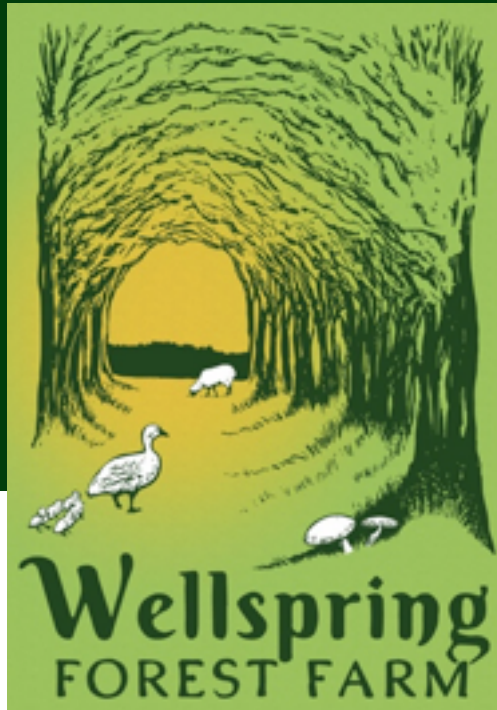




Raising Ducks

on a Small Agroforestry Farm

**By Steve & Elizabeth Gabriel
Wellspring Forest Farm & School**



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Introduction

Before moving to the land where Wellspring Forest Farm is currently located, we decided to try ducks after years of having chickens at various scales. Many of our neighbors and friends raised chickens, and we thought duck eggs could be a nice change of pace. It turned out that this happenstance decision led to a relationship we never expected. Today, we have about 50 laying ducks, mostly mixed Cayuga and Khaki Campbell breeds. We also have two wonderful guard geese watching over the group.

Our first season we bought a half dozen ducks (the NY State minimum of purchase) – 3 Indian Runners and 3 Khaki Campbell's, and constructed a simple house for them. We set up a pen in a wooded spot in the backyard of our rental house. Because the wooden area was close to the house and we would visit the ducks twice a day, we decided to place our 30 shiitake mushroom logs in the duck pen, soaking them weekly and harvesting enough mushrooms for personal use.

That season we made an exciting discovery; that our slug challenges with growing shiitakes were almost entirely gone! It made perfect sense; slugs love eating perfectly ripe shiitake mushrooms, ducks love slugs – why not raise them in the same locale. Once we bought land and as we transferred the mushroom operation to our one-acre sugar maple grove (to be a small sugarbush) we became intrigued with the fact that a three-way relationship was emerging - a polyculture of a producer (sugar maple trees), consumer (ducks), and decomposer (mushrooms). We discuss this polyculture in the article “Deslugging the Woods,” available at <http://media.wellspringforestfarm.com> if you want to read more about it.

Our initial discovery led to applying for a Farmer Research grant from Northeast SARE was intended to help explore this polyculture relationship in a more thorough way (GRANT NUMBER). The project included raising 50 ducks of four varying breeds (Rouen, Muscovy, Cayuga, Swedish Blue) for two seasons and experimenting with rotating them around the mushroom yard to see if they would help with slug control and enhance the forest ecosystem. We then applied for additional funding (FNE – XXXXX) to explore how rotating ducks could reduce slug pressure in our pasture, as they are known to transmit parasites to small ruminants. The second part of this publication offers the results of these studies.

From the marketing perspective, we initially focused on the idea of raising ducks for meat, and while we achieved some profitability we ultimately decided we didn't want to raise hundreds of meats ducks each season. Currently we sell eggs, but the main goal of our enterprise is that the sales pay for the duck feed and labor and thus the animals don't cost us much as we mostly value the ecological role of these animals as bring to the farm – mainly in their pest control as well as cycling of nutrients in the systems, in particular phosphorus.

This document is gathered from our experience at Wellspring Forest Farm after raising ducks for six seasons on a backyard and small commercial scale. It is not meant to be a complete reference for duck raising, but rather aims to serve as a guide for anybody interested in some real world experience raising ducks. The information we chose to include here are things that we wish we'd known from the outset of our duck rearing adventure.

About Our Farm

Wellspring Forest Farm is located in the Finger Lakes region of Upstate NY, about 10 miles west of Ithaca, NY (yellow pin on map).

The farm includes 30-acres we have title to, as well as another 25 that we lease for grazing, mostly utilizing sheep and woody species as we develop silvopasture systems for the site.



Our farm demonstrates techniques that restore forest ecosystems, build soil, and preserve water quality while producing food, medicine and materials. Each enterprise on the farm is designed to be economically profitable, yet no system works in isolation, as all things in nature are connected. We produce maple syrup, pastured lamb, mushrooms, elderberry, and duck eggs on the farm. We also host an AirBnb in a yurt and several workshops each season teaching others about our farm and homestead practices. Read more about the farm at: www.WellspringForest-Farm.com.

PHILOSOPHY

Wellspring Forest Farm approaches animal raising from the perspective that animals should be:

- Appropriate to land and stage of farm development
- Supportive of landscape health first and yields second
- Healthy and happy in their living environment
- Economical to maintain
- Easy to move through the use of portable housing and fencing
- Enjoyable to raise and work with

From this perspective, we've come to several conclusions with regards to ducks:

1. Ducks are an appropriate and positive addition to many contexts in the farm landscape including forest, pasture, vegetable plantings, and integrate well with other livestock.
2. Ducks offer valuable ecosystem services including manure high in phosphorous, natural pest control tendencies, and their ability to produce onsite food sources (eggs and meat).
3. There is high demand for duck products, both meat and eggs. The number of animals needed to make a profit from these products makes duck unfeasible for a small-scale farm – assuming products are sold at reasonable and competitive market rates. So either farms need to scale appropriately or value the ecological and aesthetic role of ducks on a farm.

4. In the end, 40 - 50 ducks is an optimal flock size. This size is feasible to house in easily portable housing, produce manageable amounts of manure, and does not overgraze an area too quickly. In addition, we have found this size flock is most enjoyable to work with. This is entirely our opinion, and we appreciate those who scale larger, as well as smaller.

Key Considerations for Raising Ducks

It is very surprising to us that more people don't raise ducks. We have found them to be significantly preferable to chickens for many reasons, as explained below. Of course, chickens have a place in the farmscape, and do offer several advantages over ducks, as well. The chart below offers some general observations of some of the differences between the two.

1. WATER - Ducks need a lot!

Ducks root around in the ground looking for food, and since they have no useful teeth, they need to be able to submerge their heads into water and clean out their nostrils and beak. Our ducks appear happiest when they have access to, at a minimum, a 5-gallon tub/10 birds they can bathe in. Some texts explain that bathing is essential for the duck to clean their feathers so to enable their down to remain oily. In the summer, the oils keep them cool; in the winter, it keeps them warm. We usually use 5-gallon tubs in the winter and switch to larger 10-gallon tubs in the summer, where water access from the pond is readily available. We find that 5 gallons is adequate for 8 – 10 ducks if changed on a daily basis.



2. FORAGING - Ducks are really good at it!

We have found that ducks are incredible foragers. Unlike chickens, which peck at things for hours and pre-digest food in a gullet before swallowing, ducks take their food whole. This is a VERY significant difference because it means that ducks can be used in agricultural situations as a pest control while the plants are growing (e.g. they LOVE slugs. Imagine, a garden without slugs). Depending on the breed of duck and how often you rotate their grazing area, they generally seem to be only tempted by tender greens and shoots of garden plants and not full-size plants, shrubs, or trees. This is a big difference as compared to chickens, who are useful in light tillage situations but can also annihilate a planting in short order.

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3. CHARACTER - Burrowing vs. Till & Scratch

Probably our favorite aspect to ducks foraging technique is that they don't till and scratch like chickens do, but instead they borrow into the soil with their beaks. This means that while they can remove seeds and insects like chickens do, ducks do not turn over the soil. In our gardens and orchards it appears that the burrowing promotes a healthy aeration of the soil, without destroying its structure. This quality also means that ducks can be grazed in forested settings, since they do not destroy the leaf cover and understory. Of course, we realize there are times when we all need tilling and scratching in the landscape, but as a whole we have found that ducks fit nicer as a long-term resident on our homestead and chickens services seem more temporarily useful.

4. POOP

All animal waste that is not managed well will smell really bad. The 2 flocks of 50 ducks we had in 2012 and 2013, and our current flock of 20 ducks, poop enough to create a terrible and stinky mess if not managed properly. The same amount of chickens, cows, sheep, humans, etc. would produce the same problem. Three tips we've learned to keep smell down and better help us manage manure as a resource (our potatoes loved it!) are:

1. Keep bedding fresh, add every two days
2. Leave water out of the duck house at night (except when they are young) to minimize water spillage inside
3. Move housing frequently

Duck poop is a highly nutritious resource (great source of phosphorus) and we use their manure filled straw for fertility on our farm. We mulch potatoes, garlic and trees directly with it after cleaning their



house, and we sheet mulch as much of the vegetable garden as we can with this “waste” throughout October-April.

5. DISEASE & COLD TOLERANCE

Ducks are extremely disease and cold tolerant. We are not concerned with mites or foot rot as long as the bedding stays clean. Their down feathers provide excellent insulation and as such, their cold tolerance is very high. We observe our ducks bathing in their water tubs in all temperatures. Duck houses don't need to be insulated though should be designed to remain dry in blowing wind and snow conditions. We have read that most ducks can tolerate as low as -30 degrees Fahrenheit, though we have not found specific information on this statement with relation to breed or length of exposure. Of concern in cold weather is that their feet and legs do not freeze. This is another reason why fresh, dry bedding is important in their house.



SUMMARY: COMPARING DUCKS & CHICKENS

The following chart offers some points of comparison between ducks and chickens:

| DUCKS | CHICKENS |
|---|--|
| Extremely cold hardy; ducks can thrive in cold conditions with minimal shelter; though some wind protection is recommended; can withstand some wet & wind | Moderate to good cold hardiness; depends on breed, age, size; need protection from wind and wet and insulation in the winter; too much exposure can be problematic |
| Few disease and general health problems | Can develop problems with mites, disease |
| Being waterfowl, they need consistent access to freshwater (>5 gals per 10 ducks per day) | Minimal water needed; dehydration can be a concern, especially in cold conditions. |
| Many breeds of ducks can forage for much of their diet in summer months; some resources claim that their entire diet could come from a landscape. Meat birds definitely need grain input. | Some breeds forage well, if given access to good pasture and “scratch”. Some supplemental grain likely needed, especially for meat birds. |
| Since they “burrow”, they can be rotated through many environments without damaging plant root systems; they can be raised in gardens if care is taken to fence off tender greens from being eaten. | Scratching tendencies mean that extra caution must be taken; best for establishment of new plantings and when following grazing animals; in the garden they are best in the beginning and/or end of a season |
| Vulnerable to predators. Guard goose recommended. | Some breeds excellent at evading predators; but overall vulnerable. |
| Less overall breeding leads to more variation among a breed; less breed choices out there. | Many breed options available; more breeding has been done also within some breeds |
| Housing should be shorter and wider: “nesting” tendency | Housing can be narrower and taller; “roosting” tendency |
| Tend to be noisy, except Muscovy | Besides roosters, are quiet |
| Some breeds lay eggs 300-330 days per year | Most egg-laying breeds are over 300 eggs per year. |

Breeds

There are many breeds to choose from. We will discuss only the breeds we have direct experience with. In our experience, it is dangerous to make generalizations about breed performance because animals respond as much if not more to “nurture” (management) as much as “nature” (genetics). That said, some distinctions could be made when considering the appropriate breeds.

With regards to researching the significance of ducks on forest systems and mushroom production, the factors that were most important to us were:

- 1. Forage Tendencies** - The central reason for the trials we conducted was to examine the role ducks play as biological control agents in perennial agroforestry systems and specifically, will ducks eat enough slugs so to reduce slug damage on commercial shiitake production or pasture situations? A secondary consideration was that good foraging ducks would need less feed purchased from off-farm.
- 2. Pounds of Feed vs. Pounds of Meat or Eggs** - Rather than just focusing on the breeds that put on the most weight, we questioned more the efficiency of converting food to meat. Some books claim the heritage breeds can forage for almost all of their diet. These same breeds typically put on less weight however if that bird is able to get his/her food needs mostly through foraging, this benefits the ecosystem, provides an ecosystem service to our mushroom business, reduces our costs for feed and our reliance on outside imports.
- 3. Enjoyable to Work With** - This category remains largely subjective, but having raised animals we know there are variables in temperament, aesthetics, and even entertainment value. We also know we hold a slight bias toward the heritage breeds of ducks; in a time where our food system has nearly eliminated many animal species it feels important to try and play a role in maintaining agricultural biodiversity.
- 4. Taste & Flavor** - As is common with many livestock, meat breeds often pack on more pounds, while heritage breeds have more complex and interesting flavors. To compare flavors, with the help of Cornell Cooperative Extension Meat Specialist, we concluded the first season with a duck tasting where local chefs prepared each breed in the same way and fellow duck farmers and restaurant owners ate and judged samples based on texture, appearance and flavor.



The chart below summarizes our experience by breed (note, only four of these breeds were part of the first NE-SARE grant. The other details are from additional experience):

| BREED | TYPE | BEHAVIOR | FORAGING | MEAT YIELD/TASTE | Eggs | Notes |
|----------------|---|--|-----------|--|---|--|
| Rouen | Meat, Homestead | Docile, flocking | Excellent | Live weight 6 – 8 lbs after 5 months, meat is dark and savory | Moderate; | Plumage very similar to mallard; best as a homestead meat breed |
| Muscovy | Meat, Commercial | Males can be aggressive, independent | Fair | Very lean, best to harvest at 3.5 – 5 months, exceptional weight gain; males | Low | Not a true duck, quietest of all breeds, best (other than Pekin) for commercial meat |
| Khaki Campbell | Eggs, commercial | Docile, friendly, flocking, very cold hardy | Excellent | Too small for meat | Excellent; began laying at 5 months, almost daily | Began laying at 5 months |
| Indian Runners | Eggs, homestead, maybe commercial (eggs)? | Skittish, flocking, erratic, cannot fly | Very Good | Too small for meat | Medium to good | upright, dignified look, “walking wine bottle” |
| Cayuga | Mixed, homestead, maybe | Docile, flocking, may have retained mothering instincts, very cold hardy | Excellent | Very good, dark, flavorful meat (small portions) | Moderate to good (won’t lay for 12 - 18 months) | history links to the local bioregion (Cayuga lake). |
| Swedish Blue | Mixed, homestead | Docile | Excellent | Very good, dark, flavorful meat (small portions) | Fair (no personal experience) | a beautiful mix of whites, greys, and blues. |

With the exception of Muscovy, all the ducks mentioned are essentially bred originally from wild Mallard ducks. More notes on our experience with the various breeds will be found in the second part of this document, which describes the research projects. Of the 6 breeds we raised, we ultimately settled on a mixed flock of Khaki Campbell and Cayuga because we feel they balance our goals for pest control, foraging, egg laying, temperament, and the occasional harvest for meat for our home table.

Basic Care

DUCKLINGS

Ducklings can be hatched from eggs incubated for 28 days or purchased as young as 1 day old from hatcheries. Upon hatching or arrival, it is critical to have a brooding area set up to provide continuous food, water, and warmth. A 125 or 250-watt heat lamp is a necessity because ducklings will have no down feathers.

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We raise ducklings in metal stock tanks (which we re-use later in the season for soaking mushroom logs) in a barn. These tanks provide shelter from wind and cold, are easy to keep warm, have a spout for draining liquid, easy to cover and clean. The tanks of course are open on top and ducklings need complete protection. We constructed simple frames made of wood and hardware cloth that lay on top of the tank. The hardware cloth facilitates ventilation so ducklings don't overheat.

We begin moving the ducklings to pasture (or the garden) within their first week if the weather is warm (>50 degrees and sunny). We cart them outside



on warm and sunny days so they can begin to forage and bathe in a shallow trough. Ducklings can be exposed to water and are eager to wade and swim at a very young age (think of the ducklings you see on a lake).

Of course, protection from predators (and pet dogs!) is critical when they are so tiny. We con-



struct simple 4' in diameter hoops from scrap irrigation tubing 1" in diameter and welded wire fencing, with a removable lid made from the same material. We also have a lid made of scrap roofing, which covers half the hoop in case of rain and to provide shade. These structures are lightweight and easy to slide to new pasture every few hours, or whenever their circular plot is well soiled. 10-20 ducklings per ring are ideally moved 2-3 times per day. Ducklings almost constantly eat and drink and quickly soil their entire ring of pasture with poop. It's critical to not leave them outside unattended for more than half a

day. A sunny day can become cold or rainy in the spring, and the ducklings should be moved back to the stock tank. The ducklings should be taken back to the tanks and brooding lamp before dusk.

At about 8 – 10 weeks, or when there is evidence of down feathers, the ducks can be transferred to more permanent housing. It's rather obvious when their coat changes from puffy fur to feathers. It is important to make sure access to their new housing is a gradual ramp that has some degree of "grip" so their webbed feet can maintain traction. We have observed ducklings will generally not jump up into their housing without a ramp, especially when young. When first moving the ducks to new housing, we typically close them inside for 2-3 full days so they learn this is home. Even with these few days of "lock-down", some effort to shuffle them in at night may be necessary until they catch-on. Once they have their down feathers, these 2-3 days are the only time we put food and water in their houses.



WATER

Access to clean water is critical. Ducks prefer to be able to clean themselves by getting in the water and splashing it all over their bodies. They require water for cleaning out their beaks, which become dirty from burrowing in the soil. Some texts explain that bathing is essential for the duck to clean their feathers so to enable their down to remain oily. In the summer, the oils keep them cool; in the winter, it keeps them warm. Of course, some water is necessary for drinking, but it is minimal when compared to their need/desire for bathing.

As ducklings, a water fountain should be available at all times. Once they are a week old, and only during the day when the temperatures are warm and the sun is out so we are sure they can get fully dry, we give the ducklings access to a small pen in the pasture to be in the fresh air and forage. We give them a shallow tray of water (a paint tray works well) to play and bathe in, and can easily walk in and out of. Once they are a few weeks old, sleds or lids work great as wading pools.

As they mature, small 5 or 10-gallon capacity tubs (found in farm and feed stores) work well. After a season of giving our ducks a kiddie pool of water, we found this size to be ideal. They seem to enjoy the extra space and can swim a bit in the pool, but it was much more wasteful and challenging to change the water regularly, and in winter, almost impossibly heavy to lift if the water froze. Of course, if you have a pond on your land, this is ideal for ducks. We observe our ducks bathing in the tub of water even in temperatures as low as -15 degrees. The tub seems to enable them to love life, a quality that shouldn't be discounted!

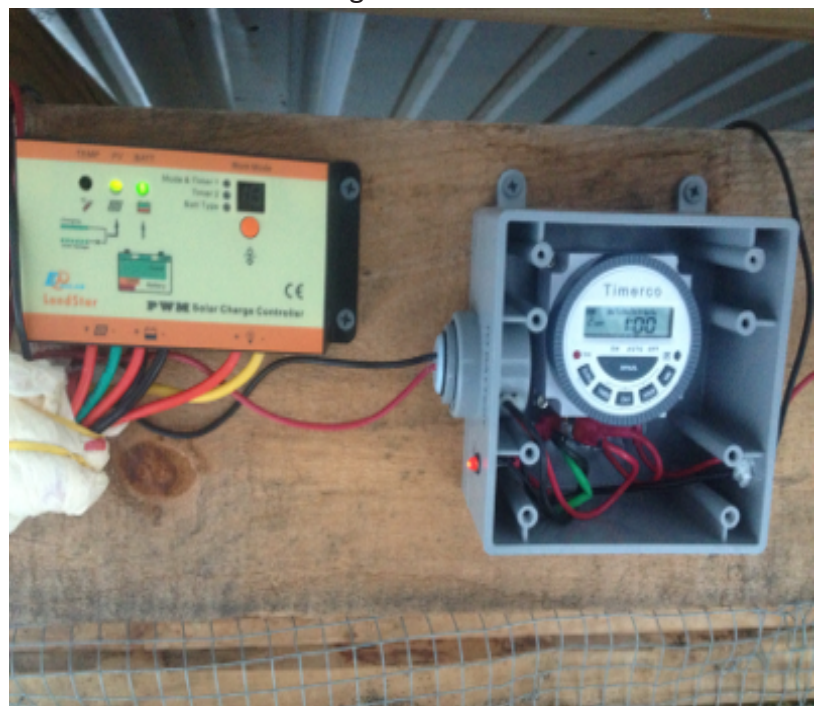
Water tubs should be filled and drained daily, as the water quickly becomes dirty and soiled. Do not worry when the ducks appear to dirty water within minutes of giving it to them; changing the water daily is sufficient. In the winter, the smaller tubs can be easily turned over and dropped on the ground to break any accumulated ice-free before refilling with fresh water.

Once the ducks have most of their down feathers and are in their permanent housing, we only give them food and water outside, and never inside their house (other than the first 2-3 days when they are locked inside their new home). This is fine for their health (assuming you let them out at a reasonable hour in the morning), as they do not need water at all times if they are not eating. More important for us, keeping water out of their house reduces the amount of fresh straw needed and you avoid a complete wet mess from occurring inside their house.

FENCING & HOUSING

Ducks can be easily contained with moveable net fencing designed for poultry. Our preference has been to fence them with 80 or 164-foot sections of net fencing rather than allow them to “free range,” which limits our ability to control where they forage and fertilize and also exposes them to predators. Most breeds, when given adequate access to forage, food, and water, will not leave the fence, though some choose to jump/fly a short distance and leave the fence (most notably Muscovy). We have not found it necessary to clip wings on any of our duck breeds.

Care needs to be taken with portable fencing to keep the grass cut around the fence line to ensure the electricity will not short out. The fence should be placed to maintain a tight line and voltage should be checked at least once a week and/or when fence is moved to a new place. A simple set up with an energizer, solar panel, and car battery makes for an easy setup that can be moved with the flock.



Housing should be movable if possible. Unlike chickens, who roost, ducks nest and so do not need a tall ceiling, 2 -3 feet tall is sufficient. They do need adequate square footage since they prefer nesting. 1.5 to 3 square feet of floor space per duck is recommended by NOFA organic standards. We have found that a house built with a 4 X 8 sheet of plywood as the base is adequate space for 10 – 20 ducks, who will cluster tightly together in the winter months and spread out more in the hotter summer months. Through trial and error we have found that building duck houses directly on top of old trailers is the easiest way to ensure the houses are moveable. We move them with the hitch and the farm truck. This is doable by one person.

The best bedding for ducks is straw or hay. It can be somewhat “rotten” and damp material can be used when it’s not winter. A fresh layer of straw should be added every 2 – 3 days to cover manure to keep the smell to a minimum. The straw can be cleaned once a month in the warmer months and applied to plantings. In the winter, we let the bedding build up to a few inches. The combination of straw and poop creates heat (N+C) and helps provide additional warmth for the birds. We try to clean the house out once a twice during the winter if there’s a few days of thaw. Harvested bedding is used at the base of trees, as mulch on potatoes or garlic, or other mulching applications.



Infrastructure: Tips and Tricks

Just to review, a few very specific things we highly recommend:

Small water tubs: *Bigger tubs don't mean less work, as one might think. Since the water gets dirty quickly, small 5-gallon tubs are easier to manage less wasteful. In the winter, a 5-gallon tub can be turned upside down and stomped on to break any accumulated ice. These rigid plastic tubs last for years and are the size we've found to be most amenable. This size also makes it easy to ration out water via five gallon buckets. On cold winter days, unless you have heating implements for the water, you may need to loosen up ice or bring ducks fresh water mid day.*

Water catchment: *Since duck houses have roofs, and ducks need lots of water, a logical effort is to catch rainwater from the roof. We have done this by fashioning a simple gutter and hose that empties into a 30-gallon tank and/or a 10-gallon trough.*

Solar lights: *We rigged a simple solar panel (40 watt), lawn mower battery, charge controller, and timer along with some LED lights so that during the winter we can extend the daylight hours for the ducks. It is recommended that ducks get 14 hours of daylight year round to lay eggs, though we observed Indian Runners and Khaki Campbell's to stop laying if temperatures were below 15 for a consistent 3-weeks or more.*

No water in house: *We've kept water out of the duck houses for three years and there appears to be no negative effect; only easier work for us.*

FOOD

When young, ducklings should be fed granular feed, often labeled "crumbles", and always have access to food (and water), basically eating and drinking as much as they want – which they will do with pleasure. Make sure the feed is not medicated, as this could kill your ducks.

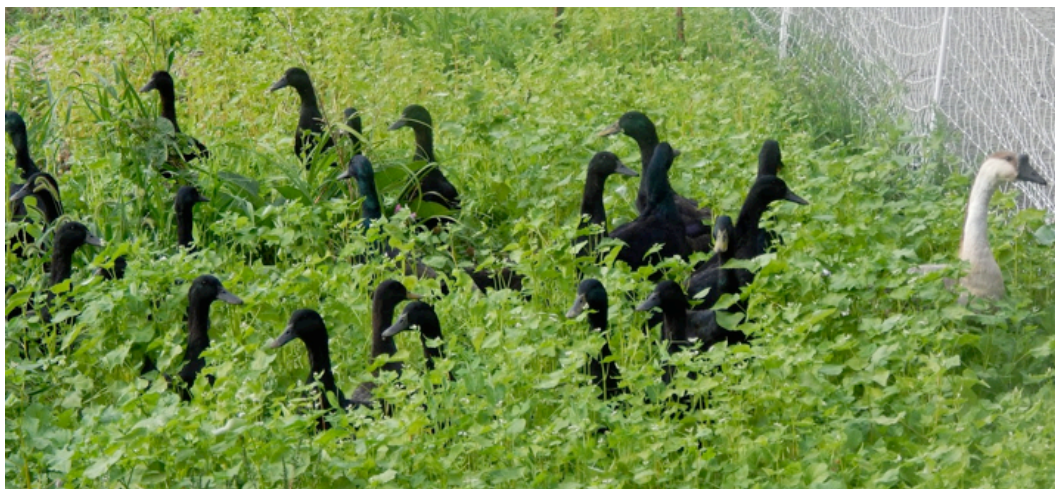
Once they are larger – about the same time you move them to their permanent housing – ducks can eat pelletized grain. Pellets are a better choice because they are cheaper to buy and the ducks don't let it go to waste it as much. It appears that unlike chickens, grown ducks leave behind fine granular particles, perhaps just too hard to grab with their wide beaks.

We experimented with feed amounts for all the breeds we have raised. We always start with a standard recommended amount per bird. (.4lbs/bird/day for meat and 8+ weeks to slaughter) We then have experimented to determine the optimal ration based on breed, production goal, and site conditions. When raising meat birds, we weighed them weekly; when raising layers, we document eggs/day. Simply observing the ducks feeding behavior will give you good insight into their feed needs; Do they gorge themselves on feed in seconds/minutes? Do they eat the feed slowly throughout the day? Do they leave a lot of feed leftover? Overall, if the farmer wants to determine the optimal ration of feed for your flock, it is necessary to do some data collection of duck weight and/or egg yields.

In our experience, a ration of feed should be allocated at somewhere between .2 and .4 pounds per bird, per day. We rotate our birds to new pasture every week and feed each bird .2 pound/day. In the case of our meat birds, on average, each bird gained only a half-pound less of total weight than if we fed them .4 pounds of food per day. We are currently settled at .2 lbs/day and will see if we can

increase onsite forage and further reduce this number.

Unless you are trying to fatten up your ducks for meat production, it is optimal to feed ducks once/day, at the end of the day, so to encourage them to forage during the daylight hours. We tried this, but because our personal morning schedules are more consistent – and routine appears to be an important effect on animal behavior – it is more practical for us to feed them in the morning. Even with feed available, Runners, Khaki's, Cayuga's and Swedish Blue's tend to ignore the feed and choose to forage in the non-winter months.



FODDER

We have observed that ducks love young and tender greens, especially lettuce, radish, beet, collard and arugula. We have only let them forage in lettuce and arugula beds once these crops are bolting and we don't want them for ourselves. We unintentionally learned they liked beet and radish tops because they mowed them all down in our garden, however the roots of both were left in perfect shape. Throughout the summer our Khaki and Cayuga ducks took very rare bites from full-grown collard, kale, brussel sprout or chard plants.

However, as colder temperatures settled in, and their forage options being less abundant, we noticed an increased interest in these greens. We fenced them away from the plants we were still eating from, but by January were pleased to let them feast on what they liked. Some resources cite that boiled potatoes and squash can be served to ducks as supplemental feed as well, though we have witnessed Arcana ducks energetically eating raw squash at Whole Systems Design, in Vermont.

Cover crops have proven to be excellent feed source on our farm for the ducks. The ducks foraged with excitement on radish tops, buckwheat, clover, and pea shoots and can facilitate soil building in this way, especially if care is taken to rotate ducks so that only the tops are clipped and the roots can re-grow another succession of vegetation. In the future we plan to grow much more of our ducks food. Many of their favorite foods are quite easy to grow at large quantity, they will gladly eat seconds of these crop and it serves our fertilizer needs to have them rotate through our garden as we finish harvesting for ourselves.

PREDATORS

The best strategy for dealing with predation is to take a multi-faceted approach. At Wellspring Forest Farm, predators can include fox, raccoon, skunk, coyote, bobcat, dogs (our neighbors) and birds of prey.

A. Fencing

The first line of defense is a good fence! As mentioned above, good fencing habits are critical to success. We lost a few birds quickly when we were a little lazy for a few days, and let the Khaki flock free-range. We highly recommend taking the time to place fences in the ground properly and ensure electricity is working.

B. Geese

After a bit of online research, we decided to add a guard goose to each of our duck flocks. It was suggested a single male goose, raised with a young flock, would protect them as though the entire flock were his mate. We have seen this to be very true with African male geese.

While ducks are often busy foraging, geese keep watch in all directions and honk whenever someone or something approaches. This noise is a good general deterrent to predators, and the ducks lift their heads too, as though they are paying attention.

Of course, any of the predators in our area could be fooled by the honk of the goose and still decide to attack, we do credit our geese with our minimal loss of ducks. Though male geese can be aggressive, especially in the spring when egg laying and rearing is taking place, we have had great success with African geese. These geese are threatening but don't charge people very often. And, it is worthwhile setting a rapport with your goose early, making sure they know who is in charge. Even with a trusted goose, a farmer should be ready and willing ready to grab a goose by the neck if he charges. (Grabbing by the neck won't hurt the goose)



C. Dogs

Our lab and husky mutts, though not “working” dogs at all, do offer some degree of protection for our ducks. They are trained to have no interest in the flock for chasing or eating, but we believe their bark, smells and urine do help deter predators. We frequently walk the outer boundaries of our land with the dogs, so that their smell is present and strong.

ROTATION

We believe that animal systems should be designed with rotation in mind because it is best for the animal and the land. When animals are in one place for too long they overharvest flora and below ground forage problems, their manure and urine accumulates creating the potential of too much nitrogen on the soil and disease for the animals, and the pen and housing generally becomes smelly. Rotating animals regularly to fresh pasture ensures their diet is diverse and abundant and reduces disease potential for the soil and animals.

In our experience, from July - October, a flock of 20 – 50 ducks in an 80-foot fence should be moved once a week if on pasture, and every 3-4 days if in the forest.

In pasture settings, the forage/grass/cover crop should be examined as an indicator of when it is best to move them. In the forest, the presence of leaf litter and vegetation is a good indicator that there is not overgrazing going on. In both cases, we try to time cleaning out the straw from their house just prior to moving the ducks. This allows us to leave a layer of manure/nutrient filled straw in the paddock where they had just grazed. This technique, along with seeding the appropriate cover crop mixture depending on the time of year, ensures a very healthy paddock that regenerates soil rapidly.

Products

MEAT

There is certainly a large demand for duck meat in the regional market outlets in our area. The barriers to production of meat on a commercial scale are discussed in more detail below. Duck meat is very delicious and favored for its fatty nature. As is with chicken, once the duck is cooked and enjoyed, the carcass makes a delicious stock.

One of the drawbacks to raising ducks for meat is plucking. Unlike chickens, ducks have two layers of feathers; the outer feathers and the down or “pin” feathers. The down feathers are very hard to remove fully. We have had some success in getting birds quite clean with a lower scalding temperature and plunging the ducks for a longer period of time, but it’s certainly not as easy as cleaning a chicken and you have to be cautious not to scald the bird for too long, so the flavor isn’t affected.

A final consideration with respect to raising ducks for meat is the end point of production. In New York State, if ducks are consumed by the farmer or sold directly to customers, up to 1000 birds can be slaughtered on farm and sold fresh or frozen. If the ducks are being sold to restaurants or retail markets, (not direct to consumers) birds must be taken to an approved facility for slaughtering.

Facilities near us, typically Amish owned and operated, charged \$4.50/duck in 2012 and \$4/duck in 2013. Obviously, adding this cost to each duck makes it that much more difficult to make duck meat economical at the commercial scale for restaurants and retail markets. Further, we were disappointed in the cleanliness of the duck that came back from the slaughter facility and were not able to sell them all as we had planned.



Given there is limited information about raising ducks, it is not surprising that slaughter facilities are not experienced with cleaning ducks. If you have plans to sell duck for meat, we suggest developing a direct outlet and doing the slaughtering on farm, unless you are able to find a local slaughterhouse that has experience and demonstrates proficiency processing ducks.

Ultimately, as discussed in more detail in section three, we decided that meat production for commercial markets was not the type of farming we wanted to get into with regard to ducks, but because of the scale necessary to make a profit and the large need for external grain inputs. Focusing on eggs allows us to pay more attention to the use of ducks as a pest control mechanism on the farm and also allows for more experimentation with reducing grain inputs by providing more forage on-site.

EGGS

There are a few key needs of ducks to be healthy and happy egg layers. One is adequate floor space in the co-op, so that they feel comfortable and able to nest and lay without disturbance.

Nest boxes with 8 – 12" walls are a good idea to provide this security. Ducks also need to be warm and receive adequate nutrition to lay. In the winter, we layer straw on the house floor every second or third day and leave the pack in the house as long as possible, to provide a measure of insulation. We also ensure that there is adequate protection from wind at all times. All this said, during very cold winters ducks will likely cease laying for several months if not until spring-time.

Egg laying breeds such as Khaki and Runner will often begin laying in 6



or 7 months, while the mixed breeds often take longer, sometimes 16 – 18 months before laying eggs. Hens can be viable layers for 2 or 3 years, after which production will decline. In regards to Khaki Campbell hens, we found that adding a small 1'x1' nest box in their house offered an ideal spot to lay, made it easier for us to find the eggs and possibly increased egg production (or just encouraged them to lay in one place). It should be mentioned that ducks often ignore the boxes and just make their own nests, too, often in the corners of the shelter.

Eggs should be collected daily and cleaned as soon as possible after they are gathered. Avoid scrubbing the shell too hard as this removes a protective layer that allows the eggs to last longer and be stored out of the fridge. Pack eggs in cartons and store in the fridge. They should last several weeks in these conditions. Niche markets should fetch between \$4 -6 per half dozen. Duck eggs are slightly larger with a bigger yolk when compared to chicken eggs. They are often white or bluish in color. Their shell is much thicker than chicken eggs and often is best cracked with a knife rather than on the edge of a pan or bowl.

SUMMARY OF BASIC CARE

Our goal in the previous section is to highlight the lessons we learned from raising ducks, especially those items we didn't read in the books and discovered as we went along. There is much more to know about ducks, and we highly recommend the following resources. We found it necessary to consult all of these sources, along with talking to other farmers and lots of time and experience, in order to become competent raisers of ducks.

Deppe, Carol. *The resilient gardener: food production and self-reliance in uncertain times*. White River Junction, Vt.: Chelsea Green Pub., 2010.

Holderread, Dave. *Raising the home duck flock: a complete guide*. Charlotte, Vt.: Garden Way Pub., 1978/1981.

Holderread, Dave. *Storey's guide to raising ducks*. Pownal, Vt.: Storey Books, 2001.

Ussery, Harvey. *The small-scale poultry flock: an all-natural approach to raising chickens and other fowl for home and market growers*. White River Junction, Vermont: Chelsea Green Publishing, 2011. Print.

