Mythbusters: grazing COVER CROPS

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Pasture Project
AN INITIATIVE OF THE WALLACE CENTER

Wallace Center
AT WINROCK INTERNATIONAL

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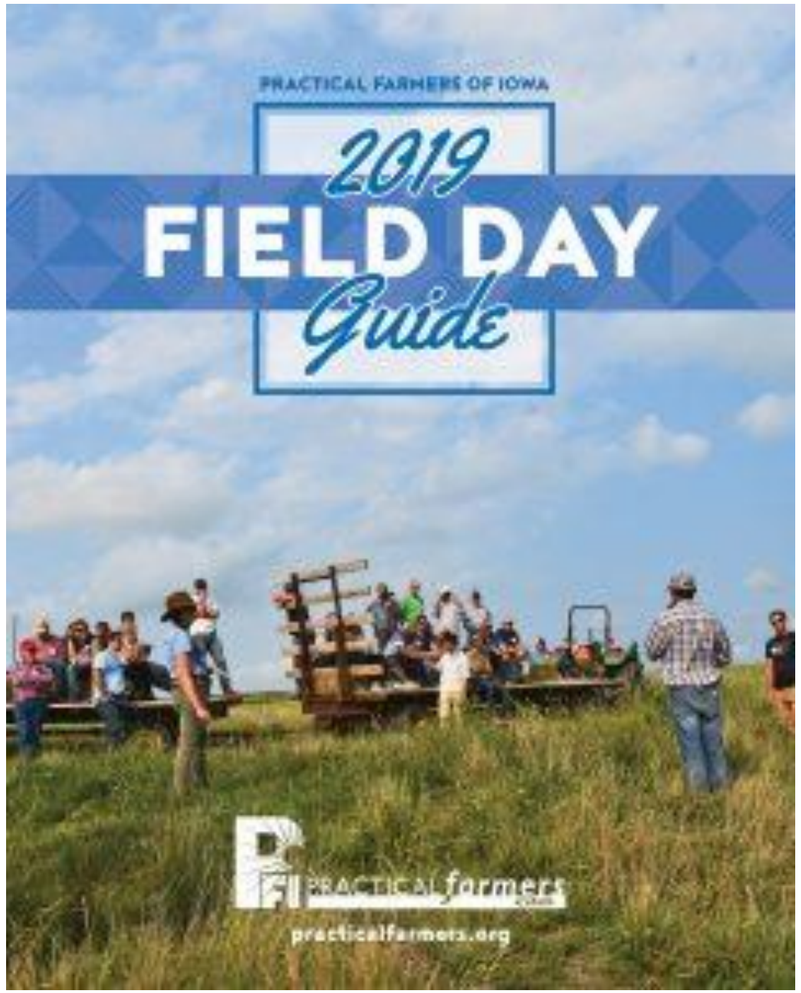
MISSION

Equipping farmers to build resilient farms and communities.

PROGRAM AREAS

Farmer to Farmer Info Sharing



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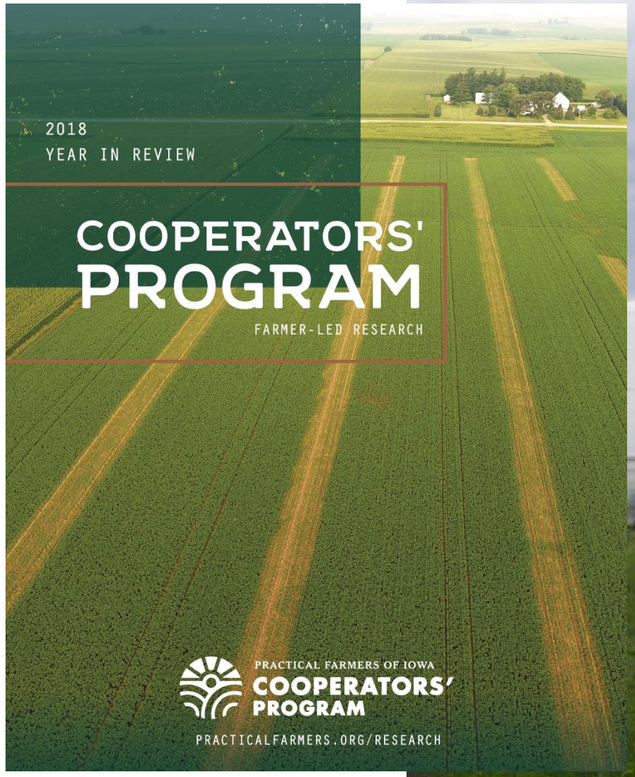

50 cooperators conducted 72 research trials

IN 2019

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Why Graze Cover Crops?

- Extend grazing season in fall and spring
- Provide relief to spring pastures
- Provide a fresh, clean spring calving pasture
- Save $$$ and reduce reliance on stored feed
- Deposit manure where needed
- Increased carrying capacity

Two Common Myths

1) Grazing cover crops causes soil compaction

2) Cover crops can be terminated with grazing

It depends!

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Grazing & Compaction

- Avoid grazing during wet & muddy conditions
- Avoid concentrated hoof traffic
- Establish a cover crop grazing plan

MANAGEMENT!

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Grazing & Compaction

Avoid grazing during wet & muddy conditions

- Dry or frozen soils are ideal
- Do not graze in wet soil unless there is a large amount (>2 tons/ac) of vegetation
- Grazing on wet soil *will* cause compaction; hinder planting

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Grazing & Compaction

Avoid concentrated hoof traffic

- Move water on a regular basis
- Rotate supplemental feed sites
- Limit livestock access to natural water sources, shaded areas, or other vulnerable areas

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Grazing & Compaction

Establish a cover crop grazing plan

- Use strip grazing to rotate animals
- Have a plan to move livestock before a heavy rain
  - Sacrifice paddock or perennial pasture
- Determine dates and conditions for livestock removal
- Determine subsequent use for fields being grazed, graze accordingly

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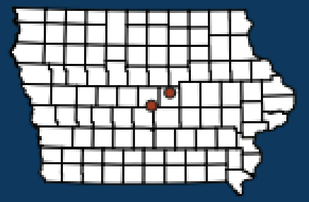
COOPERATORS' PROGRAM Farmer-Led Research

RESEARCH REPORT Soil Compaction in Grazed Cover Crop Fields



2014-2018

Staff Contact

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In a Nutshell:

- Many farmers are concerned about the compaction cattle may cause when grazing cover crops in row crop fields.
- The fear of soil compaction is a barrier that prevents wide-spread adoption of grazing cover crops.
- Researchers used a penetrometer to measure compaction in row crop fields with no cover crops and no grazing (control) and in fields where cover crops were planted and grazed (treatment).
- Cattle grazed cover crops in the fall, winter and spring, when weather allowed, for four years.

Key findings

- Four years of data show that fields where cover crops were planted and grazed had less soil compaction than fields with no cover crops and no grazing.

Cooperators

Bruce and Connie Carney, Maxwell;
Rick Kimberley, Maxwell;
Wade Dooley, Albion

Collaborators

The Pasture Project of the Wallace Center at Winrock International

Funding

Natural Resource Conservation Service (NRCS)

- 10 measurements @ 3, 6, 9, & 24” in control and treatment fields

- Measurements in June 2015 – 2018

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FIGURE 1. Carney-Kimberley – Compaction levels

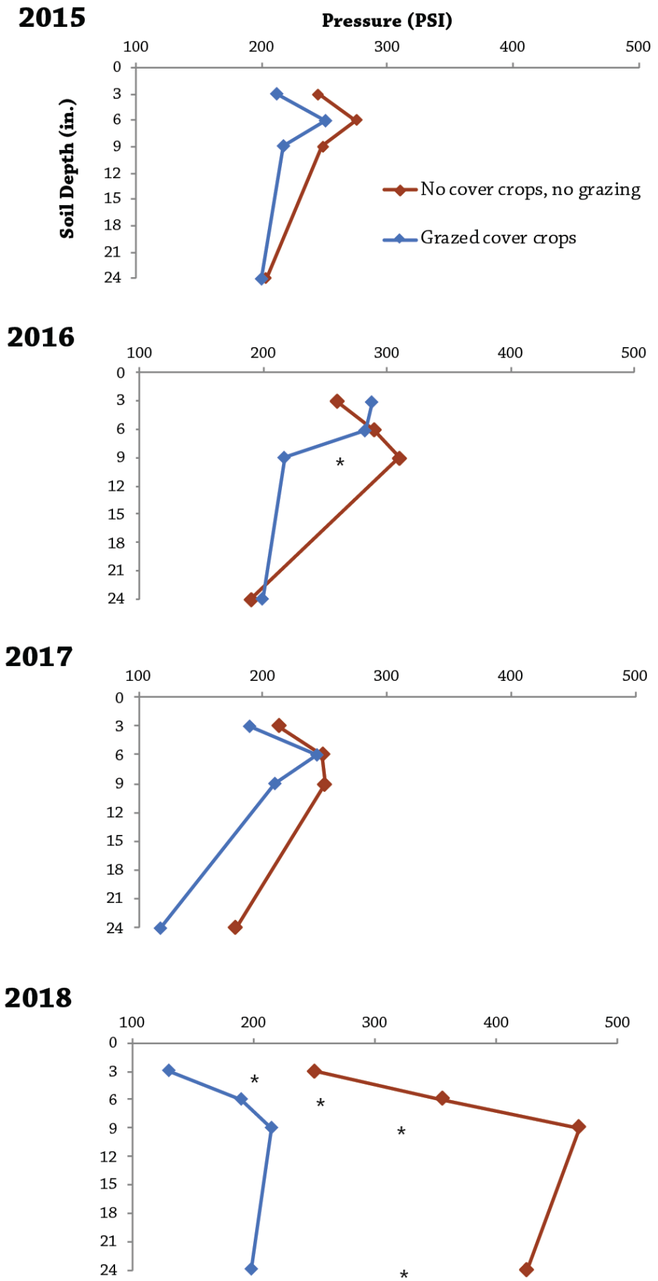
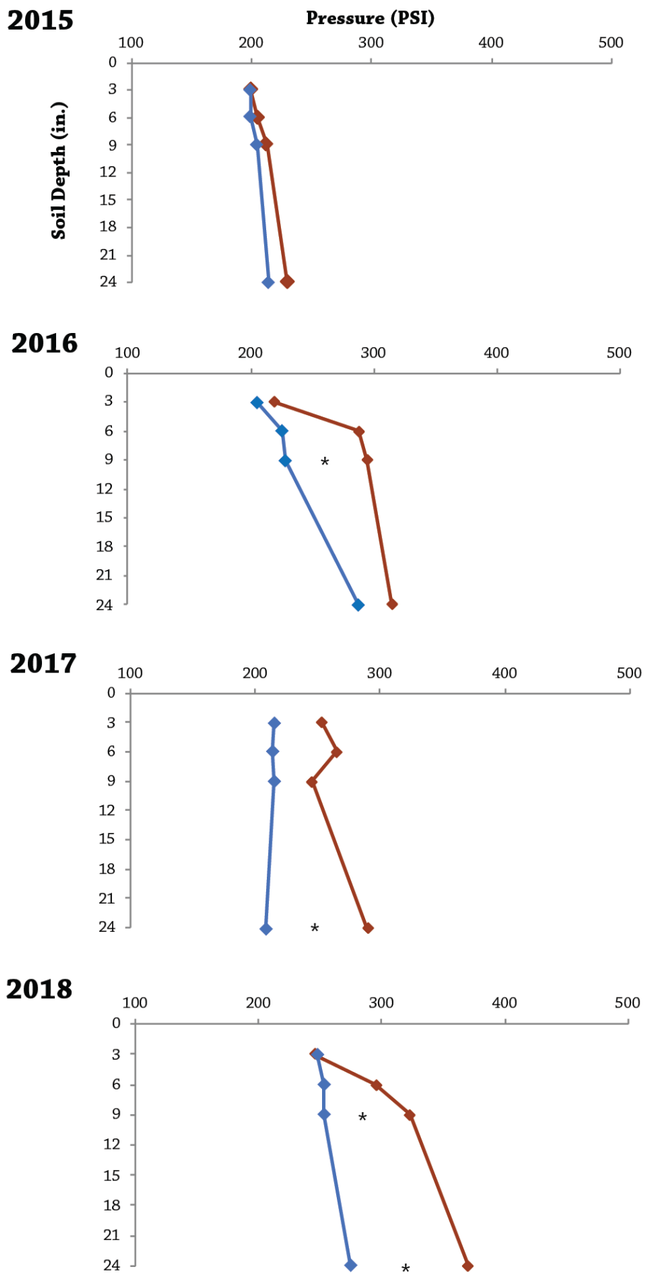


FIGURE 2. Dooley – Compaction levels



- On both farms, grazing cover crops in row crop fields resulted in **lower levels of soil compaction** than fields with no cover crops and no grazing

- The farmers had prior experience planting and grazing cover crops and employed **proper grazing management practices**, such as avoiding excessive grazing during wet and muddy conditions.

FIGURES 1 AND 2. As indicated by the asterisks, statistical analysis determined that more pressure was required to penetrate the soil profile where no cover crops were planted or grazed at 9 in. at both farms in 2016, at 24 in. at Dooley's in 2017 and at all depths at Carney-Kimberley's and at 9 and 24 in. at Dooley's in 2018.

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GRAZING COVER CROPS TO AVOID SOIL COMPACTION

With proper management, soil compaction from grazing cover crops can be minimized.

The action of grazing stimulates plant roots to grow and give off exudates, building organic matter and helping relieve compaction.

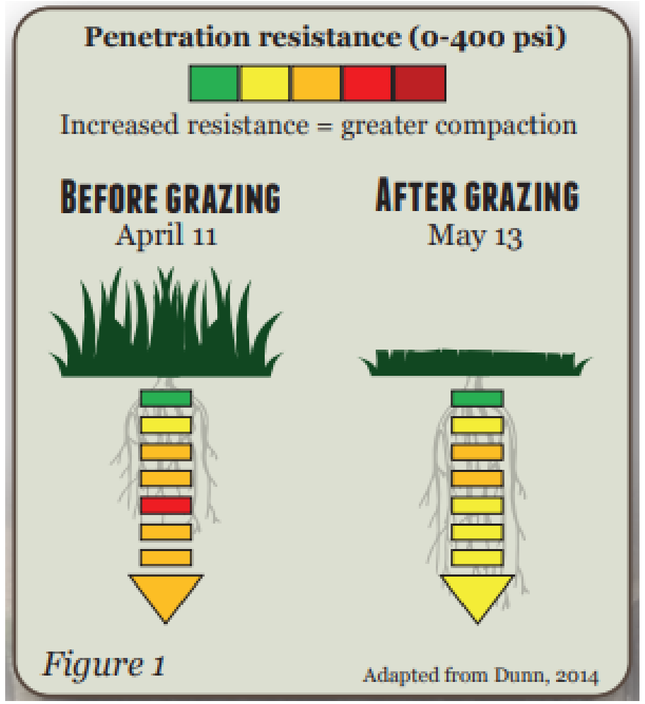
MEASURING SOIL COMPACTION

Research conducted in grazed and ungrazed fields showed that compaction, measured by penetration resistance, was greater in grazed cover crop fields versus ungrazed fields in only the upper 10 cm of the soil. Compaction near the soil surface, caused by direct hoof action, does not significantly affect plant root growth.

Tillage	Cover Crop	Penetration Resistance (J)		
		0-10 cm	10-20 cm	20-30 cm
Conventional	Ungrazed	70	171	205
Conventional	Grazed	110	168	190
No tillage	Ungrazed	109	204	240
No tillage	Grazed	122	179	198

Increased resistance = greater compaction

(Franzenluebbers et al, 2008)



*Some studies show increases in soil bulk density (compaction) from grazing, but corn yield is not significantly impacted.

Tobin, C., Singh, S., Kumar, S., Wang, T. and Sexton, P. (2020) ***Demonstrating Short-Term Impacts of Grazing and Cover Crops on Soil Health and Economic Benefits in an Integrated Crop-Livestock System in South Dakota.*** *Open Journal of Soil Science, 10, 109-136. https://doi.org/10.4236/ojss.2020.103006*

www.iowalearningfarms.org/content/cover-crop-resources

Contract Grazing

"Rick's biggest concern is compaction. Our deal is if it gets too wet, I move my cows off. If we get a half inch of rain or more, I usually move cows back onto my farm for a day, let it soak in and then go back out. That's part of the conversation you've got to have. It has to work for everybody."

"Rick and I will keep the relationship we have and we'll keep working on it. Rick is seeing benefits from cover crops, like weed suppression and less chemical use, and grazing days are a benefit to me. One thing that could help both of us in the long run is to have a long-term lease agreement that extends beyond this project."

Cover Crop Termination Methods

- Herbicide burn down
- Winter kill
- Tillage
- Roller-crimping
- Livestock grazing*

Cover Crop Termination

Livestock grazing nuances

- Cover crop mix & timing of the grazing are critical
- Cover crop has to be at the correct stage of its life cycle (finished pollinating)
- High stock densities are required to trample the cover crop
- High stock density trampling does not guarantee complete termination

Cover Crop Termination

- Cereal rye is the most common cover crop in upper Midwest

- In spring, cereal rye is terminated prior to or just after cash crop planting

- When terminated prior to planting, it's not mature enough to be terminated through trampling

- When terminated after planting, may be mature but can't graze after cash crop has been planted

- Remember, grazing stimulates growth when plants are in vegetative stage!

Cover Crop Termination

Termination can not be accomplished by grazing in a typical corn-cereal rye-soybean rotation due to **improper timing**

In diverse crop rotations, grazing and trampling may be used to terminate species in the **correct life-cycle stage**

In a perfect world…

- Graze then roller-crimp
- Diversify crop rotations and integrate livestock
- Transition to perennial cover

Cover Crop Grazing Net Profit, 2018-2019

5 cooperators

$90/acre
(@ $150/ton)

Grazing cover crops has the potential to put money back in your pocket within the same year of planting!

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