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Agroscope

Slurry application on grassland – Effects of technique, timing, slurry consistency and sward type

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Thurgau

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AGFF

Arbeitsgemeinschaft zur Förderung des Futterbaues

Association pour le développement de la culture fourragère

Associazione per il promovimento della foraggicoltura

Introduction

- gaseous emissions after slurry application as major source of atmospheric ammonia (NH_3)
- ammonia losses influenced by application technique
- conventional method: surface spreading by broadcast
- low emission techniques: reduced surface area and near-ground application (reduction compared to broadcast)
  - band-spread (30-60%)
  - trailing-shoe (40-70%)
  - drill (60-80%)

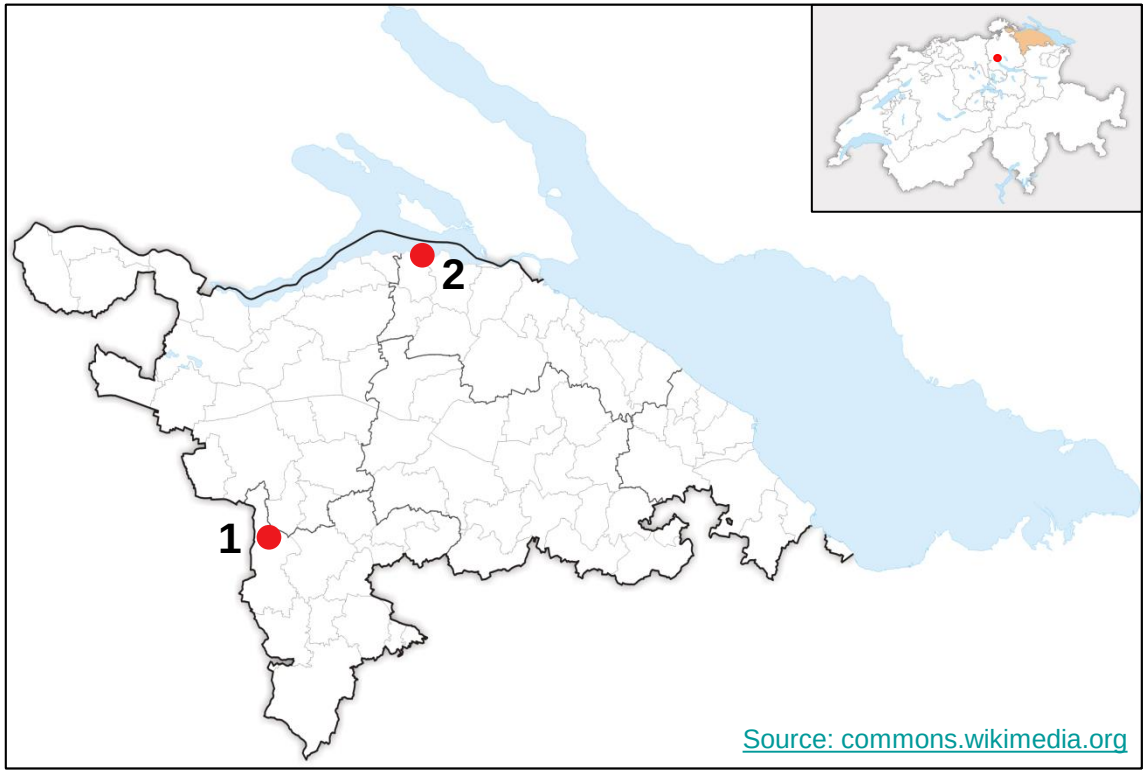
Introduction

- What are the effects of low emission techniques on
  - forage yield?
  - botanical composition?
  - forage contamination by slurry residues?

- no studies in Switzerland
- studies from Germany with conflicting results (Kiefer et al., 2004, Lorenz & Steffens, 1996)

→ 2 field trials on temporary grassland in the canton Thurgau (Switzerland)

Experimental sites



Tänikon (1)

- 7.9°C, 1124mm
- small-plot scale
- 18 m^2
- fully randomized

Arenenberg (2)

- 9.4°C, 956mm
- large-plot scale
- 135 m^2
- randomized block design

project duration: 2012-2014

Slurry application technique

trailing-shoe

broadcast

band-spread

Experimental design

Technique:

Timing:

- early (1-3 days)
- late (7-10 days)

Slurry dilution:

Sward type:

Control:

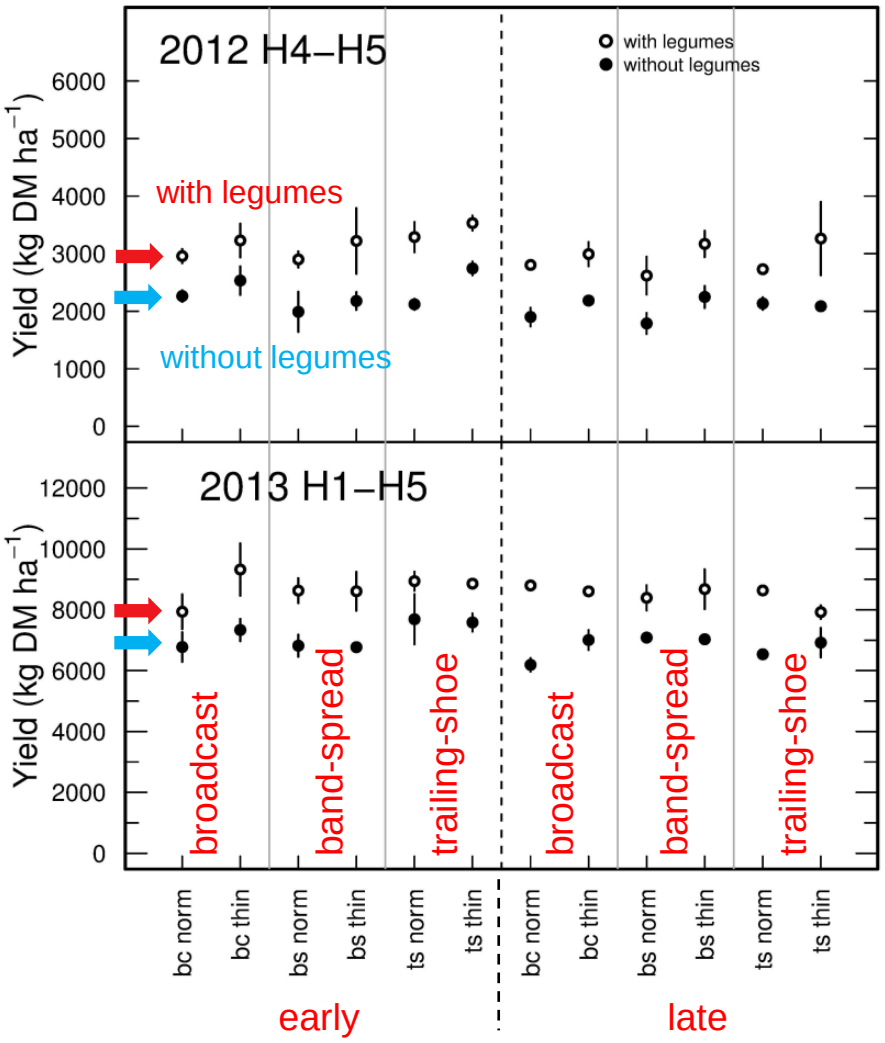
- legume-free plots
- mineral N fertilization
- graduated N level

→ multifactorial design, 3 replications

Methodology

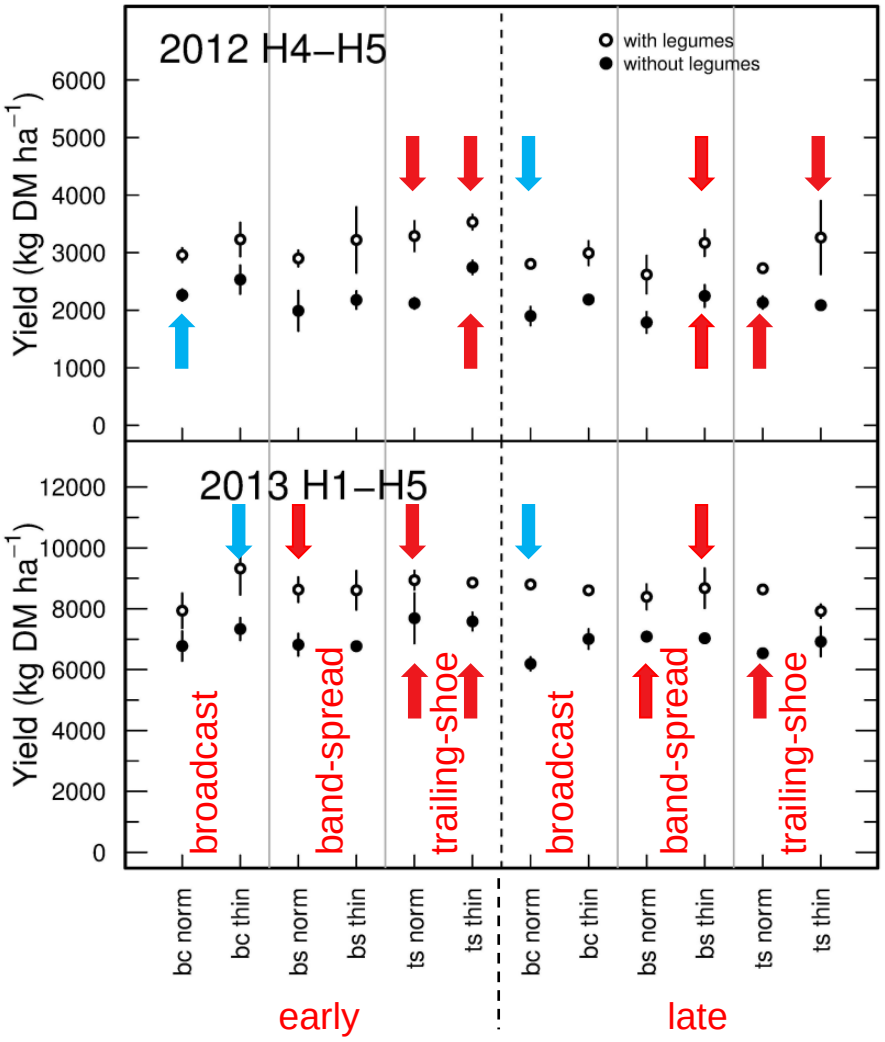
- Slurry application:
  - 5x / year
  - target value: 30 kg NH_4-N ha^{-1}
  - nutrient content
- Harvest:
  - 5x / year
  - dry matter and nitrogen content
  - forage contamination (pure grass, undiluted slurry)
- Botanical analysis:
  - 1x / year (Daget and Poissonet, 1971)
- Soil analysis:
  - at the start of the experiment

Results: Dry matter yield



- grass-clover >> pure grass
- in tendency:
  - trailing-shoe / band-spread > broadcast
  - early > late
  - thin > normal

Results: Dry matter yield



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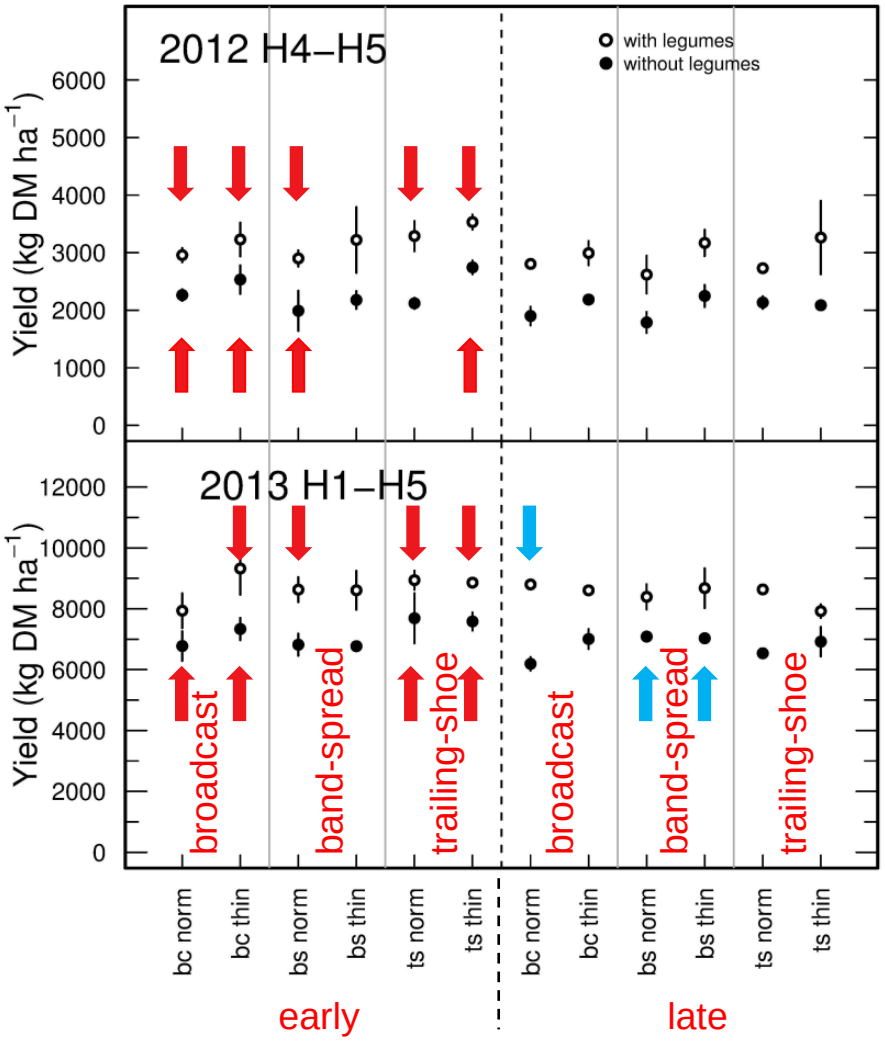

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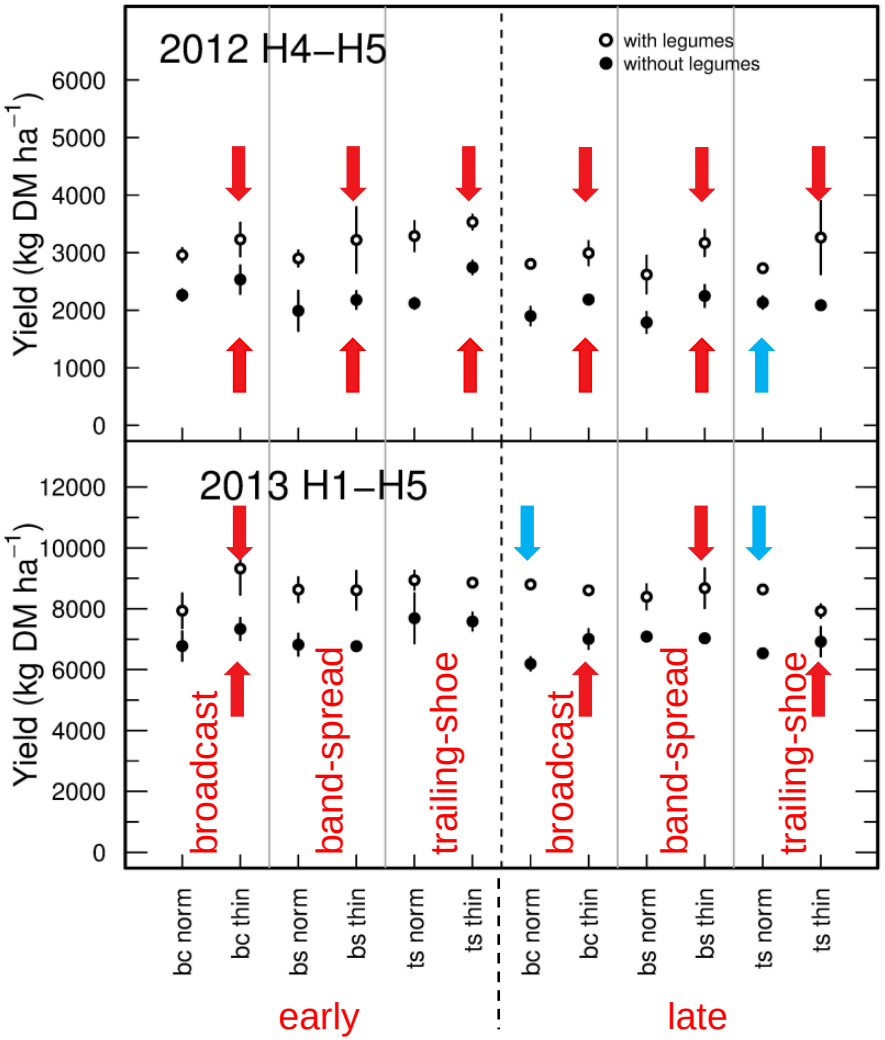

- grass-clover >> pure grass
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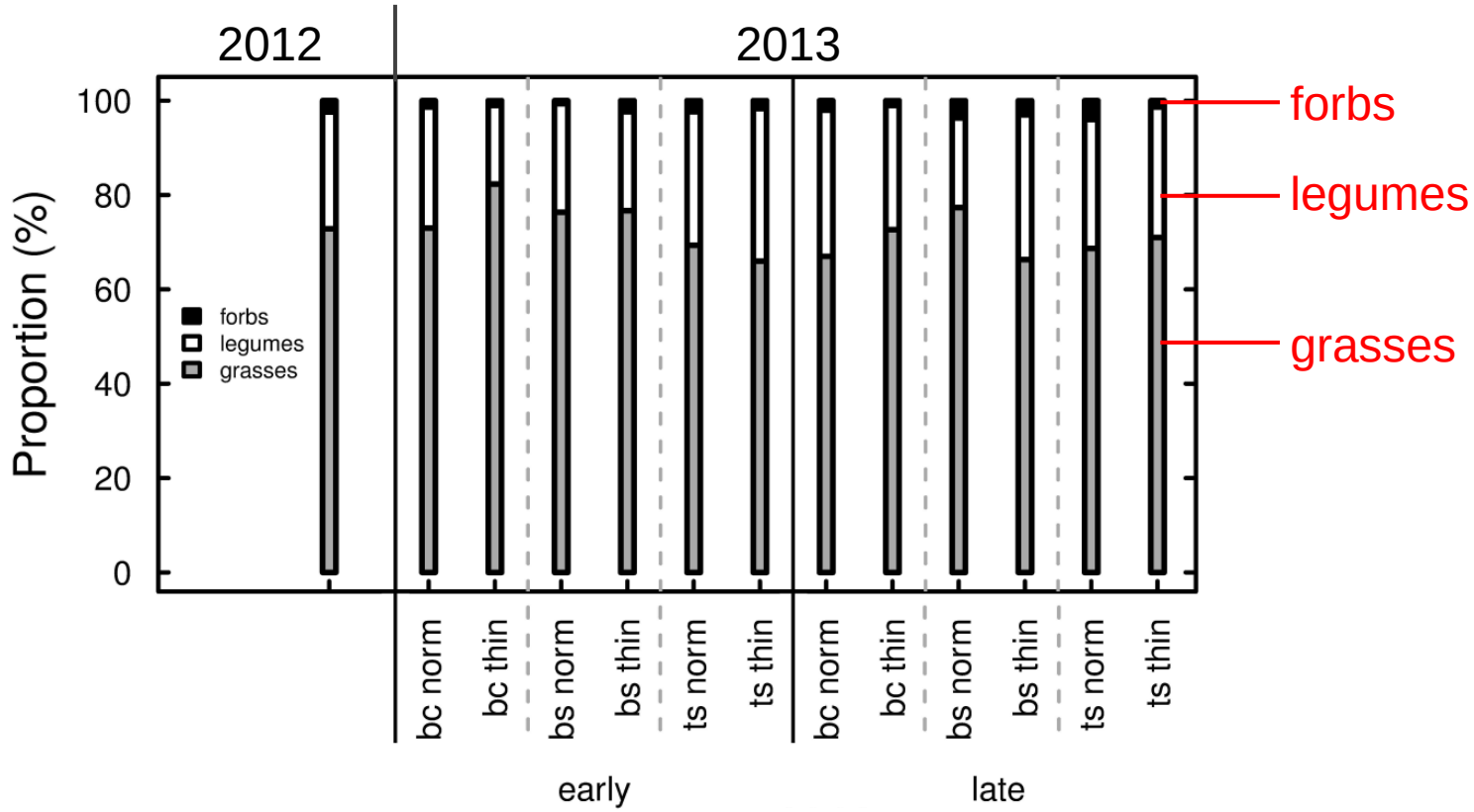
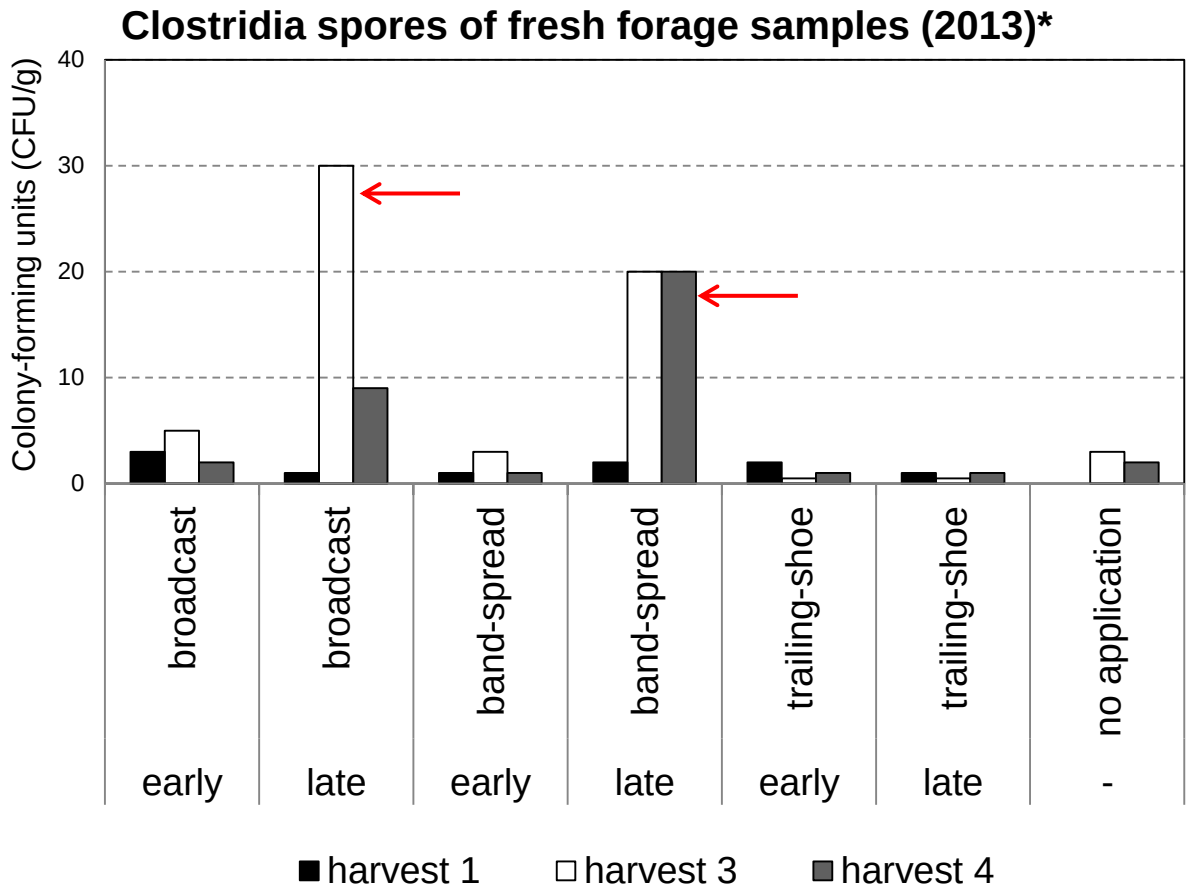
Results: Botanical composition



- no significant differences after one year of treatment application

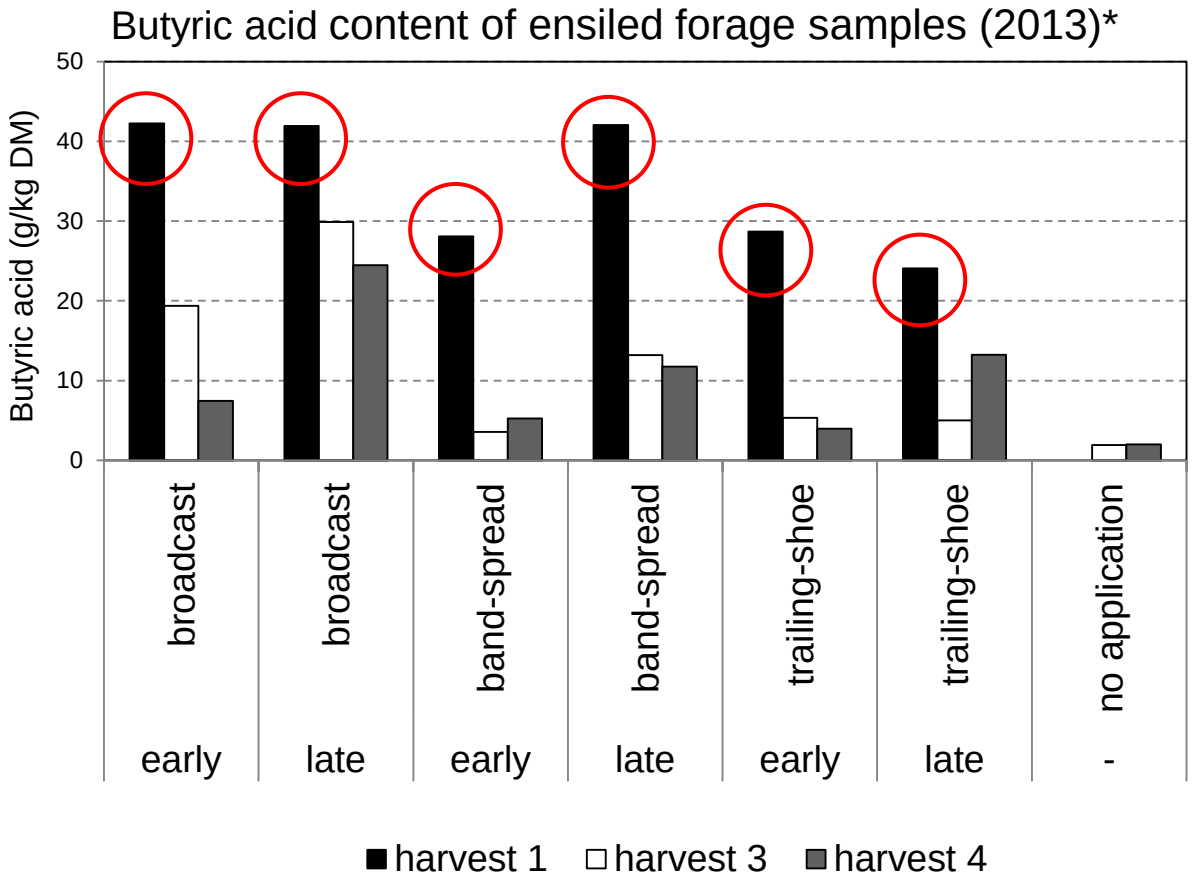
Results: Forage contamination



- low values of clostridia spores
- maximum for broadcasted, late applied slurry
- late band-spread application also with higher values

*Determinations were carried out for pure grass stands and viscous slurry only.

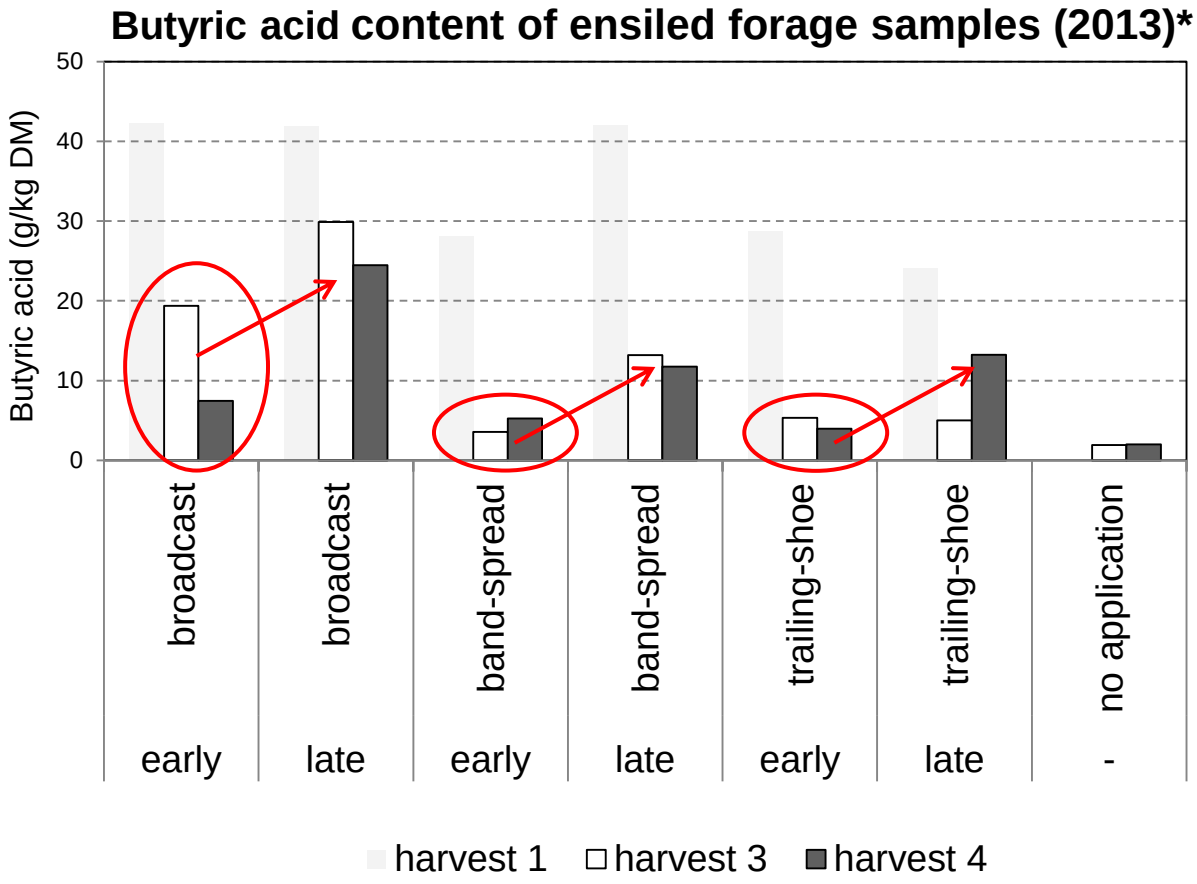
Results: Forage contamination



- harvest 1: very high values (22% DM on average!)
- harvest 3+4: broadcast > low emission technique
- late application - higher content of butyric acid

*Determinations were carried out for pure grass stands and viscous slurry only.

Results: Forage contamination



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Conclusions

- yield advantage of grass-clover swards
- no consistent differences between low emission application techniques and broadcasted application
- trend towards increased yield for low emission techniques
- slurry application at an early stage and at a thin consistency positive for dry matter yield
- after one year of treatment application no changes in sward composition
- tendency of increased contamination for broadcasted application, especially when late applied

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Thank you for your attention!

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