The Small Scale Integrated Farmstead

A Model for Sustainable Agriculture

Karl North 1992

As more people begin to adopt the idea of sustainability as a way of thinking about farming and about the future of our civilization, we who are directly concerned with organic farming need to develop and refine our idea of sustainability in order to say clearly what direction we think farming must take in the future. To this end I offer these thoughts on a general model in the hope of advancing or at least provoking the necessary debate.

As benchmarks of sustainability I'll discuss the need for several types of integration, most notably animal husbandry with plant growing as an essential step away from monoculture, and the integration of the farm with its local consumer market. And I'll argue that small scale is essential to sustainability for reasons that are not only agricultural, but ecological, economic, social, and even political. Any general model for organic farming must also be a model for success in an extremely difficult economic environment. Ever since the rise of urban civilization, rural people everywhere have been subject in varying degrees to what Wendell Berry calls a colonial economy. The colonial economy subverts and eventually destroys the economy of local self-sufficiency, replacing it everywhere with an exploitation based on export of cheap raw materials and cheap labor, and import of expensive manufactures. This process, far from being an exclusively Third World disease, is actually more advanced in Nebraska than in Namibia. In the belief that the small scale integrated farmstead (SSIF) is the best defense against that colonialism, I will be describing it as a series of strategies for outwitting or bypassing the colonial economy. The way of farming described here takes as its point of departure the old general farm, a system that has been maturing for ten thousand years.

At the outset I should reveal a bias with respect to some basic values in which I think the larger culture has become deficient:

1. Our extreme materialism has eclipsed other values. We need to value people more than things and quality more than quantity.

2. Our extreme individualism has destroyed faith in the success of serious cooperation among equals. The success of corporate imperialism has shrunk the population of self-employed individuals and families until most people know how to cooperate in their working lives only as cogs in an employee hierarchy.

3. Our tendency to analytically reduce the world to separate things grossly distorts reality. We need to stress wholes and relations among things, so as to treat things as primarily parts of whole systems.

4. Our lingering puritan heritage combines with the increasingly sheltered and synthetic environ-

ment of urban childhood to keep most people literally out of touch with their true physical nature and the nature of the ecosystem. We need to loosen up to move to the natural rhythms we begin to hear in ourselves and in the great dance of the natural world around us.

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Respect for Nature's Models

One of Wendell Berry's themes that most appeals to me is respect for nature's models. He argues that the experiments at domestication that we call agriculture are best limited to careful refinements on these models. Building viability through diversity is a lesson from nature that farmers have taken to heart for ages, although it has been under attack in the last few decades by the apostles of industrial farming. Monoculture was more labor-efficient, so the argument went, and labor was becoming scarce on the farm. But the ecological problems of monoculture combined with the financial insecurity of putting all one's eggs in one basket has addicted a generation of farmers to the crutch of production credit financing, and its long-run viability is doubtful. The rural manpower problem is a fact of life, but it is due partly to pressure from the colonial economy on farmers to expand beyond the financial and manpower limits of the farm family. If the scale of the farm operation can be reduced, there will be time to develop a diversity of products, along with some of the processing and direct marketing that returns their full value to the farmer.

The farm's products must be carefully chosen to fit tight summer schedules or to spread the work over the seasons. At Northland Sheep Dairy for example, we limit vegetable production for market since it would overburden a summer season already filled with haying, milking, and cheese-making. Instead we gain diversity by making the most of all the sheep products, processing milk, meat, wool and skins into finished retail items. Lambing is scheduled for Spring, and the peak marketing effort for Fall. We retail the orchard harvest as cider along with the sheep products in the Fall farmers' market.

Since much of monoculture and indoor animal husbandry has so deviated from nature's model as to appear unsustainable, I feel we must push in the other direction. At our farm all fields are in perennial swards of mixed grasses, legumes and other plants chosen for diversity and for permanence in our soil and climate, rather than for maximum yield. In this way we not only reduce animal housing and forage storage costs, but also much of the cost of the constant harvesting, plowdown, and reseeding attendant to alfalfa and corn, which are the conventional monoculture forages in our area. Alfalfa can be very profitable in the right environment, but experts are gradually admitting what good farmers always knew: that ordinary native grasses like orchard grass, harvested/grazed at the right stage of growth, compare well with the alfalfa in protein and other nutrients. In fact, orchard grass and other grasses that remain green and vegetative under snow cover retain these high nutrient levels in winter like vegetables in a freezer, so they can be harvested by the animals themselves year-round. Sheep, for example, will thrive grazing through up to a foot of snow when there is good pasture underneath.

In the end, a mix of near-permanent forage is better for the soil (following nature's idea of. constant cover), better for the plants (less disease than alfalfa or corn), and better for the animals that feed on it. After all, the animals did not evolve on a forage of monoculture.

After years of studying his cows' forage preferences, the British dairyman Newman Turner concluded that "unlike humans whose palates are so perverted that we cannot rely on taste to decide what is good for us," ruminants, especially the more rustic varieties, are still the best judge of their right diet. His cows' top choices in forage plants, in order of preference: Sheep's Parsley, Plaintain, Chicory, Salad Burnet, Kidney Vetch, Trefoil, and Alsike Clover. He found that when he expanded cows' forage diet from the usual two or three high yielding (but less sought after) grasses and 1egumes to include a sufficient quantity and diversity of the preferred species, the remarkable gain in the health of his dairy herd outweighed in economic value any loss in pasture or hay yield.

Similarly, on our sheep dairy we have been hesitant to do much plowdown renovation of forage fields where long abandon has allowed a species diversity to creep in that would be difficult to match with a new seeding. Instead we have overseeded existing sod with the lower yielding but relatively permanent Trefoil and Puna Chicory. And when the legumes and the native clovers, favored by lime, manure, and management have beefed up (sheeped up, rather) the soil quality, higher yielding timothy and orchard grass have spread in of their own accord from neighbors' fields to replace the poorer native' grasses.

Animal housing has been overdone, at great cost to the farmer. It may be more convenient at times to keep our sheep and draft animals inside, but it is healthier for them outside. Draft animals, for example, kept in a stable are always ready to use, but only on pasture will they get the variety of forage, the exercise, and that daily good roll in the dirt that their health requires. All our barns are open-sided and the pasture gate is always open in winter. The sheep often like to go out when they have finished their hay, and the mules and horses have always preferred to be out even in ice storms.

Taking one's cue from nature's models should not be confused with a laissez-faire approach. Managing a forage field to maximize quality and growth, and also preserve the desired mix of plant species, is a difficult art; the farmer must keep a sharp eye on what is happening out in the fields.

Symbiosis of Plant and Animal Systems

Wendell Berry says, "Put Nature to work, she works for a minimum wage." Nature has long ago proven that using plants and animals to feed each other is the most fertile, sustainable system going. Now Francis Moore Lappé, Peter Singer and many others have eloquently denounced our overly carnivorous diet for the waste, the extravagance, and (from a Third World standpoint) the imperial exploitation that it provokes. And I join with these vegetarians in their critique of the largely feedlot agriculture that has developed to nourish our carnivorous excesses. But I feel that we need to do better than the vegetarian alternative in developing a model for a sustainable agriculture. That need may not yet be apparent in North America where we have enjoyed the luxuries of cheap land, cheap energy and low population pressure on the land.

In much of Western Europe and the Far East high population density forces farming toward the upper limit of the land's capacity to provide food, so I look to these regions for models of efficiency. Chemical monoculture has of course made deep inroads in these areas of

the world, but high land prices and high transport and other energy costs have exposed its underlying inefficiency and have allowed the small diversified farm sector a competitive edge. In the last fifty years, while in North America the small diversified farm and all its support system have declined and are considered outdated, many West European and Japanese farmers have become expert at producing high yields on small acreages for local markets. Their methods, knowledge, and appropriate technology have advanced apace and are now state-of-the-art, but one of the keys to their success is still the integration of livestock to maximize fertility. European prosperity obscures the fact that the first function of livestock in the long view is manure, not food, production. But in regions that face the added constraint of a generally lower living standard, either as it affects the consumer considering the high cost of meat, or as it affects the farmer considering the high cost of fertilizer, the primary function of livestock is clear.The Chinese hoard their manure; they traffic in it. Even in Japan urban landlords give rent rebates to tenants with large families because of their higher yield of very marketable nightsoil.

We are suggesting that in a truly sustainable farm economy the primary function of livestock is to cheaply convert grass into fertilizer; fur, wool, leather, milk, and meat are important, but secondary. And manure, especially ruminant manure, is not ordinary fertilizer. Correctly handled and composted, it far outperforms vegetable compost, both in terms of soil nutrition and bio-activation.

The livestock integrated farm in our model will be the opposite of a feedlot operation. A system of controlled, intensive, extended season grazing is needed to maximize forage production, and therefore manure production, per acre. Then the excess manure will feed vegetable or fruit growing. Such a farm is an extremely flexible no-waste proposition. Manure is a primary product, like energy. Primary farm products like manure and fuelwood are crucial to the survival of the enterprise because of the way they liberate it from the crush of market forces. They are inputs in their own right that can replace cash inputs like electricity or fertilizer as the latter become less cost-effective. They lend a flexibility to secondary production that permits us to outwit the market. Just as we can use the wood pile to warm the house, cook the food, boil maple syrup, or put hot water in the milk house, or simply accumulate as equity like money in the bank, so the manure pile can go to produce vegetables or forage as the need varies, and if the market for the harvest is poor it can be fed to the chickens, pigs or, sheep. And if the market for these is poor, the manure can feed the soil, building equity for another day. Pigs, incidentally, are perhaps the ultimate in versatility: as omnivores they can be raised by feeding them any other farm products that don't bring a profit in a given market, and they will plow under their own manure.

The logic that stresses primary production on the farm extends to the production of horsepower. The small farm that already manages its complement of livestock can incorporate draft animals with little extra cost. The cost-efficiency of tractor agriculture, like that of much of the rest of conventional agriculture, has been exaggerated by ignoring hidden costs and by focusing exclusively on efficiency per man-hour. A focus on energy costs per calorie produced, or on investment costs, provides a different picture. Tractors are a good part of the reason it takes 40 calories of non-renewable energy to grow one calorie of corn in Kansas, while the ratio is inverted for the ox-powered rice paddy in Vietnam, where one calorie of fossil fuel grows at least 40 calories of rice.

In sum, animals seem as essential to farm ecosystems as they are to wild ecosystems. If sustainable agriculture needs livestock to build and maintain soil, then it appears that vegetarian agriculture is not an ideal model of sustainability. Anyone who has tried to build healthy soil exclusively with vegetable compost knows what a slow process that is.

Pushed to its logical conclusion, our argument says that a five-acre organic vegetable farm is a contradiction in terms. It's not sustainable agriculture. Neither is a farm devoted exclusively to livestock. Ideally maybe 3-5 acres of ruminants, say sheep, should sustain one acre of say, cabbages, assuming controlled grazing. Eliot Coleman in *The New Organic Grower* figures a draft team makes 30 tons of manure. That's enough to maintain both their own 2 acres of forage plus one acre of vegetables or fruit, at his suggested maintenance rate of 10 tons of manure per acre. On the other hand an acre of orchard, may well contain enough of its own forage, if managed properly, to be nearly self-sustaining. The point here is to advocate, not hard and fast ratios, but a way of thinking about sustainability, one that finds an echo, incidentally, in the restriction in biodynamic farming on the fraction of total annual organic matter production that can be removed from the farm.

Self-sufficiency and Market Farming

Self-sufficiency has been scorned as "home-steading" but has always been a first line of defense against the colonial economy. The trick is to integrate market farming with a core of self-sufficiency without letting the tail wag the dog.

So the production of inputs is a first order of business. In addition to fertilizer and energy already mentioned, feed, wood for fences and buildings, and the skills necessary to construct and maintain the farm are often so costly in the market that the time taken to produce them on the farm become a highly profitable activity. As in the Third World there is an argument to be made on the SSIF for sometimes restricting technology to a level appropriate to one's building and maintenance skills. Regarding energy for example, the cost of living in and working around the average New York farmhouse is extravagant. Where I live the typical farmhouse is a bare bump on a bare hill; energy use can be greatly reduced by simply planting wind protection: fast growing evergreens or the Lombardy poplars Europeans put in hedgerows to reduce windchill on their field crops. The typical farmer/handyman is skilled enough to use low-tech passive solar designs to build or renovate barn and farmhouse to capture and conserve the sun's energy. In my experience it is easy to reduce annual farmhouse energy use to below three cords of fuelwood and $300 of electricity, with no loss of comfort.

The farm that integrates plant and animal systems can easily attain a degree of self-sufficiency in regard to food for the farmer and feed for the livestock, but at some point the pursuit begins to yield diminishing returns. One becomes a jack of all trades but master of none. At this point the farmer either falls prey to the colonial economy or, as the Amish have done, raises the pursuit of self-sufficiency to the level of the local community. Then the pursuit of community takes on major economic importance.

In Dundee, N.Y. the Amish had managed to grow to perhaps a dozen horse-powered

farms, an enviable community from my point of view. But when I visited I was told they were leaving one by one. For although there was plenty of cheap good land, their population had not been able to reach the critical mass necessary to support the smithy, the sawyer, the schoolmaster and the other institutions and cottage industries they considered essential to a viable agricultural community. If there is a lesson to be learned here, it is a shocking one: let the farmer beware of hoping to build sustainability in the isolated splendor of his farmstead.

There is of course more than pure economics at work here. Through restrictions on technology intended to limit farm size, the Amish have expressed a deliberate preference for people over cows or cornfields, however profitable the latter may be. The form of Amish agriculture expresses one of their highest values, the value of a community of neighbors.

But the purely economic success of what has been called the "economics of brotherly love" speaks favorably not only for the priority the Amish put on community, but also for the form of small scale mixed agriculture they practice. The typical Amish farm mixes livestock, vegetables, grain, and forage on less than 100 acres. The number of such Amish farms has steadily increased over the last hundred years as the general farm population has sharply declined. and they succeed with one hand tied behind their back, as it were, for the Amish cling to patriarchal values that severely limit the status and roles allowed the female half of their population, especially regarding leadership and decision-making in the community and on the farm.

In sum, maintaining a balance between self-sufficiency and market farming is crucial. The smaller market production needed to sustain a farm that produces many of its own inputs not only liberates the SSIF from the market but gives the farmer more power over the market when he/she does enter it. A smaller harvest to sell opens up more options, including direct marketing.

Sustainable Marketing: the Custom Producer and the Loyal Consumer

If by exporting raw materials and importing expensive manufactures the colonial economy siphons off to the city the wealth of the countryside, the SSIF avoids this exploitation partly through self-sufficiency of inputs, as previously described, but also and most importantly by direct-retailing finished goods At our farm we sell freezer-ready lamb at a return of 2X the value of live lambs and processing, dyed yarn at nearly 3X the value of the grease wool and processing, and tanned skins at 2X the value of the raw pelts and processing. And the consumer gains the advantage of obtaining quality organic goods at everyday prices. Much of the farm's output is sold direct at a weekly farmers' market (April-December) or by mail or telephone order.

By obtaining the full value of its labor the SSIF not only can afford to remain small, but has a unique opportunity to build a consumer clientele whose loyalty partially protect the farm from market forces, especially from competition from industrial agriculture. Furthermore, if the farmsteader can use this special relationship to narrow the yawning gap in culture and consciousness between rural producers and urban consumers, then that can lead to important political progress.

The Bottom Line: a Balance Sheet of one SSIF

The ratio of gross to net income on the farm balance sheet is probably the clearest expression of its degree of emancipation from the colonial economy. According to a recent Cornell Extension Bulletin, a typical New York dairy farm, in order to provide a family income of $20,000, needs 100 cows producing a gross of nearly $300,000, or 15X net income. Such a farm family is usually too overworked to be able to make good use of the farm's own resources to supplement their cash income. And there may be a stress factor provoking compensatory cash consumption, so they may well need $20,000 in family income. On our farm we found a net cash income of about $10,000 let us live well, with maybe another $5,000 in non-cash income derived from self-sufficiency. But the most striking difference, as our balance sheet shows, is how a gross of less than 2X net is needed to provide this family income. If we can continue to hold the gross/net ratio this low, I think we will have steered clear of the colonial economy.

Why Small?

So far we have tried to show how smallness of scale, on-farm input production, on-farm processing, a diversity of output, and direct marketing are an interdependent system of elements, each needing and making possible the others. But there are many other arguments favoring the small farm as the most sustainable agriculture in the long run.

Ecology. The small farmer typically owns the land, identifies with it, and is more likely to care for it. Management can be good because the “eyes-to-acres” ratio is good. The smaller the farm is, the lower the density of animals and harvested crops and therefore the lower the concentration of manure, insects, disease, dust, humidity, odor, and other pollutions. Small scale handling and processing uses less complicated more easily sanitized equipment. In our dairy, for example, the milk touches no long pipelines, valves, pumps, or tanks that are common in the large dairy, and difficult to keep clean.

Economics. Even by short term economic criteria small farms come out ahead: they generally get more crop per dollar invested, and more crop per acre. Economists typically ignore efficiencies small farmers achieve by being closer to the land, able to concentrate management energies on fewer acres and buildings, and on less equipment.

Debt increases with farm size, the USDA re-ported during the farm crisis of the 1980's, saying 20% of the debt that was unlikely to be paid was held by the top 0.2% of farms as ranked by annual crop sales. Often banks cannot afford to foreclose on the larger farms, thus fostering the illusion of prosperity and strength in bigness. But the illusion has been shattered for me time and again during recent decades, in the discovery that neighbors whose big dairies looked so good from the road were slowly strangling on interest payments. We chose to build our farm to its present cash investment level of over $50,000 a different way. It took ten years to make the farm pay us a living, but we owe no mortgage or other interest. And by having to invest slowly we could see how each new building or other investment worked before adding the next, and so better integrate each new addition into the geography and the developing economy of the farm.

Community. Once the family farm was the foundation of rural American community. Its stability over generations depended on the congruency of the economic and social institutions that came together on the farm. As the farm outgrew the family it destabilized both the family

and the rural communities built on farm families. Ultimately it destroys the community by depopulation, replacing people with cows and corn, forcing the people, often against their will, into already overpopulated urban areas. As far as rural community is concerned, small is beautiful, or was while it lasted.

Politics. Ultimately the issue is one of land tenure and political power, as a new feudalism overtakes rural America (as it did urban America long ago) and reduces to a nation of hirelings a country whose democratic foundation was, in Jefferson's vision, a citizenry of economically independent farmers, craftsmen, tradesmen, and other smallholders. As the conditions for realizing Jefferson's ideal have evaporated, leaving political power largely concentrated in the hands of large corporations, the small farmer still stands for that ideal, and enjoys the satisfactions of political independence.

Aesthetics. To American travelers from bigger-is-better land, a first visit to old Europe can be like entering a fairy tale. The permanence of stone and the human scale of the architecture offer a cozy, comforting security. Narrow, winding streets of old quarters broken by attractive little squares, and whole villages nestled naturally into the countryside are a consequence of a long process of adaptation whereby human habitat finds its best "fit" both to the lay of' the land and to the aesthetic needs of the inhabitants. The planner of a small farm has an opportunity that is unusual in our industrial age to design both an enterprise and a habitat that is satisfyingly human in scale. A farmhouse, barns, and farm-stead layout built to complement and celebrate the natural beauty of the spot rather than conquer it, are a joy to live and work in, and an attractive expression, to the visitor from the city, of other values.

Conclusion

If the outlook for the proliferation of small scale integrated farmsteads on a national scale is bleak, each SSIF is nevertheless a free-standing political statement, an example of the ability of ordinary people to gain a measure of economic independence, of control over the resources of the nation and over the decisions that affect their lives. And it is a radical statement, for were it to spread, so that in one way or another the great majority were to gain even this small share in the decisions that affect their lives, it would profoundly subvert the established political order. This is not to argue that the SSIF is the only road to empowerment, or that it is useless to go out and organize to change the politics of the nation, but only to point out, to use Lynn Miller's elegant words, that "if our choice is to stay here and do good work on our farms and to believe in what we truly know, that's not retreat. It is a gracious act of defiance."

Northland Sheep Dairy Annual Farm Account, Cash Transactions

(*As this account is presented only to show the relation of net to gross farm income, the dated nature of the actual figures is irrelevant)*

EXPENSES

Feed: grain, sometimes additional hay	$1000
Field Inputs: lime, seed, fertilizer	650
Processing:	3195

Butcher: 55 animals @ $25	1375	
Wool Mill: 250 lb. @ $6.50	1625	
Tanner 15 skins @ $25	375	
Dairy/Cheesemaking supplies	160	
Telephone		300
Energy:		600
Tractor and Truck Fuel	250	
Electricity	350	
Taxes:		670
Buildings: $4000 @. 4.27%	170	
Land with agricultural exemption:	500	
Insurance: Liability on truck		130
Maintenance and Supplies		500
Veterinary		150
Marketing and Shipping		270
Depreciation		1000
Total Expenses		**8465**
RECEIPTS		
Lamb and Mutton:		7125
55 animals direct retailed cut, wrapped and frozen @$125		
10 animals, culls sold at auction @ $25		
Cheese: 700 lb. @ $10, wholesale or retail		7000
Yarn: 120 lb. @ $20, direct retailed		2400
Handknits 10 sweaters or equivalent @ $100		1000
Sheepskins: 15 tanned skins @ $50, direct retailed		750
Vegetables: organic garden surplus, direct retailed		100
Total Receipts		**18625**
Less Expenses		**-8465**
NET INCOME		**10160**