ALBERTA AGRISYSTEMS LIVING LAB

Bale Grazing in Canada

July 2025 (Preliminary Results)

Bale grazing can be a game-changer for cow-calf producers through reducing costs, improving soil, and cutting greenhouse gas emissions. But it's not a one size fits all solution. Bale grazing is a winter feeding method where hay bales are placed directly in the field for cattle to graze in place over the season. Rather than hauling feed to a central feeding area and then hauling manure back out, the nutrients are deposited right where they are needed. This practice can save time, reduce fuel use, improve soil health, and potentially lower winter feeding costs. It also holds promise for reducing greenhouse gas emissions compared to drylot feeding. However, it is important to rotate bale grazing locations to avoid excessive nutrient buildup or run-off.

This study examined how bale grazing performs on different land types and under different farm management. The goal was to model the whole-farm economic returns from bale grazing. The modeling was based on benchmark farms from the Canadian Cow-Calf Cost of Production (COP) Network and Alberta AgriSystems Living Lab participants, using 2022 data. The analysis focused on three types of land where bale grazing might be applied: pasture, hayland, and cropland. For each land type, researchers examined how bale grazing influenced farm-level economics, greenhouse gas emissions, and infrastructure requirements such as fencing and water systems.

The modelled scenarios included bale grazing (BG) on:

- P: Pasture
- P_FF: Pasture with Fencing Funding
- HL: Hay land
- HL_WS: Hay Land with Water system
- HL_WS_F: Hay Land with Water System and Water Funding
- CL: Crop Land
- CL_WS: Crop Land with Water System
- CL_WS_F: Crop Land with Water system and Water Funding
- CL_WS_F_FF: Crop Land with Water system and, Water and Fencing Funding

Key question: Who does bale grazing actually work for?

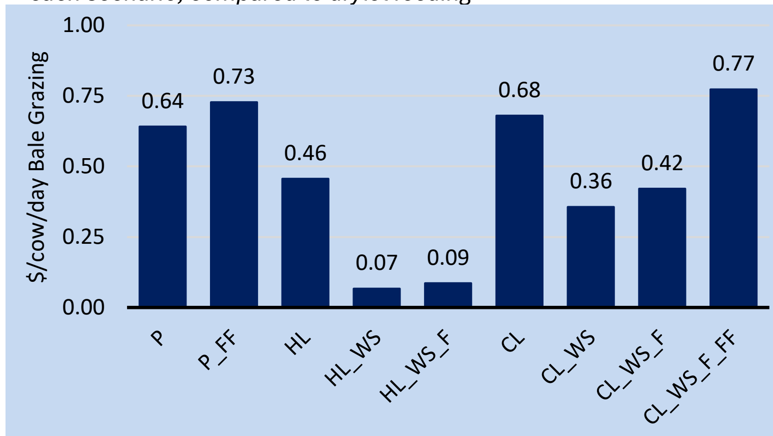
If you have the right land, infrastructure, and management, bale grazing can pay off — financially and environmentally.

- **Economically**: pasture-based bale grazing with minimal upfront costs works for nearly everyone, while hayland/cropland needs larger herds or external funding to be worthwhile early on.
- **Environmentally**: cropland bale grazing was found to offer the biggest reduction in emissions.

Economic Results

One of the biggest questions producers ask is whether bale grazing will actually save money. The answer depends on where you graze and what infrastructure you already have in place. This analysis compared pasture, hayland, and cropland systems to see how bale grazing stacked up financially across different farm types.

***Figure 1**. National average change in net income per cow per day under each scenario, compared to drylot feeding*



P: Pasture, P_FF: Pasture with Fencing Funding, HL: Hay land, HL_WS: Hay Land with Water system, HL_WS_F: Hay Land with Water System and Water Funding, CL: Crop Land, CL_WS: Crop Land with Water System, CL_WS_F: Crop Land with Water system and Water Funding, CL_WS_F_FF: Crop Land with Water system and, Water and Fencing Funding

After a 5-year model, pasture-based bale grazing had the strongest economic returns across the board. Because no major infrastructure was required beyond what most farms already had, pasture-based scenarios saved an average of $0.64 per cow per day compared to drylot feeding. Bale grazing on hayland and cropland scenarios also showed potential for profit; however, significant benefits were only realized when initial investment for water development was not needed. These systems required more investment in fencing and water delivery, which made them less profitable for smaller herds. However, if herd size was large enough to spread out those costs over more head, or if farms had access to cost-share programs, the economics became more favourable. Across all systems, the biggest cost barrier was the need for a reliable winter water source. In hayland and cropland scenarios without pre-existing infrastructure, the cost of installing water systems was often the tipping point between profit and loss. It should be noted that the results in Figure 1 are national averages.

***Table 1.** Provincial average change in net income per cow per day under each scenario, compared to drylot feeding*

	Province						
	BC	AB	SK	MB	ON	QC	MT
P	**0.48**	**0.51**	**0.71**	**0.70**	**0.86**	**0.87**	**0.71**
HL	**0.29**	-0.03		**0.65**	**0.70**	**0.56**	**0.50**
HL_WS	**0.04**	-0.38		**0.54**	-0.03	**0.16**	**0.06**
HL_WS_F	**0.18**	-0.30					
CL		**0.47**	**0.82**				
CL_WS		-0.11	**0.67**				
CL_WS_F		0.00	**0.70**				
CL_WS_FF			**0.77**				

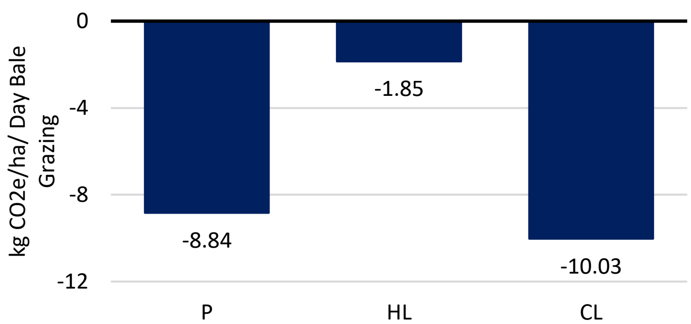
Note: Positive returns are **bolded**. Not all scenarios were tested in every province.

Table 1 presents the provincial averages of the average change in net income from the bale grazing scenarios. Eastern Canada saw a greater economic benefit from pasture and hayland site bale grazing, driven by larger savings on daily machinery use.

Environmental Results

Bale grazing is not just about saving money. When managed well, it can also reduce greenhouse gas emissions and improve soil health by spreading nutrients more evenly across the field. These environmental benefits are especially notable when bale grazing replaces confined feeding systems like drylots.

Figure 2. *National average change in emissions per cow per day under each scenario, compared to drylot feeding*



Researchers found that bale grazing reduced greenhouse gas emissions on all three land types when compared to drylot feeding. The most significant reductions occurred on cropland, where emissions decreased by an average of ~10 kg CO_2e/ha/day. Although the emission savings on hayland were smaller, there were still improvements in nutrient distribution and reduced feed and manure handling. Between land bases, the one that allows for greater aeration of manure can lead to a greater reduction in emissions, such as bale grazing on cropland followed by light tillage or harrowing to distribute buildup from bale sites. Note that the results in Figure 1 are national averages.

Table 2. *Provincial average change in emissions per cow per day under each scenario, compared to drylot feeding*

	Province						
	BC	AB	SK	MB	ON	QC	MT
P	-2.15	-0.50	-8.84	-1.46	-4.74	-0.37	-4.22
HL	-1.80	-0.78		-1.75	-7.87	**0.71**	-0.86
CL		-1.38	-15.80				

Note: Scenarios that increased emissions are **bolded**. Not all scenarios were tested in every province.

Table 2 presents the provincial averages of the change in emission from the bale grazing scenarios. One of the main drivers of emission reductions is the natural scattering and aeration of manure by cattle in extensive winter feeding systems, which limits methane (CH_4) buildup. In contrast, confined systems lack this aeration, leading to greater CH_4 accumulation. Therefore, farms transitioning from confined to extensive systems see more significant emission reduction benefits. These environmental gains depend heavily on how bale grazing is managed. Without proper planning, nutrients can build up in one spot, increasing the risk of runoff, soil saturation, or contamination of nearby water sources. To avoid this, it is important to rotate bale grazing sites annually. On cropland, harrowing or lightly tilling in the spring can help spread nutrients more evenly across the field. Producers should also consider the slope and moisture of their grazing sites. Avoid placing bales on wet soils or near water bodies, as these conditions are more prone to nutrient loss. When matched to the land and managed with care, bale grazing can be a practical way to reduce emissions while supporting long-term soil and environmental health.

Is Bale Grazing Right for Your Operation?

Table 3. *Who Does Bale Grazing Work For?*

Category	Economically	Environmentally
Land Type	Pasture-based systems have the highest economic gains (minimal upfront investment, existing water systems). Hayland and cropland can still be profitable, but initial costs (water/fencing) reduce early profitability.	Cropland systems achieve the largest GHG emission reductions. Hayland also sees reductions, though smaller. IF bales are left on the hay land for bale grazing, emissions from machinery are reduced compared to sites where bale placement is needed. Pasture systems show little statistically significant GHG improvement.
Herd Size	All herd sizes can benefit from pasture. Larger herds (especially >150 head) can offset infrastructure costs when bale grazing on hayland or cropland.	Emissions reduction does not strongly depend on herd size.
Current Feeding System	Works best for farms shifting from confined drylot feeding (with stockpiled manure), maximizing machinery and labour cost savings.	The greatest environmental benefits are when switching from confined systems due to reductions in manure storage emissions.
Infrastructure	Farms that already have fencing and water systems, or that can access infrastructure funding programs.	Environmental benefits are maximized when field management (like strategic bale placement and site rotation) is implemented.
Climate	Bale grazing benefits farms across different climates, but those in drier regions (lower precipitation) have slightly better economic consistency.	It was found that higher precipitation regions see greater GHG reductions with bale grazing, especially on pasture and hayland. Cropland emissions reduction was unaffected by precipitation. However, literature illustrates that lower precipitation results in greater emission reductions and fewer risks of nutrient runoff.
Management Factors	Best suited for producers who can manage wildlife risks, severe winter weather, and nutrient buildup.	Best suited for producers who can rotate sites, harrow fields after grazing if necessary, and manage nutrient hotspots.