Manure Effects on Legume Productivity and Persistence

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Manure

A constant and ever-changing challenge

Manure application to alfalfa

- Pros
  - ✓ More opportunities for application
  - ✓ Alfalfa has high P and K requirements
- Cons
  - ✓ Leaf damage (salt burn, smothering)
  - ✓ Tire damage to crowns, growing stems
  - ✓ Undesirable silage fermentation
  - ✓ N_2 fixation declines

Manure application to pasture

- Pros
  - ✓ Potential increase in annual production
  - ✓ Improve soil P and K levels
- Cons
  - ✓ Greater grass competition with legume
  - ✓ Potential spread of Johne's disease
  - ✓ N_2 fixation declines

Objective: determine effect of manure type and application date on forage productivity and persistence of red clover grown with orchardgrass under rotational grazing.

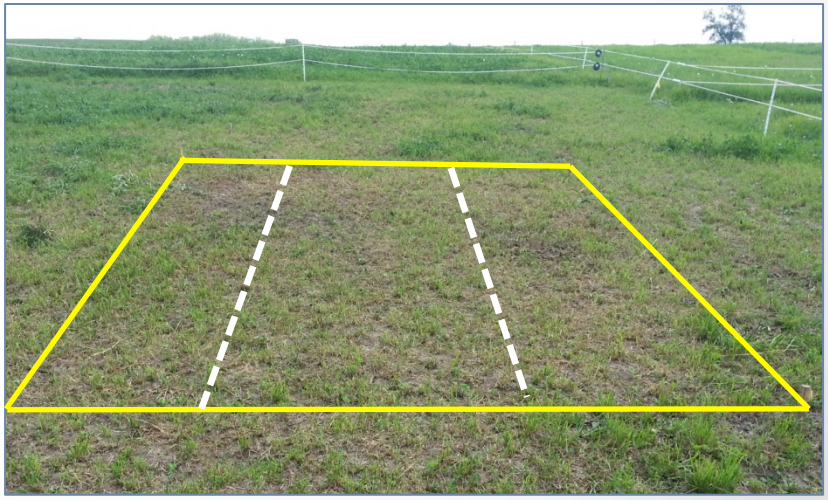
Manure/fertilizer applied one year after red clover seeded to supply 60 lb N/acre.

N source	Application date
None	
Fertilizer	April
Solid	April
Liquid	April
Fertilizer	July
Solid	July
Liquid	July
Solid	September

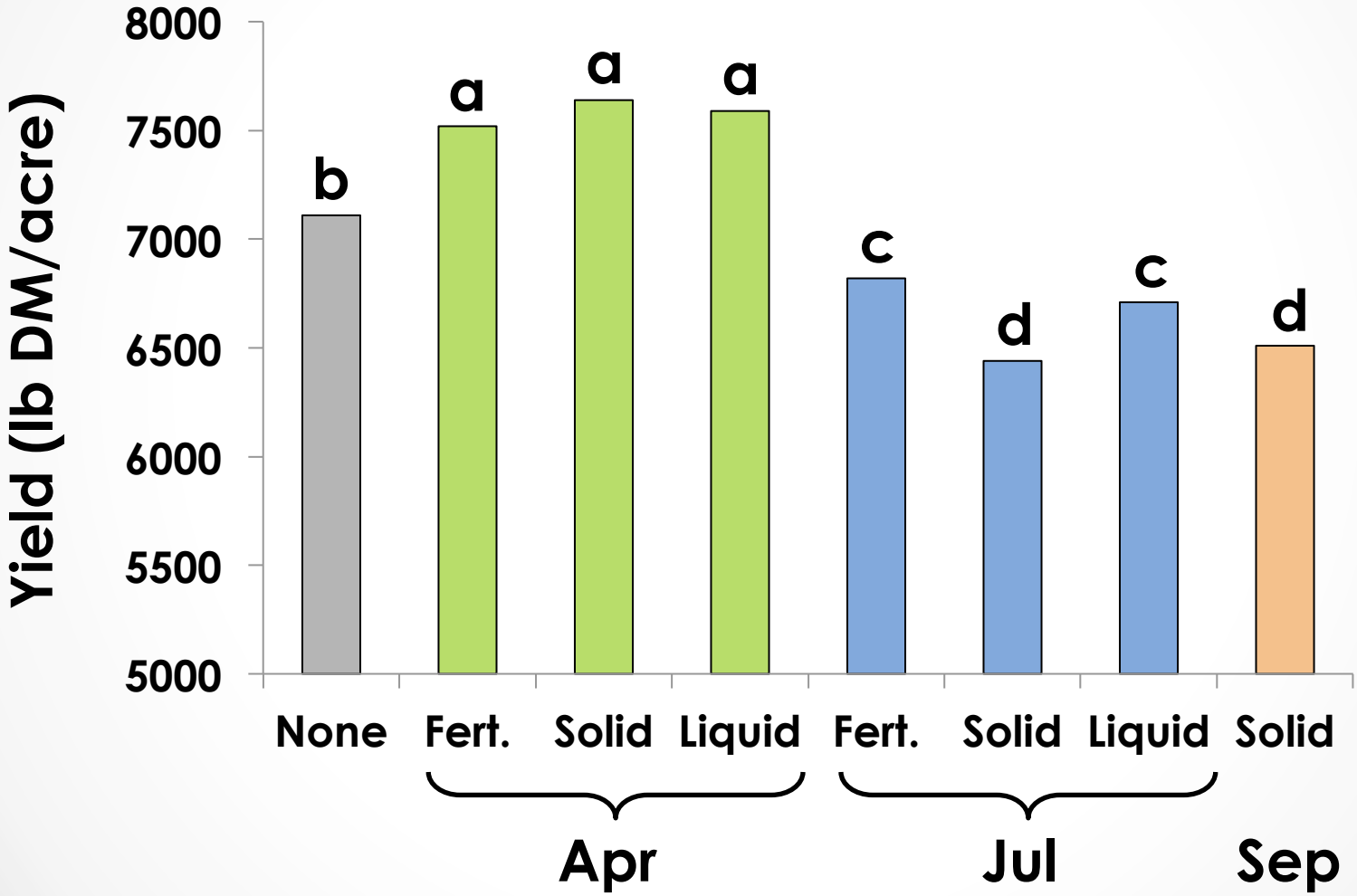
Yield: rising plate meter before each grazing event

Harvest: graze at vegetative stage (grass) 5x/year

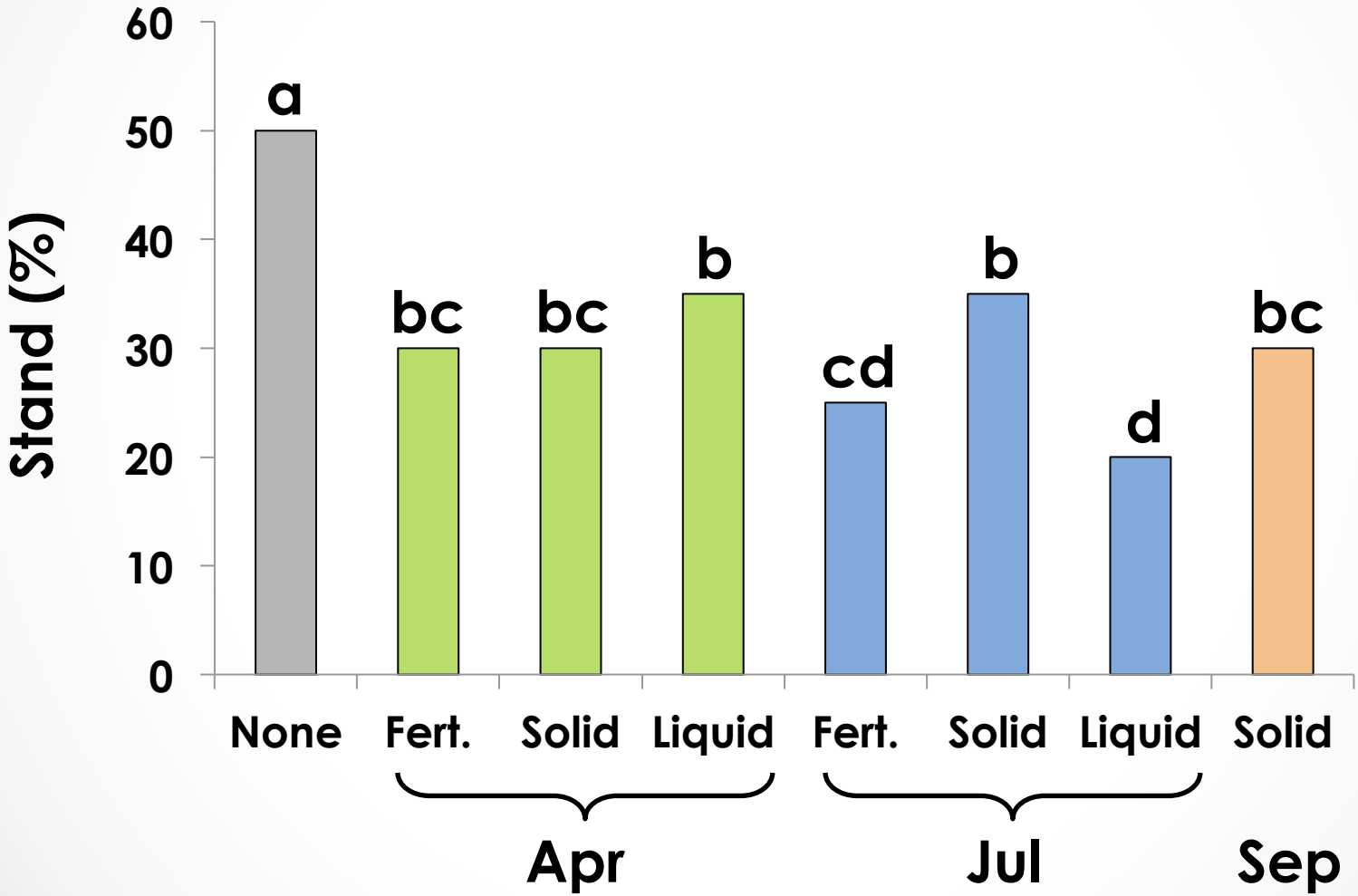
Red clover persistence: line transect in fall



RESULTS: N source and application date effects on red clover-orchardgrass annual yield (mean of 2 years).



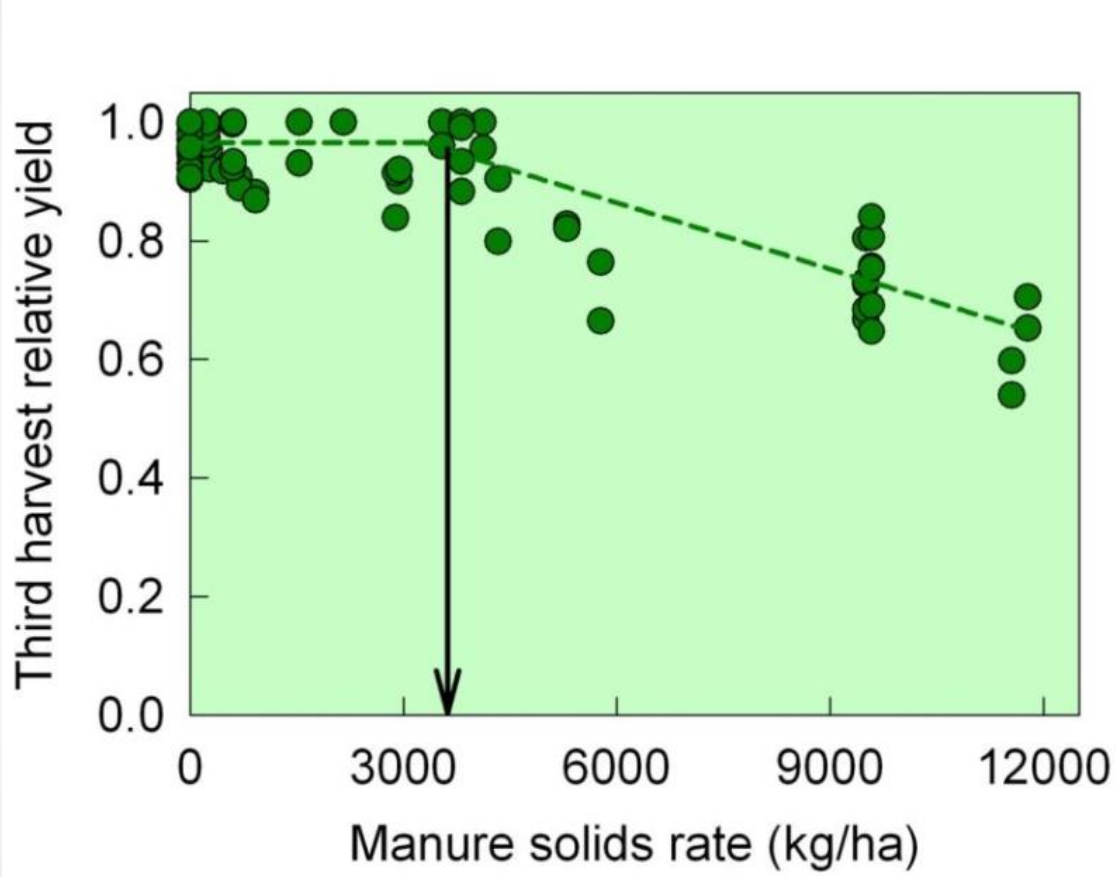
RESULTS: N source and application date effects on red clover persistence (mean of 2 years).



Objective: determine alfalfa response to rate of swine manure slurry applied in mid-summer.

Rate (gal/acre)	Date
0	4 days after 2nd harvest
2500	
3500	
4500	
10000	

Manure rate effects on yield when applied to stubble.



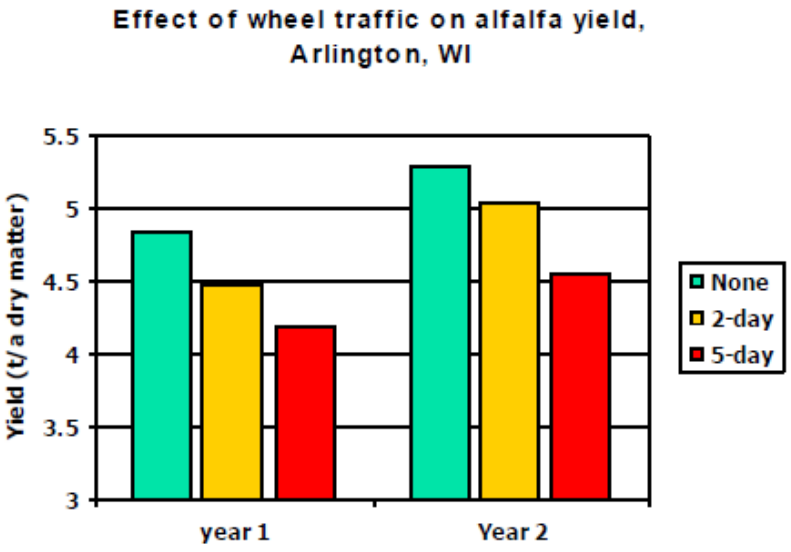
RESULTS: No effect on yield until rate exceeded 3000 lb solids/acre.

Slide by M.P. Russelle, USDA-ARS

Wheel traffic effects

5 days post-harvest

No traffic



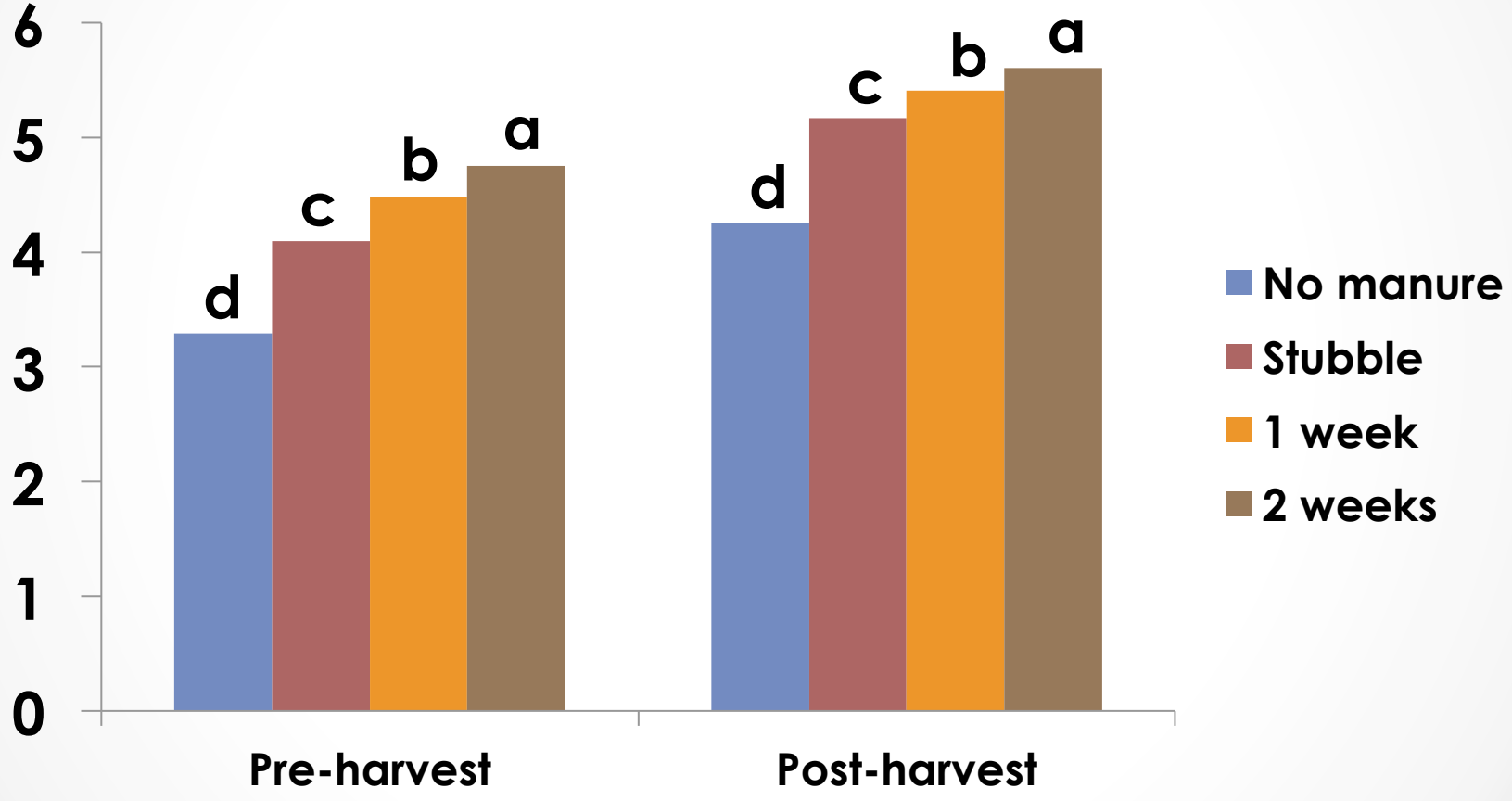
RESULTS: Traffic reduced yield of next cutting 6%/ day after mowing.

Slide by D. Undersander, Univ. of Wisc.

Objective: assess dairy-slurry effects on silage fermentation, *Clostridium* counts, and nutritive value of alfalfa conserved as balage.

- Liquid dairy manure applied at 4500 gal/A
- Treatments:
  - No manure
  - Stubble, immediately after harvest
  - 1 week regrowth
  - 2 weeks regrowth

Clostridium counts (log_{10} copies/gram) in first-harvest balage



Results

- No effect on alfalfa yield
- Little or no effect on forage quality
- Silages well-fermented
- *Clostridium*
  - Increased with manure application
  - Greater increase with delaying manure application 1 – 2 weeks.
  - No indications of clostridial fermentation (ammonia or butyric acid)

Conclusions

- **Manure application to grass-legume pastures**
  1) **Annual yield increased with spring application, but reduced by mid or late summer application.**
  2) **Nitrogen form has little or no effect on annual yield when applied in spring, but solid manure is less effective in summer.**
  3) **Nitrogen applied in any form at any time increases risk of reduced legume persistence and reduced forage quality.**
  4) **Avoid grazing with young stock to reduce risk of Johne's disease.**

Conclusions

- **Manure (slurry) application to alfalfa**
  1) **Little or no effect on yield or forage quality if rate is less than 6000 gal/acre when applied to stubble.**
  2) **There is increased risk of undesirable fermentation following any application of dairy slurry.**
     - **Risk increased more when application delayed 1 or 2 weeks following harvest compared with application to stubble.**
  3) **Traffic after mowing increases risk of stand damage, particularly after regrowth has started.**

Questions?