



Agricultural Integration

SYSTEMS IN ACTION

By

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This publication was made possible through funds from the Maine Agricultural Center,
The University of Maine, Orono, Maine.

MAC Publication 002, October 2001

Profiles of Agricultural Integration

Modern-day farms have been moving away from their integrated pasts. Historically, farms raised a number of diversified products ranging from vegetables to grains to livestock. These integrated systems enabled farmers to make complete use of their diversified resources. Rather than purchase fertilizers, farmers used cover crops and the manure from their livestock to fertilize their fields. And rather than purchase pesticides, farmers used crop rotations and companion planting to minimize pest damage. In addition, rather than raise just one product, farmers raised a variety of crops to help meet the homestead's needs as well as the needs of the marketplace. These techniques have been, for the most part, lost to the current generation of farmer.

In the current farming system, farmers purchase chemical fertilizers and pesticides and focus their production on a single product. This monoculture production may be efficient in the short run, with regards to revenue generation for the farmer, but it leaves much to be desired in terms of a healthy farm community (Goldschmidt; Lobao) and a healthy farm ecosystem (Altieri; Lowrance et al.; Soule and Piper). The focused attention on a single crop forces these farmers to continually pursue new forms of technology in order to remain ahead of others in the rush for increased income. This is the technology treadmill. Those farmers who do not pursue the new technology fast enough quite often lose the economic battle for increased revenue. Having lost this battle, these farmers are susceptible to, or maybe even eager for, buy-outs from other farmers. This is farm cannibalism. As the treadmill speeds up, and fewer and fewer farms are able to get on, cannibalism increases thus decreasing the number of farms (Cochrane; Levins and Cochrane). These decreased numbers of farms result in a diminished farming community and a diminished farm infrastructure. Thus, there is concern regarding the current path of industrial agriculture.

One way of improving the current agricultural approach is for crop and livestock farmers to work together in integrating their systems. An integrated system of crop and livestock operations should build soil quality (Gallandt et al.; Porter et al.), reduce surface and groundwater contamination (Edwards), build stronger farming communities (Flora; Goldschmidt; Lobao); and at the same time, maintain, or even increase, farm income (Files). The challenge is to develop these integrated systems in such a way as to effectively utilize the existing

knowledge and management skills of the individual producers.

The appropriateness of integrating crop and livestock operations in Maine is exemplified by the calls of some leading groups in the state. The Agricultural Council of Maine (AGCOM) in their well-publicized Strategic Plan acknowledges the need to "integrate cropping systems, join livestock and cropping operations...increase the use of locally produced inputs" and develop "economically sustainable and environmentally sound production systems." The University of Maine's Chancellor's Task Force has called for "more attention to integrated systems." And the Maine Potato Board, in its response to the University of Maine Board of Agriculture's survey, indicated a need for the "development of profitable rotation crops" and "improved soil quality and management practices to reduce plant stress and increase yields" – results which can be achieved through system integration.

Integration in the context of this study consists of dairy and potato farmers sharing land and other resources in order to better meet their operations' needs. Presently, there are a number of integrated dairy and potato systems operating in Maine. This project interviews farmers from three such integrated systems – Bob Fogler and John Dorman in Exeter; Mary Thomas and Frank Thomas in Garland and East Corinth; and Perry Lilley and Jim Hogan, Sr., in Smyrna and New Limerick. From listening to what these farmers have to say about integrating operations, the possibility arises for other farmers to integrate systems themselves.

Interviews were conducted with the above six farmers to learn how, and why, they have chosen to become involved in integrated crop/livestock systems. Most of the six farmers are sharing land with their integration partner. Some of the six farmers are providing services to the partner such as spraying and initial tillage. And some of the six farmers are even sharing equipment and labor.

The interviews revealed five common characteristics of these three integrated crop/livestock systems: 1) soil quality has increased; 2) crop quality has increased; 3) crop yield has increased; 4) values of exchanged goods and services are not determined; and 5) trust between partners is essential.

While the stated reasons for integration were to extend a potato rotation, adding land on which to

spread manure, and growing corn in an extended rotation, additional benefits of increased soil quality, increased crop quality and increased crop yield were observed. All three crop farmers saw an increase in soil quality, generally attributed to the increased organic matter supplied by livestock manure applications and the addition of green manure crops. Soil quality improvements were noted in increased soil friability, increased water holding capacity and a generally easier working of the soil.

All three crop farmers also noted improvements in crop quality, even when increased crop yields were not observed. Product quality was attributed to increased soil aeration in one case and to improved soil quality generally. Crop quality improvements resulted in a greater proportion of the harvested acreage going to market.

Crop yield increases were also noted by each of the crop farmers and by one of the livestock farmers regarding feed grain production. Crop yields were enhanced by improved soil quality and the reduction in pest pressures resulting from the extension of crop rotations. One crop farmer who was skeptical of extending his rotation now believes he would benefit from further extension, suggesting continued benefits from a higher livestock to cropping relationship.

Contrary to expectations, knowing the values of the goods and services exchanged proved of little interest or perceived value to the farmer participants. It was anticipated that the desire to enter into an integrated operation would hinge on the perceived values of the exchanged goods and services. This proved not to be the case. None of the farmers involved attempted to measure the benefits of particular exchanges and seemed uninterested in doing so. The single exception was one case where feeds are produced by the crop farmer and sold to the livestock farmer at a value representing market prices, with transportation cost savings being generally split. In cases where the swap involves land, manure spread on the partner's farms, equipment and labor no values of the swapped goods and services are determined or represented. Instead, a general attempt at equity over time is attempted.

While knowing the precise values of exchanged goods and services is not important to the success of the integration, trust is. In all cases trust rather than shadow prices was the coin of the realm. Every farmer indicated that the relationship worked because of the trust between the partners. It was

suggested that a partnership built on formal and precise exchange relationships rather than trust would not succeed.

The findings from these profiles lead to a protocol that farmers can follow to evaluate the appropriateness of integration for their operations. It should be noted that the parameters found in these cases substantially limit the number of farmers who can integrate the way these interviewed farmers have. First, integration requires cropland and livestock production within close proximity to each other. The longest distance incurred in these profiles is fifteen miles and it was suggested that this was a maximum distance. Second, integration requires a basic trust between partners. While this basic trust is usually developed by having lived in the same area for a period of time, it may be possible to have this trust develop through references and contacts with other farmers. And third, the integration can start with modest exchanges, such as a land swap, and then build into more involved integration, with goods and services exchanged, as trust develops.

With the implementation of statewide nutrient management regulations, limited availability of additional cropland, and the push for larger, more efficient farming operations, integration of crop/livestock operations provides opportunities for farmers to farm effectively without the need to learn new management skills or expand production.

However, this analysis suggests that the opportunity for existing farmers to integrate using the model from these farmers is severely limited. Existing crop and livestock farmers would have to be operating within close proximity to each other and there would have to be considerable trust between partners, the basis of which would have to exist prior to the integrating arrangements. This probably means that to generalize this integration model, new farms would have to develop in areas with potential partners, which implies areas without the infrastructure to support the new enterprise. Since it is doubtful that the arrangement could be initiated with strangers because of lack of trust, values of exchanged goods and services might have to be determined and utilized.

Thus, while crop/livestock integration is working for a select few farmers, it may be difficult to generalize their approach to the farming community at-large. However, the benefits from integration are so significant that additional research investigating alternative means of integration may be appropriate.

Bob Fogler Profile

Bob Fogler is a third generation dairy farmer on his family's Stonyvale Farm, Inc. in Exeter, Maine, that he operates with four other family members – his father, his brother, and two cousins. The farm has grown steadily over the years. Fifteen years ago they milked 100 head. Today they milk 500 head with plans to increase to 1,000 head within the next year or so. In addition to the 500 head herd, the Foglers farm 1,100 acres of their own cropland in addition to the land they share with potato farmers.

In order to increase their herd size, Bob realized that he would need additional acreage for feed production in an area of the State that was land-limited. Bob also realized that he would need additional acreage on which to spread the manure from his herd. He began collaborating with a local potato farmer, John Dorman, "I think we were in a situation where we needed to expand. We had more family members coming home. We needed to increase cow numbers. In this area, competition for land was so great that we just couldn't seem to come up with the land without starting to work with someone."

As Fogler notes, this initial collaboration has expanded quite a bit over the years. "To begin with, working with John, I think it was more of a matter of a way to increase land-base. That's why we started with John. It didn't start out as a land swap, we were just using his ground and putting some manure on it. And as things evolved we started swapping ground, sharing labor, and sharing equipment. It just evolved to that because it made economic sense to do so."

As noted, the collaboration originally involved only the use of part of the Dormans' land in order for the Foglers to spread their herd's manure. As time went on, this limited collaboration expanded to the point where the Dormans and Foglers share 400 acres of land enabling the Foglers to produce more feed and have a larger land base on which to spread their herd's manure. In addition, the Dormans have been able to extend their potato rotation from a two-year rotation with 50% potatoes to a three-year rotation with only 33% potatoes.

One aspect of this collaboration that is common among the farmers of this study is that there are no written contracts or agreements. "I think it's because of my strong feelings that I know working together and doing these things is a huge plus. I think it's just as simple as that. I just believe so strongly that as long as you can work together and you're working with people that have the same long-range vision, and have vision, chances of problems are slim," Fogler adds.

Continuing his reasoning for working with Dorman on a hand-shake, Fogler notes, "I guess, no matter what it might have cost me, it put us in the position we're in today, which is a very good one. I could have, ten years ago, said 'Boy, I spent \$10,000 more than I should have to get this [collaboration] done' and got into arguments over and concerned about it, and where would I be today? I wouldn't have been able to take advantage of any of those opportunities, and I might still be milking 100 cows today and not be profitable."



John Dorman Profile

John Dorman is a fourth generation potato farmer on his family's Double 'D' Farm in Exeter, Maine, where he farms with two other family members – a son and a nephew. The farm has grown over the years from 200 acres of cropland to where it now consists of 400 acres of land on the home farm, much of which is shared with the Foglers. "We were looking for some land base to expand our potato production and increase our rotation abilities," John explains.

There are a number of benefits to John's being able to extend his potato rotation from two to three years, "As we've come along with the system, we've realized that by having the ability to increase that rotation out the three years – the disease pressures – we don't seem to have the pressures that we had. We've been able to reduce our chemical inputs. That's been one of the biggest values, I guess, in the last few years that we've been able to do. Plus the nutrient value, the manure we've been able to plug into our input costs so that our commercial fertilizer costs have decreased."

In addition, there is the benefit of being able to improve soil quality, "The home-farm soils were really in tough shape. They just had no texture to them at all. If we got rain in the spring, we had concrete out there to work with. With this program, we've been able to change those soils a lot. . . . When we started, Robert kept saying, 'It's magic!' I used to laugh at him, but I think there is magic in what we've been able to do with our soil," John adds.

Besides being able to build soil quality by the addition of manure, John notes some other soil quality building benefits, "...When we originally started, we were primarily corn, barley – for grain that he was using in his feed program — and then into potatoes. Now, we're into corn, barley that he's green-chopping and then going into potatoes. By green-chopping, we're able to [follow the barley with a green manure crop] which has good root structure. In the fall, we work it back in. . . . So, that's changed our rotation a little bit as far as what we're putting back. Originally, we weren't putting back. So, now we've got more green material that we're putting back in rotation. I think it's making a difference."

John also adds still other soil quality benefits, "As your soil improves, your crop improves. . . . And we've been able to see that. Water's a big part of producing potatoes and as you increase that water-holding capacity, it increases your crop. We've had some tough years these last few years because of weather, but we're still all right. If it was the same soil we had ten years ago, I don't think we'd be in business today."

John concludes, "When you get out to three years, when you first initially go out there you think it's going to cost you money because you have just got to have that much land, and rotation crops are not big payers, you know. But after five years, you see the benefits. The benefits more than outweigh the costs. If we could get out to four, we'd be that much better, I know we would."



Mary Thomas Profile

Mary Thomas farms the family's dairy operation in Garland, Maine with her dad and mom, Jim and Sandra, and her two brothers, Kevin and Terry. To assist them with producing enough feed corn they share land with Mary's uncle, Frank Thomas. "My uncle actually owns more tillable ground than we do, but when you include the grass that's part of our operation, we are about 500 acres or a little bit more. He's closer to 240-260 acres that he plants. . . . What we do for corn is about between 200-280 acres of corn, and the rest is in grass products," Mary indicated.

As for their rotation, Mary says "Except for about 40 acres that's in our 'corn-after-corn', the rest of it is always corn-potatoes-corn-potatoes. . . . And some of that acreage is his, some of it's ours, some of it is jointly owned between both farms."

In addition to sharing land, the Thomases occasionally share crews. "There is some shared equipment, but the crew is mostly independent. And sometimes we would send a tractor for him to use during crop time, or he would pick rocks on our grounds, something like that, but basically independent," Mary states.

"It's really more of a historical thing. We weren't looking at the environmental issues. It was a way of life, I think, for what we were doing...as my uncle and my father were working together, and my grandfather was still alive, it was 'we will have dairy and we will have corn' and when my uncle had free

time he would help us, and when daddy had free time he would help him. A lot of the equipment was shared then. That was one of the things that I think a lot of people look at now as a benefit – oh well, I could borrow that piece of equipment. . . . Like he would go down and help load potatoes and Uncle Bill would come help us with haying. And so, like I said, it's always been that way," Mary explains.

In terms of sharing labor, though, some things have changed. "If we weren't so busy we would [share labor]. But it's gotten so much bigger now. . . . Now, people have definite hours that they have to be here. But still, his farm does a lot of rock picking for us, and he always did a lot of the spraying for us, and he still does most of it."

While the implications are appealing, the logistics can be somewhat daunting, as Mary indicates, "I think he's at least seven miles to his house. . . . We're talking almost fifteen miles, I think, to the farthest field."

But this hasn't stopped Mary's family from thinking about getting the most out of their situation, as Mary explains about their dairy operation's planned expansion, "The whole idea is to make it a better and easier facility but not a whole lot more labor. If we can do it with 300 cows, I think we can handle that. I know people that have gone up to 450 [cows] with a big expansion that want to be a[t only] 300 [cows]. It becomes a management thing, you know, a balancing act."



Frank Thomas Profile

Frank Thomas started farming at the age of 16 and joined efforts growing potatoes with his brother in East Corinth, Maine, in the mid 1970's, and the farm has essentially been the same size from then until now. "We have between 250-280 acres of chip potatoes, basically. Some of our potatoes are seed that we raise," Frank explains.

In terms of the benefits of integrating with Mary and her side of the family, "...I'd say public manure has been put on our land since probably the early '70s and maybe earlier than that," Frank adds. The addition of manure to potato ground helps in a number of ways, and Frank points out two of the more significant ways, "...The organic matter is going to be the biggest help going into the ground. . . . For any plant, the most important thing is air. Organic matter takes air into the soil. You get a better potato. Any vegetable is better if there's more air in the soil."

As a result of the added nutrients from the manure, and the potato-corn rotation, Frank sees some other benefits, "I sometimes replant land, but I don't do it continuous. And yes, there is a big difference versus the rotating – a big difference. . . . A little [bit of difference in fertilizer and pesticides, but] a big difference in crop yield."

Another benefit comes not so much with growing the crop, as with determining what needs to be done. As Frank explains, "Another benefit to it is that you've got two sets of soil tests. Most potato farmers are going to soil test ahead of the potato crop and base it on that. Well, you've got another

farmer; when they swap, they're going to soil test for the corn. So, you're looking at a soil test every year on every piece of ground to compare and follow what's going through."

Although there are benefits to swapping land and spreading manure, there are also some drawbacks. "Eight to ten years ago there was a little bit of question about the smell of manure; now everybody's trying to get used to it. It's not a big problem. I mean nobody likes to smell it, but chisel plowed in and a good rainstorm and it's gone. It's not like the old days when you spread once a day for three weeks continuous," Frank states.

In addition to this, Frank notes another drawback, "One of the downsides to look at is you can worry about scab with the higher pH. There's always a balancing act on nutrients with potatoes and corn. . . . There's no perfect variety with potato chips that are scab-resistant."

All in all, though, Frank is content with the shared-land arrangement he has with his family. In terms of advice for others interested in such an arrangement, Frank suggests, "I would recommend to anybody getting into it to just get right in and swap equipment and work back and forth. Don't keep track of pennies, but get right into it and swap equipment and work land. . . . If you worry about the nickels and dimes, it's not going to work. . . . There's going to be years that the dairy farmer's going to help the potato farmer more, and vice versa."



Perry Lilley Profile

As Perry Lilley indicates, his family's farm, Lilley Farms, in Smyrna, Maine, has quite a variety of land they work, "We have about 130 milk cows and along with that enterprise we do raise bull calves...and sell them as beef. For crops we raise about 130 acres of corn for silage, about 140 acres of alfalfa for silage, and we do raise, also, about 120 acres of soybeans. . . . We also raise barley. . . . Well, some years we raise only about 60 or 70 acres [of barley] then we raise grain with another farmer where we use his land every other year, then it's up to about 120 acres that year. We also have probably 70 acres of timothy that we allot for hay and also for silage. And we probably have 50-60 acres of pastureland we use for heifers. We don't own all our land. We do rent from four different individuals."

"We got into raising barley and we like that barley-corn rotation, and we wanted to be able to not have to plant corn on the same field two years in a row. We got into an arrangement with Jimmy Hogan because he actually had excess land. He wasn't utilizing all of his land and we were right next to him. So the first arrangement we got into was basically renting about 25 acres of ground from him that we utilized completely. He didn't raise any potatoes on it or any vegetable crops. We utilized all of that," Perry adds.

In terms of what was involved with this twenty five acres, Perry says, "What we would do is we basically put manure on his ground and did all his primary tillage for him—on any ground he wanted tilled that way, and that included some of his vegetable ground, because he's into potatoes and vegetables. That three-year rotation involved 25-30 acres. It would be one year potatoes, and we would manure that ground and do the primary tillage

work. Then we would raise corn on the next year with manure, and then the next year we would put barley on it with manure. So that ground was actually getting manure for three years in a row—and we did all the primary tillage on it."

As Perry points out, there are some benefits each participant receives in a "swap" like this, "Well, it kind of extends our rotation and we can raise more grain because of that. We're farming more ground and raising more of our own grain and extending our rotation. Instead of a two-year rotation, some ground we might go into a three-year rotation, even on our own ground. And of course these people want to improve the soil. They want to benefit from that manure."

As for the logistics of these two farmers collaborating like this, Lilley says, "Well it is all a win-win situation if the two people get along. There's no written agreements. It's done by gentlemen's agreement and you have to get along and be able to depend on this ground every year. I mean, the people you deal with, you have to be able to work with them and they work with you. There has to be some trust there between individuals."

And when asked about the possibility of putting something in writing, Lilley adds, "All farmers just like any business and businessmen, they do business differently. Some, to do business with them, I'd have to have some things in writing. But the group of people we work with we feel that we've worked with them long enough that we know them well enough and we trust each other. We've got no problem with the arrangements that we have and I think they'd be offended and we'd be offended if we had to put something in writing."



Jim Hogan, Sr. Profile

Jim Hogan, Sr., of Hogan Farms in New Limerick describes his operation by saying, “I have about 30 acres of grain, about 5 acres of vegetables, and about 10 acres of potatoes. I’ve been doing it ever since I was 13 or 14 years old with my father. And then when he passed on in ’92, I took over and I’ve decreased ever since.”

When asked about beginning the relationship with the Lilleys, Hogans says, “Well, I got curious about the manure. Years ago my father always used whatever manure he had here on the farm. I think it helped then and I think it helps now. The ground was getting so hard and I needed something to kind of fluff it up or build it up—loosen it up. And I thought I’d give a try with the manure and see what would happen. They wanted some ground to use; I had more ground than I needed, so we arranged a swap.”

“I wanted to improve the soil that I had and loosen it up and get water to go down through it better, you know, stuff like that. Hold more water for when the dry season came along and that was my main interest. I learned a lot of that from [Cooperative Extension Educator] Matt Williams,” Hogan adds.

“Well, I had nothing to lose and everything to gain. I mean, I could have kept farming the way I was and eventually the ground would have been no good for anything,” Hogan muses.

In terms of farmers trying a new approach, “I see a lot of [experimentation] in the last 10 years.

You see it a lot. I think in a few instances, like me and Perry, [potato farmer] Donald Fitzpatrick over there, experimenting with different things, and it’s working. Most of the farmers today are fairly medium-aged men and they’re still able to change their minds and see the light. My father would have said ‘No, no, no, this is my way and this is the way we’re going to do it,’” Hogan reflects.

In terms of benefits from the integration, Hogan says, “There was a slight increase in the crop, and more so the quality than the quantity. . . . That’s what I found mostly was the quality of the potatoes was so much better. I mean it just goes to show just like it was years ago that’s what made the State of Maine—the good quality potatoes.”

When asked about expanding this integration to other farms, or other dairies in Aroostook County, Hogan says, “You take that Limestone Air Force Base. A good example, too—there’s a lot of potato ground up there. And they’ve got places that right there on the base they could start a dairy organization. And as long as you don’t have to travel over 40 miles in any one direction everyone is going to be happy, you know. If somebody don’t have to buy a ton of fertilizer to grow an acre of russets, and he can just buy 5/8 of a ton or 3/4 of a ton, that way, eventually he would make some money, too. If the dairy farmer didn’t have to buy the land and just have to set up his buildings to do his cow thing in, he’s going to make some money.”



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A Member of the University of Maine System