

## The Value of 4R Nutrient Stewardship in Canadian Forages

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# Meeting the challenge of sustainable food production is a global concern

The world's population is expanding & food production **must** rise





# Sustainable agriculture is supported by environmental, economic and social pillars:

#### **ENVIRONMENTAL**

Sustain or improve soil quality

Maintain nutrient levels within natural ecosystems

Preserve wildlife habitat

#### ECONOMIC

Produce revenue to sustain farm operations

Preserve quality of life

Make the most of dollars spent on fertilizer



#### SOCIAL

Produce nutritious, abundant and affordable food

Help meet global food needs

Provide ongoing employment opportunities in agriculture



### Forages are Canada's largest cultivated crop

- 33.8 million acres (or 39%) devoted to cultivated forage, seed and feed production
- Including the 36 million acres of unimproved pasture, forages account for almost 70 million acres in Canada
- Direct economic value of **\$5.1 billion annually**
- Primary input for Canada's \$11 billion dairy and beef sector





## Are current practices sustainable?

#### Economic

- Less available, more expensive cropland
- Travelling to distanced cropland
- Below crop yield potential

#### Environmental

- Depleting soil of nutrients
- Tillage and re-seeding
- CO<sub>2</sub> emissions and nutrient loss

#### Social

- Increase yield on current land base
- Meet international nutrient demand
- Gap in research for Canadian forages





## Purchasing more land may not be the most cost effective option to increase forage crop yield

- Cropland is becoming more expensive and less available
- **Dislocated cropland** and **rising fuel costs** must be considered
- Travelling to distanced cropland risks increasing GHG emissions, and a lack of nutrient management could deplete new cropland soil





## **4R Nutrient Stewardship**



Matches fertilizer type to crop needs

Matches amount of fertilizer to crop needs Make nutrients available when crops need them Keeps nutrients where crops can use them



### Fertilizer Canada aims to provides farmers with the knowledge & resources they need to utilize 4R Nutrient Stewardship



- 46,892 tonnes of CO<sub>2</sub>e potential N<sub>2</sub>O emissions reduced by Nitrous Oxide Emissions Protocol (NERP) farms
- Estimated \$80 to \$200 per acre profit increase achieved using BMPs on PEI demonstration farm
- 59% of farmers say that 4R Nutrient Stewardship helps in achieving their sustainability goals





# Canadian forages are lacking a strong, well established nutrient research program

- 4R Nutrient Stewardship provides producers with proven, science-based BMPs
- Site-specific BMPs account for various soil and weather conditions
- 4R Nutrient Stewardship BMPs optimize nutrient availability and reduce nutrient loss





# Applying 4R Nutrient Stewardship to Canadian forages is an untapped opportunity

- Increasing Canada's fertilizer industry increases Canada's economy
- Sustainably increase on-farm profits
- Meet growing international demand for Canadian forages





# We must maintain soil health in our attempts to increase crop yields

- Forages require fairly large amounts of macronutrients
- When nutrients are removed and not returned, soil is left depleted
- Long-term economic risk of soil degradation





### The potential for 4R Nutrient Stewardship in Forages: Cultivated vs. Pasture

- Currently, it is more common to fertilize harvested forages
  - Difficult to directly measure pasture output
  - Livestock manure returns 60-90% of nutrients (management)
- Without regular application of manure, forage acres are significantly under fertilized in relation to their yield potential





# Can applying 4R Nutrient Stewardship to pasture crops reduce methane production?

- Must consider entire life cycle
- Dairy cattle are Canada's largest source of methane
- Increasing forage quality and protein content improves digestibility and dry matter intake, which can reduce methane production



"Greenhouse Gases". Agriculture and Agri-Food Canada. 2016. http://www.agr.gc.ca/eng/science-and-innovation/agricultural-practices/agriculture-and-climate/greenhouse-gases/?id=1329321969842





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