

Expanding the production of oats and small grains in Iowa and Minnesota

Prepared by the Sustainable Food Lab and Practical Farmers of Iowa

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Introduction

Iowa is ranked 1st in the nation in corn and soybean production and Minnesota is ranked 4th in corn and 3rd in soybean production. Corn and soybeans are by far the most dominant crops in these landscapes, farmed by some of the most sophisticated farmers on some of the best soils in the world. The system optimizes for production of corn and soybeans to the exclusion of almost all other crops. The productivity of these systems and the infrastructure (support services, product development, and policy) that has grown to support these systems have been designed for efficiency in the production of these crops at the exclusion of diversity. While the system itself is a marvel, the loss of farming with a third or fourth crop in rotation has resulted in unintended consequences, including insufficient crop diversity to enhance soil quality, and a decline in the supply of small grains (oats, wheat, rye, barley) in a region that is home to some of the largest processors of small grains in the country.

Commercial Rationale

Supply

Oats, once one of the most popular crops grown in the Upper Midwest, have been declining in production for years as a system and markets have been developed to optimize the production of corn and soybeans. U.S. farmers planted 3.03 million acres of oats in 2014, down from 23.3 million in 1968. Growing corn and soy instead of oats is also contributing to a decline in oat production in Canada, one of the world's largest net exporters of oats, and a key source of supply for the US. These trends contribute to a feedback loop where decline in production results in the disappearance of the necessary infrastructure, on-farm and at grain elevators, including harvest equipment, storage capacity, segregation capabilities, and transportation to market. Creating a secure supply of oats will include working with farmers and rebuilding infrastructure.

Transportation Efficiencies

Constrained supply of rail cars; increased traffic demand for chemicals, coal, and petroleum; and high harvest rates of oats and other commodities in 2013/2014 have led to the consumption of extra capacity in the US and Canadian rail system, deterioration in services, and an increase in shipping costs. Increasing the supply of oats in the Upper Midwest and Midwest, closer to major processing hubs in Minneapolis, MN, Cedar Rapids, IA and St. Ansgar, IA would reduce transportation costs and represent savings throughout the oat supply chain.

Agronomic and Economic Benefits for Farmers

According to some research, cash crop yields suffer yield reductions when grown in short rotations (2-year) or monoculture. These studies claim that corn yield is reduced 7-36%, soybeans 8-20%, barley 11-19% and wheat 9-20% (Bennett et al, 2012). A combination of factors all resulting from poor soil health are the major causes of reduced crop yields in low diversity systems. Extended crop rotations can agronomically out-perform low diverse systems while staying economically competitive despite lower market prices for small grains or forage. Two cropping systems, corn-soybean (2-year) versus corn-soybean-oats with an underseeding of red clover (3-year) profited similarly during 2008-2013. The 2-year rotation averaged \$403 return to land and management per acre while the 3-year rotation averaged \$418 per acre. Although gross returns were higher in the 2-year \$744 per acre compared to \$647 per acre in the 3-year, costs of production were drastically less in the 3-year (\$229 per acre) than the 2-year (\$341 per acre). Diversifying a corn and soybean system also yielded 5% greater corn and soybeans yields than in the 2-year (Davis, et. al., 2012, Liebman communication). Adding diversity is one of the best

ways to control costs, improve the bottom-line and increase yields of major cash crops in Iowa and southern Minnesota.

Bioservice Benefits of Rotations

Extended crop rotations offer many bioservices without necessarily sacrificing crop yield or profit. Living cover, the time which land is covered, is increased because warm season plants (corn and soybeans) grow at different times of the season than cool season plants (oats and red clover). Increased living cover improves nutrient cycling by feeding the soil microbes for longer periods of time, reducing extreme soil temperatures and improving soil properties like bulk density, particulate organic matter and potentially mineralizable nitrogen. Bulk density improves water infiltration while particulate organic matter and potentially mineralizable nitrogen allow for less purchased nitrogen inputs while maintaining crop yields in a study at Iowa State University. In that same study, 96% less pounds of herbicide was needed to control weeds in the 3-year rotation compared to the 2-year rotation which resulted in freshwater toxicity levels two orders of magnitude lower. Lastly fossil fuel usage for the 3-year rotation was half that of the 2-year rotation mainly due to reductions in needed purchased fertilizers to maintain crop yields.

Better Seed Varieties Available

Modern oat varieties tend to offer excellent yields and test weights. Oat breeding programs have developed varieties that are resistant to crown rust, the most widespread and damaging oat disease. In 2009, NAMA oat millers pledged \$510,000 to the “North American Collaborative Oat Research Enterprise” (North American CORE) a global oat research project with a mission to improve the genetic map of the oat. In partnership with USDA, this effort has developed modern tools for utilization of molecular technologies for oat improvement and a database of high performing oat varieties that can be adapted and selectively bred to perform in Iowa and Minnesota. These new varieties are ready to be tested in states like Iowa and Minnesota with their warmer summers.

The Sustainable Food Lab in partnership with General Mills, Grain Millers, Albert Lea Seedhouse, and Practical Farmers of Iowa is supporting the scoping of the potential for adding a third crop to the corn/soy rotation, along with identifying the commercial, agronomic, and ecosystem service rational that will deliver value to the whole supply chain.

Current Reality

Farmers make decisions based on anticipated revenues minus costs, factoring in risk management. There are multiple factors affecting the short-term economics for planting oats.

1. **Agronomic:** Current varieties of small grains are not as biologically adapted to the climate in the Midwest as are corn and soybeans. There is no other region in the world that is capable to producing corn with as much dry matter and protein per ton as in the Midwest. Small grains do not produce as much tonnage and revenues per acre are lower; therefore the short-term business case is weak compared to the benefits of growing corn and soybeans. Most of the oat seed varieties available for planting are adapted to the cooler, drier climates of the Northern Great Plains and are not as well adapted to the growing conditions in the Midwest.
2. **Limited Markets:** Corn and soybeans have multiple uses and multiple markets (industrial, feed, and food grade). Oats have a food grade market and a smaller market for feed and oat straw. There is also a developing market for growing oats as cover crop seed. However, because oats yield less tonnage per acre than corn and soy and receive a lower

price at market, they are not cost competitive when compared to corn or soybean on an annual basis.

“If end users provide a consistent, hedgeable, pricing mechanism for oats, that would go a long way to maintaining a consistent supply side so that people could know that they have a market and are not left holding the product. Putting the demand side in play is a key component to allowing the farmer to de-risk.” – Bob Riley, Feed Energy Solutions

3. **Making Food Grade Specification:** Oats are most valuable as a food grade crop. Oats need to produce a minimum test weight of 38 lbs per bushel to meet food grade specification, in addition to meeting specifications for beta glucan levels. In the Midwest, test weights are generally between 32-34 lbs per bushel, making 38 lbs in an ideal year. The varieties available for planting in the Midwest are largely adapted to the cooler, drier climates of the Northern Great Plains. Climate and growing conditions in the Midwest make it challenging for these varieties to consistently meet food grade specifications without additional post harvest cleaning.¹ Oats and small grains can support a healthy feed ration for dairy, beef, poultry, lactating sows and to a lesser extent finishing hogs; however, the livestock industry has developed alongside the corn and soy industry and the two systems are deeply integrated in continuing to reinforce the reliance on corn and soybeans.
4. **Marketing:** Oats and other small grains do have a diversity of uses and potential markets, however those markets are not as transparent as the markets for corn and soybeans. Farmers in Iowa who are growing oats are generally marketing to other farmers for seed, feed, or oat straw for bedding. It takes time to call different buyers to find the best market for their oat crop and buyers are not found easily, while a farmer can take their corn or soybean crop 25 miles in any direction and find a place to sell it. If a farmer is able to contract their oat crop, but does not make food grade specifications, they are left with no market and frequently limited capacity to store their grain until they find another buyer. Commodity corn and soybean markets rarely scrutinize or grade the grain being purchased so farmers have little risk to sell their product to their delivered market.
5. **High costs of land rent:** Land prices in Iowa are in the range of \$230-\$270/acre² and in Minnesota rents range from \$82-\$245/acre.³ It costs roughly \$433-\$570 to grow an acre of oats with land rent as one of the highest fixed costs in equation. If a farmer can raise 80-100 bu of oats/acre at \$3.50/bu they are losing between \$300-\$150 per acre.⁴ If the farmer can sell the straw they might break even. Developing alternative markets like oat straw and seed reduce losses and results in break even or profitable acres. At today's prices farmers are also losing on corn, but are compensated by revenue protection through crop insurance. Corn and soy farmers are willing to gamble on good times and bad times in the commodity cycle, because revenue protections are in place for these two crops. The price of oats has remained relatively stable over the years at \$3.50/bu. On one

¹ An oat crop can be cleaned to select for the higher test weight oat. The lower test weight oats can be separated and sold for cover crop seed or animal feed.

² <https://www.extension.iastate.edu/agdm/wholefarm/html/c2-10.html>

³ <http://www.cffm.umn.edu/publications/pubs/farmmgttopics/rentalrates.pdf>

⁴ <https://www.extension.iastate.edu/agdm/crops/html/a1-20.html>

hand price stability is a plus, on the other there is little immediate market incentive (Personal Communication, Margaret Smith, ISU Extension).

6. **Crop Insurance:** Crop insurance will solidify or reinforce any market incentive for a crop. The higher the input costs and returns on the crop the more reinforcement there is between the importance of insurance and the market incentive. The current paradigm is that crop insurance for oats cannot compete with crop insurance for corn and soybeans because the oat has a lower economic return per acre (yield and price). When a farmer introduces an alternate crop into their corn and soy rotation they are shifting acres away from the more desirable benefits of carrying crop insurance for those crops. Even with corn and soybean prices low, crop insurance models are based on historic prices and yield averages by county. Current crop insurance as part feedback loop in reinforcing market incentives may be an even greater disincentive for oats and small grains on rented acres. The crop insurance incentive benefit may be even strong in cases where farmers are renting acres. Over 50% of farmers in Iowa rent land. If farmers lose corn acres on rented land, both short-term value and the perceived future value of the land for the landowner may affect the farmer's ability to continue to farm those acres and provide a disincentive for both the farmer and the landowner to consider a third crop in rotation.

7. **Access to credit:** In general, farmers will need to access a line of credit prior to planting season in order to purchase the necessary seed and inputs required to grow their crop. Often, banks require insurance to help mitigate their risk. Oats have much lower seed and input costs than corn and soybeans, but the bank may still not choose to take a risk on a crop where the business case is not clear, market not transparent, and insurance less desirable. The same is true for accessing credit to invest in equipment for planting and harvesting small grains.

8. **Infrastructure:** It is unclear how much of a barrier infrastructure is. The storage and processing infrastructure exists, however, the market for oats and small grains is so small in Iowa that there is limited incentive for an elevator to divert storage and processing capacity to a crop that would not fill a bin and would require cleaning out processing equipment to run small batches. For this reason, if farmers are far from a Grain Millers or General Mills processing plant, the transportation costs for getting the grain to market can significantly disincentivize production, especially if there is no guarantee that the grain will meet the company's specifications once at the mill. Corn and soybean farmers typically have multiple markets within 25 miles of their farm and no scrutiny on the quality of the grain. Corn and soybeans are not graded and rarely rejected based on quality. Most farmers are willing to haul a small grain up to 50 miles before transportation costs become a factor. On farm storage, seeding, and harvesting capacity is also limited. Many farms no longer have combines and harvesting equipment that can be retrofitted for small grains. Livestock farms that still plant acres to grow their own feed and forage are more likely to have the necessary equipment, but the majority of corn and soybean farmers' equipment can be expensive to retrofit for small grain planting and harvesting. Storage also varies greatly from farm to farm. Inadequate post-harvest handling of grain potentially from lack of wooden storage facilities can result in lower quality grain when it comes time to deliver to market. Adequate storage adds value to a farmer's crop and gives the farmer flexibility in being able to hold on to the grain until the right buyer comes along, or until the buyer is able to take the grain for further processing. However, because Iowa has 1.43 billion bushels of on-farm storage capacity, the greatest on-farm storage capacity in the country, it is more likely that challenges

around inadequate storage are the result of lack of knowledge on how to store grain properly and the ability to adapt current storage to small grains.

All of the above factors add up to a business case that doesn't immediately deliver value back to the farmer.

- Limited marketing opportunities and distance to markets
- Crop insurance and cost of land dis-incentives for the farmer on owned and rented acres
- Additional on farm storage and equipment investments that are not justified by market signals
- Lack of knowledge on how to store and market small grains
- Difficulty accessing a line of credit from bank
- Uncertainty about seed varieties being able to attain yield, test weights, and food grade specifications

These short-term challenges don't necessarily outweigh the long-term benefits of rotations with small grains and livestock forage, but overcoming the challenges would take a coordinated systems approach.

"You have to be able to work out the business case for the rotation to improve the corn yield. If you can make that case in a simple, data backed presentation, with farmers who are also trialing, you have the best chance to make progress. " – Jim Smith, B&B Feed

Optimism for oats and small grains

"Farmers would love to have another crop in their rotation. The biggest barrier is needing a market for those small grains and convincing farmers that high quality oats can be grown in Iowa and southern Minnesota."

"There is a lot of opportunity and interest in diversification and growing other crops. In addition to cover crops and soil health bombardment – farmers are thinking a little bit differently about how they need to produce and make a profit and they are looking at new options." – Wendy Johnson, Farmer

Beyond the short-term business case for oat and small grains, there is a more complex long-term business case for the production of a third crop in rotation.

- Small grains reduce workload during the fall harvest
- Small grains reduce input costs and can increase or maintain corn/soy yields
- Livestock brings an additional market and manure to the rotation
- Small grains have a consistent and reliable market
- Small grains have small but growing seed market
- Oats and other small grains have an additional market for straw

What's needed to build a better case

Science has to prove the value of small grains in the rotation and how they can improve the profitability of corn/soy crops. Additional economic and agronomic modeling that factor in different market scenarios and incentive packages is needed to better understand where the key entry points are for transitioning acres to small grains. These models could result in enterprise

budgets and agronomic best management packages. They would also help determine at what scale (# of acres) and at what volumes of production would be needed to develop a functioning market.

Farmers need to be able to share with other farmers real life economic stories to support the science.

Agronomists and trusted Ag Service Advisors need to build out the different types of management systems that work at different scales and develop an agronomic best management plans that includes types of equipment to use, input packages, subscriptions to the Minnesota fungal weather patterns model, etc..

Incentives need to line up with the approach:

- Payments through the state for small grains, similar to the cover crop payment program
- Better crop insurance models
- Innovative risk sharing between buyers and farmers through contracts and increased transparency of demand

On-farm pilots:

A crucial next step will be to pilot different varieties with about 10 farmers, and these trials could be coupled with water quality and ghg monitoring to:

- show benefits and make case for the third crop strategy to be incorporated into Iowa Nutrient Reduction Strategy and access cost share money
- build case for food grade varieties and secure food, feed and other small grain market opportunities
- create opportunities for field days and a broad messaging campaign

The best places to pilot are Mitchell and Middle Cedar counties in NE Iowa, close to markets in Cedar Rapids and St. Ansgar and with proximity to livestock.

Promotion day:

Buyers could host an informational meeting along with farmer organizations and extension. The purpose of the meeting would be to outline the demand, make the business case, provide an agronomic and economic overview and set up contracts.

Cooperatives: Exploring building out buying cooperatives together with a grower cooperative for a particular product.

Who should be involved:

- Markets: Grain Millers, General Mills, Quaker, Dairy/Beef
- Extension: Matt Liebman, ISU – to speak to the agronomic/economic case
- Farmers: convincing and authentic farmers who are innovating successfully with small grains and oats.
- Coops: there are very few coops in Iowa that take oats – a conversation is needed with coop as to why they aren't taking small grains
- Farmer organizations: Iowa Soybean Association, Practical Farmers of Iowa, Iowa Water Agricultural Alliance, Iowa Cattleman's Association, Iowa Dairy Federation, Farm Bureau
- Coordinator: Sarah Carlson to coordinate the work on the ground and string the supply chain together.
- Seed Breeders: seed that is specifically developed for Iowa and the Midwest

- Equipment/Implement companies: for the technology to seed and harvest oats
- USDA: FSA – for storage equipment loans, RMA- for crop insurance policies that reward an extended rotation and offer small grain policies or written agreements more easily
- State Department of Agriculture: Incorporate third crops in rotation into Nutrient Reduction Strategy and offer incentive payments
- Funder:

Interviews completed as of 4/27/15

Food and Beverage Companies:

Kelloggs	Amy Braun
General Mills	Steve Peterson/Tom Rabey
PepsiCo/Quaker	Michael Pritchard

Livestock Producers:

Dairy

Craig Lane

Beef

Dave Petty

Hog

Iowa Pork Producers Association

Tyler Bettin

Co-op/Feedmill/Grain Elevators:

Feed Energy

Bob Riley

Processors:

Bay State Milling

Dan Collins
Bruce Roskens/Sam

Grain Millers

Rasner/Jessie VanderPoel

Extension/Agronomic Services:

ISU Extension

Brian Lang

ISU Extension

Margaret Smith

UMN Extension

Jocham Wiersma

NCAT

Jeff Schahczenski

Seedhouses

Albert Lea Seedhouse

Mac Ehrhardt

B&B Farm Store (they are a mill also)

Jim Smith

Growers

Century Farm

Wade Dooley

Tim Smith

Card Farms

Craig Fleishman

Wendy Johnson

Jerry Peckumn

Mike Gaul

Dick Sloan

Other:

Iowa Agriculture Water Alliance

Sean McMahon