

The Effects of Topdressing Organic Nitrogen on Hard Red Winter Wheat



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The Effects of Topdressing Organic Nitrogen on Hard Red Winter Wheat

- Bakers have been slow to incorporate local wheat flour due to inconsistent flour quality, in particular **PROTEIN**
- Generally, winter wheat produced in Vermont has protein levels below the 12-14% standard
- The amount of protein in wheat depends largely on soil nitrogen availability during plant growth.
- Most fertility amendments are applied in fall prior to planting
- Can result in significant losses of soil N over the winter



Project Purpose:

To determine whether topdressing organic nitrogen (N) amendments, during key times of wheat development, would increase grain protein and yields.



USDA OREI Grant:

In collaboration with the University of Maine and Borderview Research Farm in Alburgh, VT

Trial was randomized complete block design:

Trial Information	Winter wheat topdress trial
Location	Alburgh, VT Borderview Farm
Soil type	Benson rocky silt loam
Previous crop	Rye
Row spacing (in.)	6
Seeding rate (lbs ac⁻¹)	150
Variety	Harvard
Replicates	4
Planting date	9-15-10
Harvest date	7-12-10
Harvest area (ft.)	5x20
Tillage operations	Fall plow, disc, & spike-toothed harrow

Amendments:

Borderview Research Farm, Alburgh, VT



Chilean Nitrate: 16-0-0

Fall 2009: Composted dairy manure was applied at a rate of 70 lbs of available N per acre to all plots *EXCEPT* Control

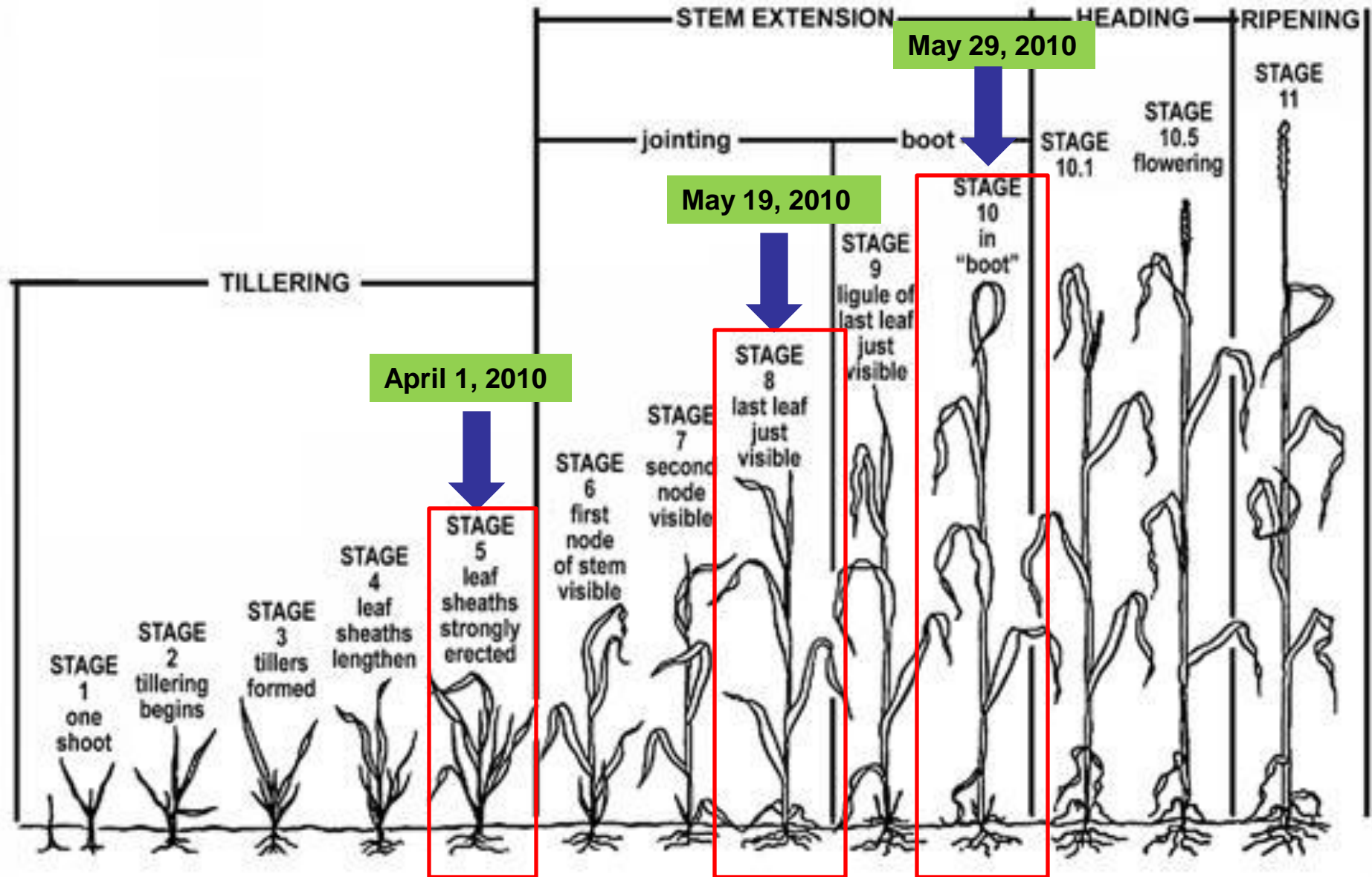


Composted Chicken Manure (Cheep Cheep): 4-3-3

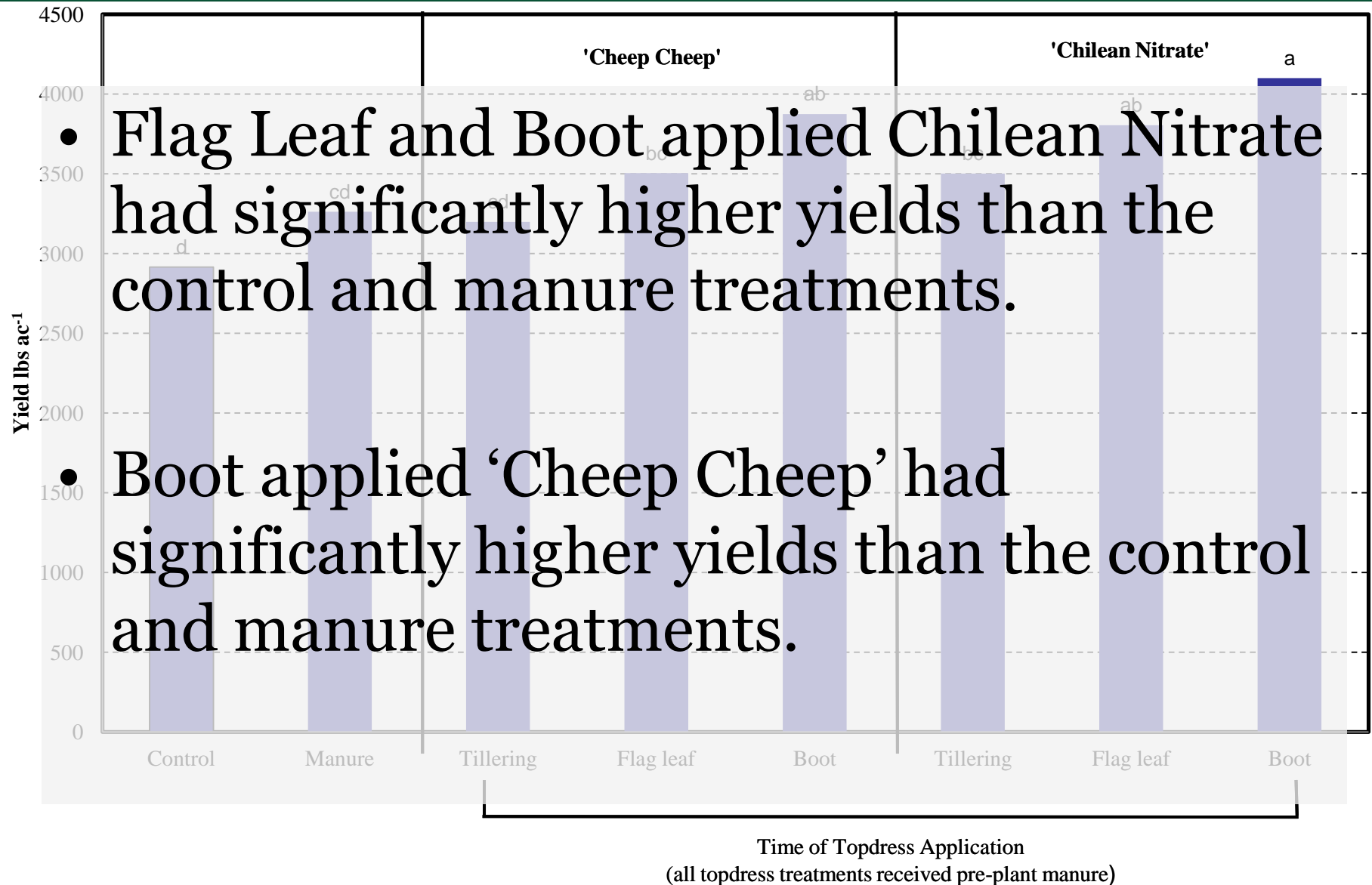


**Topdress Application Rate:
20 lbs per acre of available N**

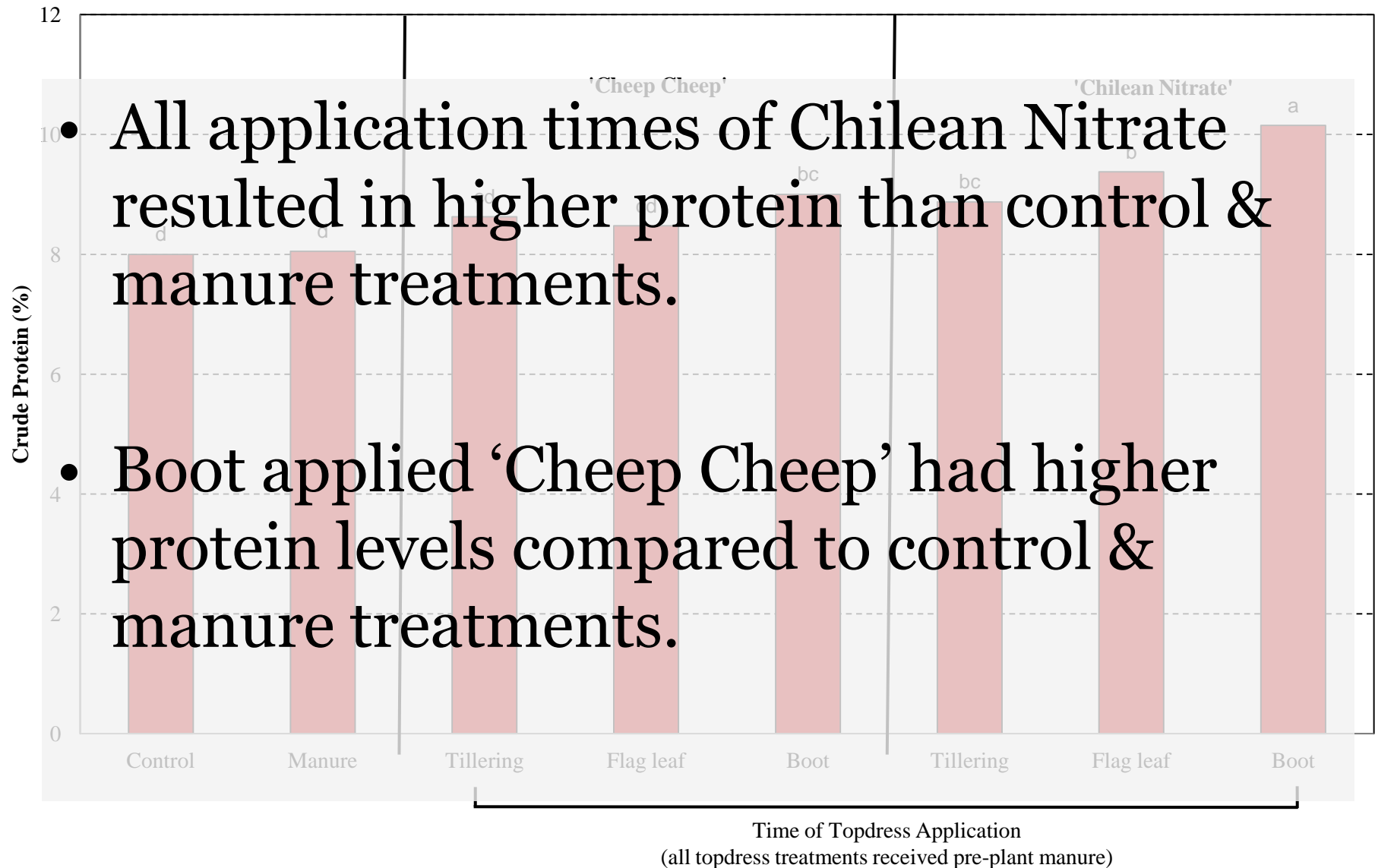
Wheat Growth Stages & Application Times:



Yield impact of topdressing organic N sources at critical wheat developmental stages.



The impact of topdressing organic N sources at critical wheat development stages on crude protein concentrations.



SARE Partnership Grant

In collaboration with Gleason Grains in Bridport, VT

Trial was randomized split block design.

Trial Information	Winter wheat topdress trial
Location	Bridport, VT Gleason Grains
Soil type	Vergennes Clay
Previous crop	Soybeans
Row spacing (in.)	6
Seeding rate (lbs ac⁻¹)	140
Variety	Redeemer
Replicates	4
Planting date	9-13-09
Harvest date	8-2-10
Harvest area (ft.)	5 x 20
Tillage operations	Fall chisel plow, & spike-toothed harrow

Amendments



Chilean Nitrate: 16-0-0



Pro-Booster: 10-0-0



**Composted Chicken Manure
(Cheep Cheep): 4-3-3**

Yellow Sweet Clover 2008



Soybeans in 2009

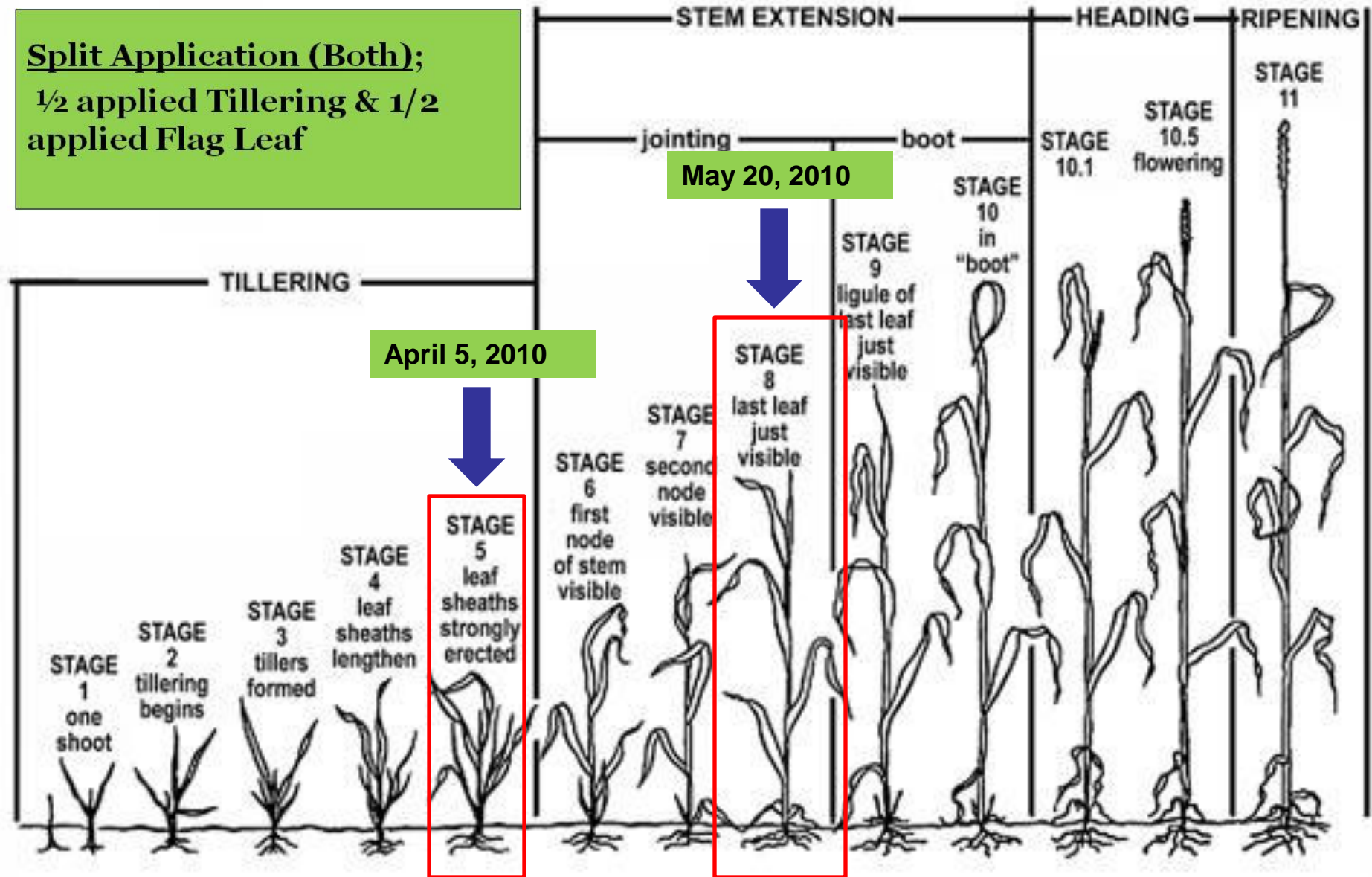


**Topdress Application Rate:
20 lbs per acre of
available N**

Wheat Growth Stages & Application Times:

Split Application (Both);

1/2 applied Tillering & 1/2 applied Flag Leaf



Trial photos:



Visual difference: Chilean Nitrate plot



Sweet clover infestation



Visual difference: Pro-Booster plot

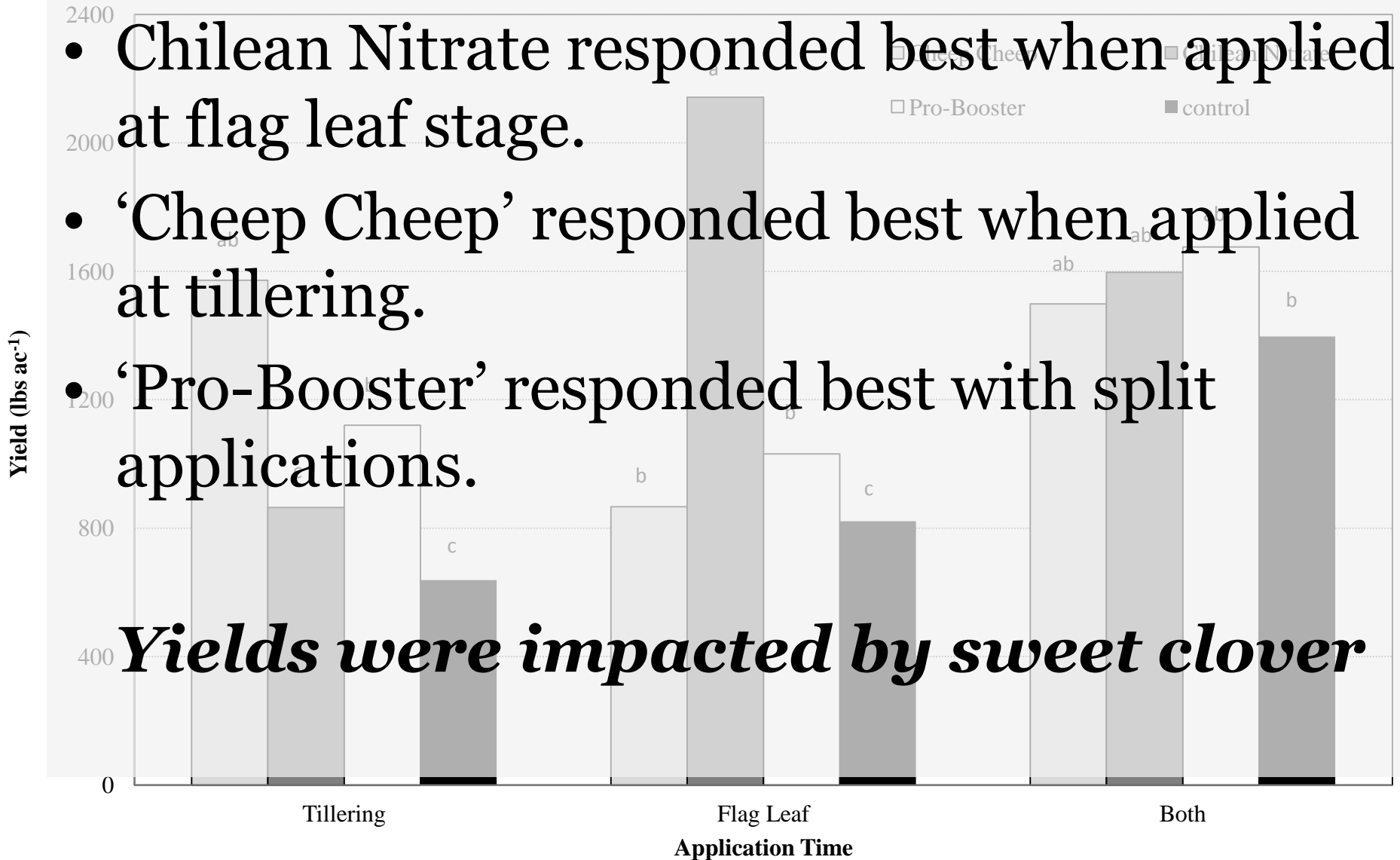


Trial harvest in Bridport, VT

The interaction of application time and amendment source on winter wheat yield.

- Chilean Nitrate responded best when applied at flag leaf stage.
- 'Cheep Cheep' responded best when applied at tillering.
- 'Pro-Booster' responded best with split applications.

Yields were impacted by sweet clover

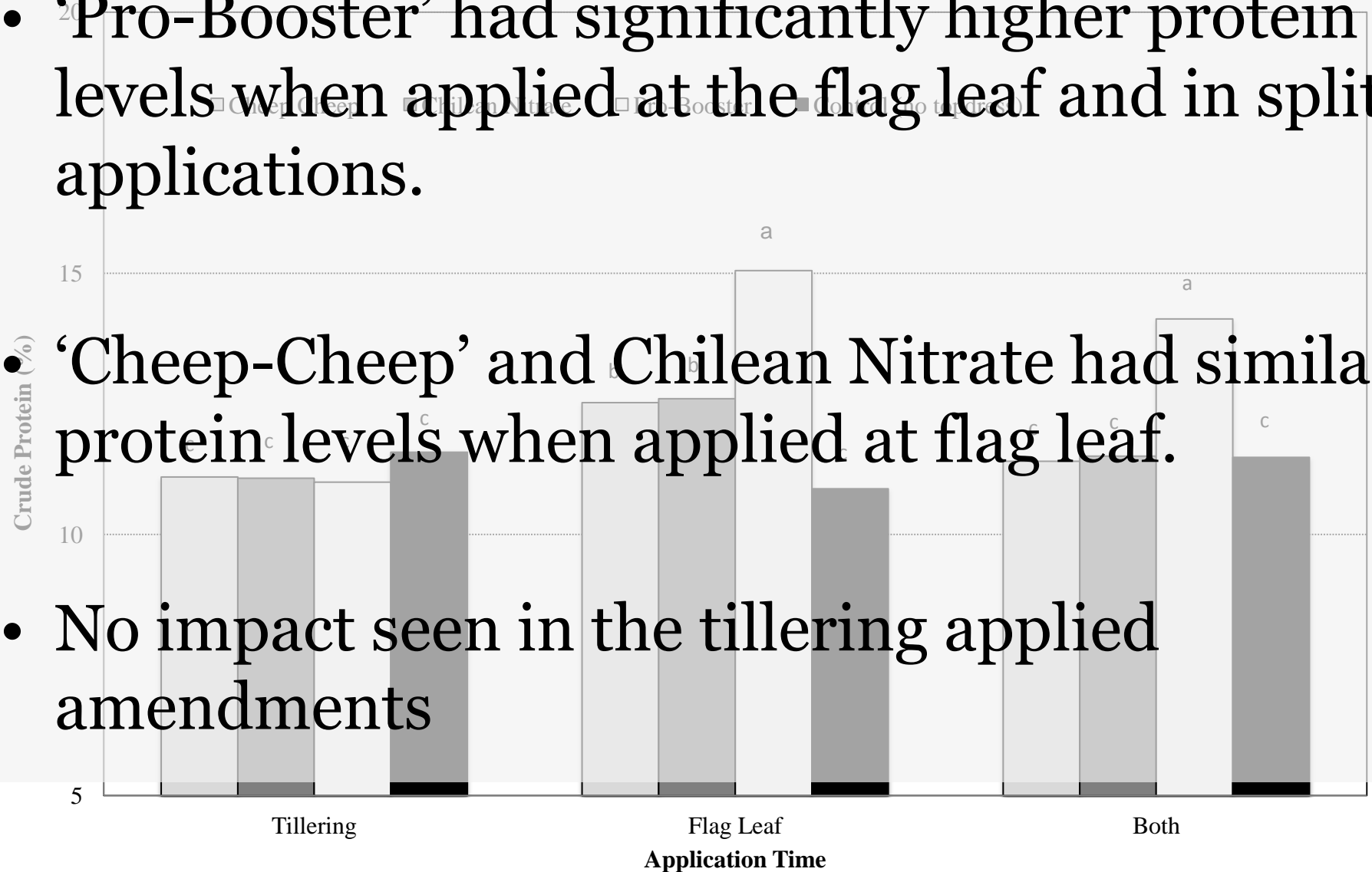


The interaction of application time and amendment source on winter wheat crude protein concentrations.

- ‘Pro-Booster’ had significantly higher protein levels when applied at the flag leaf and in split applications.

- ‘Cheep-Cheep’ and Chilean Nitrate had similar protein levels when applied at flag leaf.

- No impact seen in the tillering applied amendments



Discussion

- In general, both topdressing studies indicate that applying certified organic N amendments can increase both yield and protein levels.
- It seems as though N sources such as ‘Pro-Booster’ with both soluble and slow release N may more easily meet the N needs of the plant.
- Slow release N products such as composted poultry manure (‘Cheep Cheep’) will need to have properly timed applications to ensure the N has enough time to be mineralized into plant available N sources
- In the case of soluble N products such as ‘Chilean Nitrate’ application time will need to be applied at the time of need.
- **More research must be conducted to verify the first year results.**

Economics:

Amendment Costs:

‘Cheep Cheep’ = \$478.00 per bulk ton = \$5.98 per lb N
= \$12 per lb PAN
20 lbs = \$239 per acre

‘Pro-Booster’ = \$959.30 per bulk ton = \$4.79 per lb N
= \$14.37 per lb PAN

Chilean Nitrate = \$1450.00 per bulk ton = \$4.53 per lb N
20 lbs = \$91 per acre

The UVM Extension Crops and Soils Team would like to thank the Gleason Grains and Borderview Research Farm for their generous help with the trials and acknowledge the NE SARE Partnership grant program and USDA Organic Agricultural Research and Extension Initiative grant program for their financial support.

Questions
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