



NOVA SCOTIA DEPARTMENT OF AGRICULTURE

# Poultry/Waterfowl Production Manual

A Guide for 4-H Leaders  
and Beginning Farmers

# Poultry/Waterfowl Production Manual

## Table of Contents

<b>Disclaimer</b> .....	4
<b>Introduction</b> .....	5
<b>Section 1: Selecting an Animal</b> .....	6
Breeds and Varieties.....	6
<i>Chickens</i> .....	6
<i>Waterfowl</i> .....	8
<i>Geese</i> .....	10
Interpretation of Poultry Standards of Perfection.....	11
<i>Size and Weight:</i> .....	11
<i>Condition:</i> .....	12
<i>Shape and Type:</i> .....	12
<b>Section 2: Care and Management</b> .....	14
Housing and Cages .....	14
<i>Codes of Practice</i> .....	14
<i>Poultry Cage Construction</i> .....	15
<i>Supplies Needed:</i> .....	15
<i>To Assemble:</i> .....	16
Preparing for Chick Arrival .....	16
Heating and Temperature .....	17
<i>Issues in the Brooder</i> .....	19
Preparing for Duckling Arrival .....	20
<i>General Space Requirements for Ducklings</i> .....	21
Eggs and Nest Care .....	21
<i>Table Egg Care</i> .....	21
Predators and Pests.....	21
<i>Pests: Flies and Rodents</i> .....	22
Manure and Litter Management.....	22
<i>Manure Composting</i> .....	23
Lighting.....	23
Ventilation.....	23
Handling Poultry.....	23
Grooming Poultry for Show .....	23
Transporting Poultry.....	24
<i>Using the Right Equipment</i> .....	25

Traceability .....	25
<b>Section 3: Digestion and Nutrition</b> .....	<b>27</b>
Poultry Digestion and Feed .....	27
<i>Feeding Program for Chicks</i> .....	27
Calcium and Alternative Sources of Protein.....	29
Water Requirements.....	30
<b>Section 4: Health</b> .....	<b>37</b>
Common Illnesses .....	37
Vaccinations .....	37
Feather Picking and Cannibalism .....	39
Biosecurity .....	40
<b>Section 5: Breeding</b> .....	<b>41</b>
Selecting Your Breeding Stock.....	41
Reproduction and Incubation.....	41
<i>Candling Eggs</i> .....	43
<i>Embryo Development</i> .....	43
<b>Section 6: Business and Production</b> .....	<b>44</b>
Marketing Your Poultry.....	44
Marketing Your Waterfowl.....	44
Meat and Slaughter .....	45
<i>Home-consumption Slaughter</i> .....	45
Record Keeping .....	46
<i>Types of Records</i> .....	46
<b>Conclusion</b> .....	<b>48</b>
<b>Additional Resources</b> .....	<b>49</b>
<b>Glossary</b> .....	<b>51</b>
<b>References</b> .....	<b>56</b>
<b>Appendix A: Proper Handling Procedure for Examination</b> .....	<b>58</b>
<b>Appendix B: Biosecurity</b> .....	<b>59</b>
<b>Appendix C: Record Keeping</b> .....	<b>63</b>
<b>Appendix D: Activities for a 4-H Meeting</b> .....	<b>67</b>
Section 1: Selecting an Animal – Suggested 4-H Activities .....	68
Section 2: Care and Management– Suggested 4-H Activities.....	69
Section 3: Digestion and Nutrition .....	70
Section 4: Health – Suggested 4-H Activities .....	71

Section 5: Breeding– Suggested 4-H Activities..... 72  
Section 6: Business and Production..... 73

## **Disclaimer**

This manual is intended to be a resource that provides educational information for 4-H leaders and people who are interested in getting involved in raising poultry livestock. It covers topics such as breeds, husbandry, nutrition, health, safety, and business.

This manual's appendix includes a section that outlines topics and activities for 4-H meetings. The content included in this guide is meant for reference only.

Readers who require additional information, specific regulations, or more details are asked to contact the Nova Scotia Department of Agriculture's regional offices for assistance: <https://novascotia.ca/agri/programs-and-services/regional-services/>

While steps have been taken to ensure the content in this booklet is accurate, recommendations, guidelines, and regulations may change at any time. Authority rests with the relevant regulatory body.

## **Thank You**

Special thanks to Heather McLean (non-ruminant livestock specialist, Perennia) for assisting with reviewing this collective resource.

# Introduction

The trend of raising small poultry flocks is growing in popularity as people become more interested in knowing where their food comes from. Raising poultry can be a rewarding experience and a great way to learn about agriculture. The history of poultry is interesting and gives insight into current trends and breeds seen in the industry today.

The first chickens were thin, tough birds called junglefowl. They lived in Asia more than 5,000 years ago. Geese also come from North America as well as Europe. Ducks were first raised for food in China thousands of years ago. Muscovy, which are like a combination breed of duck, geese, and turkey, come from South America.

Today, there are many different breeds of poultry and each of them is raised for a special reason. In recent years, the main goal in poultry breeding has been to develop stock that is efficient in egg or meat production, or to breed for specific breed standards. In this manual, poultry refers to some of the types of birds we raise for meat or eggs and includes mainly chicken, with limited discussion on ducks, geese, and turkeys. Large-scale production will not be discussed in this manual. For more information, contact the appropriate associations or boards indicated at the end of this manual.

# Section 1: Selecting an Animal

## Breeds and Varieties

### Chickens

Traditionally, chicken breeds raised for meat included barred rock, white rock, and Cornish. Certain lines, or strains, have been established for their commercial production and have contributed to the rapid development of Canada’s current poultry industry. Today, most meat birds are commercial crosses of breeds such as white rock and Cornish. Typically, these commercial crosses are called broiler chicken, or, more generally, meat birds. Depending on their size, meat birds are sold as broilers or roasters. Broilers are smaller and typically weigh 1.7–2.2 kg (3.7–4.8 lbs.). Roasters are larger and weigh over 3 kg (6.6 lbs.). Cornish hens are smaller than broilers; however, there is not much of a market for them in Nova Scotia, so they are not commonly produced.

In the past, breeds of chickens raised to lay eggs included white leghorn (white eggs), and Rhode Island red and New Hampshire reds (brown eggs). As with the meat birds, today’s commercial egg layers are crosses of several breeds. Egg layers are usually selected by the colour of eggs they lay, and by the level of egg production they provide.

Overall, there are a wide variety of chicken breeds developed for egg production, meat production, and shows. While many breeds are adaptable to a backyard setting, certain breeds are better suited than others. Medium-to-large breeds are good for cold winters. Other characteristics to look for include a mellow temperament and good egg laying. Here are a few examples of some popular small-flock layer breeds. These are also popular breeds in local shows.

Barred Rock	Rhode Island Red	Wyandotte	Ameraucanas	Orpington
<ul style="list-style-type: none"> <li>• Hen standard weight about 2.95 kg (6.5 lbs.)</li> <li>• Barred plumage pattern</li> <li>• Dual purpose breed</li> <li>• Good egg production</li> <li>• Tolerant to cold</li> </ul>	<ul style="list-style-type: none"> <li>• Hens weigh about 2.95 kg (6.5 lbs.)</li> <li>• Brown eggs</li> <li>• Dark red feathers</li> <li>• Dual purpose breed, but most often used for laying</li> <li>• Hardy breed that does well in small flocks</li> </ul>	<ul style="list-style-type: none"> <li>• Hens weigh about 2.95 kg (6.5 lbs.)</li> <li>• Brown eggs</li> <li>• Many colour varieties</li> <li>• Dual purpose breed</li> <li>• Great for small flocks and rugged conditions</li> <li>• “Curvy” shape, good disposition</li> </ul>	<ul style="list-style-type: none"> <li>• Hens weigh 2.5 kg (5 lbs.)</li> <li>• Great long-term egg production</li> <li>• Green eggs</li> <li>• Many colour varieties</li> <li>• Dual purpose breed</li> <li>• Tolerant to all climates</li> <li>• Easy to handle</li> </ul>	<ul style="list-style-type: none"> <li>• Hens weigh about 3.6 kg (8 lbs.)</li> <li>• Brown eggs</li> <li>• Many colour varieties</li> <li>• Dual purpose breed</li> <li>• Heavy size is ideal for cold weather</li> </ul>

## Poultry Conformation

Conformation is the key to selecting good stock birds and understanding how they will perform. It is important to know your poultry standards and parts of the bird so you will know what to look for. Diagrams showing parts of the bird can be found online and are a good starting point for 4-H members in the poultry project. Also check out the *American Standard of Perfection for Poultry* for breed specifics, which can be ordered online.

Here are a few general conformation tips to look for:

When selecting **cockerels** (male poultry birds less than one year of age), look for

- alert, strong head and eye
- well-defined and red comb and wattles
- yellow beak skin and legs in yellow pigment breeds
- the bird standing straight and firm on its feet
- legs that are medium in length

When selecting **capons** (castrated male), look for

- undeveloped comb and wattles
- a profusion of long and narrow hackle, saddle feathers, and low tail
- meat-producing ability
- a larger frame than a cockerel during their growing season from six to eight months

When selecting **pullets** (female birds under one year of age), look for

- alert head and eye
- red velvety coloured comb and wattles
- beak, skin, and legs bleached white for high production
- large and soft abdomen
- deep, lengthy, and wide body
- no visible yellow pigment when hens have been in heavy production
- no off-coloured feathers, such as black feathers in red varieties or red feathers in barred rock varieties

When selecting **broilers/roasters** (meat production), look for

- birds with a compact, well-rounded, deep, and thickly fleshed body
- straight, long, and heavily fleshed keel bone
- well-rounded and short wings and legs



- finish, which can be determined by spreading the feathers on the wing web and over the hips and back and examining the fat covering; a creamy white covering indicates good fat finish while a bluish colour indicates lack of finish
- a well-feathered bird free from pin feathers

When selecting **broilers/roasters** (meat production), look for

- birds with a compact, well-rounded, deep, and thickly fleshed body
- straight, long, and heavily fleshed keel bone
- well-rounded and short wings and legs
- finish, which can be determined by spreading the feathers on the wing web and over the hips and back and examining the fat covering; a creamy white covering indicates good fat finish while a bluish colour indicates lack of finish
- a well-feathered bird free from pin feathers

## **Waterfowl**

There are many different breeds of waterfowl. Some examples of meat-production breeds are Rouen, Muscovy, Aylesbury, and pekin. The khaki Campbell and the Indian runner are examples of egg-production breeds. The skin of all domesticated races of ducks is yellow, except for Aylesbury and Muscovy, which have pinkish-white skin. Indian runners produce white eggs, although tinted eggs are common in some strains. The Rouen egg is bluish-green shelled, although white-shelled eggs are not uncommon. The larger breeds of ducks are noted for their market and table qualities. However, waterfowl raised for commercial egg production is very limited both in Nova Scotia and elsewhere in Canada.

Raising waterfowl has many benefits as they are efficient producers of animal protein. The term “waterfowl” includes all birds with webbed feet, such as ducks and geese. They are seldom bothered by sickness or parasites and mature waterfowl are very tolerant to wet or cold weather. It is important to provide shelter for windbreak and extreme cold. Ducks also do well in hot climates provided they have access to shade and drinking water. Here are a few examples of some popular waterfowl breeds.

## Duck Breed Profiles

Category	Breed	Weight in Males/ Females kgs (lbs.)	Yearly Egg Production	Mothering Ability	Foraging Ability	Availability
<b>Egg</b>	Bali	2.3 (5.0) / 2.0 (4.5)	150–250*	Poor	Good	Poor
	Campbell	2.0 (4.5) / 2.0 (4.5)	250–325+	Poor	Excellent	Good
	Runner	2.0 (4.5) / 1.8 (4.0)	225–325+	Poor	Excellent	Good
<b>Meat</b>	Aylesbury	4.1 (9.0) / 3.6 (8.0)	35–125	Fair	Fair	Fair
	Muscovy	5.4 (12) / 3.2 (7.0)	50–125	Excellent	Excellent	Good
	Pekin	4.1 (9.0) / 3.6 (8.0)	125–75	Poor	Fair	Excellent
	Rouen	4.1(9.0) / 3.6 (8.0)	35–150	Fair	/Good Fair/Good	Excellent
<b>General purpose</b>	Cayuga	3.6 (8.0) / 3.2 (7.0)	100–175	Good	Good	Fair
	Crested	3.2 (7.0) / 2.7 (6.0)	100–75	Fair	Good	Fair
	Magpie	2.7 (6.0) / 2.3 (5.0)	125–225	Poor	Good	Poor
	Orpington	3.6 (8.0) / 3.2 (7.0)	150–250	Poor	Good	Fair
	Swedish	3.6 (8.0) / 3.2 (7.0)	100–150	Good	Good	Fair
<b>Bantam</b>	Australian	1.1 (2.5) / 1.0 (2.2)	25–100*	Excellent	Excellent	Poor
	Spotted					
	Call	0.8 (1.8) / 0.7 (1.6)	25–75	Excellent	Excellent	Good
	East Indie	0.9 (2.0) / 0.8 (1.8)	25–125	Excellent	Excellent	Fair
	Mallard	1.3 (2.8) / 2.4 (2.4)	25–125	Excellent	Excellent	Excellent

\*Estimates

*Information presented in this profile is based on the average characteristics of each breed. Actual performance of individuals may vary considerably from the norm. (4-H Nova Scotia Waterfowl Leader Resource Manual 2000)*

### Waterfowl Conformation

Conformation is the key to selecting good stock birds and understanding how they will perform. You should know your poultry standards and parts of the bird so you will know what to look for. Parts of waterfowl birds can be found online and are a good starting point for 4-H members in the waterfowl project. Also check out the *American Standard of Perfection for Poultry* for breed specifics.

A young duck is called a duckling. A male adult duck is called a drake and an adult female is called a duck. Compared to poultry, ducks do not have combs or any other head covering. Their bill is also flatter than a chicken's beak. Their beak has an extra part on the end called a bean.

Ducks have webbed toes that are used for swimming. There are also differences among the sexes. Male ducks have curled feathers at the base of their tail.

Here are a few general conformation tips to look for:

- **Head**—Short, round, and wide; prominence of cheeks and condition of head plumage
- **Eyes**—Good size and colour; no blindness
- **Bill**—Colour is true to its breed or sex; shape is short and wide
- **Neck**—Length and strength (ducks generally have strong necks); arch of neck; feather condition good and lack of abnormal colouring
- **Back**—Length and width, meat varieties have a long and wide back; check back feathers for under colour and signs of molting or missing feathers
- **Tail**—All tail feathers present; curled feathers on adult drake
- **Abdominal area**—Spread of pubic bones (space between rear of keel bone and pubic bone); leanness and hardness; feather condition
- **Legs**—Straightness, cleanliness, colour, and abnormality
- **Toes and nails**—Colour, length, and if any toenails are missing; foot for abnormalities and abscesses
- **Webs**—Damage, abnormalities, and parasites
- **Breast**—Length of keel (breast) bone, free from defects; good feather condition and sufficient meat conditioning on breast area for meat birds
- **Wings**—Spread each one open and look at condition of primary and secondary feathers and coverts; check for signs of moulting
- **Crop**—Fullness and free from abnormalities

## Geese

Geese originate from Europe and North America. Among the more common domestic breeds in Canada are the heavy breeds, like Toulouse, Embden, and African; the medium-weight geese, like pilgrim; and the light-weight geese, like Chinese. The most common breeds of geese are satisfactory for meat production. However, the most desired characteristics in a goose are medium-sized carcass, good liveability, rapid growth, and a heavy coat of white or near-white feathers

### Geese Conformation

Conformation is the key to selecting good stock birds and understanding how they will perform. You should know your poultry standards and parts of the bird so you will know what to look for. Great resources on the parts of geese can be found online and are a good starting point for 4-H members. In general, geese have some distinguishing features compared to other poultry birds. Some geese have a dewlap, a fleshy growth of skin extending from the base of the lower bill along the top of the throat. In addition, some breeds have a horny beak. For a more extensive look at the various breeds of geese, refer to the *American Standard of Perfection for Poultry*.

## Turkey Conformation

This resource manual will not focus on raising turkeys. However, some general information about turkey conformation includes knowing basic terminology. A young turkey is called a poult. A male turkey of any age is a tom and female turkeys are hens. Turkeys are similar to chickens, but there are a few differences. Turkeys do not have a comb on top of their head, but they do have a wattle on the underside of their neck. In addition to a wattle, turkeys also have red, bumpy, fleshy tissue covering the head and neck called caruncles. They also have a fleshy growth at the base of their beak, known as a snood. On males, this part is very long and hangs down over the beak. Another conformation difference is that male turkeys have a tuft of long, bristly, black, coarse fibres attached to their breasts, known as the beard or tassel. Parts of a turkey bird can be found online and are a good starting point for 4-H members in the market turkey project. Also check out the *American Standard of Perfection for Poultry* for other breed specifics.

## Interpretation of Poultry Standards of Perfection

No matter what type of poultry you may raise or own, when selecting your poultry there are some general characteristics that will be desirable in all breeds. The following is an interpretation of the poultry standards of perfection as a reference for selecting and judging poultry birds in general:

- **Breed type**—Shape of bird's body as to the ideal breed type.
- **Breed standards**—The bird is free of breed and general disqualifications.
- **Colour**—Examine the colour of the shanks, plumage, and earlobes.
- **Healthy**—The bird is in good condition and free from disease and/or injury.
- **Temperament**—The bird is easy to handle.
- **Breeding qualities**—In case you decide to keep it for future breeding.

The purpose of the standard is to establish ideals for shape, size, and colour that are practical, useful, symmetrical, and attractive. All breeds, whether bred for economic purposes or for their beauty, must be healthy and vigorous with good productive qualities. This is to ensure full propagation and popular acceptance of the breed. Breeders are always instructed to consider the fundamental characteristics that are necessary to maintain vigour and production at the highest level consistent with true breed type.

### Size and Weight:

- **Weighing**—When size and weight cannot be determined by comparison, weighing the specimens is advisable.
- **Interpretation of weight clauses**—Weight must be in proportion to size, while preserving the ideal shape and type for the breed.

## Condition:

- **Vigour**—The vigour and health of a specimen is important and necessary for the propagation and preservation of all breeds. Breeders should not only consider the external appearance, but the actual shape of the carcass and its fleshing.
- **Faded pigmentation**—Fading or bleaching of colour (from that described in the *American Standard of Perfection for Poultry*) in the beak and shanks or the pigment in yellow-skin breeds is considered a defect when it is a result of poor health or condition. However, it is not considered a defect if it is the natural result of heavy egg production, age, or seasonal changes.
- **Molt in Rouen and call drakes**—Summer and fall molting is common in certain waterfowl male breeds like Rouen and grey calls.
- **Evidence of disease**—Any specimen showing evidence of a contagious or communicable disease should be removed from the flock.
- **Deformities**—Most deformities are hereditary, others are the result of faulty nutrition, disease or injury.

## Shape and Type:

Shape and type are important characteristics. Specimens greatly deficient in breed type should be disqualified as lacking in breed character.

**Dimensional terms**—The words broad, medium, large, deep, etc. used in standard descriptions mean *relatively or comparatively*. That is, in proportion to the size, character, and sex of the breed described. Thus, medium as applied to the size of the comb of any Orpington male and female does not mean that both would be the same size. It means that the comb would be proportionate to the body size of the male and female respectively. Likewise, the term medium, applied to the size of the comb in the shape of both Orpington and Rock breeds would not mean that they are the same size in both breeds, but that the comb in each case is proportionate to the size of the breed.

**Head**—The head is important as it shows the state of health and vitality. Emphasis should be placed on the character of the head and eye in all breeds with high egg production. The head should be strong, moderately long, and well filled in front of the eyes to avoid any appearance of crow headedness. The skull should be somewhat flat on top, rather than round. The face should be clean cut, smooth, and free from wrinkles. The skin should be fine grained and soft in texture.

The comb should be of good substance and size and bright red in colour. The over-refined thin type of comb is not only liable to buckle or show thumb marks, but also indicates a lack of constitutional vigour. The eye should be large, bright, and prominent, with an iris rich in colour

and a distinct and perfectly formed pupil. The condition of the eye frequently suggests some form of systemic disease, including leucosis.

**Back**—The back should be broad through its entire length. The carcass should carry the desired width from the shoulders to the hips and toward the base of tail. A specimen that narrows sharply from the hips is nearly as faulty as if it were narrow at the hips.

**Body**—

- **Abdominal capacity:** A large abdomen and internal capacity is necessary for adequate intestinal development. This is essential for rapid digestion and assimilation of food, which is necessary for heavy egg production. When the standard description reads “deep and full,” the dimensions can be determined by placing your thumb on the hip bone and spanning the sides of the body with your hand and fingers to the keel bone in front and behind the legs.
- **Heart-girth:** The heart-girth is measured by determining the width of the back and the depth of the body immediately behind the juncture of the wings and body. An adequate heart-girth is important for proper functioning of the heart and development of the lungs. When the heart-girth is of sufficient in size, it is conducive to health, vigour, longevity, and production.

**Colour** —

- **Black or brown:** These colours, in the quill of the primary or secondary of white varieties, should not include stains on the quill of a feather caused by the coagulation of blood.
- **Brassiness:** This colour is a serious defect on the surface plumage of white fowls.
- **Grey specks:** A few very small greyish specks in white fowls are not a serious defect providing they do not appear prominently in the primary, secondary, or main tail feathers. Grey specks should not prevent a specimen that is otherwise superior in type and colour from winning more than one that is less typical in shape but sound in colour.
- **Under colour:** Proper surface colour gives identity, lends beauty, and provides a uniform appearance. Under colour is primarily a breeding consideration and is not an overly important characteristic.

**Importance of feather quality**—Feathers act as a protective covering for fowl, protecting it from cold, rain, sun, and injury. Feathers also aid in short flight. It is important feathers be wide and the web be of good, firm texture with a strong shaft. The barbs, barbules, and barbicels should be closely and tightly knitted together, except in a few ornamental breeds such as silkies, frizzles, and Sebastopol geese. Early and full feathering is associated with good, relatively broad feather of firm structure.

## Section 2: Care and Management

### Housing and Cages

There is an endless variety of coop designs that range in cost and size. With so many options, finding a design that provides easy access and suits your requirements should be easy. There are many online sites for construction plans of poultry housing, portable tractors, and nesting boxes. We will be discussing mainly bird housing for layers in this guide unless otherwise stated.

The basic layer coop features roosts over a dropping pit for good sanitation, a window for light, and screened and shuttered openings on the north side to control ventilation. Building the nests on the outside of the coop will expand the interior floor space. See plans for this construction online.

Layer housing requirements call for 0.3 m<sup>2</sup> (32 ft<sup>2</sup>) per bird. Housing must be waterproof and insulated for protection against drafts and be able to hold in existing heat. Suggested roosts size is 5 x 5 cm (2 x 2 in.) sized lumber or round poles 8 cm (3 in.) in diameter. The roosts should be 46–60 cm (18–24 in.) above the floor and there should be 15–23 cm (6–8 in.) of roost per bird. A separate breeding pen for one rooster and one or two hens may also be required for breeding purposes.

Feeders should be 15 cm (6 in.) deep with a guard to keep hens out of the feed and a lip to prevent hooking out of feed. The waterer can be an open pan, pail, or a fountain on a platform. Ideally, a feeder and waterer should be large enough to supply a flock with a day's worth of food and water without waste.

Note: if your laying pen is large enough, a yard is not necessary. If you are looking at grazing your birds, the yard should be fenced tight and the hens should be shut in the house during the night. When hens are allowed into a yard to run, there is greater chance of loss from predatory animals, and eggs will be dirtier. You may wish to fence in an area so your poultry has some room to walk outside. Another example of fenced and/or movable shelters is a chicken tractor. This can be used for pasturing chickens and reducing cleaning time. It offers new space for chickens to graze and peck and provides an inexpensive fertilizer for the lawn. Be aware of municipal bylaws for fencing requirements in your area. For information on safe fencing, see the link for *Livestock Fencing Guidelines* at: [www.novascotia.ca/thinkfarm/documents/fencing-guidelines-2013.pdf](http://www.novascotia.ca/thinkfarm/documents/fencing-guidelines-2013.pdf)

### Codes of Practice

Canada's National Farm Animal Care Council has developed a *Code of Practice for the Care and Handling of Hatching Eggs, Breeders, Chicken and Turkeys* as well as pullets and laying hens. These codes outline proper care and handling techniques for these animals.

The codes of practice for various species serve as our national understanding of animal care requirements and are developed with a diverse group of stakeholders, including researchers, veterinarians, national animal welfare organizations, and farmers.

When using cages for showing birds, it's important the cage have proper dimensions so your animals will stay healthy and clean. Below is a list of general cage guidelines recommendations. Cages should

- be structurally sound and in good repair, with no sharp edges or abrasive surfaces in contact with the animal
- allow freedom of movement for normal postural changes
- be escape proof
- allow food and water to be provided in a way that spillage is not a problem
- be easy to clean
- allow adequate view of the animal both for general observation to prevent problems (such as birds becoming ill, no food or water, heat stressed)

For more information on guidelines, contact the Nova Scotia Department of Agriculture or visit the National Farm Animal Care Council (NFACC) at: [www.nfacc.ca/codes-of-practice/chickens-turkeys-and-breeders](http://www.nfacc.ca/codes-of-practice/chickens-turkeys-and-breeders)

## **Poultry Cage Construction**

Many small-poultry owners will save money by building their own cages for show. The necessary materials for making a poultry cage can usually be found at local hardware stores, feed stores, or building supply stores. Mail-order livestock supply companies are also a good source for materials and completed cages but tend to be more expensive.

Wire cages are easy to clean and disinfect, and these cages are light in weight. All wire used for building cages should be galvanized welded wire. Note that poultry wire (fencing or netting) is cheaper but also weaker. Predators can easily break through poultry wire because of its construction and gauge (thickness and strength) and kill your birds. Check with your local supply stores for suggested gauge. The following instructions are based on the current cage size for large ducks and geese (76 x 76 x 91.5 cm high) (30 x 30 x 36 in.).

### **Supplies Needed:**

- Flat clips (or hog rings)
- Pliers
- Wire cutters
- 1 piece 76 x 76 cm (30 x 30 in.) floor wire, 25 x 25 mm (10 x 10 in.) mesh, 14-gauge wire)
- 4 pieces 79 x 91.5 cm (31 x 36 in.) side wire (25 x 25 mm or 25 x 50 mm mesh)
- 1 piece 76 x 76 cm (30 x 30 in.) top wire—25 x 25 mm (1 x 1 in.) or 25 x 50 mm mesh (1 x 2 in.)



- 1 piece 76 x 91.5 cm (30 x 36 in.) divider for cage—25 x 25 mm (1 x 1 in.) or 25 x 50 mm mesh (1 x 2 in.)

### **To Assemble:**

1. Cut wire to the desired sizes. Be sure to cut close to lengthwise and crosswise mesh and do not leave any meeting points exposed.
2. Use flat clips or hog rings to put the wire sides together and form a rectangle. If you want to separate your drake and duck (hen), you can put a divider in the cage. Be careful to put the divider in when you are putting the sides together.
3. Put the wire top on and fasten one side edge securely. The other three sides need to be fastened with temporary clips or wires so you can easily open and close the top of the cage to get your birds out.

When you cut out your cage pieces, you'll see that the cage is quite large. A collapsible cage may be more convenient for travelling. Cut out your cage pieces as described above, but put your cage together using clips or wire rings that are easy to unfasten.

To fold the cage, unfasten the top and bottom clips on the same three sides. If your cage has a divider, fold it down flat against the bottom. Fold the top and bottom to the inside, against one side of the cage. The other three sides will flatten down for easy transport and storage at home. Leave the clips attached to the cage so everything will be together when you're ready to set up again. This is a great idea for a group activity with your 4-H poultry or waterfowl members.

### **Preparing for Chick Arrival**

This is an exciting time for many small-flock beginners and it is good to be prepared. No matter if you purchase or hatch your own birds, it is essential that you are prepared for the arrival of your chicks. How much room you will need for the chicks depends on whether you plan to raise the chicks in the same pen they are brooded in. For 20 chicks, 5 m<sup>2</sup> (16 ft<sup>2</sup>) is more than enough space to see them through to maturity. If the birds are to be raised and brooded in the same pen, they will not require the entire space for the first week or two. You can use a circular enclosure to section off an area within the pen so heat from the brooder is efficiently used. Brooding plastic or cardboard enclosures and litter materials can be purchased at a local feed store.

To section off an area, use a circular brood ring about 0.9 m (3 ft.) in diameter with enough overlap that it can be expanded as the birds get older. A circular brooder is preferred as chicks will huddle when they are cold and can pile up by crowding in the corners. Chicks that end up on the bottom of the pile will be smothered, but the circle will prevent the chicks from wandering away from the heat source and will discourage piling. The enclosure will also prevent floor drafts if adequate shavings or litter material is used.

Besides space, there are other parameters that must be considered when choosing an area for your chicks. The room must be free from drafts, as they cause condensation and litter problems that can result in health issues. The pen should be inaccessible to dogs and cats. Rodents and wild birds can also be a danger to chick health as they carry lice, mites, and diseases. Similarly, older chickens should be isolated from day-old chicks as older poultry may carry diseases that can be passed onto younger chicks whose immune systems haven't developed yet.

Once you have selected an area, you should clean and sanitize it. Brush all dust and cobwebs off the ceiling and walls. The floor should be scraped clean and washed with a germicide/water mixture. After the pen has been cleaned of organic matter, it can be sanitized using an iodine-based sanitizer mixed in water. The mixture can be placed in a pail and applied by dipping a broom into the pail and brushing it over the entire surface. Allow the place to dry, then spread a thin layer of hydrated lime over the floor.

The next decision is to determine what material will be used for litter. The most common options are chopped straw and wood shavings. If you choose to use chopped straw or hay, ensure that it is not dusty or mouldy because the fungus could cause respiratory problems among the birds. Litter should be evenly distributed over the floor, 5–8 cm (2–3 in.) deep.

Visits to the pen should happen often during the first few days to prevent any problems from developing. A constant watch of chick behaviour for the first two or three hours is essential. It is best if brooding begins in the early afternoon so the chicks can get settled if they have come from a commercial hatchery. Let them find the heat, water, and feed sources. Dip the beaks of the chicks in the water to ensure they know water is available. The first few days of brooding are important in the life of the chickens as the conditions, or habits acquired, may affect future growth.

## **Heating and Temperature**

Once the brooding enclosure is in place, it is time to add the heat source. Suspend an infrared heat lamp from the ceiling in the central area of the pen. Ensure the heat bulb is in the centre of the circle and the lamp hangs about 30 cm (12 in.) above the litter surface but can be adjusted as necessary to achieve the desired temperature. The heat source should be put in place 12 hours before the chicks arrive, so the desired temperature can be reached and maintained.

Floor-level temperatures of 35°C (95°F) are essential under brooders for day-old chicks with ambient temperature of 32°C (89°F). To measure the temperature, place a thermometer below the light 5 cm (2 in.) above the floor. Maintain this temperature for a week. After this, you can lower the temperature by about 3°C (37°F) a week until the temperature under the lamp is the same as the temperature in the pen. Pen temperatures from 18 to 24°C (64 to 75°F) are comfortable for most adult poultry stock.

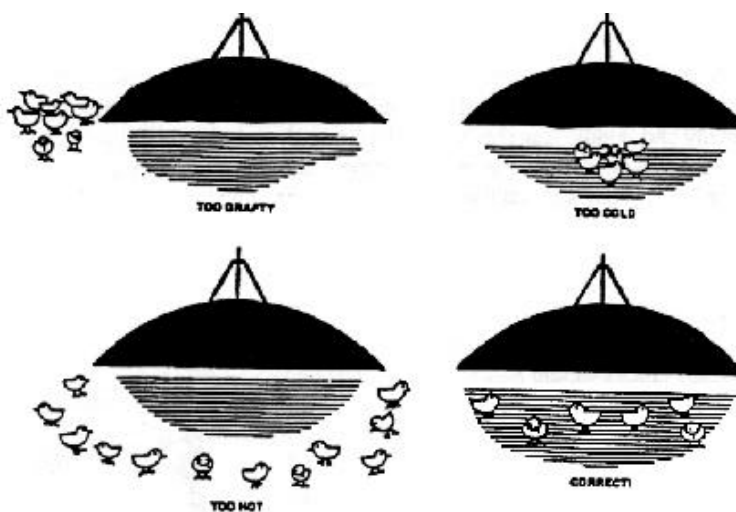
## General Requirements for Brooding

Age of Chick	Feeding Space per Chick	Watering Space per 100 Chicks	Floor Space per Chick	Temperature Under Brooder
<b>1 day–2 weeks</b>	2.5 cm (1 in.)	2–3.7 L fountains (2–1 gal.)	.05 m <sup>2</sup> (1/2 ft <sup>2</sup> )	35–37°C (95–98°F)
<b>3–7 weeks</b>	5 cm (2 in.)	2–11.3 L fountains (2–3 gal.)	.07 m <sup>2</sup> (3/4 ft <sup>2</sup> )	Drop temperature 10°C (50°F)/week
<b>7–12 weeks</b>	7.5 cm (3 in.)	2–18.9 L fountains (2–5 gal.)	.09 m <sup>2</sup> (1 ft <sup>2</sup> )	
<b>13 week–12 months</b>	10 cm (4 in.)	152.4 cm/100 birds (60 in./100 birds)	.2–.3 m <sup>2</sup> . (2–3 ft <sup>2</sup> )	

*Actual requirements of individuals may vary. (4-H Nova Scotia Poultry Leader Resource Manual 2004)*

When chicks hatch, their body temperature is the same as the incubator temperature. Soon their body temperature begins to rise, and by 10 days the chicks reach their normal temperature of 42°C (107.6°F). At this time, heating the whole room is not necessary as chicks become better able to regulate their own body temperature. Chicks should be fully feathered before supplemental heat is completely removed. Chick behaviour is the best indication of their comfort. Cold rooms and insufficient heat under the brood lamp cause crowding, which could lead to a high mortality rate and production problems. Over long periods of time, chicks will suffer from overheating as well, causing digestive troubles and affecting growth. The chicks tend to develop diarrhea and mortality may continue for several days even after heating conditions are corrected.

It is essential that you constantly watch chick behaviour for the first two or three hours. Overheated chicks will move away from the brooder lamp and tend to crowd the edges of the circular barrier in an attempt to get away from the excessive heat. They will pant with their beaks open, hold their wings away from their body, and become listless. At night, if the birds spread out in a circle at the outer edge of the lamp-covered area, then the temperature is correct. If they peep noisily and huddle together under the lamp, they are probably too cold.



POULTRY LEADER GUIDE 4-H NOVA SCOTIA POULTRY LEADER RESOURCE MANUAL 2004

## Issues in the Brooder

Condition	Problem	Remedy
Young birds are spread uniformly over the floor area and are at the feeders and waterers.	None	None needed
Birds are crowded along the perimeter of wall.	Too hot	Lower temperature
Panting and gasping	Respiratory disease or too hot	Lower temperatures if too hot; otherwise, have a veterinarian examine the birds.
Birds are huddled to one side of a heat source or are huddling in small groups.	Too drafty or cold	Eliminate drafty conditions and/or raise temperature.
Birds are huddled under heat source.	Too cold	Raise temperature
Small, scrawny birds and some are dead after two days of brooding.	Possibly dehydrated or starved from not finding feed and/or water.	Dip beaks in water to show location of waterer. Ensure lighting is adequate.
Vent pasting (fecal material sticking to the bird's vent)	Birds could be too hot, too cold, or the feed could cause laxative condition.	Adjust temperature. Change feed and make sure they have access to water.
Crowded feeders and waterers	Not enough feeders and waterers or too many birds for the feeders and waterers.	Provide more feeders and waterers, or house fewer birds in that pen/shed.
Wet litter	Too many birds for space provided, water leak, condensation. Could possibly be a feed problem.	Provide adequate space, good ventilation, and replacement litter. Make sure there are no water leaks. If none of those solve the problem, check feed.
Strong ammonia odours	Poor air movement, wet litter. Too many birds for space provided.	Provide good ventilation, replace litter. Place fewer birds in that space.

<b>Feather picking, cannibalism</b>	Not enough space, incorrect nutritional balance with feed, not enough lighting.	Provide plenty of space and ventilation. Reduce light intensity. If all else fails, trim beaks with an electric beak trimmer.
<b>Birds have poor feathering and lack uniformity at five to six weeks.</b>	Poor watering or feeding system or not enough pen space. Inadequate nutrition, poor access to feed and water, temperature incorrect, health issues.	Provide good quality feed and water. Increase space per bird; improve feed and water access. Provide proper temperature. If you suspect a health problem, contact a veterinarian.

*Referenced source: (4-H Nova Scotia Poultry Leader Resource Manual 2004-updated)*

## Preparing for Duckling Arrival

Ducklings can be brooded with ducks, hens, or artificially. If hens are used, they must be confined, and the ducklings given free range as the hens are likely to tire the ducklings by wandering too far. With an artificial brooder, any type of equipment suitable for chickens is satisfactory for ducklings.

Ducks should be moved to the brooder house about 24 hours after the hatch is completed. Temperature under the brooder should be maintained at 29.4–32.2°C (84.9–89.9°F) for the first week, 23.9–26.7°C (75–80°F) for the second week, 21.1–23.9°C (69.9–75°F) for the third week, and thereafter at no more than 21.1°C (69.9°F).

The length of time that heat is needed depends on the season and the weather conditions. Keep the ducklings close to the heat source with a brooder guard during the first three or four days until they learn where to get warm.

If the weather is warm, ducklings can run outdoors after one week of age. In cold weather, they should be kept indoors until they are at least two or three weeks old. Ducklings need shade in very warm weather and protection in cold, wet weather. As a rule, do not allow ducklings to swim until they are five to six weeks old. Breeder ducks require very little equipment for their care. For farm flocks, a shed or brooder house is satisfactory. Provide 1.5 m<sup>2</sup> (16 ft<sup>2</sup>) of floor space per bird in the house. Any feed or water equipment that is satisfactory for chickens can be used for ducks. Water troughs should be designed to keep birds out but allow for the ducks to submerge their bill to keep their nostrils clear. If the birds can climb into the water, the waterer will become filthy and a potential health hazard. Your local feed suppliers or farmers' co-ops are great starting places for additional feeding directions.

## General Space Requirements for Ducklings

Age (Weeks)	Area per Duckling	Feed Space	Water Space
	cm <sup>2</sup> (ft <sup>2</sup> )	cm (in.)	mm (in.)
1 to 2	900 (1)	2.5 (1)	12 (½)
2 to 3	1,350 (1 ½)	2.5 (1)	12 (½)
3 to 4	1,800 (2)	3.7 (1 ½)	25 (1)
4 to 5	2,250 (2 ½)	5.0 (2)	25 (1)
5 to 8	2,700 (3)	5.0 (2)	25 (1)
8 or more	4,500 (5)	7.5 (3)	37 (1 ½)

*Actual requirements of individuals may vary. (4-H Nova Scotia Waterfowl Leader Resource Manual 2000)*

## Eggs and Nest Care

In general, for chickens, nest areas should have clean litter. Droppings, broken eggs, and soiled material should be removed and replaced with clean nest material. Ideally, eggs should be gathered once daily, depending on the number of birds you raise. Frequent gathering reduces the number of dirty eggs, improves the egg quality, and reduces the incidence of egg eating.

There should be at least one nesting area for every five chickens. These should be 0.3 x 0.3 x 0.3 m (1 x 1 x 1 ft.), filled with clean litter and have a slanting roof to prevent roosting on it. There should be a perch in front of the nests and the nests should be 46–60 cm (18–24 in.) above the floor. An 8–10 cm (3–4 in.) board on the front of the nest box will keep in litter. A good flock of 10 laying hens will potentially produce three to four dozen eggs per week, depending on the breed. While supplying eggs for eating, your birds can also supply eggs for hatching, if you have a rooster. These eggs should be from parents selected for productivity, vigour, size, health, and freedom from any physical abnormalities.

Use clean nest eggs without flaws for hatching purposes. Before storage, dirty eggs should be cleaned using sandpaper, emery cloth, or steel wool. Washing hatching eggs is not recommended for small-flock owners.

## Table Egg Care

Table eggs can be washed in 46–48°C (114–118°F) water containing an egg-detergent sanitizer (not a household detergent). Wash for no more than two to three minutes and allow for rapid drying and cooling. Never wash eggs in cold water as it can cause the inside of the egg to get cooler and contract, potentially drawing bacteria into the egg as it does. Eggs should always be washed in water warmer than the egg.

## Predators and Pests

Small-flock predators include raccoons, rats, owls, hawks, foxes, dogs, and cats. It is essential to have an enclosed space for your flock to stay at night for their protection. Ensure the coop

does not have any small holes for predators to sneak in. The space should also be free of unnecessary objects, like woodpiles or equipment, as they attract predators.

## **Pests: Flies and Rodents**

Proper management of litter and manure will assist in reducing fly infestation. Rats and mice must be controlled because they will consume available feed; they also carry disease. Rats and mice can spread disease to your birds, spoil feed, and cause property damage, as well as kill chicks, pullets, and other young birds. Mice can enter an enclosure through a hole the size of your little finger, and rats through a hole the size of your thumb.

Tips for reducing rodent infestations:

- Regularly monitor your enclosure for signs of rodents, such as droppings or chewed equipment. Mice will live in buildings once they gain entry, while rats live outside and enter looking for food.
- Clean up all garbage and debris surrounding your birds' enclosure.
- Mow all tall grass and weeds.
- Store feed in tightly sealed containers that a rodent cannot chew through, such as a steel garbage can with a tight-fitting lid or an old freezer.
- Place bait stations around the exterior of your poultry house to help control rodent populations.

## **Manure and Litter Management**

Chicken manure is made up of feed residue, intestinal bacteria, digestive juices, mineral byproducts and water. In fact, 85 per cent of chicken droppings, by weight, is water. This can lead to issues with humidity and odour.

Manure should be removed at least once a week and clean shavings added as needed. Litter material should be able to absorb and release moisture; this is key to maintaining a healthy environment for your flock.

Many litter materials are used, such as softwood shavings, sawdust, and chopped straw. During the winter, having deep litter, 10–15 cm (4–6 in.), is important. If the litter is too dry, birds can develop respiratory problems. If it is too wet, there is a greater chance of pathogen exposure. Wet litter or caked litter should be removed and replaced with clean litter to prevent dirty eggs and carcass damage to meat birds.

Flock owners should thoroughly clean housing between flocks. Remove manure and clean and disinfect the equipment and interior of the barn. Use this opportunity to make any repairs to the housing or equipment. During warmer months, less litter is needed, which helps keep buildings cooler for better air quality. As mentioned earlier, movable shelters (chicken tractors)

are a valuable tool for pasturing chickens and reducing cleaning time. They offer new space for chickens to graze. See the additional information links to poultry litter management at:

[https://www.perennia.ca/wp-content/uploads/2018/04/poultry\\_litter\\_management.pdf](https://www.perennia.ca/wp-content/uploads/2018/04/poultry_litter_management.pdf)

## **Manure Composting**

Manure composting can be done right in the chickens' bedding. To start this process, lay down about 10 cm (4 in.) of bedding. Regularly stir up the bedding to prevent clumping and add fresh bedding until it is 25 cm (10 in.) deep by winter. Continue this process until the bedding gets 30–38 cm (12–15 in.) deep. At this depth, composting actively begins, and after six months, it can kill harmful bacteria. Composting releases heat, which keeps chickens warm in cooler months and attracts natural fly predators. Compost must be stirred regularly to prevent crusting. The same process can be done outside of the coop in a separate bin.

## **Lighting**

Good lighting is essential for healthy flocks. Light stimulates the pituitary gland, which, in turn, secretes hormones that stimulate the ovary of the hen to lay eggs. Layers need a maximum of 14 hours of light per day throughout their laying cycle. When the source of natural light decreases in the fall, additional artificial light must be used to ensure the birds continue to lay productively. The light can be set on a timer so it gives the birds a few hours of light in the morning and then shuts off when they are ready to roost. One light outlet in the centre of a small pen with a 25-watt bulb will generally be enough light intensity for the hens, although more lights would be required for a larger area.

## **Ventilation**

Good management of manure and litter will promote better ventilation quality. During the winter, all ventilation should be from one side of the hen house (preferably the south). Inlets that open, or tip open at the top are best. These should be adjusted according to the weather. If you find your housing area is stuffy, and the ammonia fumes are strong, it needs more ventilation. Close your housing tightly only in severe cold. During the summer, ventilation will help cool the house. Increasing air movement in hot weather is important to maintain bird health, growth, and egg production.

## **Handling Poultry**

Good management means not only keeping clean facilities, it includes ensuring your birds are handled properly. Not knowing how to handle your poultry can result in increased bird stress. It is important to properly pick up and carry your poultry when required for examinations. See Appendix A for instructions on how to carry and handle your poultry bird for inspection.

## **Grooming Poultry for Show**

There are numerous videos on how to wash your chickens for show. Most consist of a three-bucket bathing process in which birds are gently plunged in a soapy-water bath, then a clear-



water bath, and finally a vinegar-water bath. It is important to have all your supplies ready before you start. Make sure to keep your bird's head above the waterline to prevent accidental drowning. Birds should be washed three days in advance of your show to allow the feathers to dry thoroughly. When drying your bird, gently pat it with a towel so as not to break feather shafts. This may also be a good time to trim the bird's nails, if needed. Petroleum jelly may be used on shanks and feet to make them look shiny and on the comb as well. Make sure to place your freshly cleaned bird in a clean cage or building area.

## Transporting Poultry

Transporting is one of the most stressful periods in an animal's life. It is important you understand the process for when poultry need to be transported to a licensed slaughter plant for inspection and processing. This will ensure you arrange proper transport that follows the legislation governing the transport of all animals in Canada. This legislation ensures animals do not suffer unduly during transport. Codes of practice for poultry (meat birds, layers, and transport) are available on the National Farm Animal Care Council website at [www.nfacc.ca/codes-of-practice/chickens-turkeys-and-breeders](http://www.nfacc.ca/codes-of-practice/chickens-turkeys-and-breeders)

Tips for transporting poultry:

- Always catch and load immediately prior to transport to minimize the animal's stress.
- Contact the abattoir you will be using to determine when you should withdraw feed.
- Handle all birds in a calm manner. Laying hens (especially end-of-lay animals) need to be carried with caution as their bones are fragile.
- All birds have difficulty breathing when held upside down and prefer to be handled in an upright position. Place birds on their feet in the crate, never on their back. Remember to give birds enough room to adjust their position.
- Use low lighting or blue lights when catching birds—this will reduce their stress and make them easier to catch. Corral birds into small groups using dividers or screens to prevent crowding or piling. Bring crates into the barn prior to catching to minimize bird-handling time.
- Never load a bird that is not fit for transport. See the Poultry Industry Council's decision tree ([www.poultryindustrycouncil.ca/resources/poultry-transport/decision-tree/](http://www.poultryindustrycouncil.ca/resources/poultry-transport/decision-tree/)) for transporting so you can make good decisions for your poultry. Do not transport sick/injured birds to the abattoir. Cull them or contact your veterinarian.

## Using the Right Equipment

During transport, birds are placed in crates or containers that will limit/minimize their movement. A good rule is that all birds should be able to rest without touching another bird. On large farms, birds are routinely transported using plastic crates (chickens) or turkey liners (turkeys). Crates, or other cleaned and disinfected containers, may be available from your local processing plant, or you may need to have your own. Dog crates, with liners or pans, are suitable for transporting larger poultry, such as turkey and ducks.

- Transport crates should be made of a material that is easy to clean and disinfect. All crates should be cleaned and disinfected before loading.
- Birds must be secure. Make sure there are no wings, heads, legs, and toes sticking out. Ensure all birds can rest on the floor of the container and are not on top of one another.
- Never mix large or small birds, or different types of birds (such as ducks and chickens) in the same crate. Mixing bird sizes or species can cause stress and potential death from smothering or pecking. (See the Ontario Ministry of Agriculture, Food and Rural Affairs poultry transporting fact sheet at <http://www.omafra.gov.on.ca/english/livestock/poultry/facts/17-009.htm>.)

Visit the Nova Scotia provincial processor site for a list of provincially inspected poultry processing plants in Nova Scotia: <https://novascotia.ca/agri/programs-and-services/food-protection/processors/>

## Traceability

Nova Scotia livestock owners should consider registering with the Premises Identification Program and get a premise identification number (PID). A PID number is a unique number, based on national standards, that is assigned to a premise. Each premise will be issued a single premises identification number, regardless of the number of animal types or premise types on that parcel of land. Either the owner or renter of a land location may apply for a PID for a location. Land ownership must be indicated on the application.

A premise is defined as a parcel of legal land where animals are grown, kept, assembled or disposed of. Premises include farms, hobby farms, stables, feedlots, pastures, hatcheries, egg-grading stations, abattoirs, assembly yards, auctions, sale facilities, rendering plants, zoos, petting farms, fair grounds, racetracks, competition facilities, veterinary facilities etc.

Benefits of the PID program include the ability to

- notify premise owners of disease outbreaks and recommend biosecurity precautions
- determine which species are near a disease outbreak

- respond in a rapid and informed manner when emergencies occur
- address all phases of emergency management (preparedness, prevention, response, and recovery phases)
- reduce the impact of marketing restrictions by enabling quicker resolution of emergency situations

You should definitely register your birds if they will be leaving your property to participate in exhibitions or shows. You can find the application form to apply for a PID on the website listed under Additional Resources at the end of this manual, by calling 902-890-3377, or by emailing [NSPID@novascotia.ca](mailto:NSPID@novascotia.ca).

**NOTE**

For more information on traceability, see the information sheet in the appendix at the end of this manual.

## **Section 3: Digestion and Nutrition**

### **Poultry Digestion and Feed**

In order to know what to feed your flock for healthy growth, you first need to understand your birds' digestive system. We will not go into great detail on this topic here but, instead, encourage you to watch any of the numerous videos available online explaining the simple digestive system of poultry. You'll find links to them in the Additional Resource section in this guide.

Commercial poultry feed sources commonly use ingredients like corn, peas, canola, bone meal, fish meal, and soybean meal. They also contain vitamins, calcium, phosphorus, salt, and grit, which are all necessary building blocks for proper bird growth and development.

It is important to ensure the feeding troughs are free of litter and mouldy feed. Do not put new feed on top of old feed as a means of avoiding spoilage. If the feeder space is adequate, you will only have to feed once a day. Always keep feed in front of your birds, but let them clean the feeders out once or twice a week to avoid wasting food. Feed loss due to waste can reduce profitability from your flock.

### **Feeding Program for Chicks**

Start feeding your day-old chicks as soon as possible once they arrive or hatch. Baby chicks should be given feed within 36 hours after hatching to prevent loss of weight and vitality.

Ensure the chicks also have water as soon as possible to avoid dehydration, which can lead to death. Chicks will double their weight four to five times in the first six weeks of life. This tremendous growth demands proper nutrition. A commercially prepared chick starter is a good way to provide a complete nutritional package. Chick starter is usually fed for the first six weeks of life. Trays can be used to increase access to feed for chicks. At this time, feed consumption will be approximately 1 kg (2.2 lbs.) for each egg-producing chick and 4 kg (9 lbs.) for each meat-producing chick. Commercial chick starter is approximately 21 per cent protein and can be medicated or un-medicated. Note that turkey and duck starter would be higher in protein content.

Faulty nutrition can lead to tremendous costs. It is important to relate the growing stages of a chicken to the type of feed used. Starters sold by reputable feed manufacturers are formulated to meet the nutrient requirements of your birds.

Broilers can eat chick starter feed for 21 days, followed by grower feed to 42 days of age. Layers can be fed chick starter feed for the first 15–18 weeks. Adding ingredients such as grains, skim milk, or greens will only upset the balance of the ration's nutrients. By the end of the first week, the chicks can eat from the proper feeding equipment and the smaller feed trays can be removed. It is important to raise the feeders as the chicks grow, so the top of the trough is level with the backs of the chicks. Manufactured floor trough feeders can also be purchased. The feed troughs and waterers should be arranged away from the source of heat, so chicks can move closer to or away from the heat without piling up against the trough and smothering.

After pullets destined for laying are fed chick starter, they can be switched to a growing ration with a high protein content, around 14 to 16 per cent. Starting with the lower protein content ensures development does not occur too quickly or the birds lay too early. Grower ration is typically fed until the birds are 14–18 weeks old, then the birds are fed a laying mash with 16–19 per cent protein and lots of calcium. Young chicks should not eat layer mash as the high levels of calcium and phosphorus can damage their kidneys.

After broilers are fed chick starter, they can be switched to a 16 per cent grower ration. Feed for broilers typically has a higher protein content than feed for laying hens. If the birds will be slaughtered for meat, they can be fed a lower percentage finisher ration around 12 weeks, however some breeds mature quicker and can be fed finishing ration sooner.

It is important to note that different breeds will develop at different rates and the amount and type of feed should be adjusted to fit your flock’s needs. Note that if you are feeding or administering medication to your birds, there needs to be a withdrawal period before the birds are slaughtered or any eggs consumed. For reference, see different charts below for feed requirement for pullets, broilers, and ducklings.

**Feed Intake of Pullets for Egg Production (Feed Consumed to Date)**

Age in Weeks	Egg Strain		Meat Strain	
	kg.	lbs.	kg.	lbs.
2	0.18	0.40	0.23	0.50
4	0.50	1.10	0.73	1.60
6	0.86	1.90	1.45	3.20
8	1.41	3.10	2.27	5.00
10	2.00	3.30	3.14	6.90
12	2.68	5.90	4.09	9.00
14	3.41	7.50	5.00	11.00
16	4.23	9.30	5.91	13.00
18	5.00	11.00	7.05	15.50
20	5.91	13.00	7.95	17.50
22	6.81	15.00	8.64	19.00
23–26			12.50	27.50
27–30			14.50	31.90
31–34			14.90	32.80
35–38			15.20	33.40
39–42			14.60	32.10
43–46			14.40	31.70
47–50			13.90	30.60
51–54			13.70	30.20
55–58			13.50	29.60
59–62			13.40	29.40

*Referenced source: 4-H Nova Scotia Poultry Leader Resource Manual 2004*

## Feed Consumed per Bird – Mixed Broilers

Age (Weeks)	To Date (g.)	To Date (lbs.)
1	122	0.27
2	290	0.64
3	598	1.32
4	1,047	2.31
5	1,674	3.7
6	2,453	5.41
7	3,379	7.45
8	4,359	9.61

**FEED/100 Birds/Day**

*Referenced source: 4-H Nova Scotia Poultry Leader Resource Manual 2004*

## Suggested Feeding Schedule for Ducklings

Type of Duckling	0–2 Weeks	2–7 Weeks	7–20 Weeks
	Daily amount of 20 per cent protein starter feed per bird daily	Daily amount of 18 per cent protein grower feed per bird	Kilograms (pounds) of 16 per cent protein developer feed per bird daily
<b>Small breed</b>	Free choice	Free choice 5 min. twice daily	0.06–0.11 (0.15–0.25)
<b>Egg breed</b>	Free choice	Same as above	0.09–0.14 (0.20–0.30)
<b>Medium breed</b>	Free choice	Same as above	0.11–0.16 (0.25–0.35)
<b>Large breed</b>	Free choice	Same as above	0.14–0.18 (0.30–0.40)
<b>Muscovy</b>	Free choice	Same as above	0.09–0.18 (0.20–0.40)

*Actual requirements of individuals may vary. (4-H Nova Scotia Waterfowl Leader Resource Manual 2000)*

## Calcium and Alternative Sources of Protein

### Calcium

Laying hens need calcium for eggshell formation. About 10 per cent of the egg weight is shell and the shell is almost 100 per cent calcium carbonate. Most of the complete high-energy laying mashes available contain 3.5 per cent calcium. Oyster shells, which are a good source of calcium, can be fed to the layers as a supplement to ensure they have adequate calcium. A granite grit or coarse sand helps the bird's digestion. Laying hens retain the grit and sand for a long period so feeding every two weeks is adequate. A handful or two of grit/sand and oyster shells can be added to mash feed. This can be purchased at your local feed stores.

### Alternate Protein Source

Alternate protein source feed options are also available. Many articles discuss how to make your own feed ration and how to review protein source comparisons. Pearson's Square is a mathematical formula you can use to figure out the proportion of protein for homemade feed.

There are also various online calculators available. If you are a first-time poultry owner, you may prefer to purchase your feed until you feel more comfortable with your flock's needs.

## Water Requirements

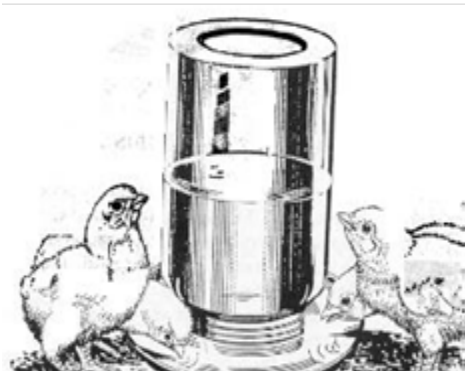
Water is essential for good health. Birds can live a few days without feed but only hours without water. Birds don't sweat—they use increased consumption of cool water to keep their body temperature in check. A bird's water consumption will almost double in hot weather. Baby chicks should be given water within 36 hours after hatching. If the chicks have had a long trip from the hatchery to your farm, putting a powdered vitamin pre-mix in the waterer for the first few days can be beneficial. Have water available near each feed trough and close enough to the heat lamp so the chicks can easily find it, but not so close it creates a hazard. A 4.5 L plastic hand waterer is adequate for starting approximately 20 chicks. Waterers with brightly coloured bases can help chicks find the water. Water for chicks

Approximate Water Consumption – Per 1,000 Birds Per Day at 21°C (70°F)						
Sexes Intermingled			Pullets			
Mature (Weeks)	Broiler Chicken L	gal.	Egg Type L	gal	Meat Type L	gal.
1	32	7	18	4	36	8
2	59	13	41	9	64	14
3	86	19	59	13	83	18
4	114	25	77	17	98	22
5	150	33	90	20	112	25
6	205	45	99	22	123	27
7	250	55	122	27	129	28
8	272	60	153	34	133	29
9	285	63	158	35	139	31
10	295	65	185	41	146	32
11			194	43	153	34
12			207	46	159	35
13	Non-laying hens		189–225	42-50	165	36
14	Laying hens		225–284	50-63	170	37
15					176	39
16					182	40
17					187	41
18					193	42
19					199	44
20					204	45
21					210	46
22					216	48
			Laying or breeding		259–297	57–65
Referenced source: 4-H Nova Scotia Poultry Leader Resource Manual 2004						

should be maintained at temperatures between 10 to 20°C (50 to 68°F). If the temperature is outside this range, the chicks will reduce their consumption. If using a waterer built for adult

birds, put a ring of rubber hose in the base so chicks cannot fall in and drown. Rocks placed in the outer ring of the base can serve the same purpose. A continued supply of fresh clean water is important if chicks are to thrive. More than 60 per cent of a bird's body weight is water, so it is a vital ingredient for all the body functions.

Generally, birds will consume water in a 2:1 ratio to feed consumption. This ratio can change if extremes of climate temperatures occur. During the winter, water tends to freeze in small poultry houses. One of the most common methods of keeping the water from freezing with small flocks is to empty the waterers out at night and fill them with warm water in the morning. Lack of water is one of the most common causes of health issues in both winter and summer. Small-flock owner should know how much water is consumed daily as it is a good indication of the bird's health. The water should be changed twice a day and waterers disinfected once a week so there is no slime buildup. When the waterers can no longer maintain a half-day supply for the flock, it is time to add more waterers or use larger waterers. Keep raising the height of the waterers as the birds grow so the bases are level with the backs of the birds. This helps prevent litter from getting into the water supply and discourages spillage. Place the waterers on stands so the birds cannot get into any damp litter that may develop beneath the waterers.



**POULTRY LEADER GUIDE 4-H NOVA SCOTIA  
RESOURCE MANUAL 2004**

## **Water Quality and Testing**

Inadequate water intake can greatly affect poultry and their performance. Water is used in the digestive process, nutrient transport, body temperature regulation, and elimination of waste. Unsuitable water that does not meet minimum quality standards will reduce performance of your flock, limit growth and egg production, affect egg quality, as well as cause illness and/or death in severe cases. The natural chemicals found in water, when out of balance and in combination with other minerals, can amplify problems. An example of this is would be if your flock's water supply has a high pH level. High-pH water will have a bitter soda-like taste and allows for more bacterial growth. Chickens have two taste sensors: salt and bitter. In nature, most poisons are associated with a bitter or alkaloid taste. The natural response of the bird is to decrease water consumption when it has a bitter taste. Water must be palatable and not harmful to bird health. Water must be tested at least annually, unless municipal water is used, to ensure it's suitable for the birds and corrective action must be taken if required. Water sampling is a service provided by the Nova Scotia Department of Agriculture. Below is a sample water quality indicator chart to help you read your water sample results.



**Water Quality Standards and Treatment Options. Information is listed as parts per million or milligrams per litre**

<b>Water Quality Indicator</b>	<b>Average Levels</b>	<b>Maximum Acceptable Levels</b>	<b>Maximum Acceptable Levels Indicate</b>	<b>Treatment Options/Comments</b>
<b>Total bacteria (TPC)</b> <b>Total coliforms</b> <b>Fecal coliforms</b>	0 CFU/ml  0 CFU/ml  0 CFU/ml	1000 CFU/ml  50 CFU/ml  0 CFU/ml	Dirty system, may taste bad and COULD have pathogens in the water system.  Water with >50 total coliforms or any fecal coliform has been in contact with human or animal feces.	Clean the system between flocks with approved sanitizing cleaners and establish a daily water sanitation system when birds are present.  Shock chlorinate well.
<b>pH</b>	6.5–7.8	5–8	Below 5: metal corrosion  Above 8: water sanitizers work poorly, “bitter” taste	Raise pH with soda ash ( $\text{Na}_2\text{CO}_3$ ), lime $\text{Ca}(\text{OH})_2$ , or sodium hydroxide ( $\text{NaOH}$ ).  Lower pH-phosphoric acid, sulphuric acid, and hydrochloric acid for strong alkalinity; citric acid and vinegar for weak alkalinity or other water acidifier.

<b>Alkalinity</b>	100 mg/l	300 mg/l	<p>Associated with bicarbonate, sulphates and calcium carbonate. Can give water a bitter taste that makes it undesirable to the birds.</p> <p>High levels can make it difficult to lower the pH.</p> <p>Can be corrosive to cool cell pads.</p>	<p>Acidification</p> <p>Anion exchange de-alkalizer</p> <p>Can be reduced by removing free CO<sub>2</sub> (carbon dioxide) through aeration.</p>
<b>Total hardness</b>	<p>Soft: 0–75mg/l as CaCO<sub>2</sub></p> <p>Somewhat hard: 76 –150</p> <p>Hard: 151–300</p> <p>Very hard: &gt;300</p>		<p>Hardness in water causes scale buildup, which reduces pipe volume and drinkers are hard to trigger or may leak (main factors are calcium and magnesium, but iron and manganese contribute small amount).</p>	<p>Do not use water softener if water is already high in sodium unless using potassium chloride instead of sodium chloride (salt).</p> <p>Polyphosphates will sequester or tie-up hardness and keep in solution.</p> <p>Acidification to below pH of 6.5.</p>
<b>Calcium (Ca)</b>	60 mg/l		<p>No upper limit for calcium, but if values are above</p>	<p>Treatment same for hardness.</p>

			110 mg/l may cause scaling.	
<b>Magnesium (Mg)</b>	14 mg/l	125 mg/l	May cause flushing due to laxative effect, particularly if high sulphate present.	Treatment same for hardness.
<b>Iron (Fe)</b>	0.2 mg/l	0.3 mg/l	Birds tolerant of metallic taste.  Iron deposits in drinkers may cause leaking.  Can promote growth of bacteria such as <i>E. coli</i> and <i>pseudomonas</i> .	Treatment includes addition of one of the following: chlorine, chlorine dioxide, or ozone then filtration removal with proper-sized mechanical filtration.
<b>Manganese</b>	0.01 mg/l	0.05 mg/l	Can result in black grainy residue on filters and in drinkers.	Similar to iron but can be more difficult to remove due to slow reaction time.  Chlorination followed by filtration most effective in pH range of 8.5, needs extended contact time with chlorine prior to filtration unless using Iron X media.  Ion exchange resin if pH is 6.8 or above.  Greensand filters with pH above 8.0.
<b>Chloride (Cl)</b>	50 mg/l	150 mg/l	Combined with high Na levels, can	Reverse osmosis, blend with non-saline water, keep water clean and use

			<p>cause flushing and enteric issues.</p> <p>Can promote enterococcus bacterial growth.</p>	<p>daily sanitizers such as hydrogen peroxide or iodine to prevent microbial growth.</p>
<b>Sodium (Na)</b>	50 mg/l	150 mg/l	<p>With high Cl levels can cause flushing.</p> <p>Can promote enterococcus bacterial growth.</p>	<p>Reverse osmosis.</p> <p>Blend with non-saline water.</p> <p>Keep water clean and use daily sanitizers such as hydrogen peroxide or iodine to prevent microbial growth.</p>
<b>Sulphates</b>	15–40 mg/l	200 mg/l	<p>Sulphates can cause flushing in birds.</p> <p>Rotten-egg smell is hydrogen sulphide, byproduct of sulphur-loving bacteria growth.</p> <p>This can cause air locks in water system as well as flushing in birds.</p> <p>Since sulphides can gas off, test results may underestimate actual level present.</p>	<p>Aerate water into a holding tank to gas off sulphur.</p> <p>Anion exchange (chloride based).</p> <p>Treatment with oxidizing sanitizers then filtration.</p> <p>If a rotten-egg odour is present, shock chlorination of well is recommended plus a good daily water sanitation program while birds are present.</p>
<b>Nitrates</b>	1–5 mg/l	25 mg/l	<p>Poor growth and feed conversions.</p>	<p>Reverse osmosis.</p> <p>Anion exchange.</p>

			May indicate fecal contamination, test for coliform bacteria.	
<b>Lead</b>	0 mg/l	0.05 mg/l	Can cause weak bones and fertility problems in broiler or turkey breeders.	Lead is not naturally occurring. Look for pipes, fittings, or solder that contain lead.  Water softeners and activated carbon can reduce lead.
<b>Copper</b>	0.002 mg/l	0.6 mg/l	High levels can cause oral lesions or gizzard erosion.	Source is most likely from the corrosion of pipes or fittings.
<b>Zinc</b>	No value given	1.5 mg/l	Higher levels may reduce growth rates.	Look for locations where water may have come into contact with galvanized containers.  Water softener and activated carbon will reduce adsorption.

*Reference: The Poultry Site, November 2008.*

## Section 4: Health

Occasionally, a bird may get thin, sick, and die. However, this is probably nothing to be alarmed about. If the whole flock gets sick, starts to cough and sneeze, looks droopy, stops eating, and suddenly stops laying, be sure to find out the cause. Some typical specimens can be taken to the provincial diagnostic laboratory for diagnosis of the problem.

Signs and symptoms of diseases:

- Droopiness
- Ruffled feathers
- Loss of appetite
- Listlessness
- Diarrhea
- Laboured breathing
- A high death rate (mortality)



POULTRY LEADER GUIDE 4-H NOVA SCOTIA RESOURCE MANUAL 2004

If disease is suspected, you should call a poultry specialist or a veterinarian. Correct diagnosis, as well as immediate and proper treatments, are very important.

### Common Illnesses

#### External Parasites

These parasites live on birds and always stay on them. The chief damage to poultry is through discomfort and irritation. This lowers the birds' resistance and makes them susceptible to other ailments. Parasites include the following:

**Lice**—Lice multiply rapidly during warm weather. Control lice by treating the bird with an insecticide according to the manufacturer's recommendations.

**Common red mites**—Mites are small spider-like parasites that hide in cracks or filth close to where birds roost. They crawl onto the chickens and suck their blood. The mite is grey in colour when they have not fed and red when they are full of blood. Common red mites multiply rapidly; if nothing is done to destroy them, the poultry house will soon be covered with them. Mites lower the vitality of the birds until they do not grow or produce eggs.

**Scaly leg mite**—A very small parasite that spreads slowly through the flock. It burrows under the scales on the shanks and toes of the chicken, causing irregular-shaped eruptions or crusts to form on the shank. Mites can be controlled by treating the birds with an insecticide according to the manufacturer's recommendations

## Internal Parasites

**Coccidiosis**—An internal parasite that can attack young birds. In acute cases, the disease causes high mortality. In less severe cases it can result in a stunted growth rate. This parasite can be combatted by maintaining dry litter, keeping the birds confined, and feeding complete feeds with coccidiostat.

## Protozoan Disease

**Caecal coccidiosis**- Affect birds at one to 12 weeks of age and occasionally older. Chicks appear cold, have droopy wings and feathers ruffled. In acute cases, free blood appears in droppings and feed consumption drops rapidly. Internally the caecum is enlarged and contains blood-stained material. For prevention make sure litter is clean and dry and low-level feeding of preventive drugs. Consult with a veterinarian for treatment.

**Intestinal coccidiosis**- Affects birds eight weeks and over. Birds have reduced feed consumption, lose weight, possible lameness, combs and wattles pale and bloody droppings may occur in acute cases. Internally there is noticeable thickening of intestinal walls with minute white spots on the inside and small hemorrhages may occur in the intestine. To prevent intestinal coccidiosis use range rotation, make sure litter is dry in laying houses and low-level feeding of a preventive drug. Consult with a veterinarian for treatment.

## Viral Disease

**Marek's disease**—Attacks the nervous system of the chicken and there is no cure once the bird contracts it. Flocks can become resistant to it but only after exposure and high mortality. Vaccinate your stock to avoid this hazard.

**Avian influenza (AI)** —Can infect domestic and wild birds. AI is not commonly seen in Canada but is a federally reportable disease. It can cause severe illness and death in domestic birds, especially chickens and turkeys. Also, it can remain viable for long periods at low environmental temperatures.

Birds become infected through direct contact with secretions or feces of infected birds, contaminated surfaces, food, and water supplies. Wild birds may also possibly transfer the virus mechanically on their feet, feathers, or dander. While waterfowl may not appear sick, they are susceptible to infection with AI and can spread the virus. It is unknown how AI will affect wild turkeys or other game birds; thus, it is important to maintain vigilance. Those in contact with domestic poultry species should use the enhanced biosecurity measures listed below to reduce the potential for pathogen transmission. Also see additional links and the appendix at the end of this manual for more information.

- Inspect and ensure that the flock is healthy and free from disease/insect infestation.
- If a disease issue is suspected or discovered, consult a veterinarian for proper diagnosis.
- If a disease exists in the flock, do not remove the birds from your property.

- Clean and disinfect all carriers/boxes used for transportation prior to use. Cardboard boxes should be discarded after a single use.
- Use disposable (one-time use) cups for feed and water. If using reusable cups, ensure they have been cleaned and disinfected prior to transporting.
- Combining birds from different flocks increases the risk of disease spread.

**Infectious laryngo-tracheitis (ILT)**- ILT is a provincially reportable disease that commonly affects birds two months and over. External symptoms include watery eyes followed by violent fits of coughing and gurgling sounds during breathing. Birds will also raise and extend neck when breathing. Internal symptoms include blood-stained mucous adhering to the walls of the windpipe. To prevent ILT vaccinate all replacement stock at 8 to 12 weeks of age and have good biosecurity. There is no treatment for ILT, once diagnosed whole flock must be exterminated.

**Infectious bronchitis**- Will cause a low mortality in adult bird, but losses in chicks may be heavy. Symptoms include mild coughing and sneezing, “crackly” breathing sometimes heard and a mucous plug in lower windpipe. Prevention includes vaccinating all replacement stock at 8 to 12 weeks of age and good biosecurity. To treat infectious bronchitis, raise brooder house temperature and use antibiotic to help control complications.

## **Bacterial Disease**

**Pullorum and paratyphoid**- Affects turkeys and chickens from one day to 4 weeks of age for an acute state. Chicks appear cold, sleepy, chirping and pasting around the vent. Internally there are no acute symptoms. Subacute symptoms include small spots on liver, limbs, and/or heart. For prevention, blood test all breeding stock to identify pullorum carriers. Detection of paratyphoid carriers is difficult. Consult with a veterinarian for treatment.

**Fowl typhoid**- Usually affects young adult birds. Symptoms include droopiness, listlessness, comb and wattles pale and green droppings. Internally symptoms are enlarged spleen, swollen liver, and gall bladder is distended. For prevention, identify typhoid carriers through pullorum testing. Obtain replacement stock from tested flocks only. Consult with a veterinarian for treatment.

## **Vaccinations**

All commercial poultry producers vaccinate their birds for Marek’s, bronchitis, and Newcastle diseases. Any one of these diseases can cause serious loss of egg production or mortality in the flock. If your birds aren’t vaccinated for these, be careful to not allow visitors around your flock and practise good biosecurity. Contact your local veterinarian for additional quarantine information requirements for show and flock introduction as timelines may vary.

## **Feather Picking and Cannibalism**

Feather picking and cannibalism are common problems that can develop while chicks are growing or during the adult stage. Cannibalism in small flocks is usually due to poor



management or nutritional issues. A similar type of problem is toe picking, which can start in a flock of chicks soon after they are put under the heat lamp. Some factors that can cause picking or cannibalism are overheating, overcrowding, lack of feed or water, and an imbalance of feed supply. Maintain proper temperatures in the pens to discourage cannibalism.

One method of controlling cannibalism is de-beaking. If small-flock owners have had problems in previous flocks, they should be purchasing laying pullets that have already had their beaks trimmed. Be aware that for show birds, de-beaking may not be permitted.

Keeping birds active and engaged is also important in small flocks. Hanging a raw cabbage or lettuce head, or putting a few spruce boughs in the house can create the necessary diversion to prevent pecking in adult birds.

A feed with low-fibre content, pellet, or crumble preparation sometimes allows birds to quickly consume their feed and they may get bored. If foraging is an option for your flock, this would also assist in keeping your birds from poor-behaviour habits. Another option is sprinkling some oats on the floor from time to time if the litter is kept dry. This will encourage the birds to stay active by scratching.

Close confinement can cause birds to become aggressive toward each other. Ensure the birds are not overcrowded and there is adequate feeder space. A proper diet is also crucial as a nutrient imbalance can cause birds to become cannibalistic. Commercial rations are formulated to be balanced to the bird's nutrient needs. Switching to a cheaper feed does not necessarily mean you are getting a bargain if it is lacking an essential component, such as protein.

Birds in pens with windows are sometimes more prone to cannibalism or feather picking. The sun's rays penetrate the pen and cause areas with high light intensity, which can sometimes trigger picking. Using artificial light will help to reduce this.

Cannibalism can soon become a habit and can sometimes be difficult to break. If the problem has started in your flock, the victim should be removed and have their injured parts painted with pine tar or another preparation with a bitter taste. Care should be taken that the preparation chosen does not burn the bird's skin. Also, applying the preparation to a few of the uninjured birds in the pen is advisable. In severe cases, you may need advice from your veterinarian.

## **Biosecurity**

Biosecurity is the preventive measures taken to minimize the introduction and spread of diseases and other hazards. There are many pathogens (viruses, bacteria, and parasites) that can cause disease in birds. These can spread by direct bird contact or indirect contact with humans, housing, and equipment. Some of these pathogens are zoonotic and pose a human health risk. People who raise poultry or game birds for personal or limited commercial purposes should be aware of the risks of such infections. For more information on biosecurity and tips for keeping your flock safe and healthy, view the *Biosecurity for Small Scale Livestock Production* factsheet in Appendix B of this manual.

## Section 5: Breeding

### Selecting Your Breeding Stock

A male bird must be present with a flock of females in order to obtain eggs for hatching. The male should be carefully chosen based on breed characteristics in hopes these characteristics will be passed on to the progeny. In selecting female birds for breeding, choose active, healthy, productive females that meet breed standards. Only keep the females you are going to use for breeding purposes, as feed is expensive and having more hens than necessary to obtain hatching eggs is not an effective use of your resources. However, you may want to keep some females for table egg production. Keep in mind that heavier breeds need a lot more feed to produce fewer eggs than the small breeds. In chickens, you can learn to distinguish between layers and non-layers. It is important to ensure that any hen you keep is a productive layer.

The following characteristics distinguish layers from non-layers:

Character	Laying Hens	Non-laying Hens
Vent	Large, dilated, oblong, moist, bleached	Small, contracted, round, dry, pigmented
Pubic bones	Wide apart	Close together
Comb	Large, red, full, glossy, warm	Small, pale, scaly, cold
Wattles and earlobes	Prominent, soft, smooth	Inconspicuous, rough, dry

*Referenced source: 4-H Nova Scotia Poultry Leader Resource Manual 2004*

Well-cared for chickens will have the highest egg production for their first year. After this time, they will continue to lay at a lower rate, and you may want to pick out the non-layers and dress them for eating. The entire flock can be replaced after 12 to 14 months of production for best results.

### Reproduction and Incubation

There are a couple of different methods for breeding a flock. One method is to let the male birds run free with the females. With chickens, you will need one rooster for every 10 hens. For the individual breeding of hens, a separate pen is required. Allow 0.3 m<sup>2</sup> per bird. The pen needs to have clean litter, water, and feed at all the times. Also, an open nest should be available. After placing the rooster with the hen, allow a minimum of three days before saving eggs for hatching. If you do plan to hatch your own eggs, here is some important information to consider:

- It takes some poultry eggs longer to hatch than others. For example, a chicken egg spends 21 days in the incubator before it hatches. A turkey or duck egg is there for 27 to 28 days, while a goose egg takes 30 to 31 days. A Muscovy egg stays in the incubator

the longest; it is there for 33 to 35 days before it hatches. Canada and Egyptian geese require 35 days; all other geese range from 28 to 30 days.

- You can also purchase fertilized eggs, day-old or week-old chicks, and even 20-week-old pullets from local poultry hatcheries. Contact your local farm supply store to see when they will be receiving orders of chicks or ready-to-lay pullets; these birds are usually commercial layer or broiler breeds. Facebook groups such as Maritime Fowl and Poultry Atlantic Canada can be good places to buy and sell hatching eggs and chicks for show breeds.

Eggs can be incubated using a broody hen or an incubator. Incubators are heated containers used to hatch eggs. The temperature inside a still-air incubator should stay at 39°C (102.2°F), and 37.5°C (99.5°F) for a circulating incubator. A broody hen is a one that has stopped laying eggs but can sit on eggs to hatch them. Using a broody hen from your flock would be best. Broody hens are usually aggressive and cluck loudly, indicating the urge to set. The best breeds for broodiness are bantam breeds that have not had the broodiness instincts bred out of them. To entice a broody hen to set, darken an area of the pen or have a separate area where a nest with eggs is present. Once the chicken begins to sit on the eggs, it takes around 21 days for the eggs to hatch.

Eggs for hatching should be collected three or four times daily. Avoid exposing hatching eggs to blasts of extreme cold or hot air; hatching eggs must be cooled slowly to room temperature. After collection, hold the eggs at 21–24°C (69.8–75.2°F) for three to four hours. To keep eggs fresh, store them at 15–18°C (59–64.4°F). Storing eggs at 70 to 80 per cent humidity will keep the air cell from enlarging too rapidly. Hatching eggs should be stored small end down until a number are available for setting, but no longer than 14 days.

Storing hatching eggs more than seven days before incubation will reduce the chance of having a good hatch. If you have more eggs than you can use, dispose of them weekly, thereby increasing the chances of having top-quality eggs. In hatching egg management, you should take care to prevent bacterial or mould infection, and control levels of temperature and humidity. Do not set eggs that are oddly shaped, cracked, or excessively dirty. Only use your best eggs for hatching for best results.

When eggs are in the incubator, turn them regularly as this stops the chick from sticking to the shell. In a small incubator, the eggs should be turned at least four times a day. In large setters, the trays of eggs are usually automatically turned every hour. The eggs should not be turned during the hatching period. See your local Department of Agriculture at [ag.education@novascotia.ca](mailto:ag.education@novascotia.ca) for chick hatching school programming and equipment.

# Embryo Development and Candling

## Candling Eggs

Eggs for table use are candled to check for cracked shells. Candling is also used to see the condition of the air cell, the yolk, albumen, blood spots, or meat spots. Candling is done in a dark room with the egg held in front of a strong light that allows you to see inside the egg. Candling is also used to see if the eggs are fertilized, and, if they are, to check how the embryo is growing. An egg candler can be bought or made. As light passes through the egg, twirl the egg several times. If an egg has been fertilized, you will see a small reddish area with blood vessels running away from it. The embryo floating around inside the egg looks like a huge red spider. If the embryo dies, the blood vessels break away and form a blood ring. All clear eggs and eggs showing blood rings or streaks should be removed from the incubator. White eggs should be checked for fertilization on the third day, while brown eggs should be checked on the fifth or sixth day. Note that it is difficult to see the blood vessels before this time frame.

## Embryo Development

The following list of chick-development stages can be seen when candling your fertilized eggs. Note that the timing of these stages is specific to chickens; other types of poultry will have different rates of development.

<b>Before egg laying</b>	Fertilization, division and growth of living cells
<b>Between laying and incubation</b>	No growth
<b>During incubation: Day 1</b>	Head and eyes start to form
<b>Day 2</b>	Heart starts to form
<b>Day 3</b>	Amnion, nose, legs, wings, and allantois start to form
<b>Day 5</b>	Sex organs start to appear
<b>Day 6</b>	Beak and egg-tooth start to form
<b>Day 8</b>	Feathers start to show
<b>Day 16</b>	Scales, claws, and beak are becoming firm
<b>Day 17</b>	Beak turns toward an air cell
<b>Day 19</b>	Yolk sac begins to enter a body cavity
<b>Day 20</b>	Yolk sac is completely drawn into a body cavity. The embryo takes up practically all the space within the egg, except the air cell
<b>Day 21</b>	Chick hatches

## Section 6: Business and Production

Now that you have your housing, nutrition needs, and new flock underway, you are probably looking to offset costs. There are numerous business opportunities for small-flock owners. Your birds could generate farmgate business to offset feeding costs while still providing you with fresh produce for your family. However, you must be aware of meat and egg provincial regulations so both you and your future customers are safe.

### Marketing Your Poultry

Now that your chicks have lost their fluff and grown to maturity, they can begin to give you a return on your investment. They can do this in one of three ways:

1. **Used for meat**—See Nova Scotia Meat Inspection Act and Regulations for reference.
2. **Used for egg production**—See Nova Scotia Egg Producers Egg Regulations for reference.
3. **Used to start a new generation of pedigree show birds**

Keep in mind that eggs, chicken meat, and turkey meat are supply-managed commodities in Nova Scotia. There are regulations restricting who can keep chickens and turkeys and where they can sell those products. If your intent is to raise birds for meat or for eggs to sell to the public, read the Department of Agriculture's online resource: *Getting Started in Small Flock Poultry in Nova Scotia* at <http://novascotia.ca/thinkfarm/documents/SmallFlockPoultry.pdf>

### Marketing Your Waterfowl

**Meat**—Non-producing ducks or geese that will not be used for breeding or egg production should be slaughtered for meat. Most ducks are marketed at seven to eight weeks of age. Pekin ducks will weigh 2.5–2.9 kg. (5.5–6.5 lbs.) and be relatively free of pin feathers. As a rule, geese should be killed when 11 to 16 weeks of age. These birds can be slaughtered and used for home consumption. They must be killed at an inspected abattoir if they are going to be sold to the public.

**Eggs**—Waterfowl raised for commercial egg production is limited in Nova Scotia. Consumers do not seem to have a high demand for purchasing duck or goose eggs. If you are collecting eggs for hatching, select those from parents of show bird conformation, productivity, vigour, size, and health. Make sure they meet breed standards without any disqualifying traits present.

**Feathers**—Goose feathers are used for many purposes. The softer feathers are used in making high-quality pillows, comforters, and sleeping bags. A goose can yield 100–200 g (3.5–7.04 oz.) of feathers. Wash the feathers in lukewarm water with a detergent, rinse thoroughly, and dry. Spread the feathers and stir frequently during the drying process to fluff them.

## Meat and Slaughter

Any meat sold in retail stores or farm markets in Nova Scotia must be slaughtered at a provincially or federally inspected abattoir. Meat slaughtered in a provincially inspected abattoir can only be sold within Nova Scotia. In order for Nova Scotia-produced meat to be sold outside of the province, it has to be slaughtered at a federally inspected facility.

Provincial inspection is provided to abattoirs free of charge and ensures that meat is safe for consumers without being overwhelming for small-scale abattoirs. This allows farms the opportunity to develop their own on-farm facilities for meat slaughter and meat processing. If you are interested in opening your own on-farm abattoir, you need a Meat Slaughtering and Processing License issued by the Food Safety Section of the Nova Scotia Department of Environment. This license is also required if you process the meat into products such as bacon or sausage, even if you do not slaughter the animal yourself. For more information, read the Meat Inspection Act and talk to a senior meat inspector. The Meat Inspection Act can be found at <https://nslegislature.ca/sites/default/files/legc/statutes/meatinsp.htm>

### NOTE

For more information on the Meat Inspection Act, or to learn more about obtaining a Meat Slaughtering and Processing Licence, view the links listed under Additional Resources.

## Home-consumption Slaughter

You will need a sharp knife, funnel, rope, propane torch, and a pail of scalding water for home-consumption chicken slaughter. Make sure the instruments are sharp and the appropriate size. You must carry out the procedure in one quick motion that results in the head being completely severed from the body. The birds should then be hung upside down in the funnel. To get a good bleed-out, cut the jugular vein in the neck and leave the bird in the funnel until the bleeding stops. Then, the bird should be removed from the funnel and immersed in the pail of scalding water (60–70°C / 140–158°F). Wait until the feathers become easy to remove and hold the bird by the feet while plucking them out. Use a propane torch to singe off any hairs left on the bird.

The next step is to eviscerate the bird. First, cut along the abdomen and around the vent. Make sure the incision is large enough to insert your hand into the bird's body cavity to remove the insides. When all the insides are gone, remove the crop by cutting along the skin of the neck and plying it away from the tissues. The remaining trachea should be removed with the head.

The feet of the bird should also be removed with the legs tied together or enclosed in a flap of abdominal skin. The gizzard, heart, and liver can be saved for eating. The gizzard is prepared by cutting along the middle, turning it inside out and removing the inner lining. The neck can also be removed. After washing the inside and outside of the bird, the neck, gizzard, heart, and liver may be put in a small bag and placed inside the bird until the bird is ready for use. The bird should be cooled as quickly as possible and can be frozen until you are ready to cook it. For long-term storage, put the carcass in a plastic bag and remove all the excess air prior to freezing. Contact the Department of Environment for additional food safety storage advice. For more information on the Meat Inspection Act or to learn more about obtaining a Meat Slaughtering and Processing Licence, view the links listed under Additional Resources.

### **Eggs for Sale**

Many poultry owners will have a surplus of eggs and may want to sell these to the public to offset production costs. Clean, uncracked eggs that are stored at 4 oC may be sold at a Farmer's Market. Eggs that have not been graded at a federally-inspected grading station can only be sold to the final consumer. You can view guidelines for selling your product at Food Safety Guidelines for Public Markets <https://novascotia.ca/agri/documents/food-safety/publicmarketguide.pdf>.

## **Record Keeping**

Records keep track of a flock's performance, health, daily management, and ancestry. Records of expenses and receipts are important and can help in determining the productivity and profitability of your flock. Whether you own one chicken, or a whole flock, a detailed production record is perfect for keeping track of your investment. Be sure to keep your records in a convenient place and keep them up to date. There are many examples of templates you can use for your record keeping online. See Appendices C to J for record templates to use for management of your flock. Below is a description of the different types of records that can be used.

### **Types of Records**

**Flock records**—This record lists the sex, date of hatch, and the date the bird leaves your farm. It basically keeps a record of the comings and goings in your flock. If you sell or purchase a bird, this chart will keep record of either who sold you the bird, or who you sold the bird to.

For hatching eggs, you will want to keep a record on fertility and hatchability. For poultry productions records, you will want to record the number of eggs laid (salable and non-salable) for layers, mortality, feed used (for flock as opposed to individual birds), and bird weight at slaughter for meat birds.

**Breeding record**—Each breeding is recorded on this record. It will help you keep track of hatching dates and help you decide which animals are productive and worth breeding. Other items listed

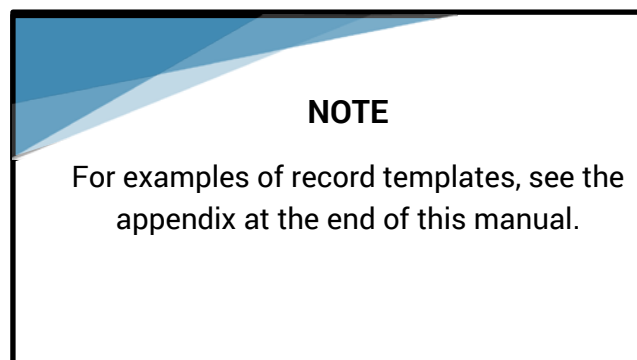
in a breeding record include date eggs are laid, successful hatched chicks, number of infertile eggs, and number of dead chicks in shell. You should also record if fledge is by parent or by hand per clutch, and then overall flock totals in the above records.

**Show record**—A show record includes the dates and places of shows entered plus information on classes and awards received. This may be of value if you are breeding birds for show to demonstrate quality standards of perfection of your flock.

**Health records**—Health records should include any symptoms or possible signs of disease and the date they were observed in each animal. If the animal receives any medication, the amount and the date must be recorded. Health records can help keep track of the withdrawal period for medication that must be adhered to before an animal can go to market or eggs can be consumed.

**Feeding records**—These records should include the type and amount of feed given to the flock. The record can also track the overall feed costs of your operation. Feeding records can also help you to design and implement feeding programs according to the life stage of your animals.

**Pedigrees**—These records show the family tree of each individual animal. Pedigrees are important because they can establish that your animal is purebred and show ancestry, so you can avoid accidentally inbreeding.





## **Conclusion**

Each section in this guide can act as a resource to help you prepare and plan for a positive experience, whether it is for small-scale farming or exploring the 4-H poultry or waterfowl projects as a leader or member. This manual is meant to act as a starting point for providing you with knowledge to learn and teach others about basic poultry and waterfowl concepts and animal husbandry. Raising poultry is a learning process. You should start slowly and expand as you gain experience. There is often strength in numbers, and networking with other small-scale poultry owners, poultry clubs, 4-H and/or government organizations is a great start to a successful experience. Contact your local Department of Agriculture for any additional questions and direction in your future farming ventures. See the Appendix K for sample meeting agenda and suggested activities specific for 4-H leaders and members for poultry and waterfowl meetings. These are just suggested topics but feel free to use this manual and additional resources noted below to make this exploration process meaningful to your group. Also see Appendix L for project year tips for 4-H Leaders.

## Additional Resources

- Atlantic Canadian Organic Regional Network: <http://www.acornorganic.org/>
- University of Minnesota Extension's Raising Chickens for Eggs: [www.extension.umn.edu/food/small-farms/livestock/poultry/backyard-chicken-basics/](http://www.extension.umn.edu/food/small-farms/livestock/poultry/backyard-chicken-basics/)
- Biosecurity Recommendations for Small Flock Poultry Owners: [www.omafra.gov.on.ca/english/livestock/poultry/facts/12-039.htm](http://www.omafra.gov.on.ca/english/livestock/poultry/facts/12-039.htm)
- Canadian Partnership for Consumer Food Safety Education: [www.canfightbac.org/](http://www.canfightbac.org/)
- Canadian Society of Bioengineering Site for Housing Considerations: [www.csbe-scgab.ca/publications/canada-plan-service-archive](http://www.csbe-scgab.ca/publications/canada-plan-service-archive)
- Chicken Farmers of Canada: [www.chickenfarmers.ca/what-we-do/high-animal-care-standards/code-of-practice/](http://www.chickenfarmers.ca/what-we-do/high-animal-care-standards/code-of-practice/)
- Chickens 101:Check list for Beginners: [www.backyardchickencoops.com.au/chickens-101-checklist-for-beginners](http://www.backyardchickencoops.com.au/chickens-101-checklist-for-beginners)
- Getting Started in Small Flock Poultry in Nova Scotia: [www.novascotia.ca/thinkfarm/documents/SmallFlockPoultry.pdf](http://www.novascotia.ca/thinkfarm/documents/SmallFlockPoultry.pdf)
- Humane Handling and Transportation Guidelines: [http://www.nfacc.ca/pdfs/codes/poultry\\_code\\_EN.pdf](http://www.nfacc.ca/pdfs/codes/poultry_code_EN.pdf)
- Livestock Fencing Guidelines: [www.novascotia.ca/thinkfarm/documents/fencing-guidelines-2013.pdf](http://www.novascotia.ca/thinkfarm/documents/fencing-guidelines-2013.pdf)
- Meat Slaughtering and Processing License: [www.novascotia.ca/sns/paal/agric/paal011.asp](http://www.novascotia.ca/sns/paal/agric/paal011.asp)
- National Farm Animal Care Council (NFACC): [www.nfacc.ca/codes-of-practice/chickens-turkeys-and-breeders](http://www.nfacc.ca/codes-of-practice/chickens-turkeys-and-breeders)
- Online Protein Calculator: [www.homesteadapps.com/app/free/feedcalc/pearsonsquare.php](http://www.homesteadapps.com/app/free/feedcalc/pearsonsquare.php)

- Ontario Ministry of Agriculture, Food and Rural Affairs:  
[www.omafra.gov.on.ca/english/livestock/index.html#poultry](http://www.omafra.gov.on.ca/english/livestock/index.html#poultry)
- Poultry Industry Council: <http://www.poultryindustrycouncil.ca>
- Poultry Industry Council Transportation Decision Tree:  
[www.poultryindustrycouncil.ca/resources/poultry-transport/decision-tree/](http://www.poultryindustrycouncil.ca/resources/poultry-transport/decision-tree/)
- Poultry Litter Management: [www.perennia.ca/wp-content/uploads/2018/04/poultry\\_litter\\_management.pdf](http://www.perennia.ca/wp-content/uploads/2018/04/poultry_litter_management.pdf)
- Transportation: [www.nfacc.ca/codes-of-practice/transportation](http://www.nfacc.ca/codes-of-practice/transportation)
- 4-H Nova Scotia: [www.novascotia4h.ca/wp-content/uploads/2019/01/2019-Poultry-Newsletter-Updated-Jan-21-2019.pdf](http://www.novascotia4h.ca/wp-content/uploads/2019/01/2019-Poultry-Newsletter-Updated-Jan-21-2019.pdf)
- How to properly wash poultry for show:  
[www.bing.com/videos/search?q=how+to+properly+wash+poultry+for+show%3f&&FORM=VDVXX](http://www.bing.com/videos/search?q=how+to+properly+wash+poultry+for+show%3f&&FORM=VDVXX)
- Digestive system of Chickens:  
[www.bing.com/videos/search?q=digestive%20system%20of%20chickens&qs=WebSearch&form=QBVR&sp=3&pq=digestive%20system%20of%20&sc=8-20&cvid=0FB4998AEA8F4914B943171FD34814BC](http://www.bing.com/videos/search?q=digestive%20system%20of%20chickens&qs=WebSearch&form=QBVR&sp=3&pq=digestive%20system%20of%20&sc=8-20&cvid=0FB4998AEA8F4914B943171FD34814BC)
- Humane Handling and Slaughter of Food Animals in Canada:  
[www.inspection.gc.ca/food/information-for-consumers/fact-sheets-and-infographics/products-and-risks/meat-and-poultry-products/humane-handling/eng/1363460100144/1363460243413](http://www.inspection.gc.ca/food/information-for-consumers/fact-sheets-and-infographics/products-and-risks/meat-and-poultry-products/humane-handling/eng/1363460100144/1363460243413)

# Glossary

**Albumen** - The whitish watery substance (88 per cent water, 11 per cent protein) that surrounds and contains the yolk in the centre of the eggshell.

**Allantois** - An embryonic membrane in birds that serves as a respiratory organ, a reservoir for waste, and facilitates the absorption of albumen and calcium.

**Amnion** - A thin, membranous, fluid-filled sac surrounding the embryo.

**Avian** - Of or pertaining to the vertebrate class Aves or birds.

**Bacteria** - Microscopic single-celled plants, some of which cause disease.

**Bantams** - The miniature breeds of bird. Usually one-fourth to one-fifth the weight of regular bird.

**Biotin** - A vitamin found in most feedstuffs.

**Blastoderm** - The collective mass of cells produced by the division of a fertilized ovum and from which the embryo develops.

**Blastodisc** - The embryo-forming spot on the ovum, from which the blastoderm develops after the ovum is fertilized by a sperm.

**Breed** - A group of birds whose members possess similar body shape, body size, temperament, and the ability to pass these characteristics on to their offspring.

**Breeder ration** - Feed used to produce hatching eggs.

**Breeding stock** - Adult birds used to produce young.

**Brood** - Baby chicks hatched from one nest (setting) of eggs.

**Broody hen** - A hen that wants to set on eggs. When a hen is broody, its personality undergoes a marked change; it spends much of the time on the nest, ruffles its feathers when molested, pecks at intruders and clucks or quacks incessantly while off the nest. Small groups of waterfowl can be brooded by broody chicken hens and most breeds of ducks. Some literature calls them foster hens.

**Candling** - Observing the shell and the contents of the egg (blood vessels, embryo, air cell) through the shell by holding the egg up to a bright light focused on the shell.

**Cell** - A microscopic mass of protoplasm enclosed in a semi-permeable membrane and containing a nucleus; it is capable of functioning as an independent unit.

**Chalazae** - Tiny white cords of protein fibre that are twisted like a rope at each end of the yolk. They anchor the yolk in the centre of the eggshell cavity.

**Chicken** - A bird of the species *Gallus Domesticus* having flexible cartilage at the posterior end of the breast or keel bone, tender meat, and soft skin of smooth texture.

**Chicken Capon** - A male bird of the species *Gallus Domesticus* having flexible cartilage at the posterior end of the breast or keel bone, tender meat, and soft skin of smooth texture.

**Chorion** - A membrane enveloping the embryo, external to and enclosing the amnion.

**Chromosomes** - A series of paired bodies in the cell nucleus, constant in number in any one kind of plant or animal and containing genetic information.

**Cloaca** - In birds, the common chamber into which the intestinal, urinary, and reproductive canals discharge.

**Concentrated feed** - Feeds that are high in protein, carbohydrates, fats, vitamins and minerals, and are low in fibre.

**Culling** - The process of eliminating inferior (crippled, deformed, diseased, low-producing) birds.

**Dorsal** - Of, on, or near the back.

**Drake** - The mature male duck.

**Dressed poultry** - Bird with blood and feathers removed.

**Duck** - In general, any member of the *Anatinae* family; it is often used specifically in reference to females of the duck family. Also, a mature female duck.

**Ducklings** - Young ducks up until feathers have completely replaced their baby down.

**Eclipse molt** - A four- to six-week period each year, usually in mid-summer, when the bright plumage of colored adult drakes is replaced with subdued colors like those of the female. This molt occurs for camouflage while the flight feathers are being replaced.

**Egg (avian)** - The female reproductive cell (ovum) surrounded by a protective calcium shell; if fertilized by the male reproductive cell (sperm) and properly incubated, it can develop into a new individual.

**Egg tooth** - The temporary horny cap on the chick's upper beak that serves for pipping (breaking through) the shell; also called the chicken tooth.

**Embryo** - A fertilized egg at any stage of development prior to hatching. In its later stages, it clearly resembles the fully developed chick.

**Embryo** - The young bird before it emerges from the egg.

**Embryology** - The study of the formation and development of plant and animal embryos.

**Esophagus** - The tube in which food passes from the mouth to the digestive tract.

**Evaporation** - The conversion of moisture (liquid) into vapor (gas).

**Eviscerated** - To remove, from a dressed bird, the respiratory, digestive, reproductive and urinary systems, the head, the legs at the hock joint, and the oil sac.

**Fat** - An energy-rich nutrient made up of carbon, hydrogen, and oxygen and found in plant and animal tissue.

**Feed conversion** - The ability of birds to convert feed into body growth or eggs. To calculate feed conversion ratios, divide kilograms of feed consumed by kilograms of body weight or eggs.

**Fertile** - Capable of reproducing.

**Fertility** - In reference to eggs, the capability of producing an embryo. Fertility is expressed as a percentage that equals the total number of eggs set minus those that are infertile, divide by the total number set, times 100.

**Fertilized** - In reproduction, an ovum impregnated by a sperm.

**Follicle (ovarian)** - The thin membrane of the ovary, which, in the chick, encloses the developing yolk.

**Full-feathered** - When a bird has a complete set of feathers.

**Further processing** - Dressed or eviscerated poultry intended for cutting into parts, canning, or manufacturing into various food products.

**Gene** - An element in the chromosome of the egg or sperm cell that transmits hereditary characteristics.

**Gizzard** - The muscular organ that contains grit for grinding the food eaten by birds.

**Glycoprotein** - Any of a group of complex proteins containing a carbohydrate combined with simple protein, such as mucin.

**Gonad** - A gland that produces reproductive cells; the ovary or testis.

**Growing ration** - Feed that is formulated to stimulate fast growth in ducklings over two weeks old.

**Hatchability** - The number of fertile eggs that hatch; usually expressed as a percentage.

**Hatching egg** - A fertilized egg with the potential for producing a chick.

**Humidity** - see **relative humidity**.

**Incubate** - To maintain favorable conditions for hatching fertile eggs.

**Incubator** - A container with the proper humidity and temperature for hatching fertile eggs.

**Infundibulum** - The entrance to the oviduct.

**Laying ration** - Feed that is formulated to stimulate high egg production.

**Mature duck or goose** - A duck or goose that does not have flexible cartilage at a posterior end of the breast or keel bone, tender meat, or soft skin of smooth texture.

**Mature turkey** - A turkey that does not have flexible cartilage at the posterior end of the breast or keel bone, tender meat, or soft skin of smooth texture.

**Membrane** - A thin, soft, pliable layer of tissue.

**Molt** - The process of shedding old feathers and re-growing new feathers.

**Mucin** - A glycoprotein found in various human and animal secretions and tissues; in the egg, the constituent of the chalazae.

**Niacin** - A B-complex vitamin. Niacin deficiency causes bowing of the legs.

**Nuptial plumage** - In colored varieties of ducks, the bright breeding plumage of males exhibited during fall, winter, and spring.

**Nutritious** - Referring to food that contains substances necessary to sustain life and growth.

**Ovary** - The female reproductive gland in which eggs (ova) are formed.

**Oviduct** - The tube through which eggs pass after leaving the ovary.

**Ovum** - The female reproductive cell.

**Papilla** - In the rooster, tiny projections in the cloaca through which semen is ejected.

**Peristaltic action** - In the hen, involuntary muscle movement that pushes the egg through the oviduct.

**Pin feathers** - The tips of new feathers coming through or about to come through a bird's skin.

**Pip** - The hole a newly formed duckling makes in its shell when it is ready to come out; also, the act of making a hole.

**Pipping** - A baby chick breaking from its shell.

**Pituitary gland** - A small oval organ attached to the brain that secretes hormones affecting growth.

**Pores** - In the shell of an egg, thousands of minute openings through which gases are exchanged.

**Post-mortem** - The thorough examination of a dead bird, usually to determine the cause of death.

**Processed poultry** - Dressed or eviscerated poultry.

**Production-bred** - Ducks that have been selected for top meat and /or production.

**Protein** - A nitrogenous compound composed of amino acids.

**Protoplasm** - The basic living matter of all cells.

**Purebred** - a specific breed that have not been crossed with other breeds for many generations.

**Relative humidity** - The amount of moisture in the air compared to the amount the air could contain at that temperature; expressed as a percentage.

**Semen** - The fluid that carries sperm, secreted by the male reproductive organs.

**Setting hen** - A broody hen in the process of incubating a nest of eggs.

**Sperm** - The male reproductive cell.

**Stewing hen** - A mature female bird of the species *Gallus Domesticus* that does not have flexible cartilage at a posterior end of the breast or keel bone, tender meat, or soft skin of smooth texture.

**Still-air incubator** - A container for hatching chicks that does not have mechanical ventilation.

**Straight run** - Young poultry that have not been sexed.

**System** - In anatomy, a functioning unit, such as the skeletal, muscular, respiratory, and digestive systems.

**Testes** - The male genital glands (singular: testis or testicle).

**Vacuum** - A space entirely devoid of matter.

**Vitamin** - A fat or water-soluble substance necessary, in very small amounts, for normal growth and body maintenance.

**Vitelline** - Of, pertaining to, or like the yolk of an egg.

**Waterfowl** - Birds that naturally spend most of their lives on and near water.

**Wet-bulb thermometer** - A device that measures moisture or water vapor in the air.

**Yolk sac** - A yellow globular mass of nutrients contained in a transparent membrane (vitelline membrane) in the centre of the egg. The yolk is the chick's food during its development and immediately after it hatches.

**Young duck or goose** - A duck or goose having flexible cartilage at the posterior end of the breast or keel bone, tender meat, and soft skin of smooth texture.

**Young turkey** - A turkey having flexible cartilage at the posterior end of the breast or keel bone, tender meat, and soft skin of smooth texture.











## References

- Code of Practice-For the Care and Handling of Hatching Eggs, Breeders, Chickens, and Turkeys-2016 <https://www.chickenfarmers.ca/code-of-practice/>
- Water: Identifying and Correcting Challenges (The Poultry Site, November 2008). [www.thepoultrysite.com/articles/1216/water-identifying-and-correcting-challenges/](http://www.thepoultrysite.com/articles/1216/water-identifying-and-correcting-challenges/)
- Ontario Ministry of Agriculture, Food and Rural Affairs Transport Guidelines for Small Flock Poultry Owners 2017 [www.omafra.gov.on.ca/english/livestock/poultry/facts/17-009.htm#equipment](http://www.omafra.gov.on.ca/english/livestock/poultry/facts/17-009.htm#equipment)
- Manitoba Agriculture - Basic Feeding Programs for Small Chicken Flocks [www.gov.mb.ca/agriculture/livestock/production/poultry/basic-feeding-programs-for-small-chicken-flocks.html](http://www.gov.mb.ca/agriculture/livestock/production/poultry/basic-feeding-programs-for-small-chicken-flocks.html)
- Agriculture Canada. Managing a Small Duck Flock. 1986. Canadian Agriculture Library-Information Services, Canada Department of Agriculture, Ottawa. <https://archive.org/details/managingsmallduc00cana/page/n1>. Accessed June 18, 2018.
- Holderread, D. Raising the Home Duck Flock. Vermont, Storey Publishing, 1980.
- Michigan State University Extension. 4-H Poultry Fitting & Showmanship Members Guide. Michigan State University, 2017.
- Nova Scotia Department of Agriculture. Nova Scotia Premises Identification (PID) Program. Industry Protection, 2013. [www.novascotia.ca/agri/programs-and-services/industry-protection/#pid](http://www.novascotia.ca/agri/programs-and-services/industry-protection/#pid). Accessed July 23, 2018.
- Perennia. Biosecurity for Small Scale Livestock Production. 2016. PDF. [www.perennia.ca/wp-content/uploads/2018/04/biosecurity-for-small-scale-livestock-production.pdf](http://www.perennia.ca/wp-content/uploads/2018/04/biosecurity-for-small-scale-livestock-production.pdf). Accessed July 5, 2018.
- Sooksom, R. Meat Inspection Resource Kit for Nova Scotia Farmers. Thinkfarm. July 2010. [www.novascotia.ca/thinkfarm/documents/fsheets/32-meat-inspection.pdf](http://www.novascotia.ca/thinkfarm/documents/fsheets/32-meat-inspection.pdf). Accessed August 21, 2018.
- Scott, M. Nutrition and Management of Ducks. New York, Ithaca, 1991.

- The American Poultry Association. American Standard of Perfection 2010. 44th ed., Barclay Press, 2010.
- 4-H Nova Scotia. Poultry Project. 2004. 4-H Nova Scotia Leader Resource Guide.
- 4-H Nova Scotia Waterfowl. 2000 Leader Resource Manual.
- Nova Scotia Meat inspections regulations subsection 32(1) of the Nova Scotia Meat Inspection Act and Regulation S.N.S. 1996, c. 6 O.I.C. 90-180, N.S. Reg. 46/90 (February 13, 1990) [www.novascotia.ca/just/regulations/regs/mimeat.htm](http://www.novascotia.ca/just/regulations/regs/mimeat.htm)
- Nova Scotia Egg Producers' Egg Regulations made under subsection 9(1) and clause 11(d) of the Natural Products Act R.S.N.S. 1989, c. 308 O.I.C. 85-1259 (November 19, 1985), N.S. Reg. 211/85 as amended up to N.S. Reg. 331/2013 (November 20, 2013) [www.novascotia.ca/just/regulations/regs/npeggreg.htm](http://www.novascotia.ca/just/regulations/regs/npeggreg.htm)
- Nova Scotia Meat Inspection Act and Regulation and Nova Scotia Egg Producers Egg Regulations
- Record Keeping Templates [www.poultryshowcentral.com/Record\\_Keeping.html](http://www.poultryshowcentral.com/Record_Keeping.html) and <https://www.bing.com/search?q=breed+poultry+template+record+keeping&src=IE-SearchBox&FORM=IESR4A> and [www.extension.unh.edu/resources/files/Resource002962\\_Rep4331.pdf](http://www.extension.unh.edu/resources/files/Resource002962_Rep4331.pdf)
- Business Form Template.com [www.businessformtemplate.com/click2.php](http://www.businessformtemplate.com/click2.php)
- British Columbia 4-H Poultry Project Leader Guide Minister of Agriculture publication 1105 version Jan 2019
- Storey's Guide to Raising Chickens. Storey Publishing, North Adams, MA.

## Appendix A: Proper Handling Procedure for Examination

Step		What to Do
<b>Removing poultry from coop</b>		Take the bird from the coop by grasping its left wing with your hand and turning the bird's head toward the door. Place your left hand beneath its body with your index finger between its legs and your remaining three fingers grasp one leg while your thumb grasps the other. Place your right hand on its back and remove the bird head first.
<b>Carrying poultry bird</b>		Use the same left-hand hold as above and place the bird's head under your elbow with your right hand placed on its back. Do not hang the bird from its feet.
<b>Examining the head</b>		Holding the bird in your left hand, show both sides of the bird at shoulder height. Use your right thumb on beak to turn its head. Turn your left hand slightly when showing the right side of the bird's head.
<b>Examining the wings</b>		Spread wings to show feather pattern and condition. Showing bird's right wing requires crossing right hand over bird your thumb up.
<b>Width of body</b>		Show width by using the span of your right hand over its back.
<b>Breastbone</b>		Show its breastbone by using your left hand to turn the back of the bird against your body. With your right hand, grasp the legs and pull to your right while sliding your left hand to its breast and expose the breast with your left-hand fingers.
<b>Examining feet and legs</b>		Show feet and legs by placing the bird against your body with its head up using your left hand. With your right hand, show its feet and spread its toes.
<b>Returning bird to coop</b>		Always return the bird to the coop head first.

Referenced source: 4-H Nova Scotia Poultry Leader Resource Manual 2004

## Appendix B: Biosecurity



### Biosecurity for Small Scale Livestock Production

Biosecurity is the protection of people, animals, and the environment from infectious disease, pests, and other biological threats. It refers to the proactive measures taken to exclude threats from farms that are disease free, and preventing spread of pathogens to other herds or flocks if/when a disease does occur. The ultimate goal of a good biosecurity plan is to implement easily attainable protocols that reduce problems to inexpensive and manageable occasions. The following are the key components of any biosecurity plan.

1. **Fences:** Good fences keep livestock in and wildlife out. Inspect boundary fences regularly and repair as needed. Stray stock may spread disease and feral animals introduce new pathogens to your farm.
  
2. **Housing, Equipment, and Yard Maintenance:**
  - Pens should be completely emptied, cleaned, and disinfected at least annually.
  - All equipment that comes into direct contact with livestock or poultry should be cleaned and disinfected periodically, including feeders and waterers.
  - If sharing equipment with other farms, be sure to disinfect the equipment before using on your farm. Use your best judgement and weigh the risks carefully.
  - Prevent pests and rodents by:
    - Keeping area around pens free of debris
    - Cutting the grass short around pens and enclosures
    - Keeping feed in tightly closed containers and cleaning up spilled feed
    - Using traps and bait as necessary
  - Standing water should be drained.

*For organic production, a robust biosecurity program can prevent the need for antibiotics and parasiticides, and can reduce the potential of GMO contamination or loss of certification.*

### 3. **Introducing New Stock:**

- Don't bring new stock to your property if they appear unhealthy.
- Avoid purchasing stock from markets and auctions.
- Obtain a health certificate if possible.
- Birds, eggs, and livestock should be sourced from farms with a solid herd or flock health program.

### 4. **Quarantine:**

- Have a quarantine area available for animals new to the farm and for sick or injured animals.
- This should be a separate area or building to prevent bird-to-bird or animal-to-animal contact.
- Three weeks will allow time for a proper assessment of health, condition, and recuperation from transport or illness.
- Observe animals or birds for any abnormal behaviour and signs/symptoms of disease. Presence of unusual behaviour or symptoms calls for veterinary inspection or tests.

### 5. **Water and Feed:**

- Water should be tested at source to ensure its suitability for livestock production at least annually.
- Design and position water bowls, troughs, and waterers to prevent fecal contamination.
- Feed or ingredients should be purchased from sources that verify its safe origin.
- Keep feed pest-free and dry, cover feed bins and feed systems to reduce the chance of contamination.

### 6. **Work Flow:**

- Farm owners and workers should have separate clothing and footwear for working around various animal species. These should be kept at the barn entrance.
- Use hand sanitizer or wash hands with soap and warm water before entering and after leaving livestock areas.
- Work with the youngest and most susceptible animals first.

#### 7. **Manure:**

- Manure should be removed from the production area regularly.
- Farms, even hobby farms and small stables, should have a manure management plan that includes collection, storage, moving, and disposing of manure to minimize chance of spreading disease.
- Tools and equipment used for manure handling should not be used for feed or bedding.

#### 8. **Herd or Flock Health:**

- Contact your herd health veterinarian when livestock appear sick, mortalities are high, or production drops off without apparent reason. Low numbers of mortality should be examined by a vet if the cause of death is unknown.
- Mortality should be disposed of in a timely manner to prevent contamination of the farm environment, reduce risk of spreading disease to other livestock and humans, and prevent attraction of pests.
- When animals are stressed from parasites, weather extremes, etc., natural treatments may be less effective. Monitor carefully and resort to other options as necessary. As well, remember that sick animals benefit from remedial care.
- Vaccinate as required (keeping the necessary records).
- Pay attention to parasites. Fecal egg counts are useful in determining if treatment is necessary.
- Keep records of treatments and veterinary care.

#### 9. **Visitors/WWOOFers/Contractors:**

- Discourage unannounced visitors.
- All visitors must follow biosecurity protocol.
- Designate a parking area for visitors.
- Visitors should be accompanied by farm staff.
- A visitor log is recommended.
- Post “Biosecurity” and “No Entry without Permission” signs on entrance doors.
- Keep extra footwear and outerwear (coveralls, smocks, etc.) for visitors.

Biosecurity is not limited to large-scale farms. Regardless of size or production philosophy, all farms, even hobby farms, have a responsibility to prevent an outbreak or spread of animal (or plant) disease or pests. Stay on top of industry association news. Be aware of local conditions or issues as they arise. **If there is a serious disease outbreak don't be the last to know!**

**There are national biosecurity standards for most livestock commodities.**

**These guidelines are a good place to start when developing a biosecurity plan for your farm.**

**<http://www.inspection.gc.ca/animals/terrestrial-animals/biosecurity/eng/1299868055616/1320534707863>**

**For more information, contact:  
Heather McLean,  
Non-Ruminant Livestock Specialist,  
Perennia**

**(902) 678-7722**

**[www.perennia.ca](http://www.perennia.ca)**

## Appendix C: Record Keeping Sample Egg Production Record

DATE	EGG COUNT			NOTES
	Total	Broken	Remaining	
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				





<b>Breeding Record</b>						
Male	Female	Date Bred	Date Clutch Hatched	No. Hatched	No. Dead in Shell/Infertile	Comments

<b>Show Record</b>						
Name of Show	Location	Date Entered	Identification Number	Classes Entered	Number in Class	Comments

<b>Health Record</b>						
Clutch /Bird ID#	Age	Illness/Symptoms	Treatment	Date Treated	Cost of Treatment	Recovered from illness/successful treatment

<b>Feed Monthly Record</b>						
<b>Date Purchased</b>	<b>Clutch ID</b>	<b>Name of Feed</b>	<b>Amount of purchase (kilograms)</b>	<b>Type of Feed (grain, grit or supplement)</b>		<b>Value</b>
		<b>Total Amount</b>			<b>Total Cost for month</b>	

## Appendix D: Activities for a 4-H Meeting

Each section in this manual can serve as a guide to help you plan topics for your 4-H livestock meetings in poultry or waterfowl as a 4-H leader. If this manual is used to deliver 4-H meetings to youth, it encourages leaders to tailor meetings to the group's age, interests, and abilities. The table below outlines a typical 4-H meeting and gives suggestions agenda format and duration of meeting time. The best types of meeting are when participants are engaged and allows for hands on learning.

<b>Welcome, call to order, and pledge</b>		10 min
<b>Roll call</b>		5 min
<b>Parliamentary procedure</b>	Minutes and business	10 min
<b>Topic information discussion</b>	Use the manual as a guide to present information on the meeting's topic.	20 min
<b>Activity</b>	Time to apply the newly learned information. See the list of suggested activities below.	30 min
<b>Handle the animals</b>	If possible, members may use this time to practice handling their animals.	20 min
<b>Wrap up and adjournment</b>		10 min

The following has different topic suggestions, information to discuss, as well as some possible activities for each section of the manual. Ideally, one or two topics should be selected to discuss during each meeting. Try to select topics from different sections for each meeting so members are exposed to a wide variety of knowledge. As a leader, feel free to be creative and use a variety of activities to help your members learn. There are many worksheets available on various websites for members to fill out. You can also invite experts and guest speakers to come in to talk to your members or arrange day trips to visit new locations.

## Section 1: Selecting an Animal – Suggested 4-H Activities

Topic	Information	Activity
<b>Parts of your poultry bird</b>	Show members a labelled diagram of a bird. For younger or newer members, begin with basic parts of the body. For older or more experienced members, you can discuss more advanced topics such as skeletal or muscular structure.	Have members label the parts of the animal. This can be done by using a worksheet or by having members take turns placing labels on an actual animal.
<b>Poultry breeds</b>	Teach your members about different breeds. Possible information to include is distinct breed characteristics, differences among the breeds, or the history of a breed.	Some suggested activities: <ul style="list-style-type: none"> <li>• Have members match a picture of poultry bird to its breed.</li> <li>• Have members research and present the ideal characteristics of their chosen breed.</li> </ul>
<b>Choosing your poultry bird</b>	Discuss standards of perfection a member might want to look for in their poultry breed. Make sure to include information on correct conformation and conformation faults.	Have members practise judging. The members should place a live or paper photo class of poultry and give reasons for their placings using the correct judging format.
<b>Purchasing your poultry stock</b>	Outline your members' options for where they might purchase stock. Discuss the pros and cons of purchasing from a private sale, a large breeding operation, an auction, or breeding their own.	Organize a trip for the members to visit a breeding operation or poultry show.

## Section 2: Care and Management– Suggested 4-H Activities

Topic	Information	Activity
<b>Housing</b>	Discuss with your members the different options for housing their birds. Make sure to include information on the National Farm Animal Care Council Code of Practice.	Have members design their own farm using whatever materials they like such as modelling clay, popsicle sticks, paper etc.... Have members present their farms and discuss their farms with the group.
<b>Handling</b>	Inform members about and demonstrate how to properly handle their animal. This activity meeting can include information on animal behaviour, proper handling techniques, and safety tips.	Have members practise handling their bird while you observe.
<b>Grooming</b>	Teach members how to properly groom their birds. You can discuss basic grooming techniques as well as grooming an animal for show.	They could bathe their bird for show.
<b>Identification</b>	Discuss the importance of premise identification.	Have members go through the process of registering their birds for PID

## Section 3: Digestion and Nutrition

Topic	Information	Activity
<b>Digestive system</b>	Teach your members about their animal's digestive system from an online video on the subject.	Have members label an image of a bird's digestive system and include brief descriptions on the functions of each part.
<b>Essential nutrients</b>	Inform your members about what the essential nutrients are and why they are important to their animal's diet.	Have members complete a worksheet where they match essential nutrients to their function.
<b>Classes of feed</b>	Discuss the different types of feed that are available for the members to feed their animals. Describe each feed and its pros/cons.	Have an animal nutritionist, feed salesperson, veterinarian etc., come in and give a talk on animal nutrition.
<b>Feeding programs</b>	Teach your members about their animal's nutritional requirements for their different developmental and life stages.	Instruct members to design a feed program for the different stages of their bird's life. Compare and contrast how a chick is fed compared to the diet of a mature bird. Have your group go through the process of doing a water sampling for review.

## Section 4: Health – Suggested 4-H Activities

Topic	Information	Activity
<b>Recognizing a healthy animal</b>	Teach members how to recognize a healthy bird and what normal behaviour conditions and signs are.	Invite a local poultry producer to speak to your group. Discuss the interpretations of standards of perfection
<b>Biosecurity</b>	Inform members on the importance of biosecurity.	Have members discuss proper biosecurity practices and ways they can implement them into their own program.
<b>Common diseases</b>	Discuss some common diseases, their cause, prevention, and treatment.	Have a veterinary in, or visit a vet clinic, to talk about common diseases and what members can do about them.
<b>Parasites/vaccinations</b>	Inform your members about the different types of parasites and their effects on their birds.	Have your members design health record chart for their flock and track for a short period of time, or have each member do a one-page report on a specific parasite and share with the group.



## Section 5: Breeding– Suggested 4-H Activities

Topic	Information	Activity
<b>Reproductive cycle</b>	Teach members about the poultry bird's reproductive cycle.	Have members label diagrams of the bird's reproductive system.
<b>Signs of brooding and incubation</b>	Inform your members about the signs a bird may show when they are ready to brood. Natural vs. artificial hatching may also be discussed.	Examine and label the part of an incubator or assemble a nesting box.
<b>Embryo development</b>	Discuss the stages of embryo development and issues seen in hatching.	Have members fill out a timeline on the stages of embryo development and description of each stage.
<b>Hatching care</b>	Teach your members about what to do following the hatching of a bird. Care for the new chicks also should be discussed.	Set up a brooder or participate in a school hatch program.

## Section 6: Business and Production

Topic	Information	Activity
<b>Marketing</b>	Discuss with members the importance of marketing and some marketing ideas/tips.	Have members research potential markets for products from their animals. Alternatively, you could organize a trip to a poultry farm or farmers market etc.
<b>Record keeping</b>	Talk to members about why records are kept, how to keep them, and what members should keep track of.	Have members fill out a record booklet throughout the year. You may use the record templates provided in this manual or use your own so long as it captures required records for achievement day completion. See poultry and waterfowl 4-H newsletters and records sheets for current year at <a href="http://www.novascotia4h.ca/project-newsletters/">www.novascotia4h.ca/project-newsletters/</a>