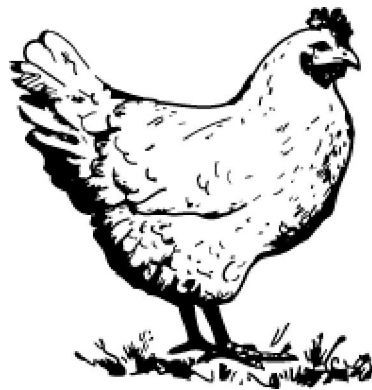


Keeping Backyard Hens – The Basics

Portland Oregon Edition



July 2010

Heather Havens

heather@concentratesnw.com

My name is Heather Havens, I have a BS in Ag from OSU, and I specialized in Animal Science. We live in Portland Oregon, where chickens are legal and very popular. We see backyard chickens as “pets with benefits”. Chickens give wonderful eggs, but they are also great pets. They have big personalities, and are very friendly and beautiful. They don't require much space and they are easy to care for properly. They help you recycle kitchen and garden waste, help with insect pest control, and contribute valuable fertilizer to your compost bin. They can help build relationships between neighbors, and they help teach children and adults about responsible animal ownership and give people a better sense of where food really comes from.

I am General Manager of Concentrates, Inc. Concentrates has been serving Portland & PNW farmers since 1938. I have been with Concentrates since February 1997, with the exception of the 2 years we spent in Canada. This booklet was first written when we lived in Vancouver BC from 2008 to 2009, where we were working to legalize backyard hens. This disclaimer explains the numerous Canadian references in this document.

~~~~~

**I. Introduction**

**A. Outline**

**II. Housing**

**A. Text**

**B. ext.vt.edu small flock pages**

**C. Plans for example house**

**III.**

**Feeding**

**A. Text**

**B. Digestive system overview**

**IV.       Reproduction**

**A. Text**

**B. Anatomy diagram**

**V. Potential Problems**

**A. Text**

**B. A Word about Avian Flu**

**C. Where to Obtain Chickens (and what about Chicks?)**

**D. Lifespan vs. Egg-laying**

**E. Vet list**

**VI.**

**Resources**

**A. Local Feed & Supply stores**

**B. Local chicken bylaws and ordinances**

**C. Books (recommended reading)**

**D. Recommended websites**

**VII.       Avian Influenza: Unjustly Blaming Outdoor Flocks by Michael Greger, M.D.  
Director, Public Health & Animal Agriculture HSUS**

## Chicken Housing

Chickens need houses because: Chickens need protection from predators. Chickens need protection from heat in summer and from cold in winter. Chickens and owners are happier when the hens have a consistent, clean, convenient, and private place to lay eggs. Chickens instinctively go to the best and safest shelter that they can find at sunset, and if they have a house to go to they will use it, and you will have a nice safe and warm place to confine them until morning.

Chickens need fenced chicken runs or yards to protect chickens from predators, and to prevent chickens from trespassing, thereby annoying people other than their owners. Both predators and annoyed neighbors may injure, steal, or kill chickens. Fences also protect chickens from dangers such as mechanical or electrical hazards, natural hazards, roads, toxic plants and substances.

Most often and most practically, backyard chicken keepers will have a hen house that sits inside of a chicken run or chicken yard (this includes chicken tractors, which are movable chicken house and run enclosures).

The house will be built so that it can be well secured at night (a good rule of thumb: a three year old child couldn't get in), and it will keep hens warm, dry, comfortable, and well ventilated. The house will be constructed so it is easy to clean.

The house should have at a minimum:

- 1.5 sq ft inside house per hen (1 sq ft per bantam)
- 6 to 10 inches of perch per hen
- 1 nest box or area per 4-5 hens.

The run or yard should have approximately 8 sq ft per hen, less for bantams (4 – 10 sq ft are recommended).

The yard or run will be accessible from the hen house. The run/yard will be securely fenced and gated. It is recommended to bury the fence, and bury it at an angle (flaring away from the hen yard, under ground). It is a good idea to cover the yard/run with some kind of mesh, netting, or screen to prevent hawks from poaching your flock. A secure mesh roof to your yard will also keep out day-time raccoons, dogs, and coyotes. It may also be advisable to cover your run with sturdy wire fencing if you intend to be away, and might not be there to open and close the hen-house door.

# Small Scale Poultry Housing

Small Flock Factsheet, Number 10

Phillip J. Clauer, Poultry Extension Specialist  
Animal & Poultry Sciences Department

Small scale poultry coops seem to be built in almost every possible shape and size. Those building a new coop often ask for plans for the perfect chicken coop. However, few plans for small poultry houses are available. Many existing buildings can easily be adapted to accommodate poultry. Poultry housing can be as crude or elaborate as you wish to build as long as you provide the following:

## 1. Protection:

A good poultry house protects the birds from the elements (weather), predators, injury and theft.

Poultry require a dry, draft-free house. This can be accomplished by building a relatively draft free house with windows and/or doors which can be opened for ventilation when necessary. Build the coop on high, well-drained areas. This prevents prolonged dampness and water saturation of the floor of the coop and outside runs. Face the front of the coop, the windows and outside run to the south which allows the sun to warm and dry the coop and soil. Allowing an adequate level of space per bird also helps keep the humidity level in the coop to a minimum.

Keeping poultry totally confined to together with fence and covered runs are your best protection from predators. If you are building a new facility, consider laying a concrete floor, and start the wall with one or two concrete blocks. This prevents rodents, snakes, and predators from digging under the walls and the floors. Windows and doors must be securely covered with heavy-gauge mesh wire or screening when opened.

With outside runs, bury the wire along the pen border at least 12" deep, and toe the fence outward about 6 inches. This stops most predators from digging under the fence. Animals always dig at the base of a fence. By toeing the fence outward and burying it, the predator digs down right into more fencing. Some people run electric fencing around the outside of their pens 4" off the ground about one foot from the main fence to discourage predators. If your outside runs are not predator-proof, you need to lock up your poultry before dark.

To prevent problems with hawks and owls, cover your outside runs with mesh wire or netting. A good ground cover of millet, broomcorn, sorghum or other tall leafy vegetation also provides cover for the birds to hide under. Many times a 3-4 ft. grid over the pen constructed of boiling twine will give excellent protection from flying predators.

To protect the birds from theft, lock your building and pens securely whenever you are not

home. Have your neighbors watch for visitors while you are away. Some people actually have burglar alarms in their bird coops. A protective dog kept near your coop usually works well to discourage predators and unwanted visitors.

Build your poultry house to prevent possible injury to your birds. Remove any loose or ragged wire, nails, or other sharp-edged objects from the coop. Eliminate all areas other than perches where the birds could perch more than 4 feet above the floor. Remove perching areas such as window sills, nest box tops, or electric cords whenever possible. These extra measures could eliminate any injury to you or your birds and may prevent damage to the coop, as well.

## 2. Adequate Space:

Birds need adequate space for movement and exercise as well as areas to nest and roost. Space requirements vary with the type of bird you raise.

**Pigeons require** a minimum of 4 square feet per breeding pair. One-eighth inch perch and two 9 inch x 9 inch nests per breeding pair are recommended.

| Type of Bird    | Sq ft/bird inside | Sq ft/bird outside runs |
|-----------------|-------------------|-------------------------|
| Bantam Chickens | 1 ft              | 4                       |
| Laying Hens     | 1.5 ft            | 8                       |
| Large Chickens  | 2                 | 10                      |
| Quail           | 1                 | 4                       |
| Pheasant        | 5                 | 25                      |
| Ducks           | 3                 | 15                      |
| Geese           | 6                 | 18                      |

Minimum Space Requirements Type of Bird Sq ft/**Perches:** With chickens, always provide 6 to 10 inches of perch space per bird. Perches are not usually used with meat chickens and waterfowl.

**Nests:** Always provide at least one nest for every 4-5 females in the flock.

## 3. Easy Access to Feed and Water:

Feeders and waters should be placed conveniently throughout the pen for birds' access. Place the bottom of the waterers and top lip of the feeders at the birds' back height. This will keep the feed and water clean and prevent wastage.

Small birds like pigeons, bantams and quail, only require 1 linear inch/bird of feeder and water space and large birds require 2-3 linear inches/bird.

When possible, place the waterer in the outside runs, especially for waterfowl. This helps to keep the humidity level lower inside the coop.

## 4. Source of Light:

If you wish to produce eggs from your flock year-round, you must have a source for electric light. One electric light every 40 feet at ceiling height is appropriate. Most small poultry houses do very well with one light above the feeding and watering area.

Windows placed on the south side of the coop will also be a good source of light and warmth in winter and a good source of ventilation in summer.

### **5. Ventilation:**

Ample air movement without a draft is essential. Fresh air brings in oxygen while excess moisture, ammonia or carbon dioxide are removed the stale air moves out of the house. Dampness and ammonia build-up are a sign that there is not enough ventilation. For small coops windows or vents on one side of the house usually provide plenty of ventilation. Well-ventilated houses must also have plenty of insulation and a good vapor barrier. Failure to insulate or ventilate properly causes moisture to accumulate on the walls and ceiling in cool weather. Poultry can handle cold very well if they are dry. However, cool and humid conditions can create many health problems. Locate openings on the side away from prevailing winds. The south or east side is usually best.

### **6. Appearance:**

The appearance of any poultry house or outside run that is visible to the neighborhood should never detract from the over-all appearance of the surroundings. Exteriors of structures should be kept painted and well-maintained. Weeds and trash should be removed from around all facilities. Proper landscaping can provide screening and also help muffle sounds from the birds. Unsightly structures are not good for the image of bird raising and may lead to new laws restricting the raising of birds in your area.

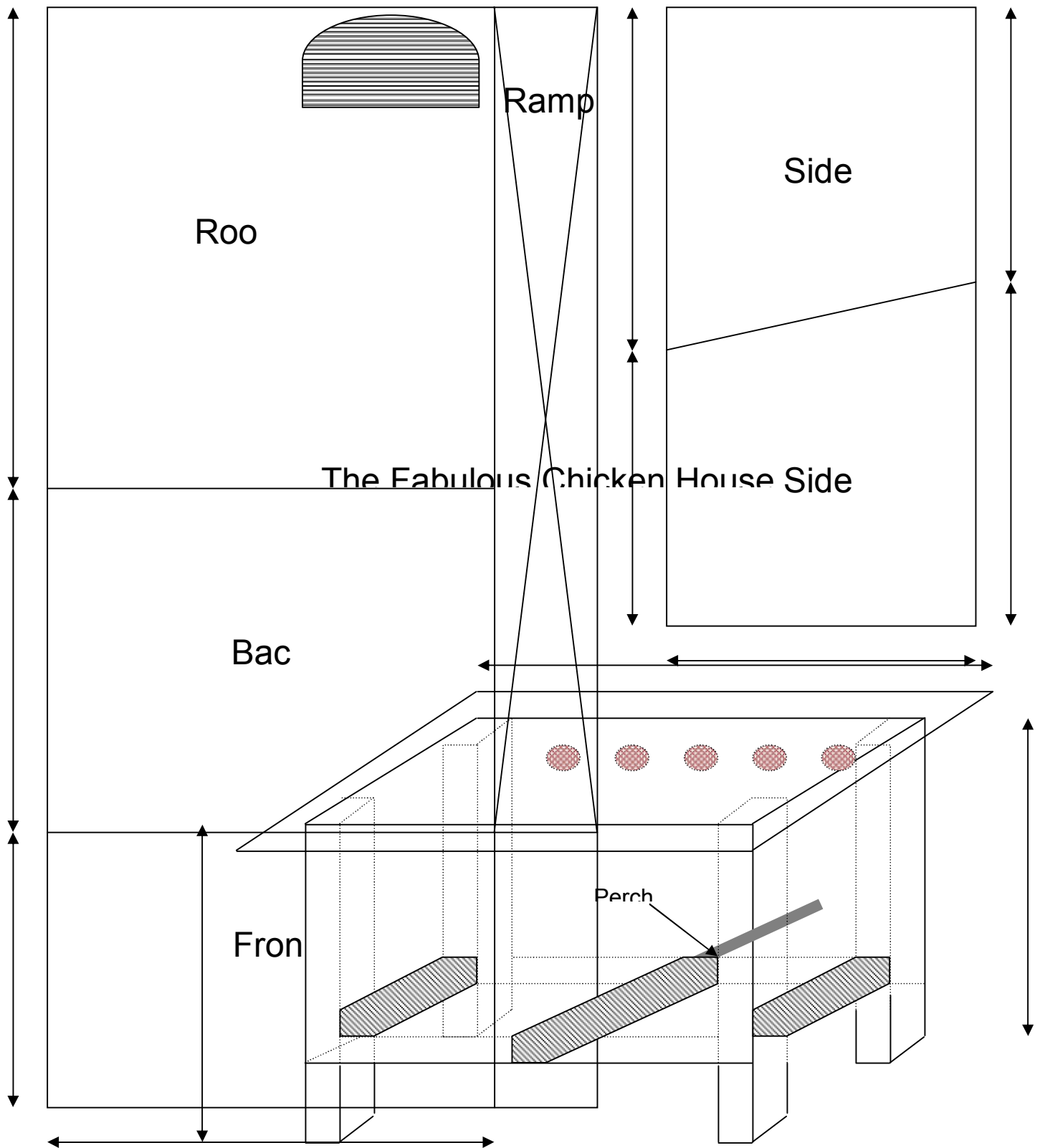
### **7. Use Common Sense:**

When building a poultry house, use common sense in designing the structure. Build the roof high enough and situate such permanent structures as nests, roosts, and feeders for easy access and to make it easier to clean all areas of the house. Install doors so that they open inward. Using sliding windows so that the birds cannot roost on them rather than windows which swing in or out. Use building materials which will be easy to clean and disinfect. Slightly sloping the floor toward the door can help prevent puddling in the building and will make the building easier to spray out and dry between uses.

### [Designs for Small Poultry Structures](#)

Visit [Virginia Cooperative Extension](#).

(Permission was given to pass this information out to the public)



4' x 8' sheet of light plywood + scrap

3 - 8' 2x4

5" of 1" dowel (broom handle) for perch

Tar paper on roof

Roof hinges have removable pins

## Feeding Chickens

### Chicken Digestion (just the highlights)

- Chickens are omnivores (eat plants and animals) and monogastrics (have one stomach, like us, and unlike a cow, who has four).
- Chickens have **saliva** in their **beaks**, which starts the digestion process (just like us).
- Food is stored in their **crop**, which is located just behind their breastbone. If they are too thin (their crop is empty), their breastbone looks like the keel of a ship, sharply angled, and it is very easy to feel. If the chicken is well fed, their crop is full (they almost look like they have swallowed a tennis ball) you can barely feel their breast bone, and can't easily see where it is.
- Food moves from their crop to their then through to the stomach, called the **proventriculus**.
- Next, food enters the **gizzard**, where it is ground up small enough to continue on down the digestion process. Birds don't have teeth, instead they have a gizzard. Birds eat grit (small rocks), which goes into their gizzard, along with their food. The gizzard clenches, and grinds up their food with the aid of the grit.
- final excretions go out the **vent**.

### Water

The most important nutrient. Always provide fresh water. It is very important in winter to provide non-frozen water, and to provide abundant fresh water in the summer.

To keep water non-frozen in the winter. Either get a galvanized chicken waterer, that you can put a metal chicken waterer-heated base under in the winter, or use an electric water dish, that keeps the water just warm enough not to freeze. If you have a chicken coop that is part of a shed or garage that stays above freezing, or use a heat lamp in your hen house, water can be kept in there where it won't freeze, just be sure it stays full, clean, and isn't soaking the surrounding area. An emergency solution, not a long-term solution, is to bring out hot water twice a day.

In the summer, you will be amazed how much water the chickens drink, and how much evaporates. Make sure to keep their water full and clean. They **MUST NOT** run out of water.

### Feed

I recommend using pre-made chicken feed rather than home made feed. Commercially made feed already contains the required amounts of protein, vitamins, minerals (except Calcium), and other nutrients to keep your hens healthy and productive. As a matter of fact, feeding additional scratch (grains) to your hens actually dilutes the nutritional value of their feed, so it is best to avoid or use very little scratch.

Feed comes in crumbles (aka mash) or pellets, and either will provide complete nutrition for full grown and full sized hens. Crumbles are preferred for bantam hens (miniature breed) and pullets (teen-agers, between chick and laying hen). Pellets are preferred for full grown, full sized hens because they waste less, meaning they make less of a mess!

Chicks or pullets have different nutritional requirements than hens, so they should be fed chick or pullet feed.

### **Chicken Feeding Requirements, Age or Type of Chicken, Protein, Calcium**

Broilers (to 6 wks) - 23 % Protein, 0.9% Calcium

Broilers (to mkt) - 10 % Protein, 0.08% Calcium

Chicks (to 8 wks) - 20 % Protein, 0.9% Calcium

Pullets (8-20 wks) - 14 % Protein, 0.8% Calcium

Layer Hens - 16 % Protein, 3.0% Calcium

Feed should be provided in a Chicken Feeder. There are various types, easily found in feed stores and even many local pet supply stores. The feeder should help prevent the hens from throwing their food around (which they love to do) which causes a wet smelly mess that attracts rodents and insects, and feeders prevent waste, which will save you money. Our favorite feeder is a very old fashioned kind. It is a tin dish, with round feeding holes in it, which screws to the top of an ordinary canning jar (small mouth, quart or larger). You fill the jar with feed, screw on the dish, turn it over, and set it in the chicken yard in a place where it will stay dry, you can easily clean the area, and the hens can't tip or drag it over (we made a little dished area to set it in, so the hens can't drag it).

### Scratch

Scratch is grain that is fed to chickens. As noted in the Feed section, scratch actually dilutes the nutritional value of the Feed, so if you use scratch, use it judiciously.

Scratch usually consists of cracked corn, with or without a combination of other cracked or whole grains and/or legumes. Whole corn is too large, as are some other whole grains, legumes, or seeds, so use common sense when deciding on a scratch. Wheat, oats, barley, rice, millet, milo, flax, peas, and lentils are all possible, and fine, scratch ingredients. If you should decide to feed soybeans, they must be roasted or heat treated, soybean meal is fine because it has been heat treated.

A few uses for Hen Scratch:

- Chicken treat. Chickens will love the person that feeds them scratch. This is a useful tool.
- Scratch, particularly corn, can help put weight on a thin or less than vigorous chicken, and can help to keep them warm.
- Scattering a bit of scratch on the ground of their chicken yard will make them happy all day. Chickens need to scratch at the ground, looking for grains, bugs, worms, and grit, most of the day in order to be truly healthy and happy. Chickens that can't scratch are stressed and will often turn to pecking their companions out of frustration. I feel that this is the most important use for scratch.

### Grit and Oyster Shell

Grit is small stones or rocks, all birds look for this in their environment. Grit is small gravel bagged and sold just for chickens. Hens use #2 Grit (chicks use #1 grit and turkeys use #3 grit).

Oyster Shell is actually mined ancient oyster shells that are ground, bagged, and sold for chickens. Chickens use "lay blend" oyster shell. It is also available in a grind for chicks and as a flour which is feed grade for other livestock, or to be used as lime in the garden.

Oyster Shell and Grit are necessary for 2 reasons:

- 1) Birds don't have teeth, instead they have a gizzard. Birds eat grit, which goes into their gizzard, along with their food. The gizzard clenches, and grinds up their food with the aid of the grit.
- 2) Oyster Shell is fed to hens to give them extra Calcium, which hens need to give their eggs strong, thick shells. This oyster shell also works as grit for the hens. If your hens lay eggs with thin or even incomplete shells, you know they need more Calcium. If your hens eat their eggs, they may need more Calcium or Protein. (If they are eating eggs, increase their oyster shell, and wait to see if they stop. If they don't stop, increase protein in their diet, fish meal and/or dairy products work well)

Grit and Oyster shell are most often mixed equally and offered free choice. This can be scattered on the ground for the hens to scratch and peck (best choice), offered in its own feeder (they will consume what they need), or may be mixed in with their feed (may encourage them to throw their food around).

Grit and Oyster Shell for chickens are both available at feed stores and some pet supply stores.

## **OTHER**

### **Food Scraps**

There are many food scraps that hens will enjoy, that are also good for them. Keep in mind that the commercially formulated feed is the best feed for them, so don't overwhelm their diet with other foodstuffs. Chickens don't have teeth or cutlery to get their food into small pieces, and too much food in the birds crop can lead to compaction there, which is a life threatening problem, therefore, it is a good idea to chop up the scraps that you feed to them. We call this "chicken-chop" in our house. Chopping scraps also makes them more attractive, so the scraps are more likely to be eaten, rather than becoming rodent bait or becoming moldy and rotten in the hen's yard..

There are also things to avoid. If something is clearly rotten, moldy, or inedible don't feed it to your chickens, just compost or dispose of it.

Cereal products, such as bread, cereal, pasta (for a good time, hand feed your hen spaghetti!), and pastry are fine.

Lean meats (cooked or raw) and fish, fish skin, and dairy products are good for chickens, since they usually benefit from added protein. Keep in mind that too much fat can lead to serious health problems. Most fruits and vegetables (peels, cores, ends, tops, etc...) are fine, cooked or raw. Chopping them makes them more attractive. They don't like citrus peels, and apple seeds are bad for them if too many. Feed brassicas, like broccoli, cauliflower, kale, and choy's, in moderation, too much may not be good for chickens.

Pet Food – Don't feed cat food to Chickens, even though they love it. Cat food is formulated with the nutrient needs of cats in mind, and it contains dangerous levels of certain amino acids for chickens.

## Garden Waste and Toxic plants

A long list of possibly toxic plants: <http://www.poultryhelp.com/toxicplants.html>.

Possibly toxic plants, the highlights: Allium (all onion family of plants), amaranth, columbine, azalea, bitter melon, bleeding heart, boxwood, brassicas (broccoli, cabbage, choy family of plants (a little bit is OK, but not too much), beet (greens, not too many), buckwheat, cacti, Canada thistle, cannabis, cassia, Chinese lantern, hellebore, clematis, daphne, cocklebur, vetch, lily-of-the-valley, ranunculus, daffodil, delphinium, foxglove, fox tail, English ivy, horse tail, euphorbia, flax, four o'clock, snowdrop, soybean (raw plant, leaves), heliotrope, holly, hyacinth, hydrangea, St John's wort, morning glory/bindweed, potato vine, iris, lobelia, birdsfoot trefoil, may apple, milkweed mock orange, nicotiana/tobacco, oleander, poppies, buttercup, vinca/periwinkle, rhubarb, black locust, rue, elderberry, Scotch broom, cassias, ferns, sorrels, sorghum, sweet pea, skunk cabbage, tansy, yew, tomato/potato plants, white clover, wisteria

Grass – Do not feed cut grass to chickens, and don't expect them to eat grass. Chickens thrive when kept on grass, but they don't really eat it. They eat seed heads and young sprouts of grass, along with other seeds, weeds, grit, insects and worms that might be in the grass. Long blades of grass can wad up in their crop and become compacted, which is a life threatening situation.

## Insects and Animals

Chickens are omnivores and crave protein, like all omnivores. Chicken's favorite treats are all kinds of insects, worms, and even mice (chickens are actually very good mouse hunters).

## **How hens lay eggs. The highlights.**

Hens can lay unfertilized eggs without the attention of roosters

It takes a hen 23 – 30 hours to lay an egg.

A hen lays an average of 2 eggs in 3 days.

Eggs vary in size depending on breed and age of hen. Older hens often lay larger eggs.

Double-yolked eggs are not uncommon in young hens and hens who lay large eggs.

### The egg-laying process, abbreviated:

A follicle in the ovary releases a mature ova, which is the egg yolk.

Fertilization occurs, if rooster is present, as the yolk travels down the oviduct. Sperm may be stored there for seven to fourteen days.

The first albumen layer is deposited. The rest of the albumen is deposited.

Inner and Outer shell membranes are deposited.

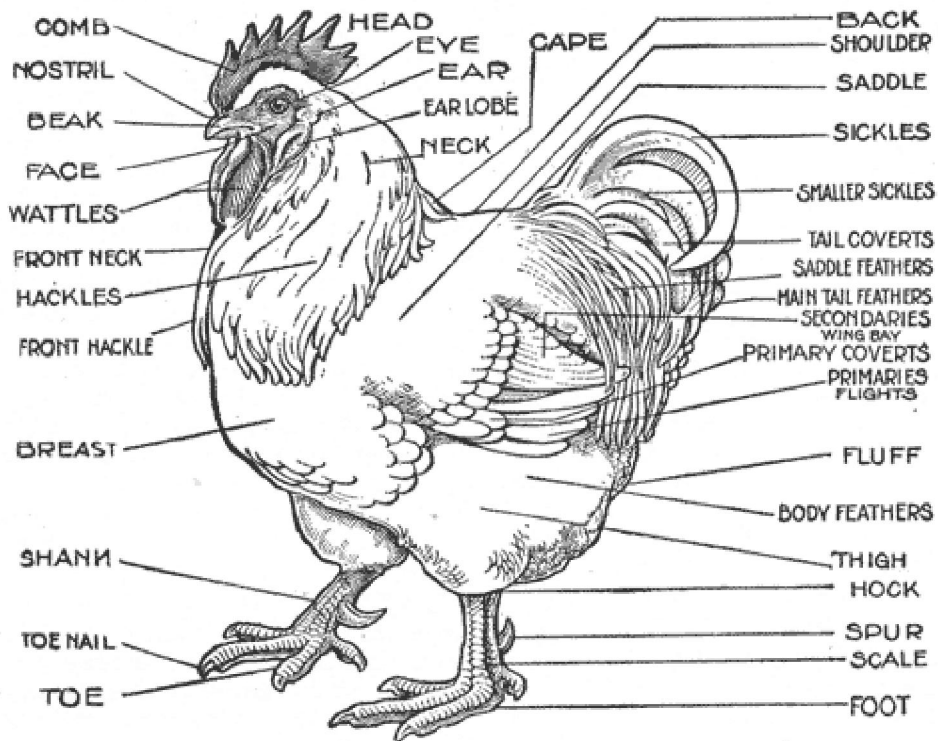
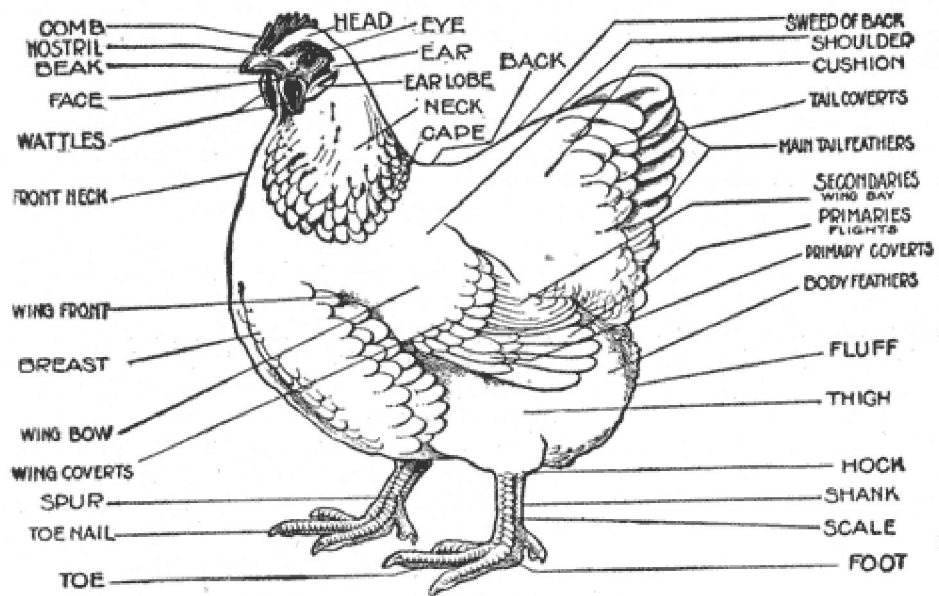
The egg moves from the oviduct to the uterus. The shell is created. The egg spends approximately 12 hours in this stage.

Egg Shell Color is acquired in last 5 hours. Egg shell color is determined by the color of their earlobe (the skin below their cheeks). White ear lobe = white eggs, colored ear lobe = brown eggs (or in the case of Araucanas, Ameraucanas, and their crosses, colored lobe = green eggs).

The egg moves into the vagina, then the reproductive tract shared with the digestive and urinary systems.

The egg leaves the hen's body through the vent, which is also where digestive excretions leave her body.

About 30 minutes after she lays her egg, her ovary releases another mature ova, and the process begins again.



## **Potential Problems with hen raising**

**Merick's Disease** is a fatal, very contagious, and incurable disease of chickens and other fowl. Breeders and commercial layers need to worry about this disease, but there is disagreement as to whether or not small, urban, backyard, isolated, healthy, non-breeding, flocks would need this vaccination. Hatcheries offer vaccinated chicks at a higher cost, so enquire with the person you get your poultry from as to whether the poultry was vaccinated or not. The vaccine is most effective in just hatched chicks, so if you plan to show your chickens, perhaps you should make sure that your hens were vaccinated as chicks.

**Egg binding** is a problem when a particularly large egg becomes lodged in the hen's vent. This problem is not very serious if properly dealt with immediately, but this is very serious if ignored.

Lubricate your finger and insert it into the hen's vent (or ask someone else who has done it before). Gently squeeze/massage the hen's abdomen, easing the egg out with a slow, steady pressure. If the egg refuses to come out, you should carefully break the egg and remove it piece by piece. This may take a while, but be patient.

Be careful not to harm hen's delicate innards with the sharp broken eggshell pieces. After the hen's vent is cleared, you should clean it if the hen's insides have been lacerated.\*

**Prolapse** is when the pink tissue from inside a hen's vent is pushed to the outside, maybe after an unusually large egg was laid. Carefully push the tissue back into the hen and apply hemorrhoidal cream. Isolating the hen while she's healing might help, especially since exposed wounds can tempt other chickens to peck at her.\*

### ***Cannibalism and Egg Eating***

Cannibalism is when the hens peck (and perhaps eat) each other. Chickens lowest in the pecking order, smaller, or youngest chickens are most affected and may even be killed. This process usually starts by plucking at another's tail area, which leaves the affected chickens without tail feathers and with bare bottoms.

Egg Eating is when hens eat their or other's eggs. They do this when they are lacking protein or Calcium.

Giving the chickens adequate space, food, water, and light usually prevents this. Proper nutrition can help, because cannibalism is often caused by deficient protein, or other nutrients. (Usually protein is the lacking nutrient. Fish meal, dairy products, or lean meats work well. Do not feed egg or chicken products)

**Pests** such as mites, ticks, and fleas, rodents.

External and internal parasites literally suck the life out of the animal, and will kill the animal if the infestation is bad enough. It is best to wash down your hen-house once or twice a year at the least with a bleach solution to kill mites. You probably won't have a mite problem, but if you do, there are three to look for. Black, red, and leg. Leg mites will make hen's legs look scaly and crusty. You can coat their legs with Vaseline and wash their perch in motor oil or WD40. Black mites live on your hen, and can be seen around the vent if you look closely, treat with Diatomaceous Earth and pyrethrin dust. Red mites only live on your hen at night, during the day they migrate back into the foundations of your hen-house, and look like red cracks. Washing your house in bleach solution will kill the red mites.

You can dust hen houses, coops, perches, feed, feeding troughs, and chickens with Diatomaceous Earth, which will kill insects but not hurt mammals or birds (just wear a mask, it is not good to breathe it). Having areas where hens can dust themselves (clean dry dirt, not "dirty" dirt) will be helpful because this dusting prevents insect infestations. I have heard that giving them sand to dust in works

well. Pyrethrin dust is a natural insecticide and miticide that works well if you can find it. Permethrin dust is a synthetic pyrethrin, and may be a carcinogen in humans and toxic to cats.

Rodents are a problem to be avoided very seriously. Feed **MUST** be kept in metal containers, under cover, and off of the ground. Uneaten feed scattered outside of feeders **MUST** be removed daily. Uneaten feed will attract rodents and other animals, and it will mold and smell bad. Rats may attack hens and chicks and eat their eggs, along with spreading diseases and insect pests. Mice spread disease, but won't hurt the hens. Chickens **LOVE** to catch and eat mice, if they can catch one, which is just fine, as long as the mouse isn't poisoned or diseased, which can't be guaranteed.

### ***Predators***

Chickens need to be kept withing a fenced area at all times (your yard is fine, as long as it is well fenced). During daylight hours dogs, foxes, raptors (eagles and hawks) may attack chickens. Chickens can usually, but not always, defend themselves against cats. At night, it is **IMPERITIVE** that you lock your chickens in a structure that a small child couldn't find a way into, and it must also be strong enough that a strong animal couldn't chew or tear its way into it in a night. At night raccoons are the biggest problem, but rats, dogs, and coyotes are also problems.

Covering your chicken's enclosure with some kind of mesh is a good way to keep hawks and eagles from stealing your chickens.

Unfortunately disgruntled neighbors also attack and/or steal chickens, so do your best to be a good chicken neighbor. Keep your hen's house and area attractive, painted, clean, and out of sight as much as possible of the neighbors and the street. Also remove roosters.

### ***Escape***

First, make sure your chickens enclosure has an adequate fence. If your hen is still able to escape, clip her flight feathers with a scissors. It is very easy, painless, and many good instructional videos and articles are online showing how to do this.

\* = some info from: [www.poultryOne.com](http://www.poultryOne.com)

### **A Word About Avian Flu**

I have personally spoken with a BCMAL vet about this issue. BC Government Vets realize that backyard flocks are negligible risk for Avain Flu outbreak. They know that the risk comes from industrial poultry farms. If anything, they believe that backyard flocks world be an early warning system. A pet hen would be treated and diagnosed if she were ill, in contrast an industrial bird wouldn't get noticed until they died, if then. Backyard hens are going to be too healthy, robust, and genetically diverse to incubate the Avian Flu Virus. If the BC Government Vets don't feel that small backyard flocks are a risk for Avian Flu outbreak, neither do I.

### **Where To Obtain Chickens (and what about Chicks?)**

I strongly recommend that first-time chicken owners start with hens or pullets, not chicks. Chicks are very fragile, and require a great deal of care and supervision, and will yield roosters even when they aren't supposed to. Only experienced chicken owners, who have accepted the responsibility, have the required knowledge, and have the time for chicks should get chicks. Because I don't recommend chicks to beginners, I decided not to go into chick care in this booklet. That would be a whole other very important class and booklet.

Adult hens and pullets (pullets are teen-aged female chickens. They are not chicks, but they are not laying yet) can be obtained in many ways. Some feed stores and nurseries carry both hens and chicks. Classified ads in rural newspapers and Craigslist are good places to look. We found our two from an

organic layer flock that needed to cut their numbers, and from a County Fair. I recommend both of those options highly.

**Lifespan vs. Egg-Laying**

PLEASE consider this before deciding to raise backyard hens! Pet chickens may live up to 20 years, yet they will only lay until they are about 8, and not lay reliably much after 6 years old. Decide what you plan to do with your retired backyard hens, before you get to that point. We will continue to keep ours as pets. Others may decide to take them to one of the few local Abattoirs to be butchered, or to a vet or the Humane Society for euthanasia. If you choose to butcher your chickens at home, keep in mind that that will most likely be illegal. Lastly, there are rumored to be farms that will take retired laying hens.

**Veterinarians who are interested in providing services to small flock poultry owners:**

|                                                                                                                        |  |  |
|------------------------------------------------------------------------------------------------------------------------|--|--|
| <b>AVIAN MEDICAL CENTER</b><br>15952 SW Quarry Rd.<br>Lake Oswego, OR 97035<br>Tel. 503-635-5672<br>Marli Lintner, DVM |  |  |
|------------------------------------------------------------------------------------------------------------------------|--|--|

Please note, Portland allows a few chickens per city lot, but the majority of the communities surrounding Portland don't allow city chickens at this time. Please check your municipalities laws before getting your own chickens. If they aren't legal where you live, get a group of like-minded people together, and change the laws! It can be a fun, rewarding, and educational process!

Also, if you need to see a vet for your backyard chicken, and can't get in to see one of the vets above, you can always try any vet that specializes in bird care, they might be interested in helping you.

Portland Metro Area Chicken Feed and Supply Stores:

|                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Concentrates, Inc.</b><br/>         Wholesale &amp; Retail since 1938<br/>         2613 SE 8th Ave. Portland OR 97202<br/>         503.234.7501<br/> <a href="http://www.concentratesnw.com">www.concentratesnw.com</a><br/>         Heather Havens BS Ag, Manager<br/>         Open 8 – 5:30 M – F, 10 – 4 Sat. for “busy season”<br/>         Organic Feeds, grains, supplements,<br/>         fertilizers.</p> | <p><b>Urban Farm Store</b><br/>         2100 SE Belmont St.<br/>         Portland, OR 97214<br/>         503-234-7733<br/> <a href="http://www.urbanfarmstore.com">www.urbanfarmstore.com</a></p>                  |
| <p><b>LINNTON FEED &amp; SEED</b><br/>         10920 NW St. Helens Rd.<br/>         Portland, OR 97231<br/>         503-286-1291</p>                                                                                                                                                                                                                                                                                    | <p><b>PISTILS NURSERY</b><br/>         3811 N. Mississippi<br/>         Portland, OR 97227<br/>         503-288-4889</p>                                                                                           |
| <p><b>LIVINGSCAPE NURSERY</b><br/>         3926 N. Vancouver Avenue<br/>         Portland, OR 97227<br/>         503.248.0104<br/>         Hours: M-F: 12-6, Sa-Su: 10-5</p>                                                                                                                                                                                                                                            | <p><b>Buffalo Gardens</b><br/>         728 NE Dekum St<br/>         Portland, OR 97211<br/>         503-288-0220</p>                                                                                               |
| <p><b>Gerens Farm Supply</b><br/>         33680 Southeast Kelso Road<br/>         Boring, OR 97009-7058<br/>         (503) 668-9323<br/> <a href="http://www.gerensfarmsupply.com">www.gerensfarmsupply.com</a></p>                                                                                                                                                                                                     | <p><b>Burns Feed Store</b><br/>         29215 Southeast Orient Drive<br/>         Gresham, OR 97080-9026<br/>         (503) 663-3246<br/> <a href="http://www.burnsfeed.hdweb.com">www.burnsfeed.hdweb.com</a></p> |
| <p><b>Aloha Feed Garden &amp; Pet</b><br/>         18840 SW Alexander Street, Beaverton, OR<br/>         97006-2804<br/>         (503) 649-6723</p>                                                                                                                                                                                                                                                                     | <p><b>Wichita Feed &amp; Hardware</b><br/>         6089 SE Johnson Creek Boulevard,<br/>         Portland, OR 97206<br/>         (503) 775-6767</p>                                                                |
| <p><b>VALLEY FEED</b><br/>         McMinnville,OR<br/>         503.472.2610</p>                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                    |
|                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                    |

**Portland Metro Area Urban Poultry Laws and their websites**

<http://www.portlandonline.com/auditor/index.cfm?c=28228>

**13.05.015E : Permit Required for Specified Animal Facility**

**E.** A person keeping a total of three or fewer chickens, ducks, doves, pigeons, pygmy goats or rabbits shall not be required to obtain a specified animal facility permit

Surrounding communities bylaws and websites coming soon.

## Recommended Chicken Books

- **\*\*Chickens In Your Backyard: A Beginner's Guide** - by Rick Luttmann
- **\*\*Chicken Tractor: The Permaculture Guide to Happy Hens and Healthy Soil** - by Andy Lee and Pat Foreman
- **\*\*Storey's Guide to Raising Chickens: Care / Feeding / Facilities** - by Gail Damerow
- **Pastured Poultry Profits** - by Joel Salatin
- **Keeping Chickens: The Essential Guide [ILLUSTRATED]** - by Jeremy Hobson, Celia Lewis
- **Living with Chickens: Everything You Need to Know to Raise Your Own Backyard Flock** - by Jay Rossier
- **Barnyard in Your Backyard: A Beginner's Guide to Raising Chickens, Ducks, Geese, Rabbits, Goats, Sheep, and Cows** - by Gail Damerow
- **Chickens: Tending a Small-Scale Flock for Pleasure and Profit (Hobby Farms)** - by Sue Weaver
- **Building Chicken Coops: Storey Country Wisdom Bulletin A-224** - by Gail Damerow
- **Day Range Poultry: Every Chicken Owner's Guide to Grazing Gardens and Improving Pastures** by Andy Lee, Patricia Foreman, and Gene Logsdon

(\*\* are my personal favorites)

## Chicken Websites (\*\*\*) are my personal favorites)

### Good websites to help you learn to keep backyard chickens:

All you need to know, simplified -

\*\*\*Just Food: NYC chickens <http://www.justfood.org/cityfarms/chickens/>

Portland OR Urban Chicken experts - \*\*\*Growing Gardens-Portland OR-Chickens  
<http://www.growing-gardens.org/portland-gardening-resources/chickens.php>

\*\*\*Great series of "How To" chicken videos -  
[http://www.expertvillage.com/video-series/2839\\_chickens.htm](http://www.expertvillage.com/video-series/2839_chickens.htm)

\*\*\*Backyard Chickens.com <http://www.backyardchickens.com/forum/index.php>

\*\*\*Raising Chickens in the Backyard | Poultry Articles for Raising Chickens at poultryOne.com  
<http://poultryone.com/raisingchickens.php>

\*\*\*Virginia Cooperative extension Poultry Factsheets  
<http://www.ext.vt.edu/pubs/poultry/factsheets/3.html>  
[http://www.ext.vt.edu/news/periodicals/livestock/aps-97\\_05/aps-783.html](http://www.ext.vt.edu/news/periodicals/livestock/aps-97_05/aps-783.html)

\*\*\* <http://www.mypetchicken.com/Links.aspx>

Cary Chickens.com <http://carychickens.com/benefits>

The Urban Chicken Project. <http://www.urbanchickenproject.com/Welcome.html>

The Urban Chicken Underground <http://urbanchickenunderground.blogspot.com/>

Small Scale Poultry Housing <http://www.ext.vt.edu/pubs/poultry/factsheets/10.html>

Chickens | Animal Lovers Web Chickens | Keeping Chickens  
<http://www.animalloversweb.com/chickens.html>

## **More good websites to help you learn to keep backyard chickens:**

The Ultimate Backyard Chicken Coop <http://www.henspa.com/>

Masters Of Chicken Keeping <http://www.chickenkeepingsecrets.com/masters/?code=S01>

What Is a Chicken? - Incubation and Embryology - University of Illinois Extension Agripedia  
<http://urbanext.illinois.edu/eggs/res08-whatish.html>

Digestive Tract of Chicken <http://www.ca.uky.edu/agripedia/glossary/digechic.htm>

## **Chicken bylaws, codes, and ordinances in North America (a few):**

Seattle Municipal Code for Keeping Chickens (allowed) — Seattle Tilth  
<http://www.seattletilth.org/resources/articles/citychickensregulations>

Portland OR pro-chicken ordinance - 13.05.015 Permit Required for Specified Animal Facility.  
<http://www.portlandonline.com/auditor/index.cfm?&a=185339&c=28228>

Victoria BC pro-chicken bylaw [http://www.victoria.ca/common/pdfs/bylaw\\_92-189.pdf](http://www.victoria.ca/common/pdfs/bylaw_92-189.pdf)

Burnaby BC pro-chicken bylaws <http://burnaby.fileprosite.com/contentengine/launch.asp?ID=303>

City of Surrey - Animal Bylaw (chickens are only allowed on acre lots in city)  
<http://www.surrey.ca/Living+in+Surrey/Bylaw+Compliance/Animal+Control+Issues.htm>

Richmond bylaw (chickens are only allowed on half-acre lots in the city)  
[http://www.richmond.ca/\\_shared/assets/072400\\_bylaw71371280.pdf](http://www.richmond.ca/_shared/assets/072400_bylaw71371280.pdf)

Toronto chicken code - Chapter 349 § 349-1. [http://www.toronto.ca/legdocs/municode/1184\\_349.pdf](http://www.toronto.ca/legdocs/municode/1184_349.pdf)

# Avian Influenza: Unjustly Blaming Outdoor Flocks

May 15, 2006

By Dr. Michael Greger

All bird flu viruses seem to start out harmless, arising out of the perpetual, benign, stable reservoir of innocuous waterfowl influenza. They begin as mild, low grade, so-called LPAI viruses, which stands for low pathogenicity avian influenza. H5 and H7 viruses, however, have the potential to mutate into virulent, high-grade "fowl plague" viruses, now known as HPAI— highly pathogenic avian influenza.

The World Organization for Animal Health (OIE) and the Food and Agriculture Organization of the United Nations (FAO) consider it "prove[n]"(1) that once low pathogenicity avian influenza viruses gain access to poultry facilities, they "progressively gain pathogenicity in domestic birds through a series of infection cycles until they become HPAI."(2) More specifically, U.S. Department of Agriculture researchers believe that "high density confinement rearing methods" give bird flu "a unique chance to adapt to the new species."(3) That is, intensive factory farming practices may remove the natural obstacles to transmission that prevent the virus from becoming too dangerous.

## Deadly Bird Flu Viruses are Made Indoors

David Swayne is the USDA's leading bird flu researcher. Director of the USDA's chief poultry research laboratory, Dr. Swayne has authored more than 100 scientific publications on avian influenza.(4) According to Dr. Swayne, there has never been a recorded emergence of an HPAI virus in any backyard flock or free-range poultry operation. This is not surprising.

Imagine an outdoor setting. A duck flying overhead dive-bombs a dropping laden with relatively innocuous virus into a grassy field through which a flock of hens is pecking. The hens may be exposed to the virus, but coming straight from waterfowl, the virus is so finely-tuned to duck physiology that it may not gain a foothold before being wiped out by a healthy chicken's immune system. When researchers create deadly bird flu viruses in the lab by passing a harmless waterfowl virus through enough chickens, they facilitate transmission by injecting infected lung tissue from one bird to another. "The conditions under which we generated highly virulent viruses from an avirulent strain are generally not duplicated in nature," one research team admitted. "However, viruses with low pathogenicity can cause viremia in physically compromised chickens."(5) Viremia means successful invasion of the bloodstream by the virus, an incursion they deem more likely to occur in compromised hosts.

If an outdoor flock does manage to get infected, the virus still has to keep spreading to remain in existence. Influenza virus is rapidly killed by sunlight and tends to be dehydrated to death in the breeze. Its ability to spread efficiently from one chicken to the next outside in the open air is relatively limited. In a sparsely populated outdoor setting, there may simply be too few susceptible hosts to pass between in order to build up enough adaptive mutations to do more than ruffle a few feathers. According to bird flu expert Dennis Alexander of the U.K.'s Central Veterinary Laboratory, with the possible exception of an outbreak among South African ostriches,(6) highly pathogenic influenza viruses are "never known to arise in an outdoor flock."(7)

## Factory Farm Breeding Grounds

Now imagine a new scenario. Tens of thousands of chickens crammed into a filthy, football field-sized shed, left to lie beak-to-beak in their own waste. The air is choked with moist fecal dust and ammonia, which irritates the birds' respiratory passages, further increasing susceptibility in chickens already compromised by the stress of confinement. Since the birds are standing in their own excrement, the virus need not even develop true airborne transmission via nasal or respiratory secretions. Rather, the virus has an

opportunity to be excreted in the feces and then inhaled or swallowed by the thousands of other birds confined in the shed, allowing the virus to circulate rapidly and repeatedly. With so many birds in which to readily mutate, low virulence strains can sometimes turn into deadly ones. Highly pathogenic bird flu viruses seem predominantly to be products of factory farming.(8) Indeed, said University of Ottawa virologist Dr. Earl Brown, a specialist in influenza virus evolution, "You have to say that high intensity chicken rearing is a perfect environment for generating virulent avian flu virus."(9)

Today's industrialized broiler chicken and egg-laying hen factory farms confine tens of thousands—and, with laying hens, even hundreds of thousands—of chickens into what are essentially giant slums.(10) These animals spend the entirety of their shortened lives eating, sleeping, and defecating in the same cramped quarters, breathing in particles of their neighbors' waste and the stinging ammonia of decomposing feces. Their first breath of fresh air is on the truck to the slaughter or rendering plant, if they're not killed on-site. In this kind of environment, mass disease outbreaks may be inevitable.(11)

The WHO, OIE, and FAO are respectively the world's leading medical, veterinary, and agricultural authorities. They all implicate industrial poultry production as playing a role in the current crisis.(12,13,14) In October 2005, the United Nations issued a press release on bird flu stating: "Governments, local authorities and international agencies need to take a greatly increased role in combating the role of factory-farming, commerce in live poultry, and wildlife markets which provide ideal conditions for the virus to spread and mutate into a more dangerous form..."(15)

The overcrowding of factory farms conspires with the stress of confinement to cause immune suppression in birds already bred with weakened immunity, offering viruses like bird flu ample opportunities for spread, amplification, and mutation. Placing inbred birds into unsanitary conditions typical of factory farms seems the "perfect storm" environment for the evolution of the next superflu strain of pandemic influenza. Why, then, has there been concern about the opposite, freerange flocks?

### **Outdoor Flocks Not the Culprit**

In 2004, while H5N1 was blasting across southeast Asia, a highly pathogenic H7N3 outbreak swept through Canada's Fraser Valley east of Vancouver.(16) The backyard chicken farmers blamed the commercial factory-farming industry for the outbreak,(17) and the industry blamed the small farmers.(18) Publicly, the industry denies culpability, but internally admits "the growing realization that viruses previously innocuous to natural host species have in all probability become more virulent by passage through large commercial populations."(19) An August 2005 article in the trade journal *Poultry International* offers a concise explanation of the role of large-scale production: "The AI virus lives harmlessly in the ducks popular in Asia to control insect pests and snails in rice paddies. If this duck flu passes to chickens kept nearby, it can mutate into a deadly and highly contagious strain that speeds rapidly with accompanying high mortality. The larger the flocks and the more intensive the production level, the more scope there is for the disease to spread for genetic changes to the virus."(20)

University of Ottawa's Dr. Brown explained to the Canadian Press, "If you get a [H5 or H7] virus into a high-density poultry operation and give it a period of time, generally a year or so, then you turn that virus into a highly virulent virus. That's what always happens..."(21) Canada's National Manager of Disease Control within the Food Inspection Agency agreed: "Just passing the virus to 3,000 or 4,000 chickens is enough to change a harmless virus into something more pathogenic."(22) "It is high-density chicken farming that gives rise to highly-virulent influenza viruses," Dr. Brown concluded. "That's pretty clear."(23)

These conclusions were based on the best available science. The Canadian outbreak first erupted not in a backyard flock or free-range farm, but on an entirely enclosed, "sophisticated" industrial facility. It then jumped from broiler chicken shed to broiler chicken shed, largely skipping free-range farms.(24) The spread of the virus was traced mainly to the human lateral transmission of infective feces via equipment or some other fomite moved from farm to farm.(25) This may also explain how the virus was first introduced into the industrial broiler factory farms. Chickens don't need to come in direct contact with ducks to get infected;

they just need contact with the virus, which can be walked into a "biosecure" operation on someone's clothing.(26)

### **Factory Farms at Higher Risk for the Emergence of Deadly Bird Flu Viruses**

In the end, epidemiological analyses placed commercial flocks in the 2004 Canadian outbreak at 5.6 times more likely to be infected than backyard flocks. Infected backyard flocks were discovered *after* nearby commercial flocks were infected, suggesting that the virus spread from the industrialized operations to free-range poultry and not vice versa.(27) Birds kept outdoors are more likely to come in contact with wild waterfowl, but also more likely to come in contact with sunlight, space, and fresh air. Lower stress levels may help their bodies better resist the initial infection, and, since they don't live in their own waste while cramped into poorly-ventilated sheds by the tens of thousands as their factory-farmed counterparts do, the virus may not spread effectively enough to mutate into a killer. Instead of blaming backyard flocks, attention should be turned to industrialized animal factories.

*Michael Greger, M.D., is director of public health and Animal Agriculture in the Farm Animal Welfare division of The Humane Society of the United States.*

### **References for this Avian Influenza Article:**

1. Capua I and Marangon S. 2003. The use of vaccination as an option for the control of avian influenza. In: 71st General Session International Committee of the World Organization for Animal Health. (Paris, France, May 18-23, 2003).
2. Morris RS and Jackson R. 2005. Epidemiology of H5N1 avian influenza in Asia and implications for regional control. Food and Agriculture Organization of the United Nations. January-February 11. [thepoultrysite.com/FeaturedArticle/FAType.asp?AREA=turkeys&Display=121](http://thepoultrysite.com/FeaturedArticle/FAType.asp?AREA=turkeys&Display=121).
3. Suarez DL, Spackman E, and Senne DA. 2003. Update on molecular epidemiology of H1, H5, and H7 influenza virus infections in poultry in North America. *Avian Diseases* 47:888-97.
4. United States Department of Agriculture, Agriculture Research Service. 2006. People and Places. [www.ars.usda.gov/pandp/people/people.htm?personid=5507](http://www.ars.usda.gov/pandp/people/people.htm?personid=5507).
5. Ito T, Goto H, Yamamoto E, et al. Generation of a highly pathogenic avian influenza A virus from an avirulent field isolate by passaging in chickens. *Journal of Virology* 75(9):4439-43. [pubmedcentral.com/articlerender.fcgi?artid=114193](http://pubmedcentral.com/articlerender.fcgi?artid=114193).
6. Sabirovic M. 2004. Qualitative Risk Analysis: - HPAI in Ostriches in South Africa. United Kingdom Department of Environment, Food and Rural Affairs. [www.defra.gov.uk/animalh/diseases/monitoring/pdf/hpai\\_safrica.pdf](http://www.defra.gov.uk/animalh/diseases/monitoring/pdf/hpai_safrica.pdf).
7. Stegeman A (Chairman). 2003. Workshop 1: Introduction and spread of avian influenza. In: Schrijver RS and Koch G (eds.), *Proceedings of the Frontis Workshop on Avian Influenza: Prevention and Control*. [library.wur.nl/frontis/avian\\_influenza/workshop1.pdf](http://library.wur.nl/frontis/avian_influenza/workshop1.pdf).
8. Horimoto T and Kawaoka Y. 2001. Pandemic threat posed by Avian Influenza A viruses. *Clinical Microbiology Reviews* 14:129-49.
9. Bueckert D. 2004. Avian flu outbreak raises concerns about factory farms. *Daily Herald-Tribune* (Grande Prairie, Alberta), April 8, p. 6. [cp.org/english/online/full/agriculture/040407/a040730A.html](http://cp.org/english/online/full/agriculture/040407/a040730A.html).
10. Davis M. Has Time Run Out? Commentary: On the monster at our door—the coming flu pandemic. *Mother Jones*, August 17, 2005.
11. Girard D. 2004. Coping with the flu virus. *Toronto Star*, April 10, p. F1.
12. Stohr K and Meslin FX. 1997. The role of veterinary public health in the prevention of zoonoses. *Archives Virology* 13:S207-18.
13. Pheasant B. A virus of our hatching. *Australian Financial Review*, January 31.
14. United Nations. 2005. UN task forces battle misconceptions of avian flu, mount Indonesian campaign. UN News Centre, October 24. [un.org/apps/news/story.asp?NewsID=16342&Cr=bird&Cr1=flu](http://un.org/apps/news/story.asp?NewsID=16342&Cr=bird&Cr1=flu).

### References for this Avian Influenza Article, continued:

15. United Nations. 2005. UN task forces battle misconceptions of avian flu, mount Indonesian campaign.
16. Steckle MP. 2005. From a management crisis, to becoming better crisis managers: the 2004 avian influenza outbreak in British Columbia. Report of the Standing Committee on Agriculture and Agri-Food. April. [parl.gc.ca/committee/CommitteePublication.aspx?SourceId=111249](http://parl.gc.ca/committee/CommitteePublication.aspx?SourceId=111249).
17. Steckle MP. 2005. From a management crisis, to becoming better crisis managers: the 2004 avian influenza outbreak in British Columbia. Report of the Standing Committee on Agriculture and Agri-Food. April. [parl.gc.ca/committee/CommitteePublication.aspx?SourceId=111249](http://parl.gc.ca/committee/CommitteePublication.aspx?SourceId=111249).
18. Bueckert D. 2004. Avian flu outbreak raises concerns about factory farms. Daily Herald-Tribune (Grande Prairie, Alberta), April 8, p. 6. [cp.org/english/online/full/agriculture/040407/a040730A.html](http://cp.org/english/online/full/agriculture/040407/a040730A.html).
19. Shane SM. 2005. Global disease update—AI overshadowing erosive diseases. World Poultry 21(7):22-3.
20. Mabbett T. 2005. People, poultry and avian influenza. Poultry International, Volume 44, Number 9 pp.34-39
21. Bueckert D. 2004. Avian flu outbreak raises concerns about factory farms. Daily Herald-Tribune (Grande Prairie, Alberta), April 8, p. 6. [cp.org/english/online/full/agriculture/040407/a040730A.html](http://cp.org/english/online/full/agriculture/040407/a040730A.html).
22. Leahy S. 2004. Bird flu defeated—at high cost. IPS-Inter Press Service, August 27. [ipsnews.net/interna.asp?idnews=25254](http://ipsnews.net/interna.asp?idnews=25254).
23. Bueckert D. 2004. Avian flu outbreak raises concerns about factory farms. Daily Herald-Tribune (Grande Prairie, Alberta), April 8, p. 6. [cp.org/english/online/full/agriculture/040407/a040730A.html](http://cp.org/english/online/full/agriculture/040407/a040730A.html).
24. CBC News. 2004. Scientist probe mystery surrounding avian flu. March 26. [cbc.ca/bc/story/mar26avianmystery226032004.html](http://cbc.ca/bc/story/mar26avianmystery226032004.html).
25. 2005. A few facts about Avian Influenza. [www.avian-influenza.com](http://www.avian-influenza.com). January. [thepoultrysite.com/FeaturedArticle/FAType.asp?AREA=broilers&Display=275](http://thepoultrysite.com/FeaturedArticle/FAType.asp?AREA=broilers&Display=275).
26. 2005. A few facts about Avian Influenza. [www.avian-influenza.com](http://www.avian-influenza.com). January. [thepoultrysite.com/FeaturedArticle/FAType.asp?AREA=broilers&Display=275](http://thepoultrysite.com/FeaturedArticle/FAType.asp?AREA=broilers&Display=275).
27. Lees W. 2004. Overview: the avian influenza outbreak in BC. Presentation to the Canadian Poultry Industry Forum, Animal Disease Surveillance Unit, CFIA. [bcac.bc.ca/documents/C%20CFIA%20Overview%20-%20Dr.%20Wayne%20Lees.pdf](http://bcac.bc.ca/documents/C%20CFIA%20Overview%20-%20Dr.%20Wayne%20Lees.pdf).