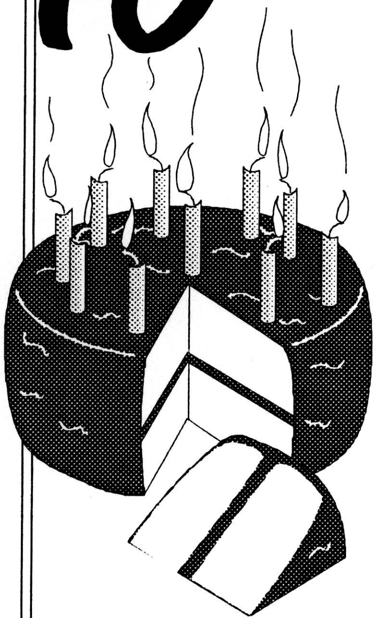
SARE Project LNC92-44

PFI

10th Anniversary Celebration!



Practical Farmers of Iowa

1994 MEMBERSHIP MEETING AND ON-FARM TRIALS REPORT

Friday–Sunday, January 6–8, 1995

Starlite Village Inn, Ames

Annual Meeting Schedule

Room:	AB	C	DEF	G
Friday				
Reception	Room 129, 7:00 –			
Bring Your Own Videos				7:00 –
"Hymns and Herds" music and slides	7:30 – 8:30			
Saturday				
Registration Opens	7:30			
Welcome, Introductions	8:30			
Sustainable Agriculture Achievement Award	9:15			
Morning Address: Paul Johnson	9:30			
Morning Break	10:30 – 11:00			
Morning Workshops				
Sustainable Communities	11:00 – 12:00			
A Decade of CRP			11:00 – 12:00	
Cropping Systems for Integrated Farming				11:00 – 12:00
Lunch		12:00 – 1:30		
Slide Scrapbook and Recognitions		1:15		
Alan Henning: Creating Healthy Pastures	1:30			
Posters and Displays	2:30 – 3:30			
Afternoon Workshops				
Women's Experiences in the Transition to Sustainable Agriculture	3:30 – 5:00			
Alternative Pork Production Systems		3:30 – 5:00		
Controlled Grazing			3:30 – 5:00	
Soil Quality				3:30 – 5:00
Afternoon Break	5:00 – 6:00			
Dinner		6:00 – 7:00		
Featured Speaker: Wendell Berry	7:00			
Community Dance	8:30 – 10:30			
Sunday				
Ecumenical Service	10:00			
PFI Annual Business Meeting	11:00			

1994 ANNUAL MEMBERSHIP MEETING
10TH ANNIVERSARY CELEBRATION
AND ON-FARM TRIALS REPORT
PRACTICAL FARMERS OF IOWA

Friday (January 6)

10:30 – ***Shared Visions*** **community groups networking conference**

Evening: (Check-in)

7:00 – **Reception in Room 129, VCR for sharing videos in Room G**

7:30 – 8:30 ***Hymns and Herds*** **– music and visual presentation by Tom Morain, Living History Farms – *Shared Visions* and all PFI members**

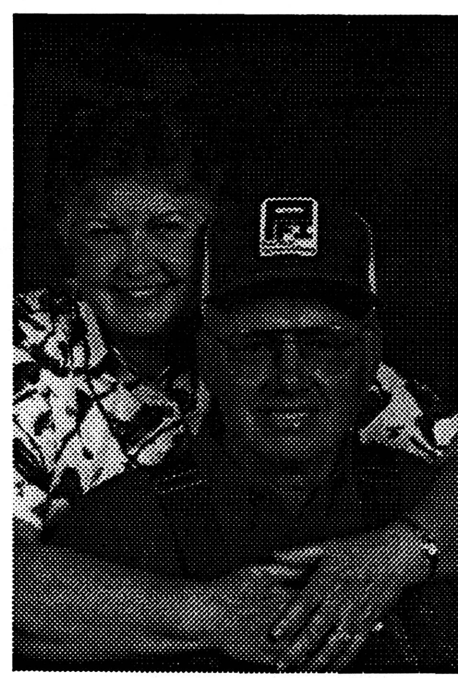
Saturday (January 7)

7:30 – **Registration Opens**

8:30 – 9:15: Welcome and Introductions: PFI President Vic Madsen, Jr.

9:15 – 9:30: Presentation: PFI Sustainable Agriculture Achievement Award by Larry Kallem, Director of the Iowa Institute for Cooperatives to Richard and Sharon Thompson.

This award was conceived as a way for PFI to honor those outside of the organization, not as a way for the organization to "pat itself on the back." However, at the tenth anniversary of PFI's founding, the board of directors unanimously made an exception to this policy in order to recognize the two people who, more than anyone else, deserve credit for Practical Farmers of Iowa and the farmer-based sustainable agriculture movement that we have in this state. Richard and Sharon Thompson, of Boone, are the 1994 recipients of the Sustainable Agriculture Achievement Award. They served on the provisional board of directors, which met in their home. Dick was the organization's first president, and he now serves as treasurer and Executive Vice President.



Richard and Sharon Thompson are the recipients of the PFI Sustainable Agriculture Achievement Award.

9:30 – 10:30: Paul Johnson, Morning Address
.... Room AB

Introduction by Ronald Rosmann, Harlan

Paul Johnson is Chief of the United States Natural Resources Conservation Service. Before taking that post he farmed and

(Continued on next page.)

served in the Iowa House of Representatives, where he was instrumental in developing the consensus that led to passage of the Iowa Groundwater Protection Act of 1987. That legislation has been a model nationally for its emphasis on research, education, and voluntary approaches to water quality. Johnson has been a PFI member since 1990. Mr. Johnson believes one of the most important challenges of our time is to learn to live in harmony with the land.

In addition to the Saturday morning address, Paul Johnson will lead a morning workshop on the future of the Conservation Reserve Program, and he will sit in on Dr. Doug Karlen's afternoon workshop on soil quality.

10:30 – 11:00: Break

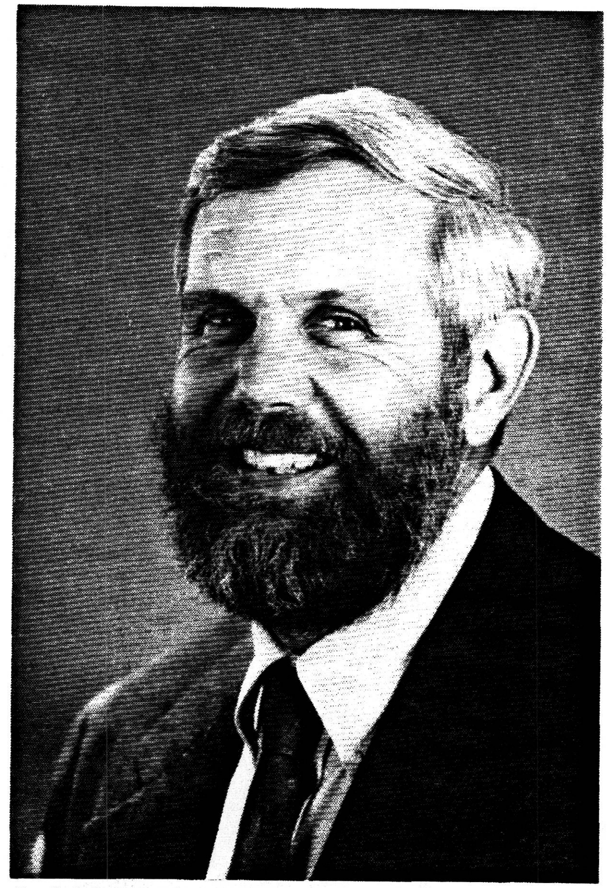
11:00 – 12:00: Workshops (select one)
A Decade of CRP .... Room DEF
Cropping Systems for Integrated Farming .... Room G
Sustainable Communities .... Room AB

12:00 – 1:30: Lunch .... Room C and Poolside
1:15: Scrapbook Slides, Recognitions .... Room C

1:30 – 2:30: Alan Henning: *Creating Healthy Pastures* .... *Room AB*
Introduction by Tom Frantzen

Alan Henning is a grazing consultant who, with his wife Gerardine, runs a 120-acre demonstration dairy farm near Madison, Wisconsin. Henning, who is originally from Illinois, learned the art of controlled grazing before it gained popularity in this country. After studying grass-based dairying in New Zealand, Asia, Russia, and Europe under a Fulbright Grant, Alan Henning farmed in New Zealand for sixteen years.

In 1988 Henning returned to the United States to promote grassland farming and low-cost ideas through on-farm consulting.



Paul Johnson, Chief of the Natural Resources Conservation Service and former Iowa legislator.

Henning has done work for several PFI farmers in northeast Iowa and was featured at the 1993 field day of Lynn and Linda Stock, near Waukon. In addition to this talk, he will also lead the controlled grazing workshop at 3:30.

2:30 – 3:30: Posters and Displays .... Rooms B, C, and hallway

More than 40 posters and displays are scheduled, featuring ideas from young people and members, projects from other organizations, and 1994 PFI on-farm research by cooperators and *Sustainable Projects* recipients. Presenters will be by their posters and displays in this hour. Posters and displays may also be viewed from 5:00 to 6:00.

3:30 – 5:00: Workshops (select one)
Women's Experiences in the Transition to Sustainable Agriculture .... Room AB

Controlled Grazing
. Room DEF
Alternative Pork Production Systems
...... Room C
Soil Quality
...... Room G

5:00 – 6:00: Break

6:00 – 7:00: Dinner
...... Room C

7:00 – 8:00: Wendell Berry, Featured Speaker: *Conserving Communities*
... Room AB
Introduction by Richard Thompson

Alan Henning (at right) makes a point at Lynn and Linda Stock's 1993 field day.

Wendell Berry is a writer of books and poetry that touch on agriculture, rural culture and values. His books include *What Are People For?, The Unsettling of America*, and many works of poetry and fiction.

Wendell Berry farms near Port Elizabeth, Kentucky, with his wife Tanya, and he teaches at the University of Kentucky. He agreed to return to Iowa at the invitation of PFI members Richard and Sharon Thompson, who have known Berry for some time. Along with rural sociologist Cornelia Flora, Wendell Berry will take part in

(Continued on next page.)

Kentucky farmer and author Wendell Berry will speak on *Conserving Communities.*

(Photo courtesy of Dan Carraco, Carrollton, KY)

the morning workshop on sustainable rural communities, and he will be part of the ecumenical service Sunday morning.

8:30 – 10:30: Community Dance!
The Pretty Good Band* with caller/teacher Mary Jo Brearley – *squares, schottisches, waltzes, contras, polkas, and two-steps.

WORKSHOPS

***A Decade of CRP**: Paul Johnson (moderator: Ron Rosmann)*
As the first Conservation Reserve Program contracts approach expiration, questions surround the program. How was it good? How was it harmful? Will it be continued in some form? As Chief of the SCS, Johnson oversees the agency that administers the CRP. He will share his insights and discuss with participants their own experiences.

***Sustainable Communities**: Wendell Berry, Cornelia Flora (moderator: Gary Huber)*
How do communities build on their strengths to make a future? What are Iowans doing to strengthen their community through the *Shared Visions* program? Wendell Berry is a national voice for rural life. Cornelia Flora is a rural sociologist who has helped place the issue of community viability into the context of sustainable agriculture. Gary Huber is PFI project director for *Shared Visions: Farming for Better Communities*.

***Cropping Systems for Integrated Farming**: Mohammed Ghaffarzadeh, Rick Cruse (moderator: Rick Exner)*
Mo Ghaffarzadeh and Rick Cruse have been among the Midwest's most visible researchers, conducting on-farm research into berseem clover, narrow strip intercropping, and other technologies that reward the management and skills of Iowa producers. Come join them for a "cutting edge," update and offer your own experiences and discoveries.

***Controlled Grazing**: Alan Henning (moderator: Tom Frantzen)*
Intensive rotational grazing can benefit almost any kind of stock. Alan Henning says whatever your livestock, the principles of good grazing are much the same. Come and discuss the ins and outs of putting pasture to work.

***Transition to Sustainable Farming Systems: Women's Experiences**: Regina Striegel, Irene Frantzen, Pam Cowles, Sheryl Wilson (moderator: Margaret Smith)*
What different roles do women assume when families make changes to alternative farming systems? How do these changes affect family relationships, personal stress levels, women's involvement in the farming operation, and interactions within the community?

***Alternative Pork Production Systems**: Dave Stender, Dan Wilson (moderator: Vic Madsen)*
Dave Stender is an Extension swine field specialist in northwest Iowa. His comments appeared recently in *National Hog Farmer Magazine*. Dan Wilson is a PFI member who pasture farrows in O'Brien County. In September he travelled to Sweden to learn about low-stress confinement systems used there.

***Soil Quality**: Doug Karlen (moderator: Jeff Olson)*
The term "soil quality" is heard a good deal, but what do we really mean by it? What do we know about the benefits of soil microbial life, earthworms, and tilth, and how can we manage to achieve those benefits? Dr. Doug Karlen is a soil scientist with the USDA National Soil Tilth Laboratory who has worked on studies comparing farming systems – including one that involved PFI members Dick and Sharon Thompson. He will describe what the Tilth Lab is learning about soil quality.

Sunday (January 8)

8:30 – 10:00: Brunch on Your Own

10:00 – 11:00: Ecumenical Service
.... Room AB

11:00 – 12:00: PFI Annual Business Meeting
.... Room AB

Origins of Practical Farmers of Iowa

In the winter of 1984-1985, Larry Kallem and Richard Thompson began discussing the need for a group to share information about farming methods that are profitable and environmentally sound. After a well-attended series of "Biological Farming" workshops organized by Iowa State University professor Robert Dahlgren, a small group joined together around Kallem and Thompson to form an organization they called Practical Farmers of Iowa (PFI). Since 1985, PFI has steadily grown in size and become widely known for its involvement in sustainable agriculture. Membership is now approximately 500, and PFI has been noted in newspapers and magazines as far away as Dallas, Texas, Japan, and the Netherlands. In 1991 PFI received the Robert Rodale National Environmental Achievement Award for on-farm research in collaboration with Iowa State University.

Who are the Practical Farmers of Iowa?

PFI is a non-profit membership organization. The majority of PFI members are voting members. Voting members derive a significant income directly from farming in Iowa, while associate members do not. Voting members in each of five PFI membership districts elect a board of directors that governs the organization. The 1994 PFI Board of Directors are listed at the back of this booklet.

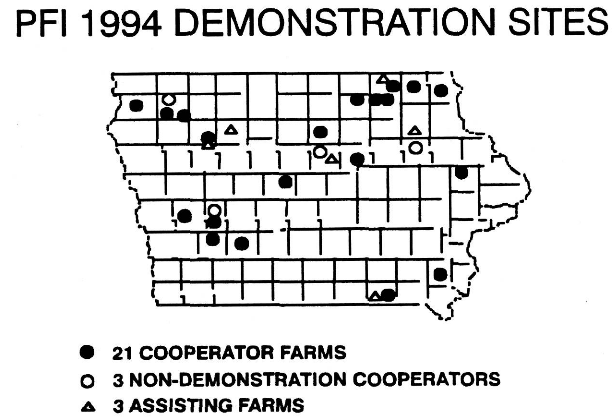


Figure 1. PFI 1994 on-farm demonstrations.

Though PFI members are spread across the state, a common thread among them is that they are all looking for ways to more efficiently use resources. As a consequence, PFI has a higher proportion of farmers who band herbicides, use small grains and forages in crop rotations, analyze soil nitrate levels to set nitrogen fertilizer rates, and use alternative tillage and grazing practices.

What Does Practical Farmers of Iowa Do?

Practical Farmers of Iowa neither sells production input products nor endorses them. PFI is affiliated with no other organization, though it seeks to work with many. PFI leaves farm policy and politics to other organizations. Rather, the guiding philosophy of PFI is that priority should be given to developing farming practices that will result in higher net income for farmers, that will be less threatening to the health of farm families and the viability of rural communities, and that will better protect the productive capacity of the land. Given this guiding philosophy, the two primary focuses of PFI are:

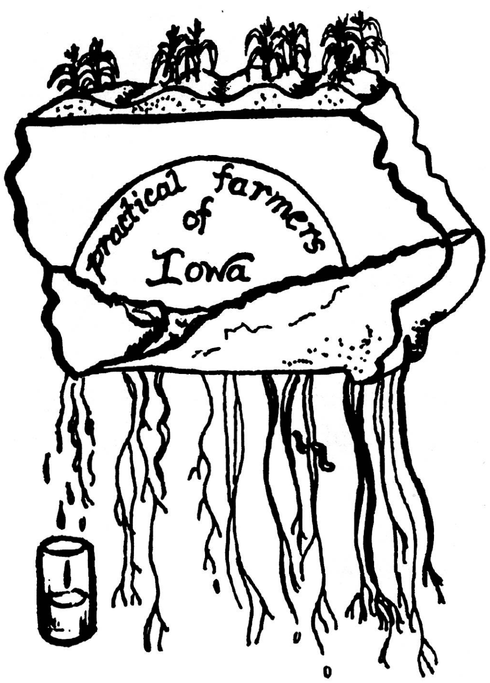
1. Generating information about profitable, environmentally sound, community-supportive farming methods;
2. Sharing the information with others.

(Continued on next page.)

Generating Information

PFI's way of generating information about farming methods is perhaps the group's most notable feature. Each year a subset of PFI members who are called "cooperators" conduct on-farm trials using a research design developed with university researchers. Since 1987 PFI cooperators have conducted 386 replicated trials using this design. The topics examined most often have been nitrogen rates and weed management techniques. In 1994 approximately 38 replicated trials were carried out by PFI cooperators and *Sustainable Projects* recipients. The map in Figure 1 shows the locations of the farms of these cooperators, and the results of their trials begin on page 10.

Beyond the replicated on-farm trials, PFI members and cooperators conduct a variety of demonstrations of different farming methods and technologies. These include such diverse things as intensive rotational grazing, grass buffer strips for erosion control, no-till corn into alfafa sod, commercial hothouse tomato and strawberry production, grain amaranth, shredded newspaper for livestock bedding, and low-investment facilities for hog production.



Sharing Information

PFI uses a variety of methods to share information with others. One is farm field days, at which PFI cooperators host farmers and others who are interested in sustainable agriculture. Another is with winter meetings in each PFI membership district, plus the annual statewide winter meeting in Ames. Results and experiences from field trials are discussed, as are a variety of non-replicated demonstrations of techniques such as controlled grazing. A third way is through a quarterly newsletter, *The Practical Farmer*, that features articles on the experiences of PFI farmers. People can receive the newsletter for the cost of a membership, which is $10 per year, $25 for three years. A fourth method of sharing PFI information is invited presentations at workshops, seminars, and meetings, which is a common activity for cooperators.

A fifth way that PFI shares knowledge and information is through informal, farmer-to-farmer communication with peers, whether this be during a visit to the bank or local coop, or while socializing during church suppers or card clubs. PFI's strength is that its members live in and are part of rural communities. When combined with the fact that the knowledge they possess comes from personal experiences on working farms, this local orientation provides unique opportunities to disseminate information to other farmers.

A PFI initiative is the education of youth on sustainable agriculture practices and concepts. Data from the 1987 Census of Agriculture showed that nearly 9,000 Iowa farmers were 70 or older, and about 7,800 more were from 65 to 69. Thus, in a few more years over 16,000 Iowa farmers will either pass away or be over 75 years old. While these numbers point to a need to help young people start farming, the education of young people about sustainable farming is the immediate concern of the PFI youth education program. The youth education program includes several projects, with the larger view of using the expertise of PFI members for youth education.

Shared Visions: Farming for Better Communities

During 1992 the PFI board of directors spent time discussing ways to encourage sustainable farming systems. These discussions came from a recognition that while on-farm trials were important, more was needed to counter the harmful impacts of the dramatic changes occuring in farming in Iowa. The result was *Shared Visions: Farming for Better Communities.*

Shared Visions is a collaborative program of PFI, Iowa State University Extension, and the Leopold Center for Sustainable Agriculture. *Shared Visions* is supported in part by a grant from the W.K. Kellogg Foundation's Integrated Farming Systems Initiative. Its purpose is to develop community-based groups that will provide the support and teamwork needed for the acceptance and use of sustainable systems of farming.

Shared Visions supports two networks. One is a network of community-based groups whose development and actions are aimed at encouraging an atmosphere of acceptance for farming systems that are financially and environmentally sustainable. The other is a network of farmers who conduct on-farm research. The first is new, while the second has been a foundation of PFI almost since its inception.

Elements of the Community Groups Network

- *People work together at the community or neighborhood level on issues they identify as important.* Top down approaches to problems seldom work. Solutions need to come from the inside out – they need to originate from people living in rural communities.

- *Local groups include both farmers and townspeople.* As Tom Frantzen, former PFI board president, explains, "We need to learn to need each other."

- *Group activities are directed toward developing and implementing local projects.* Groups create a "shared vision" of desirable farming systems for their community and then develop projects to help achieve their vision. Some projects may test ideas that put money into the pockets of farmers while protecting the environment. Others may focus on adding value locally to items produced on area farms. Still others may focus on substituting local inputs for those coming from outside the community.

- *Members of rural communities develop leadership skills.* Dick Thompson, a founder of PFI, has

SHARED VISIONS

farming for better communities

said, "We can grow people as well as crops." On-the-job leadership training is a key element of the community groups network.

- *Experiences of individual groups are multiplied by linking groups with each other.* Networking activities include an annual conference, the PFI newsletter, and annual lateral visits in which members of one group visit the community of another.

During 1994 four groups were involved in the community groups network. These groups were from Davis County, Poweshiek County, Adair County, and the Grundy/Hardin County area. In December of 1994 an additional five groups were selected for involvement in the community groups network. These groups are from Louisa County, Audubon County, Benton County, Story County, and a nine-county area in southwest Iowa.

On Friday, January 6, 1995, representatives of eight of these groups came to Ames to participate in an annual networking conference. The agenda for this one-day conference appears at right. Additionally, many participants planned to stay for the PFI annual meeting the following day.

Friday, January 6 Networking Agenda

10:00 – 10:30 am - Check into rooms
10:30 – 10:45 - Welcoming Remarks
10:45 – 11:15 - Group/Individual Introductions
11:15 – 11:30 - Break
11:30 – 12:15 pm - *A Farmer's Observations about Building Trust* - Tom Frantzen, Practical Farmers of Iowa
12:15 – 1:00 - Dinner (together)
1:00 – 2:00 - Continued Group/Individual Introductions
2:00 – 4:15 - *Diverse Personalities – Unified Action* - Mary Foley and Betty Wells, ISU Extension
4:10 – 4:30 - Break
4:30 – 6:00 - Pilot Group Presentations & Discussion (10 minute presentation plus 10 minute discussion per group) -possible topics:
- who is involved and why
- description of vision
- description of project
- problems encountered/ lessons learned

6:00 – 7:30 - Supper (together)
7:30 – *Hymns and Herds* - Music and Slide Presentation - Tom Morain, Living

Reading the Numbers, Knowing the Terms

Valid and reliable farmer-generated information is a cornerstone of Practical Farmers of Iowa. Consequently, PFI has worked to develop practical methods that safeguard the accuracy and credibility of that information. PFI cooperators use methods that allow statistical analysis of their on-farm trials. Chief among these are: 1) "replication," and 2) "randomization." (See Figure 2., a typical PFI trial layout.) The farming practices compared in a trial are repeated, or "replicated," at least six times across the field. Thus trial results do not depend on a single comparison only, but on six or more. The order of the practices, or "treatments," in each pair is chosen with a flip of the coin. This "randomization" is necessary to avoid unintentional bias. PFI on-farm trials have been recognized for their statistical reliability. So, while PFI cooperators don't have all the answers, they do have a tool for working toward those answers.

When you see the outcome of a PFI trial, you also see a statistical indication of how seriously to take those results. The following information should help you to understand the reports of the trials contained in this document. The symbol "*" shows that there was a "statistically significant" difference between treatments; that is, one that probably did not occur just by chance. We require ourselves to be 95% sure before we declare a significant difference. If, instead of a "*," there is a "N.S.," you know the difference was "not significant."

There is a handy "yardstick" called the "*LSD*," or "least significant difference," that can be used in a trial with only two practices or treatments. If the difference between the two treatments is greater than the LSD, then the difference is significant. You will see in the tables that when the difference between two practices is, for example, 5 bushels (*or minus* 5 bushels, depending on the arithmetic), and the LSD is only, say, 3 bushels, then there is a "*" indicating a significant difference.

The LSD doesn't work well in trials with more than two treatments. In those cases, *letters* are added to show whether results are statistically different from each other. (We usually use something called a Duncan multiple range grouping.) The highest yield or weed count in a trial will have a letter "a" beside it. A number with a "b" next to it is significantly different from one with an "a," but *neither* is statistically different from a number bearing an "ab." A third treatment might produce a number with a "c" (or it might not), and so on.

Average 1994 statewide prices for inputs were assumed in calculating the economics of these trials. Average fixed and variable costs and time require-

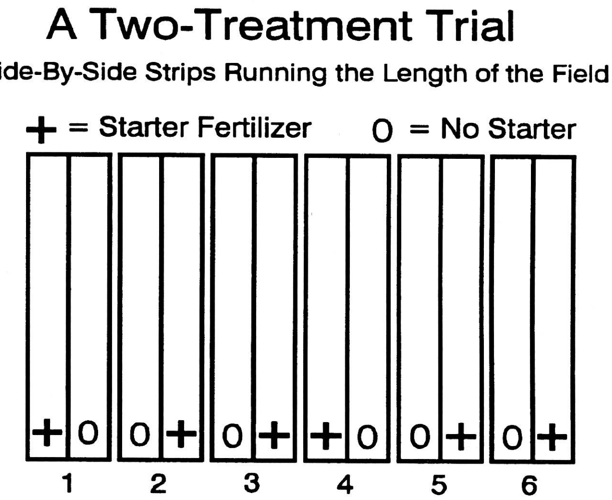


Figure 2. A typical two-treatment PFI trial.

ments were also used. These can vary greatly from farm to farm, of course. The calculations use 1994 prices of $2.00 per bushel for corn, $5.30 for soybeans, and $1.30 per bushel for oats. Labor was charged at $8.00 per hour.

Some tables show both a "*treatment cost*" (which includes relevant costs, but not the total cost of production) and "*treatment benefit.*" The treatment benefit is the *relative* advantage of a practice compared to the least profitable treatment in that trial, which is often assigned a treatment benefit of $0. If there are no significant yield differences in the trial, treatment benefit is calculated solely from input costs. If the yield of a treatment is significantly different from that of the least profitable treatment, then that difference in bushels is also taken into account to calculate treatment benefit for the more profitable practice.

Dollar amounts shown in parentheses ( ) are *negative* numbers. A treatment "benefit" that is a negative number indicates a relative *loss*. The highest-yielding practice doesn't always have the greatest treatment benefit. You will see that sometimes the additional input costs of a practice outweigh its greater gross return.

This on-farm research and demonstration program has been supported, in part, by Iowa State University Cooperative Extension, the W.K. Kellogg Foundation, The Leopold Center for Sustainable Agriculture, and the Sustainable Agriculture Research and Education program of the United States Department of Agriculture.

(Continued on next page.)

Table 1. STARTER & OTHER FERTILITY TRIALS

COOPERATOR	CROP	TREATMENT "A"		TREATMENT "B"
		DESCRIPTION	YIELD (bu.)	DESCRIPTION
ALERT	SOYBEANS	STARTER, 2" BELOW SEED	46.2	NO STARTER
DAVIDSON	SOYBEANS	STARTER FERTILIZER	37.6	NO STARTER
STONECYPHER	CORN	STARTER ON SEED	143.1	NO STARTER
ROSMANN	SOYBEANS	45 LB/ACRE ROCK PHOSPHATE	69.0	7.5 LB/ACRE ROCK PHOSPHATE
TIBBS	SOYBEANS	BANDED 22+70+90	54.5	NO FERTILIZER
FRANTZEN	CORN	80+8+50 AFTER BERSEEM CLOVER	171.1	20+8+50 AFTER BERSEEM CLOVER
LUBBEN	SOYBEANS	ACA W. HERBICIDE ON 6/27	62.7	NO ACA, JUST HERBICIDE
OLSON	SOYBEANS	GROZYME™ /AGRI-SC™ PREPLANT BAND	63.9	ZERO CHECK
OLSON	CORN	GROZYME™ /AGRI-SC™ POST BAND	165.2	ZERO CHECK
STOCK	SOYBEANS	ACHIEVE™ & REMEDY™ PREPLANT BROADCAST	54.0	ZERO CHECK
STOCK	CORN	ACHIEVE™ & REMEDY™ PREPLANT BROADCAST	159.5	ZERO CHECK
WURPTS	SOYBEANS	BIOLOGICAL FERTILITY PROGRAM	60.6	ISU FERTILITY RECOMMENDATIONS
WURPTS	CORN	BIOLOGICAL FERTILITY PROGRAM	184.7	ISU FERTILITY RECOMMENDATIONS

Here is one more thing to be aware of. Fertilizer shown with dashes between the numbers (18–46–0) means *percent* by weight of nitrogen, phosphate, and potash in the product. Fertilizer shown with plus signs (18+46+0) indicates *pounds per acre* of those nutrients in an application.

The results that appear here imply neither endorsement nor condemnation of any particular product. Producers are encouraged to carry out their own trials to find what works in *their* operations. In reports of trials that involve proprietary products, brand names are included for purpose of information.

TRT "B"	DIFFERENCE				
YIELD (bu.)	YIELD DIFF.	YLD LSD (bu.)	YLD SIG.	$ BENEFIT OF TRT "A"	COMMENT
43.1	3.1	1.9	*	($6.63)	8+24+48 AS 2-6-12 SUSPENSION
37.9	-0.3	1.8	N.S.	($6.33)	2+7+13 AS 2-6-12 1" BELOW SEED. HP204 EDIBLE BEANS
150.6	-7.5	10.9	N.S.	($9.45)	1+6+6 IN STARTER
69.2	-0.3	0.9	N.S.	($3.75)	BLACK PHOSPHATE METERED THROUGH PLANTER INSECTICIDE BOXES. SOIL P1 TEST=21 PPM (HIGH)
53.6	0.8	1.7	N.S.	($33.82)	BEANS PLANTED DIRECTLY OVER FALL DEEP BAND. THREE REPS ONLY.
169.1	2.0	8.1	N.S.	($13.38)	LATE SPRING SOIL NITRATE: HIGH RATE 77 PPM, LOW 71 PPM. STALK NITRATE: 673 PPM HIGH RATE, 605 PPM LOW RATE
62.8	-0.1	2.3	N.S.	($4.14)	UNRANDOMIZED TRIAL, STATISTICS WEAKENED
65.0	-1.0	5.2	N.S.	($10.76)	GROZYME™ SAID TO RELEASE SOIL NUTRIENTS, AGRI-SC SOLD AS SOIL CONDITIONER
164.0	1.2	16.1	N.S.	($10.76)	" "
53.0	1.0	6.3	N.S.	($13.85)	BIOLOGICAL EFFECT SOMEWHAT CONFOUNDED WITH STRIP "SIDE" (NORTH-SOUTH) EFFECT
160.5	-1.0	9.6	N.S.	($13.85)	
60.3	0.3	2.3	N.S.	($8.75)	
187.3	-2.6	7.2	N.S.	($10.11)	

Banded Fertilizers

As in past years, several PFI cooperators evaluated starters and other banded fertilizers in 1994. By now it should be no surprise that results were mixed. Even where these fertilizers increased crop yields, there was sometimes no clear economic advantage.

Doug Alert and Margaret Smith, Hampton, were among the ridge-tillers trying out the deep placement applicator shoe for the Buffalo planter. In

Table 2. MANURE TIMING AND STARTER FERTILIZER

COOPERATOR	CROP	PREVIOUS CROP	YIELD SIGNIFICANCE	TREATMENT "A" DESCRIPTION	YIELD (bu. or T)	STAT.	TRT COSTS	$ BENEFIT
THOMPSON	CORN	SOYBEAN	*	NO MANURE, NO STARTER	165.9	b	$0.00	$0.00
					(PRORATED COST ¤)		$0.00	$0.00
				NO MANURE, STARTER	170.1	ab	$6.37	($6.37)
					(PRORATED COST ¤)		$6.37	($6.37)
	MAIN EFFECT: MANURE TIMING			NO MANURE	168.0	b	$0.00	$0.00
					(PRORATED COST ¤)		$0.00	$0.00
	SUB EFFECT: STARTER FERTILIZER			NO STARTER	168.9	b	$0.00	$0.00
THOMPSON	SOYBEAN	CORN	N.S.	NO MANURE, NO STARTER	69.5	a	$0.00	$43.80
					(PRORATED COST ¤)		$0.00	$35.65
				NO MANURE, STARTER	68.7	a	$22.14	$21.66
					(PRORATED COST ¤)		$22.14	$13.51
	MAIN EFFECT: MANURE TIMING			NO MANURE	69.8	a	$0.00	$21.66
					(PRORATED COST ¤)		$0.00	$13.51
	SUB EFFECT: STARTER FERTILIZER			NO STARTER	70.0	a	$0.00	$22.14

¤ PRORATED MANURE APPLICATION COSTS CALCULATED ON THE BASIS OF NUTRIENT WITHDRAWAL OF THE CROP IN THE FIVE-YEAR ROTATION.

soybeans, the fertilizer, placed two inches directly below the seed, increased yield 3.1 bushels, but the benefit was less than the cost of the 2–6–12 suspension fertilizer (Table 1). In the corn trial, Doug and Margaret compared placement below the seed, two inches to the side, and a no-starter check treatment (Table 3). Their soil tests very high in phosphorus and high in potassium. There was no observable yield difference among the three treatments. Don and Sharon Davidson, Grundy Center, also used the deep banding planter shoe in a soybean trial (Table 1). There was no significant effect on yield. Jeff

MANURE TIMING AND STARTER FERTILIZER

TREATMENT "B"					TREATMENT "C"					
DESCRIPTION	YIELD (bu. or T)	STAT.	TRT COSTS	$ BENEFIT	DESCRIPTION	YIELD (bu. or T)	STAT.	TRT COSTS	$ BENEFIT	OVERALL COMMENTS
FALL, NO STARTER	170.8	ab	$21.66	($21.66)	SPRING, NO STARTER	170.0	ab	$21.66	($21.66)	
(PRORATED COST ¤)			$17.73	($17.73)	(PRORATED COST ¤)			$17.73	($17.73)	
FALL, STARTER	173.8	a	$28.04	($12.24)	SPRING, STARTER	171.0	ab	$28.04	($28.04)	
(PRORATED COST ¤)			$24.10	($8.31)	(PRORATED COST ¤)			$24.10	($24.10)	
FALL MANURE	172.3	a	$21.66	($13.00)	SPRING MANURE	170.5	ab	$21.66	($21.66)	
(PRORATED COST ¤)			$17.73	($9.06)	(PRORATED COST ¤)			$17.73	($17.73)	
STARTER FERTILIZER	171.6	a	$6.37	($0.96)						
SPRING, NO STARTER	70.5	a	$21.66	$22.14						
(PRORATED COST ¤)			$13.51	$22.14						
SPRING, STARTER	69.2	a	$43.80	$0.00						
(PRORATED COST ¤)			$35.65	$0.00						
SPRING MANURE	69.8	a	$21.66	$0.00						
(PRORATED COST ¤)			$13.51	$0.00						
STARTER FERTILIZER	69.0	a	$22.14	$0.00						

and Gayle Olson, Mt. Pleasant, evaluated a planter band too, this one two inches to the side of the soybean seed and consisting of just potash fertilizer (Table 3). There was no yield effect. The potassium soil test there is between medium and high.

The usual method of deep banding involves a separate pass with an implement in the fall. Harlan and Sharon Grau, Newell, took this approach, comparing a fall deep band, fall broadcast, and a no-fertilizer check treatment. The corn in the deep band treatment yielded significantly better than the check treatment (nearly 16 bushels), with the broadcast treatment falling in between (Table 3). Soil tests are medium-to-very-high for phosphorus and high-to-very-high for potassium. Different results were obtained by Allen and Jackie Tibbs, Alden, who no-till planted soybeans directly over a fall band of fertilizer. They reported no yield increase from the fertilizer band (Table 1). The soil on this field tests low-to-medium for phosphorus and high for potassium.

Ron and Maria Rosmann, Harlan, have put their home farm in a transition to organic certification. They evaluated two rates of a mined rock phosphate on soybean yield, but saw no effect (Table 1). Their soil test for phosphorus was already medium-to-high.

Ray and Marj Stonecypher, Floyd, evaluated 3–18–18, a low-salt starter, which they placed right with the corn seed (Table 1). The 11 gallon per acre rate amounted to about 1+6+6 of nitrogen, phosphate, and potash. Surprisingly, leaf tissue tests showed a reduction in both nitrogen and magnesium where the starter had been applied. For the third year running, the Stonecyphers saw no yield effect from a low-salt starter. Their soil tests very high in P and K.

Probably the most ambitious starter trials in 1994 were carried out by Dick and Sharon Thomp-

Table 3. MULTIPLE-TREATMENT PLANT POP. & FERTILIZER TRIALS

				TREATMENT "A"				
COOPERATOR	CROP	PREVIOUS CROP	YIELD SIGNIFI-CANCE	DESCRIPTION	YIELD (bu. or T)	STAT.	TRT COSTS	$ BENEFIT
RICEVILLE FFA	NK4242	CORN	*	24,200 SEEDS/ACRE (22,200 PLANTS)	151.7	c	$27.19	$0.00
RICEVILLE FFA	P3751	CORN	*	24,200 SEEDS/ACRE (22,200 PLANTS)	141.8	c	$24.73	$0.00
ROSMANN	CORN	SOY BEANS	*	21,950 SEEDS/ACRE (16,840 PLANTS)	136.7	c	$18.59	$0.00
ALERT	CORN	SOY BEANS	N.S.	20 LBS P, 40 LBS K 2" BELOW SEED (DEEP PLANTER SHOE)	137.0	a	$34.59	$0.00
GRAU	CORN	SOY BEANS	*	BROADCAST P & K	174.4	ab	$28.73	($28.73)
OLSON	SOY BEANS	CORN	N.S.	75 LB K PLANTER BAND	64.2	a	$9.50	$9.50
NEELY-KINYON	CORN	SOY BEANS	*	0 LBS ANHYDROUS NITROGEN	136.4	b	$0.00	$0.00

son, Boone, who evaluated both starters and timing of manure applications for corn and for soybeans (Table 2). How do you test both manure timing and starters in one trial? They used what is called a "split plot" design. The "main plots" represented different manure application times – fall (in the corn trial), spring, and a no-manure check plot. Each of these main plots was split into a subplot with starter fertilizer and one without starter, the location of each subtreatment being chosen at random.

In the Thompson's soybean trial neither manure nor starter affected yields measurably. However, in the corn trial, both manure and starter had an effect on yield. Fall applied manure was significantly better than the no-manure treatment, with spring-applied manure in between. The highest yielding treatment was fall-manure-plus-starter. However, because of spreading costs even this treatment lost money compared to the no-manure-no-starter treatment. Table 2 shows the economics calculated both for in-year costs and "prorated" spreading costs. Dick Thompson distributes spreading costs across all the crops of the five-year rotation, with each crop's charge weighted according to its nutrient withdrawal. It's worth noting that this field has been manured two or three years out of five for some time, so all treatment yields reflect the long-term benefits of manure. Soil tests for P and K are both very high here.

MULTIPLE-TREATMENT PLANT POP. & FERTILIZER TRIALS

TREATMENT "B"					TREATMENT "C"					
DESCRIPTION	YIELD (bu. or T)	STAT.	TRT COSTS	$ BENEFIT	DESCRIPTION	YIELD (bu. or T)	STAT.	TRT COSTS	$ BENEFIT	OVERALL COMMENTS
27,700 SEEDS 25,400 PLNTS	158.7	b	$31.13	$10.11	32,000 SEEDS 28,200 PLNTS	162.9	a	$35.96	$13.68	
27,700 SEEDS 25,400 PLNTS	144.6	b	$28.31	$1.89	32,000 SEEDS 28,200 PLNTS	150.2	a	$32.70	$8.76	
24,400 SEEDS (19,800 PLANTS)	146.1	b	$20.67	$16.68	28,200 SEEDS (23,760 PLANTS)	157.7	a	$23.89	$36.76	LATE SPRING SOIL NITRATE 38 PPM, FALL STALK NITRATE LOW IN ALL TRTS
20 LBS P, 40 LBS K TO THE SIDE OF THE SEED	140.2	a	$34.59	$0.00	CHECK TREATMENT: NO BANDED P & K	136.9	a	$22.30	$12.29	TWO REPS DISCARDED BECAUSE OF MISSING DATA
DEEPBAND P & K	182.1	a	$29.41	$2.26	CONTROL (NOFERT.)	166.3	b	$0.00	$0.00	TREATMENT $ BENEFIT IS RELATIVE TO CONTROL TRT
150 LB K PLANTER BAND	65.4	a	$19.00	$0.00	ZERO K	61.2	a	$0.00	$19.00	SOIL K TEST: 125 PPM, MEDIUM-HIGH
75 LBS ANHYDRS. N	154.3	ab	$8.63	($8.63)						* RATE SET W. SOIL NITR. TEST. THREE REPS ONLY
* 110 LBS ANHYDRS. N	166.7	a	$12.65	$48.83	150 LBS ANHYDRS. N	167.5	a	$17.25	$44.23	

Nitrogen

A few years back, nitrogen rate trials were the most common on-farm experiment. That's no longer true, maybe because we now have the late spring soil nitrate test for corn. At the Neely-Kinyon Research Farm, near Greenfield, Bernie Havlovic carried out a demonstration of nitrogen rates for corn following soybeans (Table 3). Four rates were compared: zero, 75, 110, and 150 pounds per acre spring-applied anhydrous ammonia N. The 110 pound rate, which was determined using the late spring soil nitrate test, yielded as well as the 150 pound rate, and both yielded significantly better than the check treatment. The corn yield in the 75 pound treatment was not significantly less than the two high rates. With more replications than the three that were used, the trial might have distinguished the 75 pound treatment as different too.

Tom and Irene Frantzen, New Hampton, tested the nitrogen contribution to corn from a previous crop of berseem clover (Table 1). There was no yield difference between the corn receiving 80 pounds N and that getting 20 pounds, suggesting that the berseem may have supplied a significant amount of N to the crop. The whole field had also received six tons of hog manure in October, 1993. The late spring soil nitrate test showed both treatments to be in the seventies (very high). However, both treatments gave late season cornstalk tests in the 600's, suggesting the possibility of an N *shortage*.

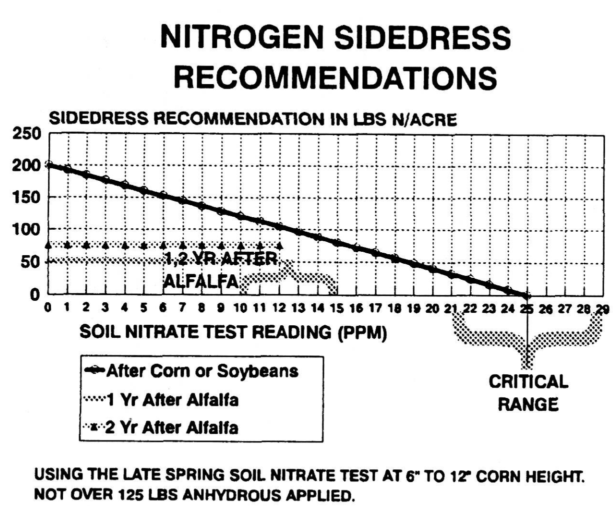


Figure 3. Sidedress recommendations for the late spring soil nitrate test.

In early 1994, there were dry and warm conditions that released soil nitrogen and led to the large number of high readings for the late spring test. Then the rains returned, leaching soil N out of the root zone – and conditions were also excellent for crop removal of nutrients. As a result, some PFI farmers were left wondering if they really did have enough nitrogen in 1994. Dr. Fred Blackmer, who adapted the late spring soil nitrate test for Iowa, recommends always including one field strip of a high nitrogen rate. This can be a very useful reference if questions arise in mid-season.

Biologicals and Unconventional Products

A number of PFI farmers experimented with unconventional products in 1994. Dave and Lisa Lubben, Monticello, continued a line of investigation they began several years ago, testing ACA (zinc acetate), ACA is said to increase nitrogen uptake of corn under some conditions, but Dave and Lisa tried the product on soybeans this time (Table 1). There was no effect on yield.

Jeff and Gayle Olson, Mt. Pleasant, evaluated a package of biological soil amendments from Ag Spectrum. In both corn and soybeans, they applied Grozyme™ and Agri-SC™ (Table 1). Jeff reports that Grozyme is said to release soil nutrients, and Agri-SC is said to be a soil conditioner to help the Grozyme go into the ground. The products were added to an herbicide band in each trial. Crop yields were not different than in the check treatment that received the herbicide without the biologicals.

Lynn and Linda Stock, Waukon, evaluated a package of biological amendments from Farm for Profit. Lynn describes Remedy™ as a microbial inoculant that is sold to clean petroleum residues from the soil and improve structure. Achieve™ is a product said to provide nutrients for the microbes in Remedy. The trial was carried out within the strips of a narrow strip intercropping field, and that complicated the analysis. However, no difference in corn or soybean yield was seen between the biological treatment and the control treatment (Table 1).

John and Rosie Wurpts, Ogden, were *PFI Sustainable Projects* participants in 1994. They carried out an evaluation of two approaches to soil fertility, comparing ISU recommendations to a package of biologicals from Agrienergy (Table 1). This was the fourth year of the comparison. As in previous years, there was no significant difference in yield, so the economic difference was based on input costs alone. In earlier years, the ISU Extension recommendation was for no fertilizer except nitrogen for corn. In 1994, the ISU recommendation included some P and K for the corn. However, the cost of the fertilizer was less than that of the biologicals.

Corn Population Trials

In 1994, corn population trials came from both cooperators Ron and Maria Rosmann, Harlan, and the Riceville, Iowa Future Farmers of America, which participated through a *Sustainable Projects* grant. In all three trials there was a consistent yield response to increasing populations (Table 3 and Fig. 4). The Rosmanns are adjusting their cropping system as they make the transition to organic certification. Not only did they see a yield response to population, they found through stand counts that rotary hoeing and cultivation had thinned the planted population by around 4,700 plants per acre. The finding may refocus their attention on these operations.

The Riceville FFA compared three planting populations, the highest being 32 thousand seeds per acre. That population was the yield winner in both of the corn hybrids evaluated, although crop stands were up to four thousand plants less than seeding rates. Of course, 1994 was a good year for corn. In a more stressful growing season, the yield response could be different. These trials probably should be repeated for a number of years, and results should be considered along with information provided by the seed companies and by third parties like ISU Extension.

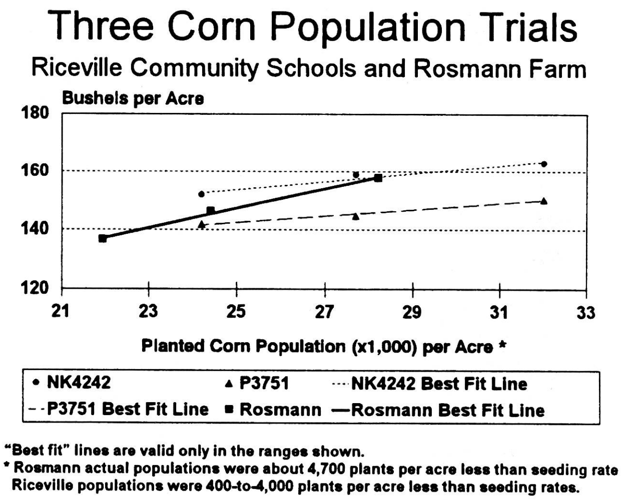


Figure 4. Three 1994 corn population trials.

Tillage

Three cooperators and a *Sustainable Projects* recipient compared no-till to some other tillage system in 1994. Ted and Donna Bauer, Audubon, achieved 19-inch soybean rows by offsetting the 38-inch row planter and making two passes across the field. Although the narrow-row soybeans yielded significantly better than beans in the 38-inch rows, the cost of the extra planter pass made the practice somewhat less economical (Table 5). Still, the narrow-row soybeans yielded well, and the results suggest the trial is worth repeating.

Don and Sharon Davidson, Grundy Center, compared ridge-till and no-till beans and corn in 38-inch row spacings. This was the second year for the trials on that particular site. The no-till crops received one cultivation and broadcast herbicides, while the ridge-till received banded herbicides and two cultivations. There were no significant differences in crop yield (Table 5). Ridge-till corn had more broadleaf weeds than no-till corn, but there was more grass pressure in no-till corn and soybeans. In the soybean trial, weed management costs were markedly higher in no-till than in ridge tillage.

The Dordt College Agricultural Stewardship Center conducted a two-factor experiment – tillage and soybean variety (Table 4). Drilled no-till yields and ridge tillage yields were not significantly different. Economics favored the drill because ridge tillage strips received one cultivation plus the two

Table 4. MULTIPLE-TREATMENT TILLAGE TRIALS

COOPERATOR	CROP	PREVIOUS CROP	YIELD SIGNIFICANCE	TREATMENT "A" DESCRIPTION	YIELD (bu. or T)	STAT.	TRT COSTS	$ BENEFIT
DORDT COLLEGE	SOY BEANS	CORN	*	RIDGE-TILL, SO I237	68.4	a	$77.10	$13.83
(TILLAGE & VARIETY, 2x2 FACTORIAL)				RIDGE-TILL, LOL 2200	63.1	b	$79.00	$1.07
	FACTOR 1: TILLAGE			RIDGE-TILL	65.8	a	$59.56	$0.00
	FACTOR 2: VARIETY			SOI 237	67.4	a	$19.88	$11.34
RICEVILLE FFA	SOY BEANS	CORN	*	8 ROW 30" PLANTER	46.7	b	$14.02	$9.22
THOMPSON	SOY BEANS	CORN	N.S.	NIGHT, FLAT PLANT	73.6	a	$0.00	$4.14
				BROADLEAFED WEEDS PER ACRE:	43	b		

broadcast applications of herbicide that the no-till treatments were given. There was a significant yield difference between the two soybean varieties.

The Riceville FFA carried out an extensive evaluation of tillage systems for soybeans: 30-inch planted rows; 15-inch drill; 8-inch drill with true no-till, and 8-inch drill with reduced tillage (Table 4). The no-till 8-inch drilled soybeans were the only ones in which no primary cultivation was used to prepare a seedbed. The yield winner was the soybeans drilled in 15-inch rows. Jim Green, high school agriculture instructor for the group, thinks that the 8-inch drill was not used to its full capability. It should have been calibrated for each treatment. There were significant stand differences among the treatments; however, these differences, in themselves, were not correlated with the yield differences.

Dick and Sharon Thompson, Boone, designed a trial to "shed light on" the rumor that weeds can be kept from appearing by depriving them of the light cue that stimulates germination. Work in Europe continues on this, but most reports from the U.S. have been negative. The Thompsons compared flat (no-till) planting at night, flat planting in the day, and ridge planting in the daytime – all with no herbicides. But the phenomenon remained elusive. There were similar numbers of broadleafed weeds in the night and day flat planting. Ridge-till day planting had significantly more weeds, which might be expected from ridges built the previous fall. The light-weeds connection may be unproven, but the tillage-weeds connection was confirmed once again.

Miscellaneous Trials

Several on-farm trials don't fall into easy categories, but that doesn't make them any less

MULTIPLE-TREATMENT TILLAGE TRIALS

TREATMENT "B"					TREATMENT "C"					
DESCRIPTION	YIELD (bu. or T)	STAT.	TRT COSTS	$ BENEFIT	DESCRIPTION	YIELD (bu. or T)	STAT.	TRT COSTS	$ BENEFIT	OVERALL COMMENTS
NO-TILL, SOI 237	66.3	ab	$77.17	$2.89						RIDGE-TILL CULTIVATED ONCE, ALL TREATMENTS BROADCAST HERBICIDE TWICE
NO-TILL, LOL 2200	62.9	b	$80.06	$0.00						
NO-TILL	64.6	a	$54.64	$4.91						
LOL 2200	63.0	b	$22.43	$0.00						
20' DRILL, 15" ROW SPACING	54.3	a	$13.29	$40.77						
15' DRILL, 8" ROW (NO-TILL)	46.2	b	$23.24	$0.00	15' DRILL, 8" ROW (REDUCED TILL)	47.4	b	$13.68	$9.57	
DAY, FLAT PLANT	73.3	a	$0.00	$4.14	ONE FALL CULT. TO BUILD RIDGE. DAY PLANT ON RIDGE	72.5	a	$4.14	$0.00	NO SOIL PREP-ARATION FOR FLAT PLANT
BROADLEAF WEEDS PER ACRE:	59	ab			BROADLEAF WEEDS PER ACRE:	104	a			

interesting. Ron and Maria Rosmann, for example, who compared corn populations in their transitional organic system, also looked at soybean planting rates. They compared 171 thousand seeds per acre with 190 thousand seeds (Table 5). They observed no difference in either crop yield or weed suppression between the two planting populations.

Ted and Donna Bauer compared purchased soybean seed with farm-grown seed (same variety) that was cleaned and germination tested by a neighbor (Table 5). There was no yield difference, and even after accounting for handling, storage, and the lost sales opportunity, planting farm-grown seed was more profitable by over seven dollars per acre. This was the third year they have done this trial, and the result has always been similar.

The Bauers also carried on a comparison of mid-October and early-November corn harvest dates that they began two years ago. In the first year, the late harvest clearly came out ahead, while in year two the economics favored the early harvest. In 1994, moisture-corrected yields were 7.5 bushels greater with the early harvest (Table 5). But because of greater drying and handling costs, the November 2 harvest date was more profitable, even taking into account the value of the yield difference. Ted also points out that the combine moves more slowly through the moister corn encountered at the early harvest. And what about the corn left on the ground due to late harvest? Ted is hoping for some open winter weather that will allow his cattle to clean up those ears.

Tom and Irene Frantzen wanted to know how berseem clover would behave with oats. They know that berseem has potential as a green manure and a source of quick livestock forage. But how would it fit into their present cropping system? They compared oats seeded with berseem to oats seeded with mammoth red clover (Table 5). In

Table 5. TILLAGE & OTHER TRIALS				
COOPERATOR	CROP	TREATMENT "A"		TREATMENT "B"
		DESCRIPTION	YIELD (bu.)	DESCRIPTION
BAUER	SOYBEANS	19" BEAN ROWS	63.6	38" BEAN ROWS
DAVIDSON	CORN	NO-TILL	134.8	RIDGE-TILL
DAVIDSON	SOYBEANS	NO-TILL	38.8	RIDGE-TILL
FRANTZEN	OATS	OATS W. BERSEEM CLOVER	64.0	OATS W. RED CLOVER
BAUER	CORN	10/13 HARVEST	168.6	11/2 HARVEST
BAUER	SOYBEANS	CLEANED, SAVED SEED	66.3	PURCHASED SEED
ROSMANN	SOYBEANS	61 LB/ACRE SEED (170,800 SEEDS)	67.1	68 LB/ACRE SEED (190,400 SEEDS)

1994, the berseem grew nearly as tall as the oats, making it necessary to windrow the oat crop. Unfortunately, rains combined with the heavy berseem growth to retard drying of the cut grain, so some oat yield was lost in the berseem strips. Tom notes, though, that the berseem clover may contribute more as a green manure for next year's corn than it takes away from oat yields.

Pasture Versus Feedlot for Dairy Heifers

The Dordt College Agricultural Stewardship Center has long had a strong dairy program. In 1994 they took their first steps in management-intensive grazing. With support from *PFI Sustainable Projects*, the Stewardship Center carried out a comparison of feedlot and rotationally grazed Holstein heifers. A group of 23 animals was divided in May for the two treatments. Six animals remained in the lot, while 17 were put out to pasture. The first year's results appear in Figures 5 and 6.

Figure 5 shows that average daily gain was sometimes higher in the pasture setting, sometimes in the feedlot. It also shows that there was a difference in average weight right from the beginning of the trial. Larger animals were selected for the feedlot because of involvement with a local business on another project. In the future, animals will be selected randomly for the two treatment groups in order to make a truer comparison.

The figure also starts at May 11, although weights are not shown until May 30. Animals went to pasture on May 11, but individual weights were not taken until nineteen days later. This makes it difficult to put absolute profit figures to the treat-

TILLAGE & OTHER TRIALS

TRT "B"	DIFFERENCE				
YIELD (bu.)	YIELD DIFF.	YLD LSD (bu.)	YLD SIG.	$ BENEFIT OF TRT "A"	COMMENT
60.8	2.8	0.9	*	($4.02)	
135.4	-0.7	7.9	N.S.	($1.07)	NO-TILL HAD MORE GRASS, FEWER BROADLEAFED WEEDS
38.4	0.4	0.9	N.S.	($16.47)	NO-TILL HAD SIGNIFICANTLY MORE GRASS
75.5	-11.5	6.6	*	($28.89)	
161.1	7.5	--	--	($28.61)	(UNREPLICATED DEMONSTRATION) CATTLE WILL SCAVENGE DROPPED CORN
	OR, INCLUDING THE YIELD DIFFERENCE:			($13.61)	
65.8	0.5	1.5	N.S.	$7.47	
67.4	-0.3	1.3	N.S.	$2.02	NO OBSERVED DIFFERENCE IN WEED SUPPRESSION AT HIGHER CROP POP

ments, since the weight gain of the two groups is not known for the first period. However, student Lee DeHaan has done a good job of deriving the cost side of the equation. Feedlot costs per head are constant through the season. However, daily production cost for heifers on pasture decreases as fixed costs are spread across the lengthening grazing season (Figure 6). These first-year results should catch the attention of Sioux County dairy farmers looking for a better bottom line.

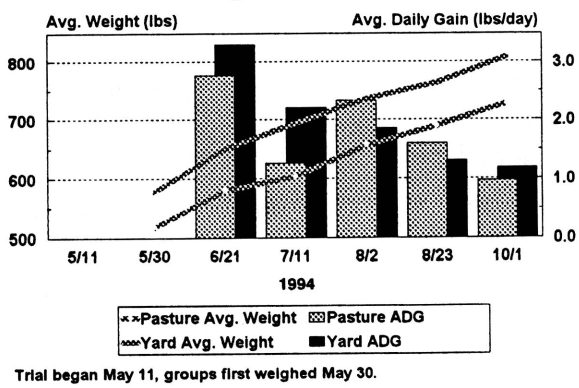


Figure 5. Pasture and feedlot heifer weights and average daily gain in the 1994 Dordt College trial.

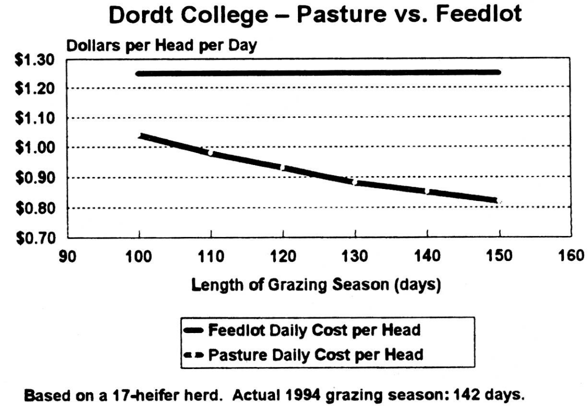


Figure 6. Projected production costs as grazing season lengthens, 1994 Dordt College trial.

Table 6. WEED MANAGEMENT TRIALS					
COOPERATOR	LOW RATE TREATMENT				HIGH RATE TRT
	DESCRIPTION	YIELD	BROADLEAF WEEDS/ACRE	OTHER WEED INFORMATION	DESCRIPTION
(CORN)					
MUGGE	4x HOE, NO GRASS HERBICIDE	166.0	--	GRASS RATING 4.2	GRASS HERBICIDE, NO HOE
(SOYBEANS)					
BAUER	BAND/2 CULTIVATIONS	65.6	--		BROADCAST/ 1 CULTIVATION
SVOBODA	ANNUAL MEDIC IN-ROW	56.1	--		FRONTIER™ IN A PLANTER BAND

Weed Management

Three other trials were devoted specifically to weed management. Ted and Donna Bauer, Audubon, compared banding to broadcasting herbicide in soybeans. They did not take weed counts, but yields were the same in both treatments (Table 6). They found it was more economical to band and cultivate twice than to cultivate just once and broadcast.

Paul and Karen Mugge, Sutherland, evaluated ridge-till corn with and without a grass herbicide (Table 6). Both treatments received a broadleaf herbicide. In place of the grass herbicide, they substituted four rotary hoeings. While there was no significant difference in yields, the cost of the four trips with the hoe made that system less profitable. There was a tendency for hoeing to control grassy weeds better than the herbicide, but it fell just short of being statistically significant at the 95% confidence level.

Dick and Mary Jane Svoboda, Aurora, compared banded herbicide to a weed-suppressing cover crop of annual medic (Table 6). A relative of alfalfa, the medic is supposed to compete with weeds early in the season, then die back and let the crop grow through. Unfortunately, the medic establishment was very poor, so there was no observable effect on weeds.

Transition to Grazing for Dairy

Matt and Diana Stewart, Oelwein, are PFI members who attended the talk by grazier Joel Salatin that PFI hosted last January. It was an important experience for them, and they began to plan changes for their own farm. In 1994 they received support from *Sustainable Projects* to document the process of moving their dairy operation to greater use of pasture. Matt's report follows.

"Stewartland Holsteins is very similar to the large number of family dairies in Northeast Iowa. We farm 380 acres and have milked 75-80 registered Holsteins in a tie-stall barn. We have two silos with a capacity of 1,000 tons and a liquid manure system with an earthen pit. Over 340 acres are tillable, and our corn base is 245 acres with a 129 bushel yield.

Our cows have been drylot-managed for most of the fifteen years since my wife and I joined my parents. We milked three times a day for the eleven

WEED MANAGEMENT TRIALS

HIGH RATE TREATMENT			TREATMENT DIFFERENCES					
YIELD	BROADLEAF WEEDS/ACRE	OTHER WEED INFORMA-TION	YIELD DIFF.	YLD. SIG.	YLD. LSD	BRDL. WEED SIG.	LOW RATE $ BENEFIT	COMMENTS
168.8		5.7 GRASS RATING	-2.8	N.S.	5.8	N.S.	($6.76)	GRASS RATING 1 = NO GRASS, 10 = COMPLETELY GRASSY
64.9	--		0.6	N.S.	0.9		$5.43	
58.6	--		-2.5	N.S.	4.3		($4.97)	POOR MEDIC STAND

years preceding this spring. Our herd average has been between 21,000–22,000 for the past ten years. The work force has consisted of my wife and me, my father, our four children (aged 3-13), and a full-time hired man. The heifers have been housed on a separate acreage seven miles away, and the man that lives there does the daily feeding in exchange for rent. We have a full line of machinery for chopping, haying, and hauling liquid manure. My brother has planted and combined our corn.

Our objective has been to switch to grass-based dairying as quickly as possible and demonstrate the economics of such a drastic change. Most of the economic data will not be available until next winter, but it does appear that we will be able to stand the transition and show an average net gain. This report covers the physical changes we have made and a couple of observations from our DHIA test sheets.

The first tough decision was to let ASCS know that we didn't want that big advance deficiency payment – we would only plant 60 acres of corn. (Now I know how hard it really is to get off welfare.) Of this 60 acres, 27 acres were chopped and put in the silo for winter feed.

About April 1 we direct-seeded 100 acres with 5 lbs. bromegrass, 1 lb. reed canarygrass, 1 lb. ladino clover, and 1 lb. red clover per acre using a Brillion seeder. We have seeded our alfalfa this way for ten years with no chemicals and excellent results. The foxtail was cut before it headed out, and it yielded 3 round bales per acre. The seeding was grazed twice after that in large paddocks with low stock density. As the foxtail regrowth became coarse in August and September, lactating cows refused to eat the lush new seeding beneath. Heifers grazed these fields until late November.

Historical Income, Cost & Pregnancy Rate

Matt and Diana Stewart Farm, Oelwein

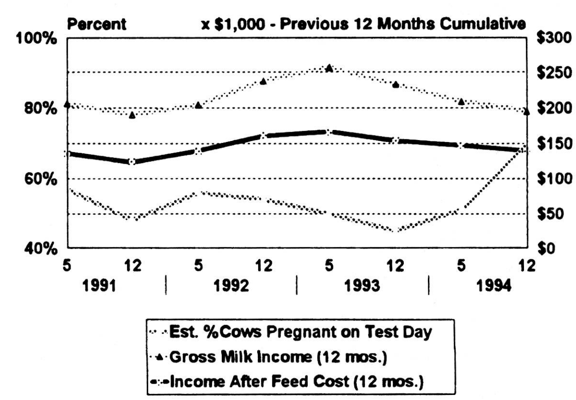


Figure 7. Cost and pregnancy trends, Stewart dairy farm.

Another 100 acres of alfalfa-orchardgrass hayfields were too thin to hay again this year and diverted to pasture. As bred heifers had been out on cornstalks and hayfields last winter, the stubble was very short, and grazing was delayed until April 20. We had four groups on grass. The first group, the lactating cows, had to return to conventional feeding on October 1. It became very difficult to maintain production in late September. The dry cow group and the two heifer groups maintained excellent condition through the seven months they were on grass, trace-mineral salt blocks, and no supplemental feed. We were extremely satisfied with their performance.

The milking group was allowed to gradually change from silage to grass. The first two days we waited until they were full to let them out to pasture. For the next two weeks we let the cows decide when they wanted to walk away from the bunk and go to pasture. We had been feeding 14 lbs. of grain in the barn and 40 lbs. of wet corn gluten feed with the silage. The transition was very smooth, and production was good. Our biggest mistake was that we should have raised the grain level to 18 lbs. By mid-June, the cows were too thin, production was about 5-10 lbs. lower than we thought it should be, and we did increase the grain to 18 lbs. In July we started feeding 10-20 lbs. corn silage. We monitored the appetite at the bunk to determine feed availability in the pastures. The cows were locked in the paddocks from the end of milking until one hour before milking.

Figure 7 shows our history of gross milk income, income after feed costs, and the estimated proportion of cows pregnant on testing days. The percent pregnant cows is based on confirmed pregnancies plus half of the "maybe" pregnant cows.

Figure 8 is also based on test days and focuses on the 1993 and 1994 grazing seasons. 'Total cows' is the number of milking and dry cows on test day. For a good part of the year, grazing allows us to milk more cows than the barn will hold at one time – we just move two shifts through from pasture. We were limited to 80 milking at any one

Herd Size and Economics on Testing Days

Matt and Diana Stewart Farm, Oelwein

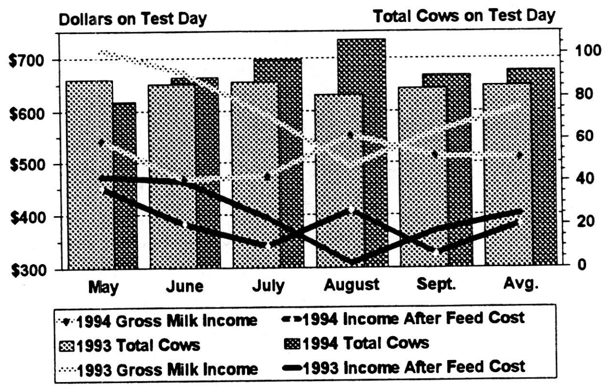


Figure 8. Comparison of 1993 and 1994 economics and dairy herd size on Stewart farm.

time under our conventional system. 'Income After Feed Costs' applies to the whole cow herd on the day of testing. Milk prices were comparable between the two years. The total income after feed costs for the 160-day grazing period is $3,200 less than for the same 160 days in 1993. This will be more than offset by reduction in labor costs. We let our full-time employee go in May, when we dropped to milking twice a day. We thought we might go back to milking three times when the cows were back in the barn this winter, but so far production has remained acceptable with two milkings."

Narrow Strip Intercropping

Narrow strip intercropping is a complex system requiring careful management. Maybe we should think of it as a finely tuned sports car. It's a roadster that can really perform on a good road. But it isn't built for rough ground or muddy lanes. We know, for example, that in stress years, there has not been the hoped for "overyielding" in the outside rows of the corn strips. 1994 appeared to be the smooth highway that farmers had been waiting for, but there were new lessons around the bend.

There is a potential "biological efficiency" built into narrow strips. It has to do with the borders between strips. That is where neighboring crops can use resources like light, fertility, and soil moisture in complementary ways. This doesn't automatically happen, but crops that use these resources at different times of the season often make

Table 7. NARROW STRIP INTERCROPPING TRIALS

COOPERATOR	CROP	ROW DIRECTION	YIELDS (bu.)			COMMENTS
			STRIP	FIELD	DIFF.	
ALERT/SMITH	CORN, P3394	N-S	152.8	126.3	26.6	STRIPS @ 35,000, BLOCK @ 27,500 SEEDS/ACRE
ALERT/SMITH	CORN, P3417	N-S	152.3	141.8	10.4	STRIPS @ 35,000, BLOCK @ 27,500 SEEDS/ACRE
DAVIDSON	CORN	E-W	89	105	-16	STARTER SHOE PLUGGED IIN ONE OUTSIDE ROW
MUGGE	CORN, NO-TILL	E-W	150.8	153.0	-2.2	
MUGGE	CORN, CONV.	E-W	183.3	168.0	15.3	
OLSON	CORN	SE-NW	134.2	128.9	5.3	GRASSY STRIP BORDERS
THOMPSON	CORN	E-W	172.0	173.2	-1.2	ROTATION, TILLAGE, & FERTILITY DIFFERENCES
			CORN AVERAGE:		5.5	
ALERT/SMITH	OATS	N-S	73.2	--		
DAVIDSON	RYE	E-W	20	18	2	
MUGGE	OATS	E-W				
OLSON	OATS	SE-NW	67.3	100.5	-33.2	
THOMPSON	OATS	E-W	71.1	--		
ALERT/SMITH	SOYBEANS	N-S				COMBINE MALFUNCTION
DAVIDSON	SOYBEANS	E-W	39.2	37.5	1.7	
MUGGE	SOYBEANS	E-W	68.0	69.9	-1.9	
OLSON	SOYBEANS	SE-NW	25.8	40.5	-14.7	WEEDS IN STRIPS (NO HERBICIDE)
THOMPSON	SOYBEANS	E-W	57.5	61.2	-3.7	
			SOYBEAN AVERAGE:		-4.7	

good neighbors in strip intercropping. Oats, for instance, are harvested in July, leaving extra resources for neighboring row crops. Corn and soybeans are potentially competitive, but in past years, increased corn yields have not come at the expense of soybean yields in most PFI trials.

University and farmer researchers have seen that in stress years, the yield benefits of strip intercropping are less evident, as competition between crops dominates over the complementary use of resources. So 1994, which was generally a good year for crops, should have been a great year for narrow strip intercropping. In fact, some cooperators did see the yield benefits in corn (Table 7). The largest yield benefit was nearly 27 bushels, in one of Doug Alert and Margaret Smith's trials. They optimize their strips, using higher corn populations and fertilizer rates than in the whole-field blocks. And their strips are in a three-year rotation, while the rest of the field is in a corn-soybean rotation.

In other trials narrow strip intercropping did not fare so well. Observations in the field point the finger at weeds. The grass got out of hand in some stripped crops. Why was it worse in strips than in the whole-field blocks? Corn in strips lets in more light. This appeared to stimulate grass in some strips. And in some cases weed pressure had built up from two years in which weather prevented a second cultivation. Where trials got into trouble, the corn strip edges were the place with the most light, the lowest stands of corn, and the most grass.

What is the take-home lesson? It may be "back to basics" – not necessarily in the sense of a return to conventional farming practices, but in the recognition that narrow strip intercropping is a very management-intensive system. It is a system that is less forgiving of slips in weed management, and perhaps in fertility and tillage as well. It's that high-performance roadster that likes a smooth road.

Table 8 and Figures 9 and 10 also show corn yields in narrow strip intercropping, but these are hand-harvest yields row by row. They differ from the machine harvests shown in Table 7 both by the method and because they represent only a small part of the field, while the combine yields reflect the system as a whole. The effect of low stand and grass in some strip borders is evident, but a trend found in 1993 also stands out. This is the tendency for the east edges of north-south strips to yield better than the west edges. Corn on the east borders of strips receives the greatest part of its light in the morning, when moisture stress is reduced. Corn on the west edges of strips receives the full light of afternoon, and stress may prevent it from taking full advantage of this light.

Table 8. STRIP CORN YIELD BY ROW POSITION (hand harvest)

STRIP ORIENTATION: NORTH-SOUTH	STOCK	FRANTZEN	OLSON	ALERT/ SMITH
ROW	CORN	CORN	CORN	CORN
(W)	(SOY)	(SOY)	(SOY)	(SOY)
1	121.9	174.9	126.7	173.1
2	123.7	174.9	130.1	152.5
3	134.7	195.6	161.3	171.1
4	136.8	197.6	150.O	182.9
5	136.4	(OATS/ BERSEEM)	132.8	(OATS/ BERSEEM)
6	141.5		92.7	
7	132.9		(OATS/ BERSEEM)	
8	130.5			
9	136.7			
10	144.8			
(E)	(SOY)			
STRIP AVERAGE:	134.0	185.7	132.3	169.9
BLOCK:			137.4	101.9

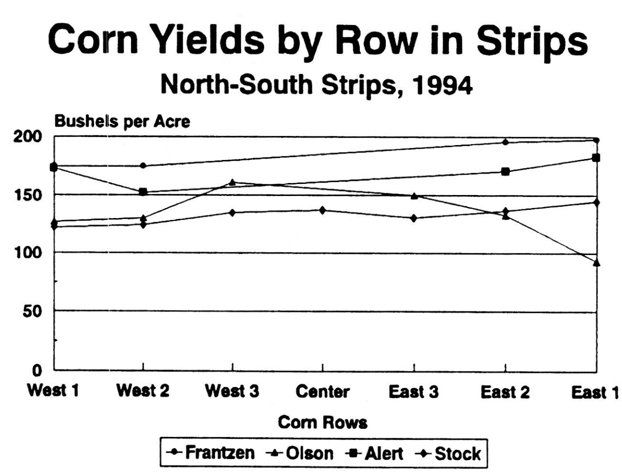


Figure 9. Narrow strip intercropping corn yields in north-south strips, 1994.

STRIP CORN YIELD BY ROW POSITION (hand harvest)				
STRIP ORIENTATION: EAST-WEST	STOCK	DAVIDSON	MUGGE	THOMPSON
ROW	CORN	CORN	CORN	CORN
(S)	(SOY)	(SOY)	(SOY)	(SOY)
1	130.0	49.8	181.1	152.1
2	137.1	83.3	179.7	183.9
3	144.5	84.2	172.1	172.0
4	140.7	59.8	172.1	126.6
5	142.8	(OATS/ BERSEEM)	172.0	(OATS/ BERSEEM)
6	144.8		175.0	
7	143.9		(OATS/ BERSEEM)	
8	129.8			
9	144.1			
10	139.6			
(N)	(SOY)			
STRIP AVERAGE:	139.7	69.3	175.3	158.6
BLOCK:		109.8	150.8	171.8

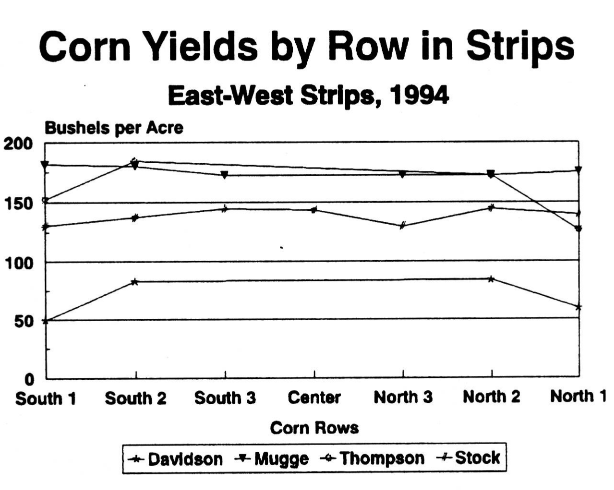


Figure 10. Narrow strip intercropping corn yields in east-west strips, 1994.

Forage Quality and Returns from Grazing

Steve Hopkins and Sarah Andreasen milked a small herd of Jerseys near Decorah the last several years. In October, they moved their cows to a farm near Newton, but not before wrapping up a project documenting their pasture-based approach to dairying. The effort began in 1993 with support from the Leopold Center for Sustainable Agriculture and *PFI Sustainable Projects*. In 1994, Steve and Sarah became PFI cooperators.

Figure 11 shows that, as in 1993, milk production improved somewhat and income over feed cost improved dramatically in the spring when pasture became available. Income and cost are expressed here per hundredweight of milk sold. Typical feed costs for well-managed dairies are \$5-6 per hundredweight of milk. During most of the time the cows were in the paddocks in 1994, feed costs were around \$3 per CWT milk sold. From May to July, daily feed costs were less than one dollar per cow.

Figure 12 shows the result of weekly forage sampling. In 1993, Steve and Sarah were surprised to see a mid-summer slump in non-fiber carbohydrate (NFC), an important measure of feed energy content. In 1994, forage energy fluctuated, reflecting the different paddocks

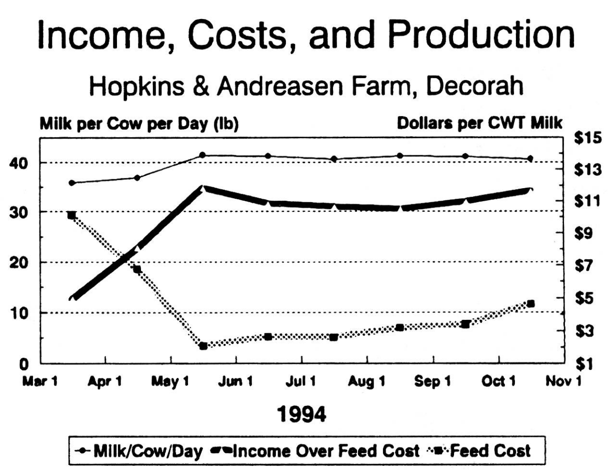
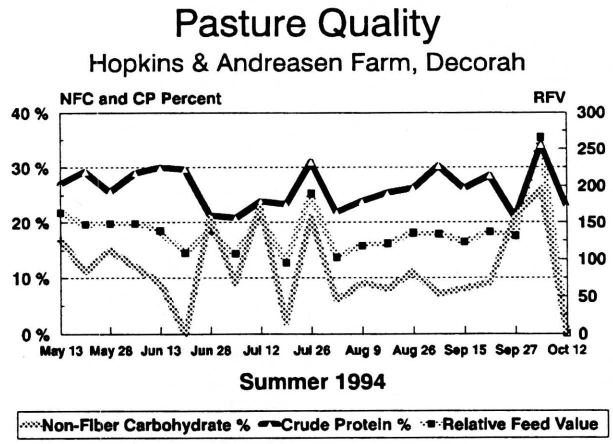


Figure 11. Milk production, feed cost, and income after feed cost over the 1994 grazing season, Hopkins/Andreasen farm.

in which the cattle grazed. Depending on paddock NFC, the cows were fed 10-16 lb. corn in the barn. Steve says that what impresses him is that crude protein levels were more than adequate throughout the season. He notes that this is the result of grazing grass in the leaf stage. His working theory is that, while crude protein is a function of grass height, NFC reflects both the growth stage of the grass and the fertility status of the soil. Steve and Sarah are looking forward to new pastures that aren't quite so steep and a grazing season just a bit longer than those in northeast Iowa.



Zero values are artifacts of the testing formulas.

Figure 12. Forage analysis over the 1994 grazing season, Hopkins/Andreasen farm.

Barley-Based Hog Ration vs. a Corn-Based Ration

Dan Wilson, Paullina, sends this description of the trial he and brother Colin carried out:

"This test was conducted on a group of cross-bred gilts raised on pasture. The main goal was to see if barley is an economical alternative to corn for growing/finishing pigs. We wanted to find a good use for the small grain in our crop rotation. The test was set up by splitting a group of 222 gilts. The gilts were farrowed on pasture. At six weeks of age they were weaned and moved to the barn with outside concrete lots. After being vaccinated and sorted, they were weighed and returned to pasture for the test.

The corn and barley were tested for protein, and the rations were balanced accordingly. Both rations were mixed on the farm using soybean meal and a vitamin/mineral premix. We started the group using barley on a ration of 200 lbs. barley per ton and slowly increased the barley to 700 lbs. per ton when they reached 150 lbs. This meant that 42 percent of the grain in the ration was barley, the rest was corn.

In calculating the cost of production we used $1.85 a bushel for corn and $1.50 a bushel for the barley (season-average market prices for our area). All other ingredients were priced at cost. Because barley is higher in lysine, we were able to reduce the amount of soybean meal in the barley rations. This helped to reduce the cost per ton of the barley ration, and it accounts for the fact that this group consumed more pounds of feed but cost the same per pound of weight gain (Table 9).

We were quite encouraged by the result of this trial, as it makes small grain a viable option in crop rotations. We will repeat the trial again to see if the results are consistent."

When the Wilsons repeat this trial in 1995, they will improve several procedures. They hope to have two replications in 1995; their barley crop was hailed in 1994, leaving them with only enough grain for the one rep of gilts. The barley group actually went on the ration August 17, the same day as the corn group. However, they couldn't be weighed and turned out until a week later, by which time they were heavier pigs. This could raise suspicions that the '94 test was really showing the effect of age/size, not rations. Finally, the packing house lost the records for individual pigs in one group. This means there is no way to know whether the one percent difference in percent lean or the 1.8 percent difference in carcass yield is a real difference or is probably just due to chance. But from the 1994 results, the Wilsons already have an indication that they can "afford" to grow a small grain in their crop rotation.

Table 9. COMPARISON OF BARLEY-BASED AND CORN-BASED HOG RATION – WILSON, 1994	CORN-BASED RATION	BARLEY-BASED RATION
DATE ON TEST	AUG. 17	AUG 24
NUMBER OF HEAD ON TEST	110	112
AVERAGE WEIGHT ON TEST	62.2 LBS	70.3 LBS
DATE OFF TEST	NOV. 30	NOV. 29
NUMBER OF HEAD OFF TEST	108	111
AVG. WEIGHT OFF TEST	238 LBS	244 LBS
GAIN PRODUCED ON TEST	19,064 LBS	19,336 LBS
FEED FED ON TEST	65,692 LBS	68,385 LBS
COST OF FEED	\$3,461.55	\$3,510.64
FEED CONVERSION (LBS FEED PER LB GAIN)	3.45	3.54
COST PER LB OF GAIN	\$0.18	\$0.18
RATE OF GAIN	1.67 LB/DAY	1.79 LB/DAY
CARCASS YIELD	74%	72%
CARCASS PERCENT LEAN	49%	48%

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