2018

YEAR IN REVIEW

COOPERATORS' PROGRAM

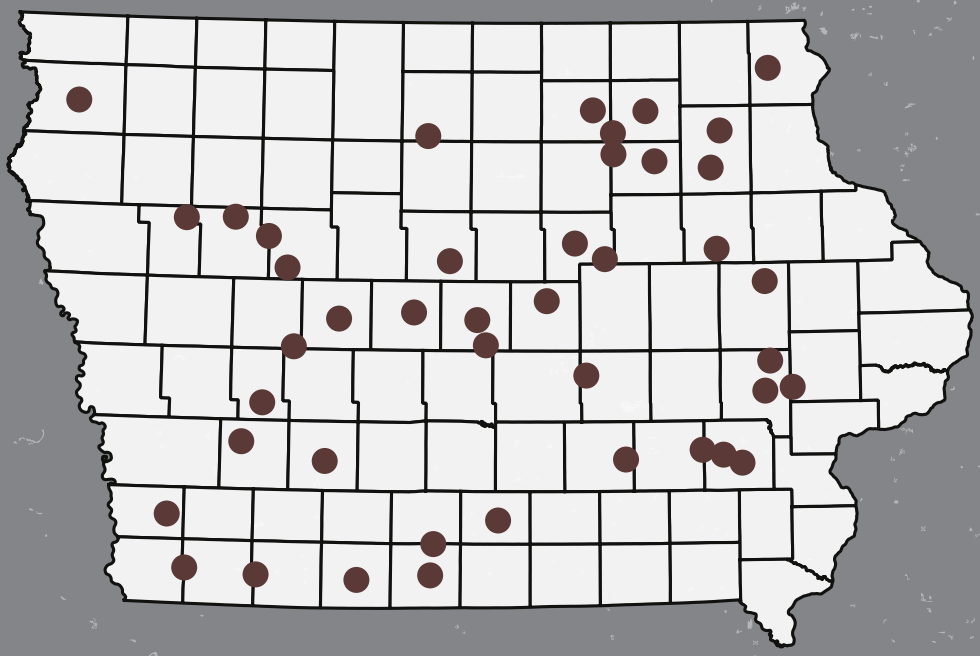
FARMER-LED RESEARCH

PRACTICAL FARMERS OF IOWA

COOPERATORS' PROGRAM

PRACTICALFARMERS.ORG/RESEARCH

2018 FARMER-LED
RESEARCH PROJECT LOCATIONS



IN 2018, 54 FARMERS CONDUCTED 77 RESEARCH TRIALS.

Farmers in Practical Farmers' Cooperators' Program conduct on-farm research **experiments** and **demonstrations** to better answer their most challenging questions. Knowledge from these research trials helps equip farmers to be more profitable, to be better environmental stewards and ultimately, to make their farms and communities more resilient. This research has not only influenced other farmers – it has shaped some of the most important university research coming out of the state over the past few decades. Since 1987 when the Cooperators' Program began, 240 different cooperators have conducted over 1,400 research trials on their farms.

EXPERIMENTS are trials that involve a rigorous, scientific design. This means treatments are applied to randomized and replicated plots in a farmer's field. Conclusions are based on statistical analysis of the results much like academic research studies.

DEMONSTRATIONS are trials that involve making observations of two or more management strategies or keeping detailed records of production practices. Strategies or practices are typically only replicated once in part of a field or bed, or among a group of animals. This doesn't allow for statistical analysis of the results, but cooperators draw meaningful conclusions that inform their production systems, and some demonstrations eventually evolve into experiments.

TABLE OF CONTENTS

STAFF CONTACTS

STEFAN GAILANS | RESEARCH AND FIELD CROPS DIRECTOR | *stefan@practicalfarmers.org*

HAYLEY NELSON | RESEARCH ASSISTANT | *hayley@practicalfarmers.org*

LIZ KOLBE | HORTICULTURE AND HABITAT PROGRAMS MANAGER | *liz@practicalfarmers.org*

MEGHAN FILBERT | LIVESTOCK PROGRAM MANAGER | *meghan@practicalfarmers.org*

CELIZE CHRISTY | SWINE AND POULTRY COORDINATOR | *celize@practicalfarmers.org*

Full research reports can be found at **practicalfarmers.org/research.**

FIELD CROPS

STEFAN GAILANS
Research and Field Crops Director

HAYLEY NELSON
Research Assistant

Field crop farmers are the largest membership contingency at Practical Farmers. Our field crops research focuses heavily on making cover crops and diverse rotations practical and profitable on cooperators' farms. To do that, we conduct research on cover crop and small grains varieties, planting and fertilizer strategies, termination strategies and fitting these practices into farmers' rotations.

2018 RESEARCH

WINTER CEREAL RYE COVER CROP EFFECT ON CASH CROP YIELD, YEAR 10

In partnership with Iowa Learning Farms
Jim Funcke, Rick Juchems, Rob Stout, Kelly Tobin, Whiterock Conservancy

COVER CROP SKIP ZONES FOR CORN

Jon Bakehouse, Mike Jackson, Loran Steinlage, Michael Vittetoe, Jack Boyer

NO-TILL VS. STRIP-TILL CORN AND SOYBEANS FOLLOWING A CEREAL RYE COVER CROP

Tim Sieren, Jack Boyer, Jeremy Gustafson

CORN PLANTING DATE FOLLOWING A COVER CROP

Dick Sloan, Wade Dooley

COVER CROP TERMINATION DATE BEFORE CORN

Arlyn Kauffman

CEREAL RYE COVER CROP FOR REDUCING HERBICIDES IN SOYBEANS

Sam Bennett

INTERSEEDING COVER CROPS TO CORN AT V2 STAGE

Michael Vittetoe, Chris Teachout

PLANTING CORN IN 60-IN. ROW-WIDTHS FOR INTERSEEDING COVER CROPS

Jack Boyer, Chris Teachout, Brian and Heather Kessel, Jim Johnson, Fred Abels

SPRING- OR CO-SEEDING LEGUMES TO CORN

Fred Abels, Chris Teachout

TERMINATING COVER CROPS AFTER SEEDING SOYBEANS

Jack Boyer, Tim Sieren

SOYBEAN ROW-WIDTH AND SEEDING DATE WHEN USING A ROLLER-CRIMPER FOR COVER CROPS

Scott Shriver

OAT VARIETY TRIAL 2018

ISU Northeast Research Farm, ISU Northern Research Farm, ISU Ag Engineering and Agronomy Farm, Wendy Johnson

PLANTING CORN IN 60-IN. ROW-WIDTHS FOR INTERSEEDING COVER CROPS

COOPERATORS

Fred Abels, *HOLLAND;* **Jack Boyer,** *REINBECK;* **Brian & Heather Kessel and Jim Johnson,** *LAMONI;* **Chris Teachout,** *SHENANDOAH*

Interseeding cover crops to corn at the V4 stage has had mixed success, likely because of shading by the tall corn canopy later in the season has hindered cover crop growth. Seeding a cover crop at this time of year (early June) is appealing to farmers because it presents opportunities for an abundance of cover crop species like cowpeas, sunn hemp, radish, buckwheat and many others that cannot be seeded in the fall in Iowa.

A wider corn row might increase the chances of successful interseeding by permitting more sunlight to the cover crops seeded in the interrows. For this project, cooperators planted corn in 30- and 60-inch row-widths and interseeded cover crops to the corn in early June. Corn yields and cover crop biomass produced by the end of the season were evaluated.

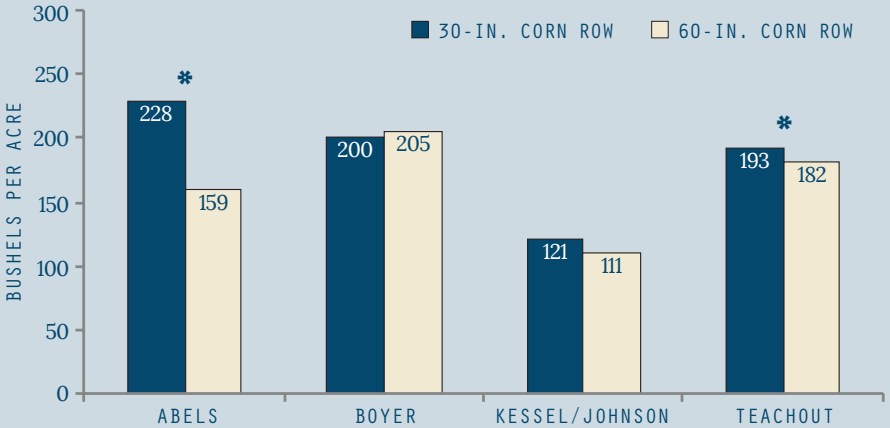
EXPERIMENTAL STRIPS OF CORN PLANTED IN 30- AND 60-INCH ROW-WIDTHS WITH COVER CROPS INTERSEEDED BETWEEN THE CORN ROWS ON JUNE 27, 2018.

"Your main reason for trying something like this should probably be grazing. Weed control can be a challenge with interseeding cover crops to wide-row corn in June, and we won't know if we can cut back on N fertilizer for succeeding cash crops until we try it." – JACK BOYER

FINDINGS

At the Boyer and the Kessel/Johnson farms, corn yields were statistically equivalent between the 30- and 60-inch row-width treatments. Corn yields at the Abels and Teachout farms, however, were reduced in the 60-inch row-width treatment compared to 30-inch row-widths. Cover crops consisted primarily of cowpeas (a legume), and those interseeded to the 60-inch row-widths at the Boyer and Kessel/Johnson farms produced four to 10 times as much biomass as the cover crops interseeded to the 30-inch row-widths. The cover crops interseeded in the 60-inch row-widths at those two farms contained between 60 and 100 pounds of nitrogen per acre in their above-ground biomass.

CORN YIELDS



*STATISTICAL ANALYSIS DETERMINED THAT CORN PLANTED IN 60-INCH ROW-WIDTHS YIELDED SIGNIFICANTLY LESS THAN CORN PLANTED IN 30-INCH ROW-WIDTHS AT FRED ABELS' AND CHRIS TEACHOUT'S FARMS, AS INDICATED BY THE ASTERISKS OVER THOSE COLUMNS.

EXPERIMENT

ESTABLISHING COVER CROP SKIP ZONES FOR CORN

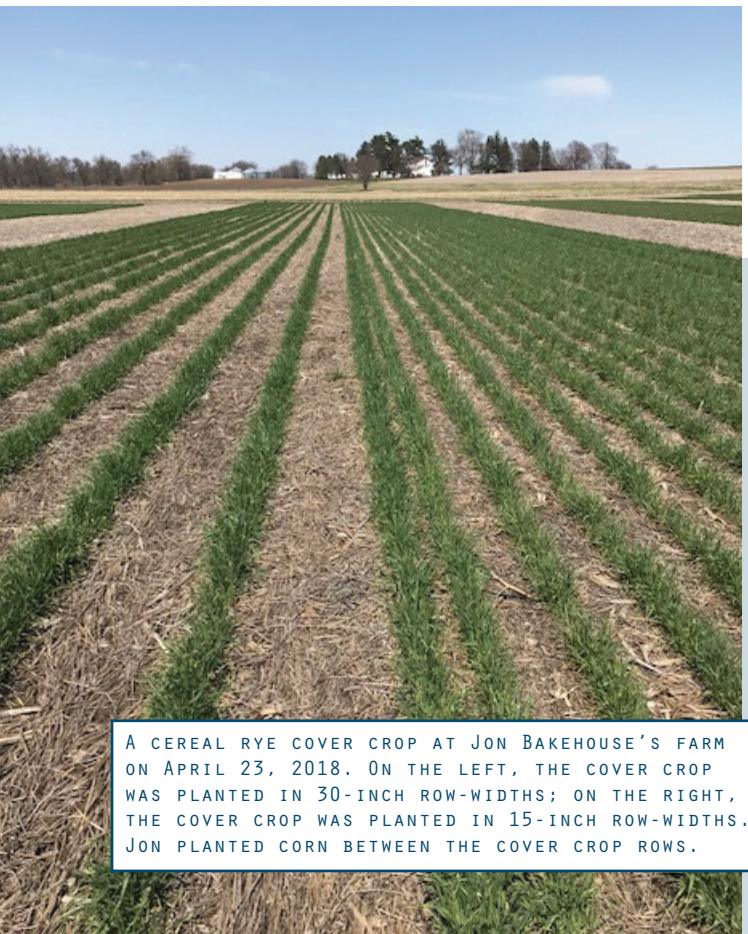
COOPERATORS

Jon Bakehouse, *HASTINGS;* **Mike Jackson,** *OSKALOOSA;* **Michael Vittetoe,** *WASHINGTON;* **Loran Steinlage,** *WEST UNION;* **Jack Boyer,** *REINBECK*

Proper management is required for successfully overcoming yield drag in corn following a cereal rye cover crop. This typically involves waiting 10-14 days between cover crop termination and corn planting, as well as applying some nitrogen fertilizer near the time of planting. Removing the influence of a cover crop from the eventual corn row zone may be another practice that falls under the category of proper management.

Cooperators in this project investigated different seeding methods to achieve cover crop "skip zones" for corn that followed a cereal rye cover crop. The cooperators created skip zones by using planters to seed cover crops in wide rows or by plugging seed drill openers while seeding cover crops, thus ending up with cover crops in twin rows.

Cereal rye cover crop seeded in twin rows at Mike Jackson's farm on April 19, 2018.



A cereal rye cover crop at Jon Bakehouse's farm on April 23, 2018. On the left, the cover crop was planted in 30-inch row-widths; on the right, the cover crop was planted in 15-inch row-widths. Jon planted corn between the cover crop rows.

FINDINGS

Corn yield varied across locations in response to the seeding methods. Jon Bakehouse and Mike Jackson were the only cooperators to include control strips with no cover crops. At both farms, cover crops reduced corn yields despite the skip zones each farmer created.

Michael Vittetoe and Loran Steinlage compared termination dates of their twin-row cover crops relative to their corn planting dates. At Michael's, delaying termination to eight days after planting corn reduced yields compared to when he terminated the cover crop four days before planting corn. Loran's termination dates varied from 25 days before planting corn to 13 days after planting corn; he saw no difference in corn yield.

Jack evaluated tilling the skip zones and nitrogen fertilizer rate. He saw no yield difference among treatments. Refraining from tilling the skip zones and applying 150 pounds of nitrogen per acre (compared to 190 pounds of nitrogen per acre) reduced overall costs of production.

NO-TILL VS. STRIP-TILL CORN AND SOYBEANS FOLLOWING A CEREAL RYE COVER CROP

COOPERATORS | **Jack Boyer,** *REINBECK;* **Tim Sieren,** *KEOTA;* **Jeremy Gustafson,** *BOONE*

A successful management strategy for corn and soybeans following a cereal rye cover crop may differ across farms in terms of tillage, nitrogen fertilizer application or both. This study looked at the effect of no-till and strip-till on corn and soybeans when following a cereal rye cover crop. The three farmers involved wanted to know if corn or soybean yields, and returns on investment, could be improved with strip tillage in a cover crop system.

"This trial confirmed the yield increases [I've been seeing on my farm] with my strip-till practices."

– TIM SIEREN

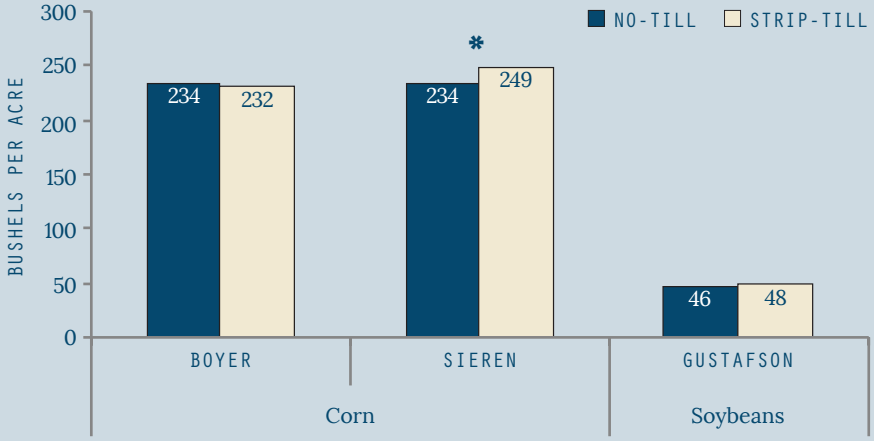
COSTS, REVENUE AND RETURNS ON INVESTMENT THAT DIFFERED BETWEEN TILLAGE TREATMENTS AT TIM SIEREN'S IN 2018.

Costs ($/ac)	No-till	Strip-till
Strip tillage	--	19.20
N fertilizer	54.86	54.84
Tillage + N fertilizer	54.86	74.04
Revenue		
Corn yield (bu/ac)	234	249
Corn price ($/bu)	3.41	3.41
Yield × price ($/ac)	797.94	849.09
ROI: Returns - Costs ($/ac)	743.08	775.05

FINDINGS

Corn yields at Jack's farm and soybean yields at Jeremy's farm did not differ between the no-till and strip-till treatments. At those two farms, strip-till reduced returns; no-till proved the better system economically. Compared to strip-till, Jack scored greater returns by $28 per acre, and Jeremy saw greater returns by $1 per acre with no-till. Moreover, Jack saw similar corn yields between two nitrogen fertilizer rates (150 and 190 pounds of nitrogen per acre) regardless of tillage. At Tim's farm, however, strip-till resulted in greater corn yields (by 15 bushels per acre) and returns (by nearly $32 per acre) compared to no-till.

CROP YIELDS



THE ASTERISK ABOVE THE COLUMN FOR TIM SIEREN'S FARM MEANS STATISTICAL ANALYSIS DETERMINED THAT STRIP-TILL IMPROVED CORN YIELDS COMPARED TO NO-TILL.

EXPERIMENT

CEREAL RYE COVER CROP FOR REDUCING HERBICIDES IN SOYBEANS

COOPERATOR	**Sam Bennett,** *GALVA*

The costs associated with planting and managing cover crops are a barrier to adoption for many growers, despite the benefits to weed control and soil and water quality. Sam Bennett has been growing cover crops in his corn and soybean rotation for several years and has observed their positive impacts on his farm's soil quality and weed control.

Seeking to encourage other growers to adopt cover crops, Sam wondered if the highly effective weed control he has seen on his farm from cereal rye would help him and other growers save money by reducing their herbicide programs. This study looked at differences in weed control, soybean yield and returns on investments among three cover crop treatments with different herbicide programs and a no-cover treatment with a full herbicide program.

"[Going forward] I'll rely on the rye more than I had been knowing how effective it can be at suppressing weeds."

– SAM BENNETT

SUMMARY PARTIAL BUDGET COMPARING RETURNS ON INVESTMENTS AMONG WEED MANAGEMENT SYSTEMS AT SAM BENNETT'S FARM IN 2018.

No cover, Full herbicide program		**Cover, Full herbicide program**	
Costs	***$/ac***	***Costs***	***$/ac***
Herbicides + application	57.83	Cover crop + herbicides + application	89.08
Returns	***$/ac***	***Returns***	***$/ac***
80.0 bu/ac @ $8.44/bu	675.20	77.4 bu/ac @ $8.44/bu	653.26
Returns on investment	**617.37**	***Returns on investment***	**564.18**
Cover, Reduced herbicide program		**Cover, No residual herbicide program**	
Costs	***$/ac***	***Costs***	***$/ac***
Cover crop + herbicides + application	78.28	Cover crop + herbicides + application	66.95
Returns	***$/ac***	***Returns***	***$/ac***
79.9 bu/ac @ $8.44/bu	674.36	80.3 bu/ac @ $8.44/bu	677.73
Returns on investment	**596.08**	***Returns on investment***	**610.78**

Cover crop treatments include the costs associated with cover crop seed, seeding and chemical termination.

FINDINGS

Soybean yields were statistically equal across the four treatments. Moreover, reducing the amount of herbicide applied in the cover crop treatments did not sacrifice weed control or soybean yield. The return on investment was highest for the no-cover treatment. However, the return on investment in the cover crop treatment with no residual herbicides was only lower by $6.59 per acre. Eliminating the residual herbicide did not lead to more weed pressure and resulted in equal soybean yields – compared with all other treatments.

The results of this trial show that while none of the cover crop treatments reduced herbicide costs by enough to fully pay for the costs of establishing cover crops, growers choosing to implement cover crops can reduce herbicide costs without sacrificing soybean yield or weed control.

HORTICULTURE

LIZ KOLBE
Horticulture and Habitat Programs Manager

With interest growing for Iowa fruit and vegetable production, the number of Practical Farmers members who raise these crops is increasing, too. These farmers are interested in conducting on-farm research to create profitable, diverse farms. Current priorities for horticulture research include enterprise budgets, season extension, variety selection, fertility, pollinator services and pest and weed management.

2018 RESEARCH

PELLETED SEED AND COVERED TRAYS FOR SUMMER LETTUCE GERMINATION

Kate Edwards, Carmen Black, Jill Beebout

CAULIFLOWER VARIETY TRIAL

Rob Faux, Shanti Sellz, Mark Quee

SUMMER LETTUCE VARIETY TRIAL

Kate Edwards, Carmen Black, Jill Beebout, Jordan Scheibel, Jon Yagla

BRASSICA PRODUCTION FOLLOWING GRAZED COVER CROP

Carmen Black, Mark Quee

STRAWBERRY ESTABLISHMENT AND PRODUCTION ENTERPRISE BUDGET

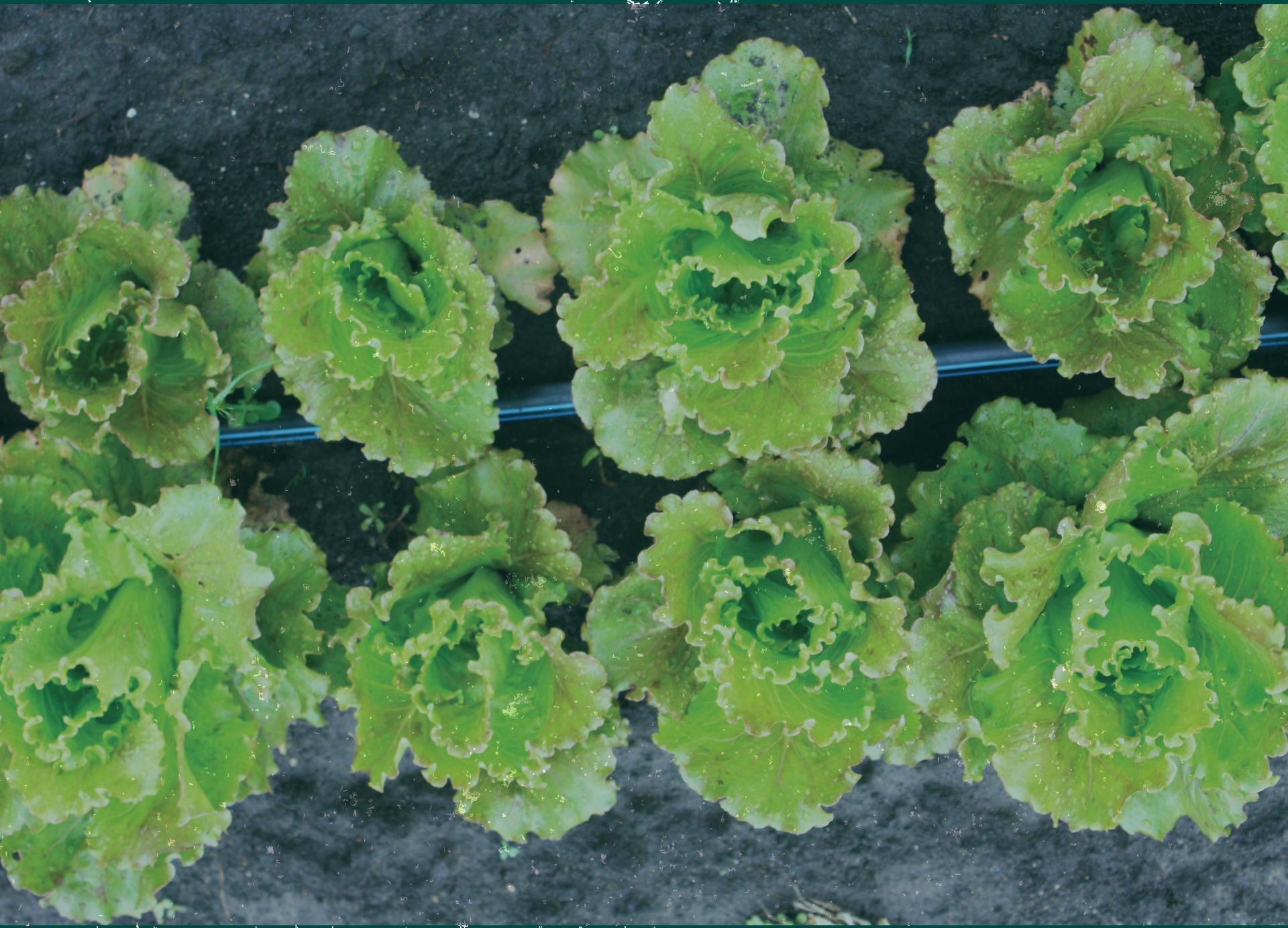
Lee Matteson and Rose Schick

CHERRY TOMATO ENTERPRISE BUDGET

Emma and Marcus Johnson, Molly Schintler and Derek Roller

HEIRLOOM AND HYBRID TOMATO VARIETY TRIAL IN HIGH TUNNEL

Lee Matteson and Rose Schick
Rob Faux



STRAWBERRY ESTABLISHMENT AND PRODUCTION ENTERPRISE BUDGET

COOPERATORS	**Lee Matteson and Rose Schick,** *NEVADA*

Locally grown strawberries are in high demand at markets, but the time and labor demands of growing them make strawberries a trickier crop to manage than many realize. The plants require a year to establish before the first harvest, and preventing competition from weeds is critical. In this demonstration, Lee Matteson and Rose Schick compared the enterprise budgets for four strawberry varieties that were established using two different methods: matted rows mulched with cornstalk mulch, or planted into biodegradable plastic mulch.

For two years, the farmers tracked expenses, labor, yield and revenue to determine which establishment system was better for their farm. The strawberry varieties included Archer, Cavendish, Jewel and Valley Sunset, and were planted on April 20, 2017, with their first bearing year in 2018.

"In general, the plastic kept a more compact row as the plastic prevented runners from suckering in the first year. The black plastic had less weeding the first year, but by the second year the biodegradable plastic was gone and weeding was the same in both [establishment systems]."

– ROSE SCHICK

THE EARLY DAYS OF THE TRIAL, WITH BIODEGRADABLE PLASTIC ON THE LEFT AND SPACE FOR THE MATTED ROWS ON THE RIGHT, AWAITING CORNSTALK MULCH.

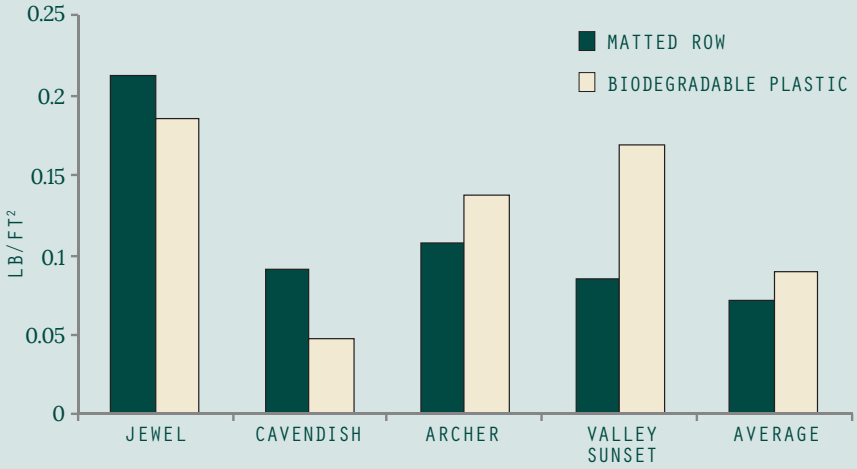
LEE MATTESON HARVESTS STRAWBERRIES IN JUNE 2018.

FINDINGS

2018 was a very poor strawberry season due to extreme heat in May. Strawberry picking typically lasts five to six weeks; the 2018 season lasted only two weeks. Even with the unfavorable weather, the strawberries on the biodegradable plastic did provide a modest positive net return over the two years of expenses, at $0.66 per pound ($0.09 per square foot).

The matted row did not provide a net profit, due to more labor costs – particularly in the establishment year – and slightly lower average yield across varieties (0.07 pound per square foot for matted rows versus 0.09 pound per square foot for the biodegradable plastic). Rose noted that the Cavendish variety did not handle the heat at all, and fruit became unsellable. In a more typical growing season with better weather and higher yields, the farmers' net income would have been positive under both establishment systems.

STRAWBERRY YIELDS



STRAWBERRY YIELDS FOR EACH VARIETY AND MULCH TREATMENT, AND THE AVERAGE OF ALL VARIETIES.

EXPERIMENT

SUMMER LETTUCE VARIETY TRIAL

COOPERATORS	**Jill Beebout,** *CHARITON;* **Carmen Black,** *SOLON;* **Kate Edwards,** *IOWA CITY;* **Rob Faux,** *TRIPOLI;* **Jordan Scheibel,** *GRINNELL;* **Jon Yagla,** *IOWA CITY*

To meet the desires of their customers, farmers are interested in finding varieties of head lettuce most tolerant to the heat of summer that taste acceptable and work in their production system. In a 2017 summer lettuce variety trial, Magenta had the highest yields on three of the six cooperating farms, and showed the best tolerance to heat.

Specific preferences from the 2017 trial differed slightly by farm, but most of the farms were interested in conducting a second variety trial with Magenta and three additional varieties: Concept, Cherokee and Nevada (one farm also included Bergam's Green). Six farmers tested these varieties in randomized, replicated trials on their farms in 2018 to determine which varieties produced the highest yield and best quality of summer lettuce.

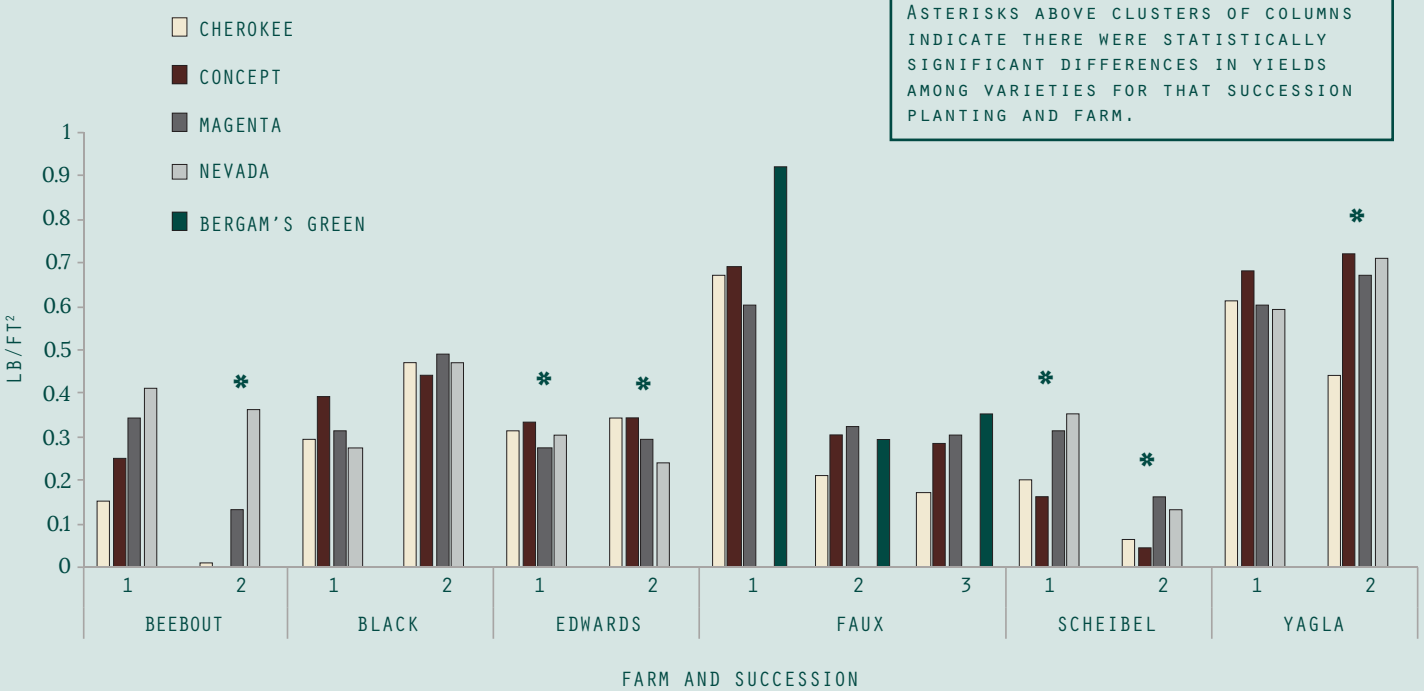
FINDINGS

Concept was the top-yielding variety in five of the 13 trials, though not always with statistical significance. In six different trials, differences in yield were statistically significant at 90% certainty. Among those six trials, the four main lettuce varieties – Cherokee, Concept, Magenta and Nevada – each achieved the highest yield at least once.

Differences in yields among farms may be explained by differences in plant spacing, but additionally, some farmers prefer, or are willing, to harvest smaller heads to meet market timing restraints rather than waiting for maximum head size. Extremely low yields were typically the result of plant loss due to bolting. Cherokee and Concept were most prone to bolting. Three farms reported that Nevada had the best flavor, while Cherokee was most often cited for bitterness.

SUMMER LETTUCE YIELD BY FARM, SUCCESSION

SUMMER LETTUCE VARIETY YIELDS BY SUCCESSION PLANTING AND FARM IN 2018. ASTERISKS ABOVE CLUSTERS OF COLUMNS INDICATE THERE WERE STATISTICALLY SIGNIFICANT DIFFERENCES IN YIELDS AMONG VARIETIES FOR THAT SUCCESSION PLANTING AND FARM.



EXPERIMENT

PELLETED SEED AND COVERED TRAYS FOR SUMMER LETTUCE GERMINATION

COOPERATORS	**Jill Beebout,** *CHARITON;* **Carmen Black,** *SOLON;* **Kate Edwards,** *IOWA CITY*

The Sundog Farm team from left to right: Carlos Manule Williams, Maja Black, Anna Hankins and Carmen Black.

During the 2017 Summer Lettuce Variety Trial, several cooperators noticed the uneven germination of the pelleted lettuce seed being used for the trial. The farmers were curious if this was because of the pelleting or because of the heat, and if there was a better way to germinate seeds for summer lettuce transplants. This project compared the effect of pelleted lettuce and the effect of a wetted sheet over the seed trays on germination success in a split-plot, randomized and replicated design. The lettuce variety Magenta was used, as it was the favored variety of the growers from the 2017 summer lettuce trial.

"My main takeaway from the trial is that when it gets hot, I'm going to put a wet sheet over my seedling trays."

– KATE EDWARDS

FINDINGS

Each farm had at least one statistically significant effect on seedling quality from the treatments, though the effects were not consistent across the three farms. At Carmen's, pelleted seeds produced statistically taller seedlings than unpelleted seeds, but did not have a statistically different number of leaves. Germination rate was not statistically different among treatments.

Kate ran two successions of the trial. In succession 1, uncovered trays had taller seedlings but lower germination rates than covered trays. There was no discernable effect from the pelleted seeds. Seedling measurements in succession 2 did not have any statistical differences among the treatments.

At Jill's, covered seedlings had statistically fewer leaves. Seedling height was not affected by the treatments. Jill was the only cooperator to record number of days to emergence. Across treatments, the number of days to emergence was statistically similar.

Covered and uncovered seedling trays in the research trial at Carmen Black's farm.

CHERRY TOMATO ENTERPRISE BUDGET

COOPERATORS	**Emma and Marcus Johnson,** *CENTRAL CITY* **Molly Schintler and Derek Roller,** *MECHANICSVILLE*

Farmers plant and manage cherry tomatoes according to their own timing, markets and preferred practices. But how do these choices affect production costs and labor efficiency? In this enterprise budget study, two cooperating farms – including Emma and Marcus Johnson, of Buffalo Ridge Orchard, and Derek Roller and Molly Schintler, of Echollective Farm – tracked data on cherry tomatoes raised in a high tunnel that were trellised to maximize space and lengthen the harvest window. The data collected from each farm was standardized to provide insight into cost and labor efficiency at each farm.

ROLLER/SCHINTLER CHERRY TOMATOES

JOHNSON CHERRY TOMATOES

"It looks like we are actually incredibly efficient, which is surprising. Our high yield and selling bulk through our wholesale markets saves time and money."

– MARCUS JOHNSON

NET INCOME MEASURES AND NET INCOME RATIO, BY FARM

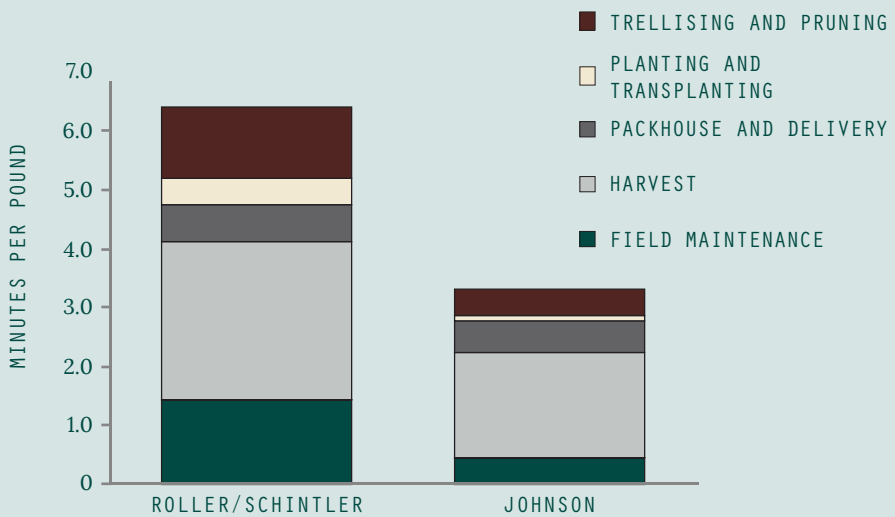
		Roller/ Schintler	Johnson
Net Income	Per lb	**$2.42**	**$1.79**
	Per ft²	**$4.45**	**$3.76**
	Per labor-hour	**$22.24**	**$31.72**
Net income ratio (net/gross)		**0.61**	**0.68**

FINDINGS

Labor was the largest portion of expenses on both farms, accounting for 69 percent of total costs at Echollective Farm and 74 percent of total costs at Buffalo Ridge Orchard. At both farms, harvest was the most time-consuming labor task, accounting for 53 percent of labor hours at Echollective Farm and 42 percent of labor hours at Buffalo Ridge Orchard.

Per pound produced, Emma and Marcus had fewer expenses and labor than Molly and Derek, though the latter earned more net income per pound and per square foot. Both farms had strong revenue and net income per labor-hour, with Echollective Farm netting $22.24 per hour, and Buffalo Ridge Orchard netting $31.72 per hour.

LABOR (TIME) BREAKDOWN BY TASK, PER POUND OF CHERRY TOMATOES PRODUCED



LIVESTOCK

MEGHAN FILBERT
Livestock Program Manager
CELIZE CHRISTY
Swine and Poultry Coordinator

Practical Farmers' livestock program represents a diverse suite of livestock farmers, encompassing beef cattle, swine, poultry, sheep, goat and dairy operations. Many of these farmers are raising livestock on pasture and practicing regenerative farming practices such as rotational grazing, integrating livestock and crops, and grass finishing. Grazing cover crops, diverse perennial and annual forages; feeding small grains to swine; and soil health through livestock integration have been identified as priorities in recent years.

2018 RESEARCH

COMPACTION IN GRAZED COVER CROP FIELDS
Bruce and Connie Carney, Wade Dooley

FATTY ACID COMPOSITION OF 100% GRASS-FED BEEF
Bruce and Connie Carney, Dave and Meg Schmidt

ECONOMIC AND SOIL HEALTH IMPACTS OF GRAZING COVER CROPS IN CATTLE OPERATIONS
Wesley Degner, Ben Albright, Bill Frederick, Mark Schleisman, Matt Schuiteman, Zak Kennedy, Seth Smith

SOIL HEALTH IN GRAZED CRP LAND
Dave and Meg Schmidt

REPLACING CORN WITH HYBRID RYE IN FEEDER PIG RATIONS
Tom Frantzen

FATTY ACID COMPARISONS OF GRAIN AND FORAGE-FED PORK
John and Holly Arbuckle

EFFECTS OF APPLE CIDER VINEGAR IN DAIRY CATTLE
Francis Blake, Scott Wedemeier, John C. Gilbert, Kevin Dietzel

EXPERIMENT

COMPACTION IN GRAZED COVER CROP FIELDS

COOPERATORS	**Bruce and Connie Carney,** *MAXWELL;* **Wade Dooley,** *ALBION*

Many farmers are concerned about the soil compaction that cattle may cause when grazing cover crops in row crop fields. This fear is a barrier to the widespread adoption of grazing cover crops. For this project, cooperators used a penetrometer to compare compaction in fields where grazing cover crops occurred with adjacent fields where no cover crops were planted and no grazing occurred.

Bruce Carney, a cattle grazier, worked with his row-cropping neighbor, Rick Kimberly, to contract-graze cover crops. Wade Dooley grazed cattle on his father Alan's row crop fields. The cooperators took penetrometer measurements in June and grazed their cattle on the cover crops and crop residue in the fall and spring, when weather allowed. The project took place over four years.

"To begin with, I was a little concerned that cows' hooves would cause some compaction, but according to these results, it looks like that isn't the case because the cover crops mitigate any issues the cows are causing."

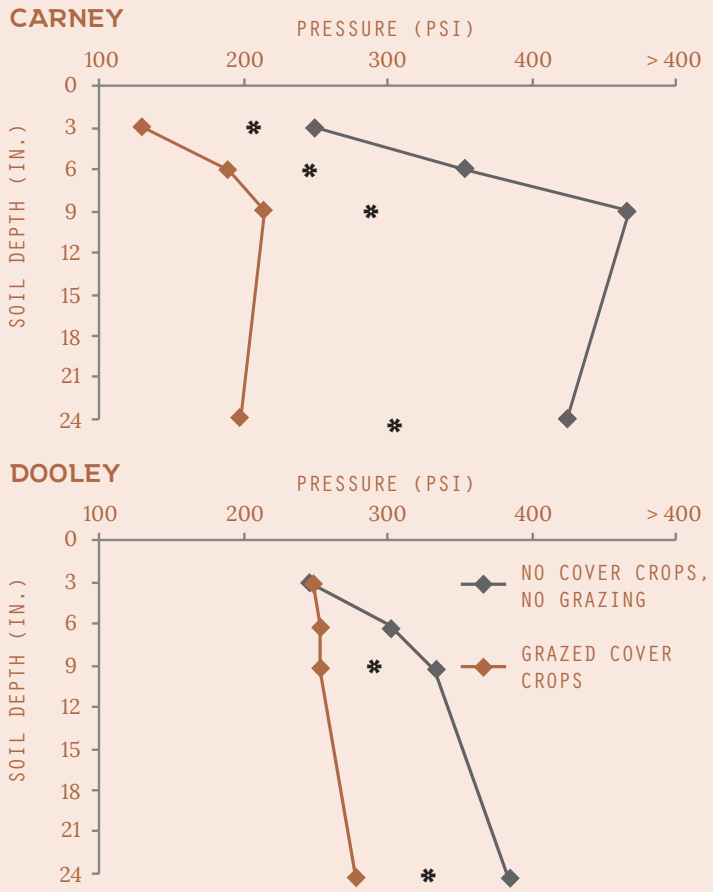
– WADE DOOLEY

FINDINGS

At both locations, four years of data show that grazing cover crops did not contribute to soil compaction in row crop fields. Baseline penetrometer readings taken in 2015 showed that both sets of fields tested by Bruce and Wade started with similar compaction levels. As the study progressed, compaction increased in the fields without cover crops and grazing. Compaction did not increase in the fields with cover crops that were grazed.

This study showed that grazing cover crops in row crop fields will not result in soil compaction when proper grazing management is employed. This means avoiding excessive grazing during wet and muddy weather, and rotating water and supplemental feed sites to avoid creating compacted areas.

2018 COMPACTION LEVELS ON BOTH FARMS



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 ALL DEPTHS AT BRUCE CARNEY'S, AND AT 9 AND 24 INCHES IN WADE DOOLEY'S FIELDS. THE AMOUNT OF PRESSURE REQUIRED IS DIRECTLY RELATED TO THE LEVEL OF COMPACTION.

EXPERIMENT

FATTY ACID COMPOSITION OF 100% GRASS-FED BEEF

COOPERATORS	**Bruce and Connie Carney,** *MAXWELL;* **Dave and Meg Schmidt,** *EXIRA*

Advocates of grass-fed and grass-finished beef claim that it contains a healthy balance of omega fatty acids. The American Heart Association recommends an omega-6 to omega-3 ratio for human diets of 4-to-1. On average, grain-fed beef has an omega-6 to omega-3 ratio of 8-to-1. Increased consumption of omega-3 fatty acids is known to decrease the risks of cardiovascular and autoimmune diseases. Research has found that a ratio of 2.5-to-1 reduced cancer cell proliferation, and anti-aging experts tout ratios of 2-to-1.

For this study, a combined 27 ribeyes from two farms – Carney Family Farms in Maxwell and Troublesome Creek Cattle Co. in Exira – were sent to laboratories at Iowa State University and analyzed for fat content and other attributes. These ribeyes came from Red and Black Angus and Angus Cross grass-fed cattle. They were finished between 20 and 32 months old, with carcass weights ranging from 528 pounds to 772 pounds.

"We work hard to keep our cattle gaining weight on an all-forage diet. Having ISU confirm that our beef really does have the beneficial characteristics of a grass-fed ration is very gratifying."

– DAVE SCHMIDT

FINDINGS

The average omega-6 to omega-3 ratio of the 27 grass-fed ribeyes was 1.8-to-1, ranging from 1.4-to-1 to 2.2-to-1. The results also showed that harvesting cattle in the spring, after feeding them through the winter on stored forage such as hay and baleage, did not negatively affect the omega fatty acid ratio. In fact, the omega fatty acid ratio in spring-harvested beef was lower (1.72-to-1) than that of beef harvested in fall and early winter (1.93-to-1). Regardless of harvest date, the omega fatty acid ratios of the beef harvested at both farms were better balanced than the ratio recommended for healthy diets by the American Heart Association.

AVERAGE OMEGA-6 TO OMEGA-3 FATTY ACID RATIOS FROM 27 100% GRASS-FED RIBEYE STEAKS HARVESTED BETWEEN 2016-2018.

Carney Family Farms	Troublesome Creek Cattle Co.
1.82-to-1	1.83-to-1

FATTY ACID COMPOSITION OF GRAIN AND FORAGE-FED PORK

COOPERATORS	**John and Holly Arbuckle,** *LA PLATA, MISSOURI*

Raising pigs on pasture increases their exposure to and intake of forages, which can in turn affect the fatty acid composition of pork. Grass-fed animal fats contain higher proportions of omega-3 fatty acids than grain-fed animals. Pork that is predominantly grain-fed usually has a higher ratio of omega-6 to omega-3 fatty acids. This demonstration aimed to see if the omega fatty acid ratio could be better balanced by including forage in pigs' diets. John Arbuckle examined fatty acid composition and feed cost economics from 75 pigs fed three different rations: grain-free, 50% grain and 100% grain.

"The 50% reduced grain group hits the sweet spot for farmers trying to reduce the amount of grain fed [to their pigs] and overall feed costs, while justifying a higher price point for pork. This project was undertaken to evaluate the feasibility of three different feed management systems. We hope that farmers who read this study will have a greater understanding of what can happen when you lower the amount of grain in pig rations."

— JOHN ARBUCKLE

FINDINGS

Pigs from the three groups had different fatty acid compositions, with varying omega-6 to omega-3 ratios. Pork from the grain-free group had the highest concentration of omega-3s while pork from the 50% grain group had an intermediate omega-3 concentration and the 100% grain group had the lowest.

Feed costs also varied among the three groups. Pigs from the grain-free group were the priciest to feed, with feed costing $1.27 per pound of gain. These pigs also took the longest time to finish. The 100% grain group incurred middling feed costs, at $0.53 per pound of gain, while the 50% grain group had the lowest costs at $0.48 per pound of gain. Feeding 50% grain (and 50% forage) was ideal for John to reduce feed costs and achieve a fatty acid profile that could bring a higher price for pork based on consumer preference.

AVERAGE OMEGA-6 TO OMEGA-3 FATTY ACID RATIOS FROM JOHN ARBUCKLE'S PIGS AND STORE-BOUGHT LOIN PORK CHOPS IN 2017.

	Grain-Free	50% Grain	100% Grain	Store-Bought
Ratio, omega-6 to omega-3	5.15-to-1	9.88-to-1	13.84-to-1	29.40-to-1

PRACTICAL FARMERS OF IOWA

1615 Golden Aspen Drive, Suite 101
Ames, IA 50010

PRACTICALFARMERS.ORG