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Corn planted green into rye and oats cover crop mix

Pankow Farm

MAXIMIZING COVER CROP BENEFITS THROUGH PLANTING GREEN

Introduction

JD Pankow is a second-generation farmer who operates Pankow Farm with his parents, David and Valerie and two brothers in Castile, New York. JD's parents established the farm in 1988 with 45 cows. Today, Pankow uses a 3½ year crop rotation on 1,500 acres with 400 acres of established hay, 200 acres of alfalfa, and 900 acres of silage corn and occasional sorghum acreage to feed the operation's 800 dairy cows.

Reducing Tillage

With conventional tillage, the Pankow's alfalfa fields required about five passes and picking rocks before planting. In 2003, David decided to experiment with reduced-till on 50 acres to minimize labor and costs. At the same time, he dabbled with cover crops. Encouraged by the results, he expanded these practices.

In 2005, he bought a zone tiller and in 2014, the farm purchased a vertical tillage tool with independent rubber-mounted discs. Today, alfalfa seeding ground requires a 22-foot vertical-tillage tool, a cultimulcher, and a 26-foot planter. It takes one or two passes to prepare the field with minimal rock disturbance.

On corn fields, Pankow switched from the moldboard plow to strip-till in 2003 and has cut the number of passes from four to two. "I've noticed that pulling the (tillage) shank through strip-tilled fields doesn't feel like it's logging all day like it did years ago," JD said. After having recent success with no-till on limited acreage, he plans to expand this practice next season.

The Pankows began planting cover crops of rye, oats, and wheat on

JD Pankow

150 acres in 2005, following corn silage. Today, they typically plant rye following all corn fields and began planting green in 2020. "We thought if we can eliminate a pass, it's great for the soil, and it's also great for our pocketbooks," said Pankow.

Maximizing Soil Health and Environmental Outcomes

The combination of cover-cropping and reduced-till practices has contributed to several improvements. First, yields have increased, and JD attributes 30–40% of that change to soil health, with other factors like seed advancements also playing a role. Other benefits have included reducing dry fertilizer applications from 150 pounds to 50 pounds per acre and better weed control.

To estimate the water quality and environmental benefits experienced on one of JD's 41-acre fields, USDA's Nutrient Tracking Tool (NTT) was used to compare his previous 'conventional' to his current 'soil health' management under his 4-year corn/3-year alfalfa rotation between 2000 and 2019. NTT estimates his use of reduced-till, cover crops, and nutrient management lowered N, P, and sediment losses by 34%, 72%, and 92% respectively. On the same field, USDA's COMET-Farm Tool estimates JD's soil health practices resulted in a 453% reduction in total greenhouse gas emissions, which corresponds to taking seven cars off the road each year.

Economic Outcomes of Planting Green

Pankow is one of nine farms that participated in a two-year study (2021 and 2022) to observe the impact of planting grain crops into living cover crops, or "planting green." By delaying cover crop termination, farmers can maximize the soil health benefits of cover crops while mitigating difficulties of wet spring soils and late emergent weeds. Challenges include cash crop stand establishment, pest pressure and the cost to purchase or modify planting equipment. "It's not for every type of field," JD said. "But where it worked, it worked well. It's another useful tool in our arsenal, and if we think we can plant green without suffering with weeds or sacrificing yields, we will use it."

JD's trial included three cover crop planting rates of rye: no cover (control), a single "farmer-rate" (50#/acre in 2021; 60#/acre in 2022), and a double rate (100#/acre in 2021; 120#/acre in 2022). Each of these treatments was either terminated pre-planting of corn or planted green and terminated a few weeks later.

Agricultural economists used a marginal approach to compare cover crop treatment plots to control plots. Changes in net income (profit) were calculated using values of crop

Pankow Farm's Change in Profit, Planting Green at Two Different Cover Crop Planting Rates

Analysis Utilizes Data from Replicated Field Trials for Two Cash Crop Growing Season

2021*

Net Income (Profit) Positive Effects				
Increases in Total Value of Production (TVP)				
	COVER CROP (50#/AC)		COVER CROP (100#/AC)	
ITEM	Pre-Plant Termination $/Acre	Planting Green $/Acre	Pre-Plant Termination $/Acre	Planting Green Per $/Acre
Value of Production	$0	$0	$51.30	$0
Total TVP Increases	**$0**	**$0**	**$51.30**	**$0**
Cost Decreases				
Hebicide Material on Control Plots	$49.20	$49.20	$49.20	$49.20
Total Decreased Cost	**$49.20**	**$49.20**	**$49.20**	**$49.20**
Total Increase Net Income (Profit)	**$49.20**	**$49.20**	**$100.50**	**$49.20**
Net Income (Profit) Negative Effects				
Decreases in Total Value of Production (TVP)				
Value of Production	$45.60	$34.20	$0	$102.60
Total TVP Decreases	**$45.60**	**$34.20**	**$0**	**$102.60**
Cost Increases				
Cover Crop Termination Herbicide	$13.75	$13.75	$13.75	$13.75
Cover Crop Seed	$14.00	$14.00	$28.00	$28.00
Cover Crop Planting	$15.40	$15.40	$15.40	$15.40
Total Increased Cost	**$43.15**	**$43.15**	**$57.15**	**$57.15**
Total Decrease Net Income (Profit)	**$88.75**	**$77.35**	**$57.15**	**$159.75**
Annual Change in Net Income (profit)	**-$39.55**	**-$28.15**	**$43.35**	**-$110.55**

2022*

Net Income (Profit) Positive Effects				
Increases in Total Value of Production (TVP)				
	COVER CROP (60#/AC)		COVER CROP (120#/AC)	
ITEM	Pre-Plant Termination $/Acre	Planting Green Per $/Acre	Pre-Plant Termination $/Acre	Planting Green Per $/Acre
Value of Production	$0	$0	$115.90	$6.10
Total TVP Increases	**$0**	**$0**	**$115.90**	**$6.10**
Cost Decreases				
Hebicide Material on Control Plots	$49.20	$49.20	$49.20	$49.20
Total Decreased Cost	**$49.20**	**$49.20**	**$49.20**	**$49.20**
Total Increase Net Income (Profit)	**$49.20**	**$49.20**	**$165.10**	**$55.30**
Net Income (Profit) Negative Effects				
Decreases in Total Value of Production (TVP)				
Value of Production	$73.20	$109.80	$0	$0
Total TVP Decreases	**$73.20**	**$109.80**	**$0**	**$0**
Cost Increases				
Cover Crop Termination Herbicide	$13.75	$13.75	$13.75	$13.75
Cover Crop Seed	$16.80	$16.80	$33.60	$33.60
Cover Crop Planting	$15.40	$15.40	$15.40	$15.40
Total Increased Cost	**$45.95**	**$45.95**	**$62.75**	**$62.75**
Total Decrease Net Income (Profit)	**$119.15**	**$155.75**	**$62.75**	**$62.75**
Annual Change in Net Income (profit)	**-$69.95**	**-$106.55**	**$102.35**	**-$7.45**

*Values based on actual reported prices for 2021 and 2022 with machinery cost at 2021 cost basis for both years.

production (price * yield) and selected cost variables that differed between the treatment and control plots. Calculated changes in net income (profit) by treatment for each of the two years are shown in the tables above—the 2021 analysis is on the left, and the 2022 analysis is on the right.

Increases or decreases in the value of production were determined using the corn silage yield measurements of the treatment plot minus the yield of the control plot and an estimated value of corn silage. There was a difference in the cost of herbicide materials used on control and treatment plots. Product recommendations differed due to agronomic factors. All plots had one field pass for herbicide application—weed management for controls and cover crop termination for treatments.

The treatment plots had total cost increases for cover crop establishment (seed and planting costs) of $29.40/acre and $43.40/acre in 2021 and $32.20/acre and $49.00/acre in 2022. The difference in cover crop establishment cost was the slight increase in seeding rate in 2022.

Variability within the results suggests that only the cover crop seeded at the double rate (100# and 120#/acre), pre-plant termination plot produced greater profit when compared to the control plot. This was the case for both 2021 and 2022. The opposite was true for the cover crop seeded at the double rate (100#/acre), post plant termination plot in 2021, and the cover crop seeded at the single rate (60#/acre), post plant termination plot in 2022.

Given the variability of the results, other treatment plots generated profit estimates quite near the control. Results for these plots suggest any soil health benefits associated with the cover crop practices were generated while maintaining economic performance.

Closing Thoughts

JD is eager to participate in on-farm trials because they provide first-hand data about how different practices work on his soil. That, he says, is critical because outcomes could be different even just a mile down the road. "We can say, okay, this works here instead of looking at it in a newsletter report from somewhere else that may not be applicable here," he said.

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