

Life cycle assessment of sheep production in Ontario

Ontario's 3,000 sheep producers are represented by the **Ontario Sheep Farmers** organization. With a focus on profitability and sustainability, the organization works in the areas of advocacy, industry capacity, research and market development. Its goal is to provide consumers with premium lamb and sheep products.

To provide a better understanding of the environmental profile of sheep production in Ontario, the Ontario Sheep Farmers commissioned a screening environmental Life Cycle Assessment (LCA) of sheep production in Ontario.

Objectives

This work identified priority areas for environmental footprint reduction and mitigation in the context of an anticipated increase in sheep production and established a baseline against which the Ontario sheep industry will be able to benchmark its performance over time.

The LCA study is compliant with the ISO 14040 series and follows the methodological guidelines for the environmental assessment of small ruminants' supply chains as proposed by the FAO (2013).

Scope

This study assessed the life cycle of sheep production in Ontario for which the system boundaries consider a cradle-to-farm gate approach.

Functional unit: the production of one (1) kg of live weight Ontario-produced sheep at the farm gate



Feed production: field inputs and operations, manure spreading, irrigation and emissions required to produce sheep feed.



Farm operations: energy consumption, farm infrastructure and water consumption for sheep and lamb rearing.



Enteric emissions: methane emissions from the digestion process of adult sheep and lambs.



Manure management: emissions produced during manure storage and treatment.

Indicators: Environmental impact results are reported per kg of sheep live weight using four environmental indicators:



Climate change
kg CO₂ eq.



Energy use
MJ of non-renewable energy consumed



Land use
m²*year of land occupied



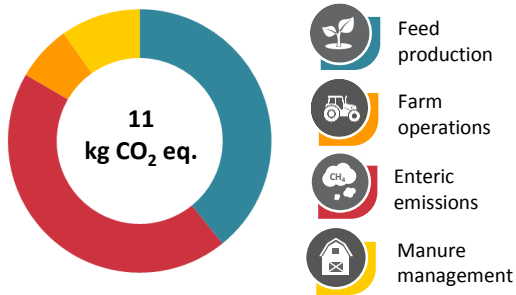
Water consumption
L of freshwater consumed

This project was funded in part through Growing Forward 2 (GF2), a federal-provincial-territorial initiative. The Agricultural Adaptation Council assists in the delivery of GF2 in Ontario.



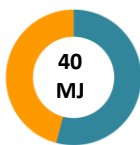
Results

Cradle-to-farm gate carbon footprint (1 kg of live weight Ontario-produced sheep)

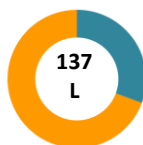


Other indicators

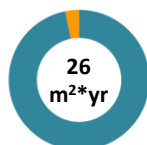
Energy use



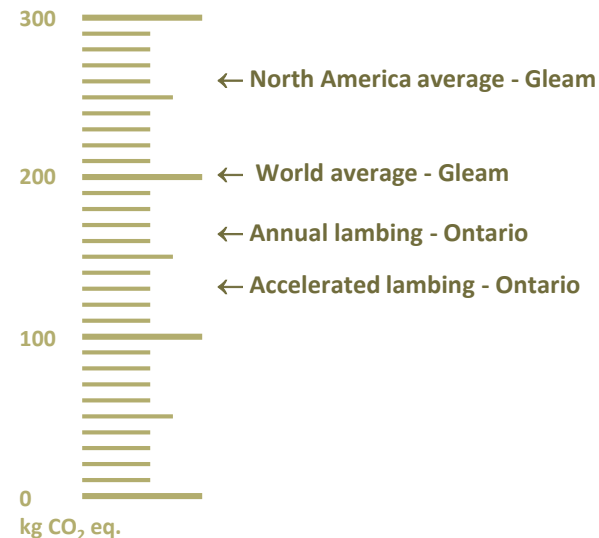
Water consumption



Land use



Carbon footprint of sheep meat (per kg of protein)



Key findings

Enteric emissions and feed production contribute to most of the potential impacts to climate change. Manure management is not a major contributor because the study assumed that best management practices are applied.

Increasing productivity and providing high quality grain, forage and pasture are the best way to reduce the relative contribution of enteric emissions to overall impacts.

The use of synthetic fertilizers, which drives the environmental impacts of feed production, can be offset through an **optimal and efficient nutrient management plan** which involves the use of manure for fertilization.

Productivity is the key parameter explaining variations between annual and accelerated lambing systems. High-productivity systems are characterized by high fertility and growth rates, low mortality rates and high feed digestibility.

The trade-off between using pasture, forage and grain in sheep and lamb diet is complex and any changes should be assessed through a life cycle perspective that considers the impact of these changes on feed production, enteric emissions and overall productivity.

Research priorities

This study demonstrates the importance of conducting research on themes related to productivity, including animal health and welfare, nutrition, genetics, reproduction and production systems.

Regarding the **nutrition** theme, the study highlights the **importance of validating recommendations using a life cycle perspective** in order to avoid or minimize potential environmental impacts.

For the **environment** theme, one key aspect identified in this study is **promoting the use of best nutrient management practices** to improve the environmental performance of Ontario Sheep producers.

Finally, when compared with results from FAO's Gleam initiative, results for **Ontario sheep meat indicate an excellent environmental performance** which offers good marketing opportunities on national and international markets.



For additional information

Ontario Sheep Farmers
Jennifer MacTavish, General Manager
jmactavish@ontariosheep.org
Tel: 519-836-0043

Study conducted by

G R O U P E
AGÉCO
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