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VEGETABLE CROP AND LIVESTOCK FARMING IN DOWNEAST MAINE: KING  
HILL FARM, A CASE STUDY

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## **ABSTRACT**

This case study documents the physical, practical and economical characteristics of King Hill Farm, a diversified vegetable and livestock farm in Downeast Maine, with particular emphasis on the integrated pest management practices utilized and underutilized to control insect pest populations. The case study details management practices of both the vegetable production, as well as livestock production. Additionally, the case study discusses the numerous markets utilized by King Hill Farm to sell their varied products, and the economic value (both to the farmers and to their community) of each.

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## ACKNOWLEDGEMENTS

For my mother, Julia: I'll love you forever, I'll like you for always.

## Chapter 1

### General Data

King Hill Farm, owned and managed by Paul Schultz and Amanda Provencher, is located on a hill off of State Route 199 in Hancock County, Maine. The driveway diverges from the main road roughly 2 miles south of the start of 199 at its intersection with State Route 15 and 2 miles north of the small town of Penobscot, located on the Penobscot Bay. Fifteen miles to the west on 15 is the town of Bucksport, and roughly the same distance to the east is the town of Blue Hill, a major hotspot for wealthy summer vacationers. This is apparent in the streets lined with expensive bistros and art galleries, as well as the fact that said streets remain largely unoccupied before the beginning of June and after the peak of August. The entire Blue Hill Peninsula is a largely agricultural area, and many of the small family farms rely on the influx of people in the summer to support their businesses.

Paul and Amanda own roughly 140 acres, 40 of which are cleared for cultivation, hay production, pasture and structural uses. Fruit and vegetable production, including two large hoop houses, takes place on 6 acres, while the structures, which include 2 houses, a barn, two pole barn shelters for farm machinery and 3 cabins for use by apprentices take up 3 acres. That leaves approximately 31 acres in use as pasture or for hay production. The hundred wooded acres contain ponds, trails, and of course, lumber. Adjacent lots are also wooded and largely unoccupied.

Paul and Amanda operate a diversified livestock and vegetable farm, as follows:

### **Beef Cattle**

The farm raises 6 cow/calf pairs at a given time. They are Maine Organic Farmers and Growers Association (MOFGA) certified organic and pasture-raised mixes of Belted Galloway, Buelingo, Charlais and Hereford breeds. Three or four mature cattle are slaughtered each year at 18 months, and sold as halves or quarters, while at least an entire animal is for personal consumption on-farm, and some is processed and packaged as ground beef, steaks and sausages for sale on-farm and at market.

### **Pigs**

The farm raises 10 hogs per year. They are kept in a ¼ acre enclosure where they are allowed to wallow, and also have a small shelter available to them. They are a hybrid mix of Duroc, Yorkshire and Hampshire and marketed at 6 months. Their feed is pelletized and organic, but they are also fed as many kitchen and garden scraps as they can stomach. They are sold as wholes or halves, or processed and sold on-farm and at market.

### **Laying Hens**

The farm raises 50 laying hens at a time. They are Black Sex Links, which is a production hybrid, and kept for 2 years. Each year, 25 new hens are ordered, and 25 older hens are either slaughtered or given away. The layers yield between 10 and 20 eggs per day.

### Broilers

The farm raises nearly 150 Kosher King breed broiler roosters from chicks every year. They are marketed at 11-12 weeks, but are not processed at a USDA-certified location, but are instead slaughtered on-farm, so cannot be sold at market. Broilers are sold exclusively on-farm, informally.

### Turkeys

The farm raises between 20 and 25 turkeys every year for Thanksgiving. They usually raise a basic white production breed, which are ready for slaughter at 12-15 weeks. When they raise heritage breeds, maturation time is doubled to 24-26 weeks.

### Summer crops

The farm grows a wide variety of vegetable crops. Planted in the hoop house in the early spring are beets, carrots, chard, lettuce, kohlrabi, kale, bok choy, tatsoi, arugula, hakurei turnips and spinach. These are also grown outside later into the season. Cucurbit crops include summer squash, zucchini, cucumbers, butternut and other winter squashes (delicata, acorn, etc), pumpkins, cantaloupe and watermelon. Solanaceous crops include many varieties of tomatoes, eggplants, sweet and hot peppers, potatoes and tomatillos. Brassica crops include broccoli, cauliflower, Brussels sprouts, kale, kohlrabi, broccoli rabe, red and green cabbage, Chinese cabbage, hakurei turnips, radishes, arugula and mustard greens. Horseradish grows wild on the property. Allium crops include onions, scallions, leeks, chives, and garlic. Garlic scapes are harvested from the garlic plants in

the summer, and the bulbs in the late fall. Additionally, sweet potatoes, lettuce, peas (shell, snap and snow), green beans, sweet corn and celeriac are grown.

Additionally, the farm grows strawberries, raspberries, and rhubarb. Wild Maine blueberries exist on the property but are not maintained nor are they harvested. Herbs grown include dill, cilantro, parsley, basil, and oregano. A variety of flowers are grown for CSA members.

Specifics on the exact cultivars and varieties of crops are not included, as they vary from year to year.

### **Fall crops**

This is where Paul and Amanda have set themselves apart and created a niche for themselves that is very important for allowing them to raise a family and both be full-time farmers. The majority of their annual income is from the wholesale of their fall root crops to various venues down the coast of Maine, as far south as Scarborough. They grow parsnips, garlic, beets, turnips and carrots. Carrots are, by and large, their biggest cash crop, and they cannot seem to grow enough. Their root crop deliveries in the fall net them between \$3000 and \$4000 per week from early October through January, February or March depending on the presence and severity of molds.

They also harvest pears and apples from several fruit trees on the property in the fall.

### **Hay**

Hayfields are 22.5 acres of the farm, and they are a mix of alfalfa and orchardgrass. Most of the hay used as feed comes from first cut in the middle of the summer, which is

generally of higher nutritional and digestive quality. Both small rectangular bails and large round bails are made on-site. Paul also hays on 24.5 acres that are owned by the former owner of King Hill Farm, Jo King, in the nearby town of Orland. Those 24.5 acres are comprised of five fields, one of which gets reseeded every year, thus each field is reseeded every five years. Hay production is so prolific that King Hill Farm provides hay to several other farms in the area, and additionally has excess first cut hay that has no other purpose than to act as mulch between vegetable rows.

### Machinery

Dennis and Jo King built a pole barn out of lumber from their own wooded acres to house their farm machinery. In it is a 35.7-horsepower Kubota L-series tractor with frontloader that Paul uses for hauling compost, moving the manure pile, or hauling wood. There are numerous tillage attachments, as well as a bale grabber that can be used with the Kubota as well. The more interesting piece of equipment is the Allis-Chalmers Model-B tractor, referred to fondly as “Little Allis”. It is a small tractor that hasn’t been produced since 1957 but was originally designed as a tractor solution for small-scale farms. It is used primarily for inter-row cultivation. In addition, there are two rototillers: a BCS model and a red Troybilt model. Both require the operator to walk along with them, but the BCS rototiller is slightly larger and pulls itself along much more than the Troybilt. A weed whacker is also available and frequently used.

## Buildings and Facilities

The two homes on the property were built by Dennis and Ronald King in the early 2000s and were designed to utilize passive solar heating and cooling. This means the angle of the houses and the placement of windows and doors takes advantage of the path of the sun throughout the day and throughout the year to allow for a cool interior in the hot summer months without the use of air conditioning, and a warmer interior in the winter, with limited need for the woodstove. The houses were built using pine and cedar from trees that were felled and milled on the property. The three apprentice cabins were also built using lumber from the property, but were not designed with passive solar in mind.

The two homes on the property have plumbing and use well water, but the indoor toilets are compostable and must be turned and emptied with some regularity. Outhouses also exist immediately adjacent to Paul and Amanda's house and near the apprentice cabins, only one of which has a shower, a kitchen and running water.

A pole-barn adjacent to Paul and Amanda's house stores scrap wood, a neglected John Deere tractor and the canning kitchen, which is only partially protected from the elements, but contains a large woodstove and water access from the hose attached to the main house.

The other pole-barn contains the tractor, Little Allis, the rototillers, 3 chest freezers and a single upright freezer to house meat. The loft acts as a large storage area for farm supplies such as Remay, plastic row covers, hoses, and harvest boxes.

The main barn, also built using lumber from the property, once acted as a dairy, and therefore has the equipment for one, but the ground floor is now largely unoccupied. The

loft contains all of the rectangular bales of hay and straw. Adjoining the barn is a room that contains a grain mill and all of the tables and tools used in on-farm butchery. Below this room is the cellar for root crops, and above it is a room that holds unmilled grain.

There are two hoop houses on the property: one that is 27' by 70' and one that is 17' by 96'. Additionally, two small greenhouses adjoin the main house and to the barn.

## Chapter 2

### Management Features

#### Soil Fertility

Paul subscribes to the Kinseyian school of thought on soil fertility management, which differs from (or expands upon) the most commonly taught soil management practices. Neal Kinsey's soil fertility management theories focus on the levels of micronutrients in the soil, such as magnesium, calcium, iron, boron and molybdenum, in addition to the classical three macronutrients: nitrogen, phosphorous and potassium. Paul sends soil samples to a lab at the beginning and end of every growing season to be analyzed for various micronutrients. A basic soil test from a university such as Penn State or, in the case of King Hill Farm, the University of Maine costs \$10. A Kinseyian soil test costs \$50 but provides much more detailed information regarding the nutrient content of the soil. That is not to say that Neal Kinsey's school of thought is the perfect soil fertility management strategy. Paul and Amanda manage their nutrient content through the incorporation of crop residues and composted pig, cow and chicken manure, as well as the composted food scraps that are not diverted to their pigs' food trough.

The media they use for starting seedlings in the greenhouse is composed of their own compost, sand, vermiculite, greensand (potassium), lime (calcium), bone char (phosphorous and carbon), and blood meal (nitrogen). These components provide a strong nutritional backbone for the young plants before they are transplanted into the field. While some crop and soil scientists try to discredit the Kinseyian method of soil

fertility management, the yield, vigor and flavor of King Hill Farm's crops in comparison to nearby farms that focus solely on NPK posits a strong case for the value of micronutrient management.

### **Tillage**

King Hill Farm practices fairly conventional tillage practices. To prepare beds for planting, Paul uses a rotary tiller implement attached to the Kubota tractor. To designate three rows in each bed, chains hang from the undercarriage of the tractor and drag through the newly turned earth, leaving three straight lines for those following behind with seeds or seedlings to plant into. After the initial tillage at the beginning of the season to incorporate composted manure and vegetable material, the field is tilled in strips throughout the season as more space is needed to plant later crops. As earlier crops finish their season, such as early greens in the hoop house or peas in July, those beds are tilled again in preparation for another crop to be planted in their stead. Another implement used often is a tine cultivator, as a secondary tillage practice. At King Hill Farm, a tine cultivator implement can be attached to the tractor, or if the cultivation is to be used as a weeding mechanism *between* rows, Little Allis is used. The tines on the back of Little Allis cultivate the narrow spaces between the three rows in a bed. The BCS and rototiller are used as inter-bed weed control every one to two weeks.

### **Weed Control**

King Hill Farm has been managed organically since the 1970s, and has therefore not seen the use of herbicides in a very long time. Like any farm, weeds persist as a pest, but the weed population has been managed much more effectively on King Hill Farm than many

other nearby farms of similar size. In general, the weeds on King Hill Farm are very manageable. This success could be attributable to their crop rotations, which include the use of a pea-oat-vetch cover crop mixture, and also to the efficiency of their mechanical weed management, which operates with the goal of eliminating weeds before they go to seed. This practice, while wonderful in theory and largely in practice, is not 100% achievable, and therefore weed control is still an everyday job. In addition to tillage and inter-row cultivation, much has to be weeded by hand. The biggest problem weeds within the field are common purslane (*Portulaca oleracea*), hairy galinsoga (*Galinsoga ciliata*), wild mustard (*Brassica kaber*) and, above all else, common chickweed (*Stellaria media*). Field edges suffered most from the presence of wild carrot (*Daucus carota*), white campion (*Silene alba*), yellow woodsorrel (*Oxalis stricta*), common lambsquarters (*Chenopodium album*), both broadleaf (*Plantago major*) and buckhorn plantain (*Plantago lanceolata*), and a suite of perennial grasses (Poaceae spp.) (Uva, et al, 1997). Field edges were tilled infrequently, but weeds are kept in check via weed whacker in field margins and along fence lines. Hay fields are managed well enough that their alfalfa-orchardgrass mixture suppresses other weeds, but some pastures that the cattle graze are spotted with Canada thistle (*Cirsium arvense*) and dandelion (*Taraxacum officinale*) (Uva et al, 1997). Dandelion and other minor weeds are mowed down after the cattle pass through onto the next paddock, while the Canada thistle relies on the farm workers to scout and whack down any plants several times throughout the growing season to keep it under control and prevent the spread. By chopping the plants down, the thistle must direct its energy and nutrients into regrowing instead of producing seed or storing carbohydrates in its

rhizomes, which will weaken the plant and lessen its chances of survival through the winter.

### **Insect Control**

Paul and Amanda operate an organic farm, and thus synthetic insecticides are not used on their crops, nor were they for the 30 years before Paul and Amanda acquired King Hill Farm. Using a suite of integrated pest management strategies, they are able to control their pest populations to varying degrees of success. The most economically important insect pests on King Hill Farm are the clipper beetle, or strawberry bud weevil (*Anthonomus signatus*), the striped cucumber beetle (*Acalymma vittatum*), the squash bug (*Anasa tristis*), the Colorado potato beetle (*Leptinotarsa decemlineata*), and a variety of aphid species (Aphidoidea spp.).

*Strawberry Bud Weevil (Anthonomus signatus)*: The strawberry bud weevil is responsible for a potentially huge yield reduction in the strawberry crop at King Hill Farm. The growing season of 2012 was the first year that Amanda chose to keep the strawberry patch in the same place for two years in a row. When growing strawberries, the “plugs” are most often ordered from a nursery and are planted at the beginning of the growing season. These plugs will put off stolons that must be trained to be in line with the bed so that the plants will be in neat, linear rows the next year. The first year of strawberries, the farmer will pull off any buds before they flower to keep the strawberry plant producing stolons and in turn becoming bushier and producing more fruit the next year. No strawberries are harvested the first year. The second year should produce a respectable bounty, and then the plants are normally turned into the earth. King Hill Farm

left their 2011 strawberry plants in the hopes that they would produce a comparable yield the next year, but the strawberry bud weevil population had skyrocketed and the very few strawberries that were yielded were tiny button berries.

The strawberry bud weevil inserts an egg into the developing bud, which then breaks off and dangles from the stem or falls to the ground, never given the opportunity to produce fruit. Adults emerge from the buds, feed and reproduce (Eaton & Kaufman, 2007). A cultural form of control is simply to rotate strawberries out of a bed after 2 years and move them to another location with a good bit of distance from the first. In large-scale strawberry operations, beds are normally covered by Remy or plastic row covers, which act as mechanical barriers from the insect pests, unless of course they are emerging from the soil the strawberries are in. The primary “control” used on King Hill Farm in 2012 was simply to manually remove infected buds from the plants and the soil to prevent growth of the population. It did nothing to prevent the loss of yield in 2012. In the future, based on the successes they’ve had with it in the past, Paul and Amanda will simply rotate their strawberries.

*Striped Cucumber Beetle (Acalymma vittatum)*: The striped cucumber beetle is a major pest to the large spectrum of cucurbit crops grown on King Hill Farm. Walking between the summer squash beds in the morning, one could see the striped cucumber beetles rising from inside the squash flowers like clouds of dust, and within days, the large leaves of the plants would be riddled with holes and, eventually, nearly skeletonized. Cucumbers, zucchini, all varieties of summer and winter squash and pumpkins are included in the striped cucumber beetle’s buffet (Eaton & Kaufman, 2007). For the better part of their growing season, the cucurbit crops are kept under Remy to

prevent the striped cucumber beetle from feeding on the young tissue and to allow for the plants to become strong before the Remay is removed because the plants outgrow their shelter and pollinators need access to the flowers. Paul and Amanda will buy organic resistant varieties of crops if they are available, but not in exchange for good yield or flavor. The primary method of control of the striped cucumber beetle on King Hill Farm is the spray of the organic insecticide Entrust (spinosad) or the deterrent Surround (kaolin clay).

*Squash Bug (Anasa tristis)*: The squash bug is, unlike the striped cucumber beetle, a true bug, meaning it has piercing-sucking mouthparts and therefore damages cucurbit crops in a different manner. The piercing and sucking of the squash bug disrupts the flow of water in the plant, resulting in wilting and eventually drying out of the tissue (Borror & White, 1998; Eaton & Kaufman, 2007). The Remay that covers the cucurbit plants acts as a mechanical barrier, but there aren't many other effective modes of control of the squash bug, other than manual removal and destruction of the eggs from the underside of leaves. Fortunately, the squash bug isn't nearly as economically important as the striped cucumber beetle, and is seen with much less frequency than other cucurbit pests.

*Colorado Potato Beetle (Leptinotarsa decemlineata)*: The Colorado potato beetle is the most important pest affecting potato plants on King Hill Farm. Because Paul and Amanda run a small winter CSA and rely on their own bounty to feed them throughout the long Maine winters, potatoes are an important crop. The Colorado potato beetle defoliates potato plants, both as a larvae and an adult (Eaton & Kaufman, 2007). Oddly, they seem to focus on certain plants, and while one plant may have not a single larvae or beetle on it, the plant adjacent to it will have 30 and be nearly completely defoliated.

While mild defoliation doesn't reduce yield by much, complete defoliation will kill the potato plant and greatly reduce yield. The crop rotation used by Paul and Amanda contributes a form of cultural control by delaying the arrival of the beetle at the potato plants. Weekly or biweekly sprays of pyrethrin, a neurotoxic compound derived from chrysanthemums and a certified organic insecticide, in the early morning before the beetles are active acts as a moderately effective form of chemical control. However, the Colorado potato beetle has become largely resistant to most forms of chemical control (Gullan & Cranston, 2010).

*Aphids (Aphidoidea spp.):* Aphids are a ubiquitous pest, and the vast range of species allows the group of insects we call aphids to feed on an extremely wide range of host plants. On King Hill Farm, they are largely a greenhouse pest for seedlings and, to a lesser extent, tomatoes. In the field, they seem to be held in check by other biological agents, but can sometimes be found cohabitating with Colorado potato beetles on potato foliage. Aphids are true bugs, in that they have piercing-sucking mouthparts, and feed on the contents of the phloem tissue of many different economically important food crops. They also act as vectors for a large number of damaging plant viruses such as cucumber mosaic virus (CMV) and tomato spotted wilt virus (ToSWV) (Gullan & Cranston, 2010). For those reasons, aphids are an important insect pest to control, particularly with small seedlings. A critical benefit to a pest being largely confined to the greenhouse is that the use of biological control agents is much more feasible and economically viable. Paul and Amanda order ladybird beetles (any number of beetles in the Coccinellidae family) and release them into the greenhouses attached to both the main house and the barn, as well as the back half of the larger standalone hoop house that is designated as the seedling

house. If needed later in the season, ladybird beetles are also released into the hoop house where the tomatoes are grown. The ladybird beetles are a moderately effective control method, but sometimes, as was seen this year, the aphid population is too great for the ladybird beetles to control without help. In that case, Amanda chose to make a dilute pyrethrin solution and invert the seedling flats and dip them into it. This effectively controlled the aphid population that was damaging the seedlings. Unfortunately, pyrethrin also acts upon the ladybird beetles and they, like the aphids, die. This is not a viable option for controlling aphids on fully grown tomato plants, so in that case, pyrethrin is simply applied to the tomato foliage using a backpack pesticide sprayer.

While the control tactics used on King Hill Farm are effective, and Paul and Amanda have yet to see any huge economic losses due to insect pests, the variety of control methods leaves something to be desired. Of course, a solid and diverse crop rotation is an important cultural control tactic for nearly any pest, and mechanical barriers such as Remay and plastic row covers play a large role in protecting many crops. Tillage and removal of crop residue also contributes to insect management. It would be interesting to see how much King Hill Farm could cut back on insecticide use if Paul and Amanda attempted some alternative practices. Some that could potentially be effective are the use of trap crops, changing the planting dates of certain crops to avoid peak pest populations, or more resistant varieties of certain crops such as potatoes, cucumbers and squash.

## Nematode and Disease Control

The growing season in 2012 didn't produce much in the way of disease. The only noteworthy incidence of disease was damping off in the hoop house eggplant seedlings, which is a fungal disease of seedlings. Once the eggplants were transplanted into the soil in the hoop house, some of their stems around the soil line became dark, necrotic and spindly. They were removed immediately and disposed of. The rest of the seedlings in the hoop house were then sprayed with Oxidate, which is a broad-spectrum bactericide and fungicide that Paul and Amanda use to sanitize tools and seedling flats before planting, but also as a foliar-applied fungicide spray.

## Labor

Paul and Amanda are the only year-round, full-time pairs of hands on King Hill Farm. Through the Maine Organic Farmers and Growers Association (MOFGA), they accept two "full season" apprentices each year, both of whom arrive on the farm at the beginning of April and stay into November when there are no more carrots to harvest or wash. They also accept a single "short season" apprentice from May through August. All three apprentices are given a cabin in which to stay and access to all of the farm-fresh eggs, meat and produce they can stomach, as well as a modest stipend of \$50 per week. Apprentices work alongside Paul and Amanda from about 7 AM to 4 or 5 PM on Monday through Friday, and then from 7 AM to noon on Saturdays (normally spent at the farmers market). Sundays are a free day. A former apprentice, Everett Ottinger, owns a very small startup farm a few miles away and helps Paul and Amanda when another set of hands is

needed. During haying season, countless people from the surrounding community come to help load and toss hay into the loft of the barn.

## Chapter 3

### Animal Enterprises

#### Beef Operations

Paul and Amanda raise 6 cow/calf pairs at a time, which totals 12 cows. They are not all the same mix of breeds, but all are some mix of Belted Galloway, Buelingo, Charlais and Hereford breeds. In late June every year, Paul purchases a bull to breed with some of his heifers. In September, the bull, almost always a Hereford, will go to the slaughterhouse with 4 or 5 of the mature cows for processing. Cattle are slaughtered at 18 months, with the goal average hanging weight for the herd to be above 500 lbs. Hanging weights from 2012 were 610, 540, 510 and 373.

Cattle are pasture-fed on a 12.5-acre, 20-paddock rotation that completes its cycle in approximately one month. Feed is supplemented in the winter months with hay grown on-farm, which is a mix of alfalfa and orchardgrass, in addition to Fertrell brand mineral supplement.

Cattle are sold as quarters and halves, but are also sold as individual cuts or products that are processed and packaged by the USDA-certified slaughterhouse and butcher. Steaks, ground beef and sausages are marketed to CSA members, friends and attendees of the Blue Hill Farmers Market.

## **Pork Operations**

Paul and Amanda raise 10 hogs each year. They are a hybrid mix of Duroc, Yorkshire and Hampshire breeds, and are slaughtered at 6 months. Most of the hogs are sent to a USDA-certified slaughterhouse so that they can be processed and sold legally at market. The 2 or 3 hogs that Paul processed on-farm cannot be sold, but are instead for family and apprentice use. In 2012, the hogs were slaughtered several weeks earlier than in the past, and they averaged 200 lbs hanging weight.

The hogs are the one animal on the farm whose primary nutrition comes from an off-farm source in the form of Fertrell brand grower pellets. In 2012, the 10 hogs were fed 650 lbs of grower pellets over the course of 6 months. Additionally, they are fed a large volume of kitchen and garden scraps that are diverted from the compost to supplement the hogs' feed. Materials excluded from the hogs' scraps are meats, bones, and eggshells.

Hogs are sold as halves or whole animals, or as processed and packaged meat products such as tenderloin, pork chops, ground pork, sausage, bacon and trotters.

## **Chicken Operations**

Paul and Amanda raise 150 broilers per year, all of the breed Kosher King, arriving in three shipments. They receive 50 chicks at the beginning of May and raise them until they are large and strong enough to be moved from the heated chicken house into a chicken tractor that is moved through a pasture paddock daily (usually about 3-4 weeks). When those chickens are moved into the field, another shipment of chicks arrives and is cared for in much the same way. The chicken tractors are moved regularly to allow for

the chicken droppings to fertilize a larger area of the field, and also to allow the chickens to scavenge for insects, and help to “mow” the field.

In addition to what the roosters are able to scavenge, they are fed a mixture of hullless oats that are grown on-farm and roasted soy. The oats average 12% protein, and the soy 36% protein. The broilers start on a 20% protein mixture for their first 3 weeks, and then are switched to a 16% protein mixture. Conventional chicken farms raise their roosters on a much higher protein content, and therefore King Hill Farm’s roosters grow more slowly on the custom mixture than they would on conventional pelletized food. The roosters are slaughtered at 11-12 weeks and average 5-6 lbs.

Paul and Amanda have 50 laying hens at once, and they are kept for 2 years before being slaughtered for meat or given away. They are kept on a rotation so that every year 25 new chicks are raised, and 25 “old” laying hens are removed. The laying hens are, like the broilers, raised on pasture, but are kept in a larger enclosure and moved much less frequently. Their feed is supplemented with a 16% protein mixture of hullless oats and soy.

The laying hens yield between 10 and 20 eggs per day.

### **Turkey Operations**

Turkeys arrive at the beginning of July so that they will be fully-grown and ready for slaughter before Thanksgiving. Paul and Amanda are able to sell these pasture-raised, organic turkeys for a high premium, and have a long waiting list of customers hoping to buy one, particularly because they only raise approximately 25 birds per year.

Turkeys are raised in a shelter with a heat lamp for the first 3 weeks, and then moved onto pasture, where they have access to the shelter, but also a fenced-off section of grass in which to scavenge and expel waste. Turkeys are fed a 22% protein mixture of organic hullless oats and roasted soy.

Paul's specifications for slaughtering the turkeys are more vague than with any of the other livestock. He simply slaughters the birds when they look big enough. The goal weight for King Hill Farm's jennies (female turkeys) is in the low teens and for the toms (male turkeys) it is in the low 20s. While they currently raise the most common, white, production breed of turkey, which takes between 12 and 15 weeks to mature to a marketable size, some years will see King Hill Farm raising heritage breeds, which can take more than twice that amount of time to reach the same weight.

### **Lamb Operations**

King Hill Farm no longer raises sheep, but in 2012 was still marketing and selling ground lamb, lamb chops, and summer sausage from lambs raised and slaughtered in 2011. The meat has a niche market that is surprisingly profitable in Downeast Maine, but the responsibility of another kind of animal to raise was unreasonable for an operation as small as King Hill Farm.

## Chapter 4

### Markets and Marketing Strategies

#### Farmers Market

Beginning on the last Saturday in May and running through the middle of August, the Blue Hill Fairgrounds are alive with vendors for the Blue Hill Farmers Market from 9 to 11:30 am. Although there is another market at the same venue on Wednesdays, as well as one in the nearby town of Castine on Thursdays and in the lobsterman's hub of Stonington on Fridays, Paul and Amanda only attend the Saturday market. The sales in the first three weeks are largely from seedlings as home gardeners prepare their beds for bounties later in the season, but early greens that were started in the hoop house such as spinach, beet greens, lettuce and Swiss chard are also sold. Seedlings are sold mostly in packs of 4, but more mature tomato seedlings are sold individually. Sweet and hot peppers, celery, eggplant, broccoli, cauliflower, Brussels sprouts, basil, lettuce and parsley are also sold as seedlings early in the market season. Once crops really begin to yield, seedlings are replaced on the market table with more and more vegetables. Crops such as onions, scallions, beets, carrots, turnips, and bok choy are bunched prior to going to market and are priced and sold per unit. Loose greens such as spinach, mixed lettuce, etc are weighed and sold in 1/3 or 1/2 bags. Squash, broccoli, cauliflower, peas, heads of lettuce and cabbage, tomatoes and other solanaceous crops are sold loose and weighed as they are sold.

A large cooler containing meat products is brought to market, including frozen beef, pork and lamb products. While lambs are no longer raised on King Hill Farm, some meat was still available in 2012 from the previous year, and sold very well. The meat products sold at market were all processed and packaged at a USDA certified organic slaughterhouse, even though Paul slaughters and butchers at least one cow and a number of pigs on-farm every fall. The on-farm butchered and processed meat is not legally saleable, so is instead for personal use. For this same reason, the whole chickens are not sold at market. Excess eggs are sold by the dozen, unrefrigerated.

The produce is displayed on the table in shoebox-sized, rough-hewn pine boxes propped up on a slanted board to allow passersby to easily see the produce. The table is draped with a red and white checkered table cloth, and herbs are sold in bunches sitting in mason jars of water. The image portrayed is that of rusticity and of-the-earth, old-fashioned country living. It is an effective image, particularly as neighboring stalls sell their seedlings in red solo cups and their basil in Ziploc baggies. If one were to ask Amanda about the “brand” that she maintains at market, she would likely mention that it is not calculated, but simply a reflection of how she and Paul truly live and run their business, and it is true. They simply utilize materials they have available to them. The most important thing to Amanda at market is to make sure it always appears that they have plenty. She always brings more than she thinks they’ll sell, or brings seedlings to take up space on the shelves, so no customer, even at the end of market, thinks he or she is scraping the bottom of the barrel.

The Blue Hill Farmers Market is a lucrative market for King Hill Farm. In May, their profits for the 2.5 hour market may be around \$400, but can be closer to \$800 in the peak of the season. It is by no means, however, their primary market.

### **Community Supported Agriculture Summer Share**

The most energy and planning goes into the summer CSA. Community Supported Agriculture (CSA) is a business model that has become increasingly popular among small vegetable farms in the last few years. Some have adapted the model for meats, cheeses, value added products, and even beer. Before the growing season, members of the community can buy “shares” or “half-shares”, for which they pay upfront, and then are provided a selection of produce regularly throughout the season. It’s a beneficial business model for the farmer, as it provides capital before or at the start of the season when costs are highest (buying seeds, tillage, fertility management, etc) and it also diverts some of the risk associated with farming onto the shareholders. If there is a large crop loss due to poor weather conditions, poor pest control, disease outbreak or any number of other reasons, the customer has already paid. However, it’s an exciting business model for the customer as well, as he or she inherently have a more vested interest in the success of the farm, gains a personal connection with the farm and farmer by interacting on a weekly or bi-weekly basis, and also is eating the freshest possible produce as it comes into season.

King Hill Farm offers both a full share and a half share to its customers. The full share costs \$425 and the half share costs \$250, and both run for 16 weeks, beginning with the last week in June and running into the middle of October. Emphasizing the words “community” and “support”, Paul and Amanda make exceptions for a number of

customers, and even donate a few small shares to people in the community who cannot afford fresh produce all summer long. They will accept incremental payments throughout the season and, most uniquely, trades. A friend of theirs runs a maid/housekeeping business, and in exchange for her weekly share, comes to Paul and Amanda's house once a week to scrub the floors, vacuum, organize the children's toys and clean the bathrooms. So in the case of King Hill Farm, CSA could also stand for *Community Supporting Agriculture*.

The CSA had 45 members in 2012, about half of whom bought full shares, and half of whom bought half shares. CSA pick-up is on Tuesday and Thursday afternoons, and unlike some CSAs such as Tait Farm in Boalsburg, PA, the shares are assembled and boxed prior to pick-up. The former owners of King Hill Farm set out the components of each week's share for the customers to weight and choose for themselves. The major problem with that, despite the fact that it saves the farmers and workers time and effort, is that customers would take more than they were entitled to, and produce would run out before the last few members arrived to pick it up. Now, Paul and Amanda and their apprentices harvest some crops that keep well on Monday and Wednesday afternoons, and the more perishable crops such as greens on Tuesday and Thursday mornings.

Crop varieties, planting dates and what crops to actually grow and how much of each are planned largely based on King Hill Farm's CSA. It is the source of most of the time and effort during the summer, and it is also the basis for the farm's primary marketing strategy: build strong personal relationships with members of the community, and provide them with quality product to encourage word-of-mouth promotion.

## **Direct Sales**

While Paul and Amanda make no concerted effort to advertize that they sell whole chickens, turkeys, eggs, and frozen beef and pork products directly to customers from the farm, interested customers will regularly inquire. Turkeys are commissioned long before they arrive on the farm, and a lengthy waiting list exists for customers hoping to buy a local, pasture-raised turkey for Thanksgiving. Chickens are sold by arrangement, but beef and pork products are kept in a series of chest freezers in the barn with a notebook and money box, allowing customers to purchase as they please, even when Paul and Amanda are away or even asleep. This arrangement operates on the honors system.

An upscale restaurant in Blue Hill, ME buys lettuce directly from King Hill Farm several times throughout the season for use in their salads and other dishes.

Additionally, strawberries not eaten, frozen or distributed to CSA members in 2012 were sold in bulk to an annual customer to make jam. The transaction was a direct farmer-to-customer exchange.

## **Community Supported Agriculture Winter Share**

In addition to the summer CSA, Paul and Amanda run a much smaller winter CSA that runs from November to February. Shares are \$400, are comparable in size to a full summer share, but are delivered bi-weekly. The CSA only consists of 12-15 members, and there are no plans to expand beyond that. The shares consist of fall root crops such as potatoes, sweet potatoes, parsnips, carrots, celeriac, beets, and a variety of greens grown in the hoop house.

## Wholesale Markets

The bulk of King Hill Farm's income comes from the winter wholesale of fall root crops, namely carrots, to a number of grocery and health food stores southward down the Maine coast. The relationships with these establishments were in place before Paul and Amanda took over the farm, but have continued to be the most lucrative endeavor for King Hill Farm. An acre and a half is used for the production of garlic, carrots, parsnips, beets, rutabagas and turnips for wholesale. As the CSA is coming to an end in mid-October, the harvest and processing (cleaning, weighing, etc) of these crops is picking up. Once processed, the crops are kept in a cellar to prolong their salability, as Paul delivers them to 7 retailers every week for the better part of the winter. Starting in Hancock county and moving south, the retailers who buy wholesale from King Hill Farm are as follows: Belfast Co-Op in Belfast, Good Tern Co-Op in Rockland, Rising Tide Co-Op in Damariscotta, Morning Glory Co-Op in Brunswick, Royal River Natural Foods in Freeport, Lois' Natural Marketplace in Scarborough and, their largest buyer by far, Whole Foods in Portland. These sales bring in between \$3000 and \$4000 per week in the winter, providing a good deal of primary capital for the next year's growing season, which begins in February when early greens are planted in the hoop house and seedlings are started in flats. Without these wholesale markets, King Hill Farm would likely be struggling to differentiate itself from the countless other small farms in the area, many of which are run by part-time farmers. This niche allows Paul and Amanda to be farmers full-time.

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# ACADEMIC VITA

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## **Education**

B.S., Agroecology, 2012, The Pennsylvania State University, University Park, Pennsylvania

## **Honors and Awards**

Recipient of the Theola F. Thevaos Trustee Scholarship in the College of Agricultural Sciences in Spring 2012

## **Association Memberships/Activities**

Member of the Pennsylvania State University Chapter of Gamma Sigma Delta, the Honors Society of Agriculture

Member of the Pennsylvania Association for Sustainable Agriculture

Member of the Maine Organic Farmers and Gardeners Association Apprenticeship Program

**Professional Experience**

I worked as a research assistant and laboratory technician working to find nutrient deficiency and drought stress resistant varieties of beans and maize in the Penn State Department of Horticulture under Dr. Jonathan Lynch from February 2010 to May 2012.

I served as the staff-student liaison for the Penn State Department of Crop and Soil Sciences Faculty, Staff and Student Affairs Committee during the 2011-2012 academic year under Katherine Butler.

I served as a part-time volunteer farmhand at Tait Farm, a vegetable community supported agriculture farm in Boalsburg, Pennsylvania in the summer and fall of 2011 under farm manager Steven Spinelli.

I worked as a full-time farmhand and apprentice at King Hill Farm, a diversified vegetable and livestock farm in Penobscot, Maine in the summer of 2012 under Paul Schultz and Amanda Provencher. This was in association with the Maine Organic Farmers and Gardeners Association.

**Research Interests**

I have broad interests in sustainable agriculture and food security, particularly small-scale diversified farms that integrate fruit/vegetable production with livestock production. I have particular interest in the local food movement and an increased reliance on regional, seasonal food systems.