ALBERTA AGRISYSTEMS LIVING LAB

Forage Rejuvenation in Canada

July 2025 (Preliminary Results)

Forage rejuvenation includes several management practices that aim to improve perennial forage yield, biomass, and forage quality, establish a more desirable mix of plant species, or enhance soil health. Some methods for rejuvenating forages include cultivating, re-seeding or over-seeding, applying fertilizer or manure, liming, or applying herbicide to suppress undesirable species. Bale and swath grazing are sometimes also included under the umbrella of forage rejuvenation but will be discussed in separate reports.

The goal of this analysis was to model the whole-farm economic returns from forage rejuvenation. The Canadian Cow-Calf Cost of Production (COP) Network and Living Lab benchmark farms (consisting of 3-6 operations each) were used as the baseline, and scenarios were modelled.

Key Takeaways:

1. **Add manure to forages**: Adding manure was the most cost-effective and environmentally beneficial method of rejuvenating forages.
2. **Keep forage stand productive as long as possible**: It's generally more profitable to maintain productive forages rather than to breaking and reseeding regularly.
3. **Keep costs low**: Scenarios where costs were under $100/ac were most profitable.
4. **Use companion crops if forage stand is broken and reseeded**: Companion crops can be a big boost for winter feed stocks, or they can be sold to cover the cost of rejuvenating the stand.

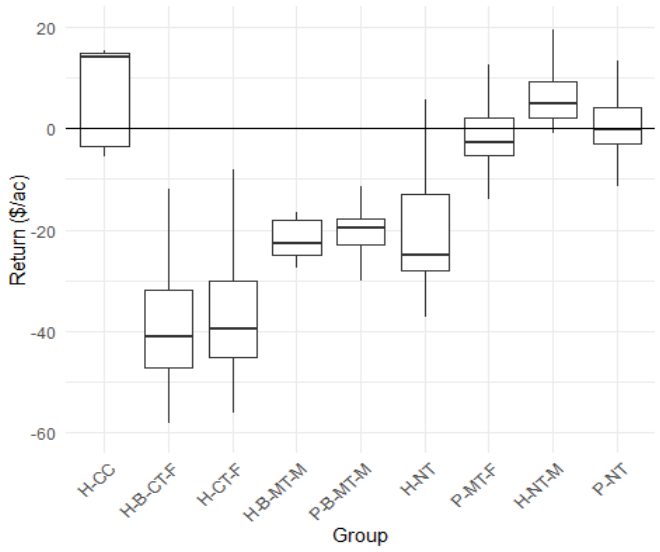
Scenarios

A survey was sent out to COP Network producers in August to September 2023, from this nine rejuvenation scenarios were created (the average cost for each scenario is in brackets). These costs are not specific to any species or seed mix; but are based on average costs of rejuvenation from surveys. The same goes for fertilizer and herbicide costs. However, these scenarios were regional reflecting the conditions producer face:

- **H-B-CT-F** – Hayland, chemical burn-off, conventional tillage and fertilizer ($256/ac)
    - **H-CC** – This scenario was also tested with an oat companion crop ($309/ac)
- **H-CT-F** – Hayland, conventional tillage and fertilizer($192/ac)
- **H-B-MT-M** – Hayland, chemical burn-off, minimal tillage and spread manure ($131/ac)
- **P-B-MT-M** – Pasture, chemical burn-off, minimal tillage and spread manure ($121/ac)
- **H-NT** – Hayland, No-till seeding ($111/ac)

- **P-MT-F** – Pasture, minimal till seeding and fertilizer ($99/ac)
- **H-NT-M** – Hayland, no-till and spread manure ($93/ac)
- **P-NT** – Pasture, no-till seeding ($76/ac)

***Figure 1**: Average returns after 5 years for each rejuvenation scenario.*



Economic Results

Most farms did not increase profitability after five years. The average return was -$24/ac after one year and -$13/ac after five years across all scenarios. Some scenarios did have an average increase in net returns: the full break and reseed with companion crop, minimal tillage with fertilizer on pasture, no-till with manure on hayland, and no-till on pasture. These are all shown in Figure 1, with the scenarios starting at the highest cost on the left and lowest cost on the right.

All the low-cost scenarios on the right where the boxes are around the break-even line cost less than $100/ac to rejuvenate and did not break up the previous stand. This highlights how important it is to manage forages before they need to be completely reseeded.

On the far left, the companion crop was also generally profitable. A companion crop can not only help establish a new forage stand if the old one needs to be broken, but the sale of the companion crop generally covers the cost of rejuvenation. The takeaway from this scenario is that if a stand needs to be broken, adding a cash crop can provide a good financial boost.

It should be noted that these are national averages – provincial averages are shown in Table 1. The provincial breakdown shows that high returns heavily favoured the eastern provinces. This is because rainfall is more consistent, especially in the last five years, and greater yield gains can cover more costs on a per acre basis. Good moisture also reduces the risk of stand establishment failure, which also affects the costs of rejuvenation.

It was interesting to see that large operations (any with more than 450 beef cows) were not profitable in any scenario, although the sample size for this group was very small and only existed in Saskatchewan. There was no difference in the range of profits between farms with fewer than 450 cows. Saskatchewan and the BC interior tend to have the lowest forage yields overall (around 1.13 tonnes/ac), so costs need to be very low on a per acre basis for rejuvenation to make financial sense.

***Table 1**: Average per acre returns after 5 years with ranges in brackets ($)*

Scenario	Province						
	BC	AB	SK	MB	ON	QC	MT
H-CC		**7.08 (-5 – 15)**					
H-B-CT-F	-42.90 (-50 – -37)	-38.39 (-50 – -30)	-47.44 (-83 – -19)	-28.05 (–)	-47.16 (–)		
H-CT-F	-41.18 (-51 – -33)	-36.63 (-51 – -26)	-44.59 (-79 – -15)	-24.15 (–)	-47.24 (–)		
H-B-MT-M	-23.56 (-26 – -22)	-20.16 (-32 – -7)	-27.55 (-58 – -7)	-16.40 (–)	-24.64 (–)		
P-B-MT-M	-20.19 (-25 – -18)	-17.27 (-24 – -5)	-19.22 (-24 – -15)	-16.45 (-19 – -15)	-23.95 (-33 – -18)	-36.29 (-51 – -24)	-20.95 (-22 – -19)
H-NT	-25.75 (-36 – -16)	-22.61 (-41 – -11)	-27.97 (-60 – -1)	-10.34 (–)	-32.57 (–)		
P-MT-F	-2.58 (-6 – 6)	-0.45 (-7 – 12)	-3.63 (-10 – 3)	-0.38 (-7 – 8)	**10.44 (-1 – 24)**	**27.68 (-6 – 53)**	-0.06 (-4 – 2)
H-NT-M	**9.29 (4 – 17)**	**8.87 (0 – 37)**	**4.24 (-18 – 17)**	**39.77 (–)**	**18.34 (–)**		
P-NT	-1.01 (-4 – 5)	**0.64 (-4 – 10)**	-1.81 (-7 – 3)	**1.61 (-4 – 7)**	**8.07 (0 – 18)**	**19.43 (7 – 35)**	**0.82 (-2 – 3)**

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

CO_2 Emissions Results

Most scenarios sequestered more CO_2 equivalent in the soil that offset increased greenhouse gas emissions. Carbon emissions increased in nearly every scenario and province because of the additional biomass and fertilizer or manure added. But the additional carbon sequestered from the new biomass was nearly always greater than the emissions.

The only scenarios where emissions were greater than the amount of carbon sequestered in the soil were full break and reseed scenarios on the Prairies. The loss of soil carbon from conventional tillage was not regained, even after the forage stand returned to productive levels 7-9 years later.

Scenarios where manure was added had the largest increase in soil carbon sequestration. Adding fertilizer increased emissions more than adding manure, mostly due to the emissions created from fertilizer manufacturing (Table 2).

***Table 2**: Average yearly per acre change in kg CO_2 equivalent emissions*

	Province						
Scenario	**BC**	**AB**	**SK**	**MB**	**ON**	**QC**	**MT**
H-CC		-986					
H-B-CT-F	-117	**123**	-341	**228**	-2,103		
H-CT-F	-1,659	**241**	-824	-45	-3,675		
H-B-MT-M	-2,953	-1,309	-1,937	-1,213	-4,196		
P-B-MT-M	-220	-204	-224	-178	-357	-357	-404
H-NT	-3,532	-542	-1,789	-859	-4,264		
P-MT-F	-352	-138	-293	-470	-425	-196	-128
H-NT-M	-4,029	-1,236	-2,013	-1,053	-3,458		
P-NT	-208	-123	-192	-251	-284	-154	-101

Note: Scenarios that increased net emissions are **bolded**. Not every scenario was modeled in every province