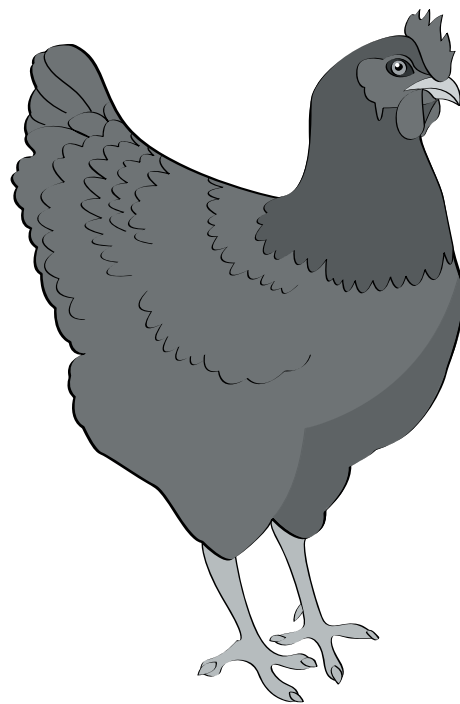


B.C. 4-H Poultry Manual



Ministry of
Agriculture



Publication #1110
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The 4-H Motto
“Learn to Do by Doing”



The 4-H Pledge
I pledge
My Head to clearer thinking
My Heart to greater loyalty,
My Hands to larger service,
My Health to better living,
For my club, my community, and my country.

The 4-H Grace
(Tune of Auld Lang Syne)
We thank thee, Lord, for blessings great
on this, our own fair land.
Teach us to serve thee joyfully,
with head, heart, health and hand.

Acknowledgments

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Agriculture et
Agroalimentaire Canada

Agriculture and
Agri-Food Canada

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Introduction

How To Use This Manual

This manual is for new 4-H poultry members to learn about how to care for and raise their projects. Poultry refers to all the birds we raise for meat, eggs or show. B.C. 4-H Poultry project options are chickens, turkeys, ducks, and geese. Members who are interested in other types of birds need to communicate with their leader on the possibility of the “contract system” unit. This manual focuses on chickens, with most of the information being similar for all poultry.

The table of contents will guide you to the different sections in the manual. All sections will be beneficial to a poultry member; however, there are some sections with more detail that will correspond with certain units. Ask your leader which section would be most relevant to your project. For a complete list of units consult the project specific poultry regulations, B.C. 4-H Publication #1101.

If you find that there are **bold** words that you are unfamiliar with there is a glossary located at the back of this manual. There may be some words that you do not know that are not in the back of this manual – a good dictionary should help you out in this case!

This manual provides good basic information. You will find that there are some situations and skills that are not covered. You will have to find out more about poultry from other sources – such as the B.C. Chicken Marketing Board, B.C. Egg Producers (Marketing Board), B.C. Turkey Marketing Board, books, the internet, members of the community, senior 4-H members, and your 4-H Leader.





The 4-H Poultry Project

Learning about poultry can be fun and rewarding. This is not just a project about taking care of an animal. You will be in control of this project and you will be making all of the important decisions. The success of your project depends on you.

The 4-H poultry project is organized to provide experience for young people in the selection, feeding, husbandry, and exhibiting of poultry. Handling a live animal, watching it grow for several months and exhibiting the animal has value far beyond the monetary gain which is possible from the project. This fact should be kept in mind by the 4-H Club Member at all times.

The type of poultry project you select is up to you. Although this manual is mainly about **chickens**, you may also raise **ducks, geese** or **turkeys**. 4-H poultry projects range in length from 3 to 12 months depending on the objectives of the unit. If you are thinking about raising a bird that is not a chicken, turkey, duck or goose, discuss this with your 4-H Club Leader, as the unit you would be interested in is called the “contract system”. Review the B.C. 4-H Poultry Project Specific Regulations (publication #1101) and discuss unit options with your 4-H Club Leader when selecting units at enrolment time.

New or inexperienced members are encouraged to begin the 4-H Poultry project with one of the following units:

- **Unit 1:** Exploring the Poultry Project
- **Unit 2:** Beginning Poultry Breeder

As members develop they are encouraged to challenge themselves by trying one of the more advanced units such as:

- Breeder Replacement Stock
- Poultry Raising – Layer
- Poultry Raising – Meat
- Hatchery
- Senior Management projects for experienced senior members

The animal must be the property of you the member, or your parent or if by other arrangement, using the 4-H Livestock Lease, B.C. 4-H Publication #140(E). As outlined in the project specific regulations, a **trio** consists of one male and two females of the same age and breed. The exception to this is an **urban trio**, which is for members who live in urban areas where municipal or city by-laws prohibit them from raising a rooster or cockerel. An urban trio consists of three females of the same age and breed.

Remember your club leader is a good source of advice when considering a project. Other members of the community are usually quick to help a 4-H member with questions they may have. These are great sources of information when you are trying to select your project animal. Perhaps in the years to come, other new members will be coming to you for help with choosing their animal.



Record Keeping

Record keeping is a very important part of the training in 4-H club work. Records should be kept accurately, neatly, and continuously. Record keeping disciplines a person and provides valuable information for anyone to take pride in his or her efforts. Record keeping is becoming increasingly important to the farm operator today and a thorough understanding of the basic fundamentals will be a tremendous asset in the future.

Record books are available from the B.C. 4-H Publications Order Form (publication #154A). Ask your leader about obtaining a copy each year for each project. If properly completed, your record book will tell the complete story of your project, from the time it was born or purchased until the end of the project. A completed record book is necessary for 4-H Achievement.



Animal Care

4-H members are responsible for providing the highest quality of care for their 4-H livestock project(s). This can be achieved by ensuring that the “Five Freedoms” of farm animal care are being provided.

Five Freedoms

- 1. Freedom from Hunger and Thirst - provide access to fresh water and adequate feed.*
- 2. Freedom from Discomfort - provide appropriate shelter from the elements and a comfortable resting area.*
- 3. Freedom from Pain, Injury or Disease - take steps to prevent accidents and disease, monitor health, and provide rapid treatment when disease or injury is detected.*
- 4. Freedom to Express Normal Behaviour - provide sufficient space and company of the animal's own kind.*
- 5. Freedom from Fear and Distress - ensure conditions and treatment which do not alarm the animal.*



History and Project Selection

History

People started raising poultry a long time ago. The first chickens were thin, tough birds called the Jungle Fowl. They lived in Asia more than 5,000 years ago, and may still be found today. Turkeys have been used for food in North and South America since people have been here. Ducks were first raised for food in China thousands of years ago. Geese come from Europe and North America.

Today, there are many different **breeds** of poultry with each of them 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. Traditionally, the breeds of chickens raised for meat included Barred Rock, White Rock and Cornish. Certain lines or strains widely known for their commercial production have been established and contributed to the rapid development of Canada's present poultry industry. Today, most meat birds are commercial crosses of breeds such as White Rock and Cornish. Often, these commercial crosses are called **broiler** chickens.

Breed Characteristics of Chickens

One of the first things that a member has to do when they decide to do a 4-H poultry project is to select an animal to work with. Deciding the breed characteristics and the breed to be used is the first step. Breed characteristics include body size, feather colour, and **conformation** specific to a breed.

The Egg Producing Flock

These birds have smaller bodies than broiler chicks, and they do not eat as much feed. They also lay more eggs. Common breeds are: production-type Rhode Island Red, White Leghorn, Hybrids and Sex-Link.

The Broiler (Meat Producing Flock)

Crossbred chicks are used for broiler production. These chicks grow fast and produce broilers in 6 to 7 weeks. One pound (0.5 kg) of meat is produced on less than 2 lbs (1 kg) of feed. The principles of brooding broilers are the same as for other chickens. Common breeds are: Red Sussex, Cornish Game and Hybrids.

Dual Purpose (Meat and Eggs)

These birds typically lay brown-shell eggs and are used to produce both meat and eggs. They are gentle and easy to manage. Common breeds are: Rhode Island Red, New Hampshire, Sex-Link and White Plymouth Rock

You should learn about the various types of poultry in your area so you can decide which one best suits your needs. To help you to decide you should also look at the regulations (B.C. 4-H Publication #1101) and choose an animal based on the project you wish to do. There are more breeds than those listed here. You may want to do some additional research to find a breed that works for you and is available in your area.



Common Breeds of Chickens in British Columbia

RHODE ISLAND RED

Varieties:

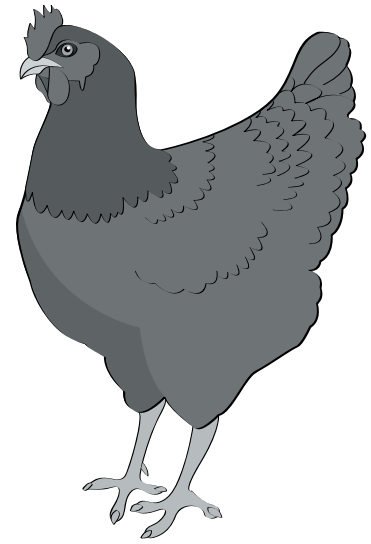
- Single Comb
- Rose Comb

Use: A dual purpose medium heavy fowl; used more for egg production than meat production because of its dark coloured **pin feathers** and its rate of laying eggs.

Characteristics: Rapid-feathering and quick-growing makes it a good general purpose breed used for both eggs and meat. Plumage colour is a rich brownish red, with yellow skin and **shank** colour. Rectangular-shaped body provides a good capacity for laying brown-shell eggs. Also good for meat purposes.

Standard Weights: Males 3.4-3.8 kg; Females 2.5-3.0 kg.

Breed Disqualifications: Entirely white feather(s) showing in outer plumage; shanks and feet other than yellow or reddish horn.



LEGHORN

(Pictured is Dark Brown)

Varieties:

- Single Comb Dark/Light Brown
- Rose Comb Dark/Light Brown
- Single Comb White, Buff, Black, Silver, Red, Black Tailed Red, or Columbian
- Rose Comb White or Buff

Use: Used extensively by commercial egg laying businesses around the world because of their egg laying abilities.

Characteristics: Small size, great activity, hardiness and abundant egg production. Due to body type, they are not very desirable as a meat-producing chicken. They are good foragers and are capable of flying, often roosting in trees if given the opportunity. All varieties have yellow skin and shanks and lay white-shell eggs.

Standard Weights: Mature males 2.2-2.7 kg; Females 1.8-2.0 kg.

Breed Disqualifications: Red covering more than one-third of the surface of earlobes in cockerels and pullets, more than one-half in cocks and hens.





PLYMOUTH ROCK

(White Plymouth Rock)

Varieties:

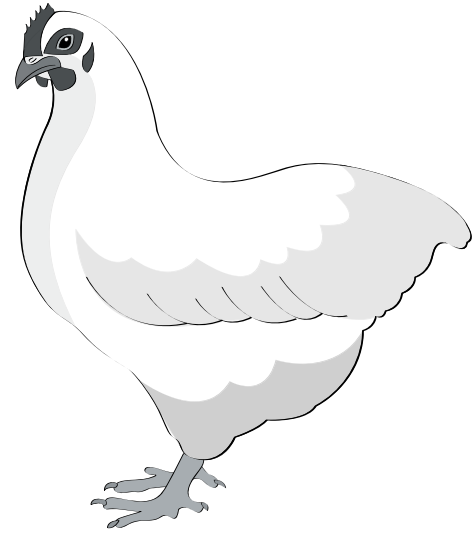
- Barred
- White
- Buff
- Partridge
- Silver Penciled
- Blue
- Columbian

Use: Dual purpose for production of meat and eggs.

Characteristics: Attributes of the Rock in frame size, colour, feathering and egg production have helped make this cross the universal meat chicken of today. The body is long, deep and full, making it a popular dual purpose bird. Skin and shanks are yellow. The egg shell is brown.

Standard Weights: Males 3.6-4.3 kg; Females 2.7-3.4 kg.

Breed Disqualifications: Barred Plymouth Rocks - Red or yellow in any part of plumage; two or more solid black **primaries**, or two or more solid black **secondaries**, or two or more solid black main-tail feathers; shanks other than yellow.



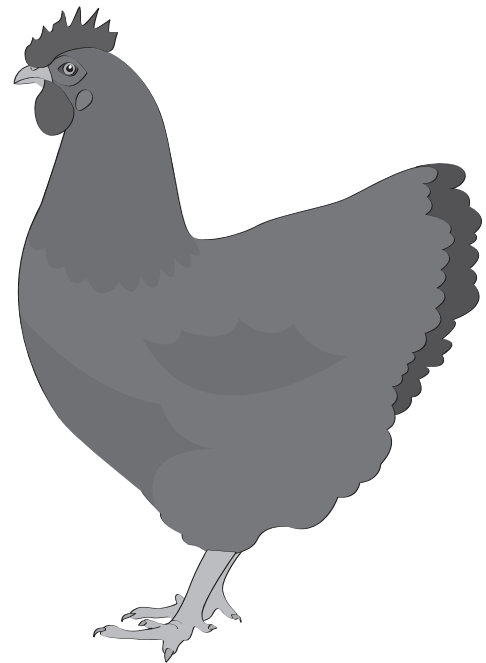
NEW HAMPSHIRE

Use: A dual purpose chicken, selected more for meat production than egg production. Medium heavy in weight, it dresses a plump **carcass** as either a broiler or a **roaster**.

Characteristics: The breed's rapid feathering and early maturity characteristics helped develop the broiler chicken industry. Lately, the breed has almost disappeared from commercial use. The skin and shank colour is yellow and eggs are brown. In the male, body plumage is a medium chestnut red, with head and neck as reddish grey. The female is a medium chestnut red throughout.

Standard Weights: Males 3.4-3.8 kg; Females 2.5-3.0 kg.

Breed Disqualifications: One or more entirely white feathers showing in outer plumage.





SUSSEX

Varieties:

- Speckled
- Red

Use: A general purpose breed for producing meat and/or eggs. One of the best of the dual purpose chickens, a good all-around farm fowl.

Characteristics: Sussex are alert, attractive and good foragers. The Sussex body is long, broad and deep. The speckled **variety** is especially attractive with its multi-coloured plumage. Sussex are broody and make good mothers. The skin is white and the eggs are brown.

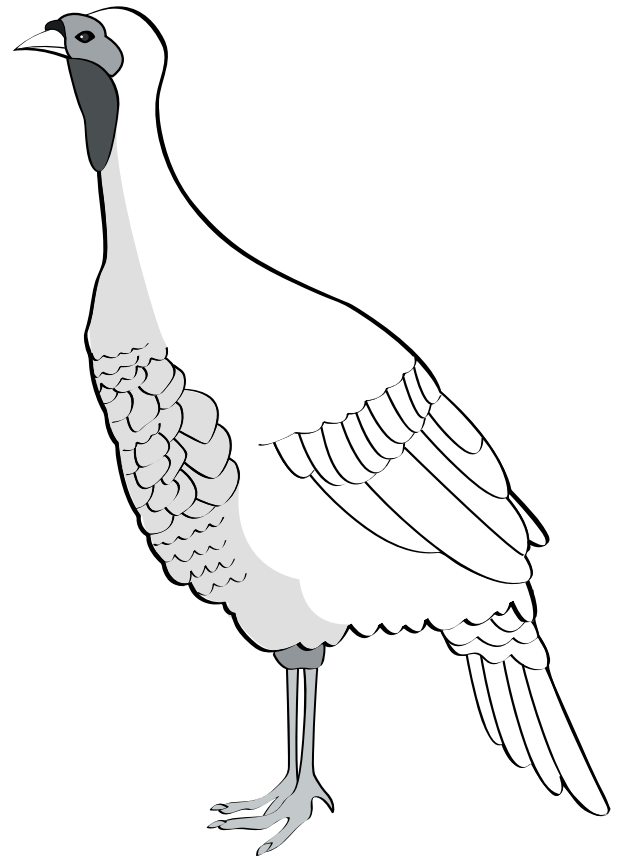
Standard Weights: Male 3.4-4.0 kg; Female 2.7-3.2 kg.



Common Breeds of Turkeys in British Columbia

The turkey breeds that have a breed standard are the Beltsville Small White, Narragansett, Slate, White Holland, Bourbon Red and Bronze. The non-standard, commercially produced breeds are the Broad Breasted Bronze and Broad Breasted White. Other specialty lines have been established by breeders for broiler and heavy turkey commercial production.

The Beltsville Small White is a combination of many breeds and is a white, small, wide breasted turkey. The Narragansett breed has a distinguished colour pattern and is dual purpose for meat and eggs. The Slate, or Slate Blue breed can be easily recognized due to its colour. The White Holland birds have blue eyes and are large white birds used typically in the commercial market. Commercially, they are referred to Broad Breasted White, although this variety does not have the blue eyes that the White Holland does. The Bourbon Red was established in the United States and bred for its darker red colour. While present-day weights are usually higher, the standard weights for the Bronze breed are 36 lbs. (16 kg) for **toms** and 20 lbs. (9 kg) for hens. They are a brown-black bird with distinguishing white colour patterns. Both commercially produced varieties, the Broad Breasted Bronze and the Broad Breasted White, were bred for increased meat production and as such are unable to mate naturally; therefore artificial insemination is commonplace at commercial operations.



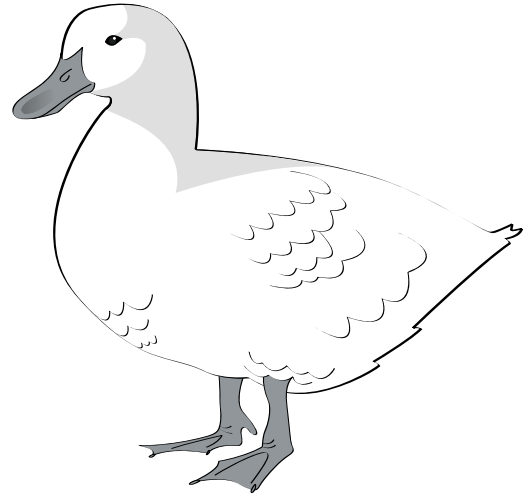


Common Breeds of Waterfowl in British Columbia

DUCKS

While there are numerous breeds of ducks, only about five are popular for commercial use. Meat production breeds are White Pekin, Rouen, Muscovy, Aylesburg and Pekin; Egg production breeds are Khaki Campbell and Indian Runner. Well managed flocks of Indian Runner and Khaki Campbell ducks outperform most poultry breeds for egg production.

The skin of all domesticated races of ducks is yellow, with the exception of the Aylesbury and Muscovy, which have pinkish white skin. Runner ducks are easily notable with a quick step movement and upright shape. The colour of duck eggs is dependent on its breed. Indian Runners produce white eggs, although tinted eggs are common in some strains. The Cayuga and the Black East India lay a very characteristic egg. When production begins the eggs are practically black, but as production progresses the black pigment fades and the eggs are blue. The Rouen egg is a bluish-green shelled, although white-shelled eggs are not uncommon.



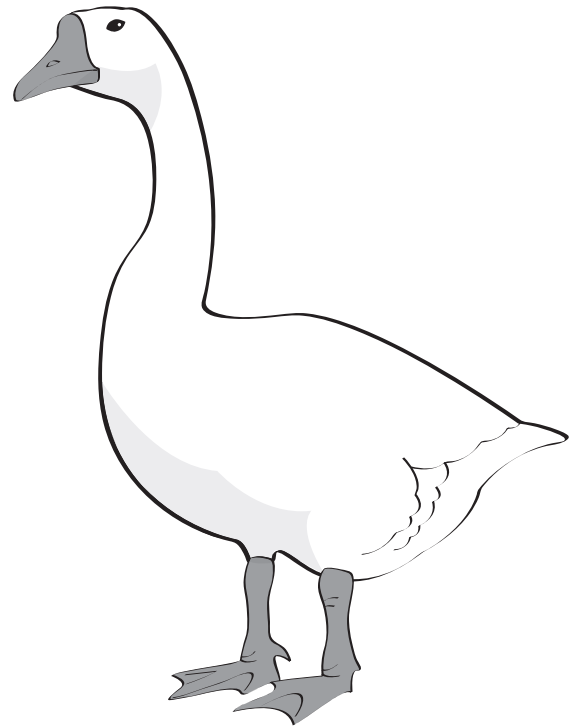
GEESE

The domestic breeds of geese in Canada are classified into weight categories:

- Heavy breeds - Toulouse, Embden and African
- Medium weight - Pilgrim
- Light weight - Chinese.

These most common breeds can be used for meat production. The most desired characteristics in a goose are medium sized carcass, good livability, rapid growth and a heavy coat of white or near white feathers.

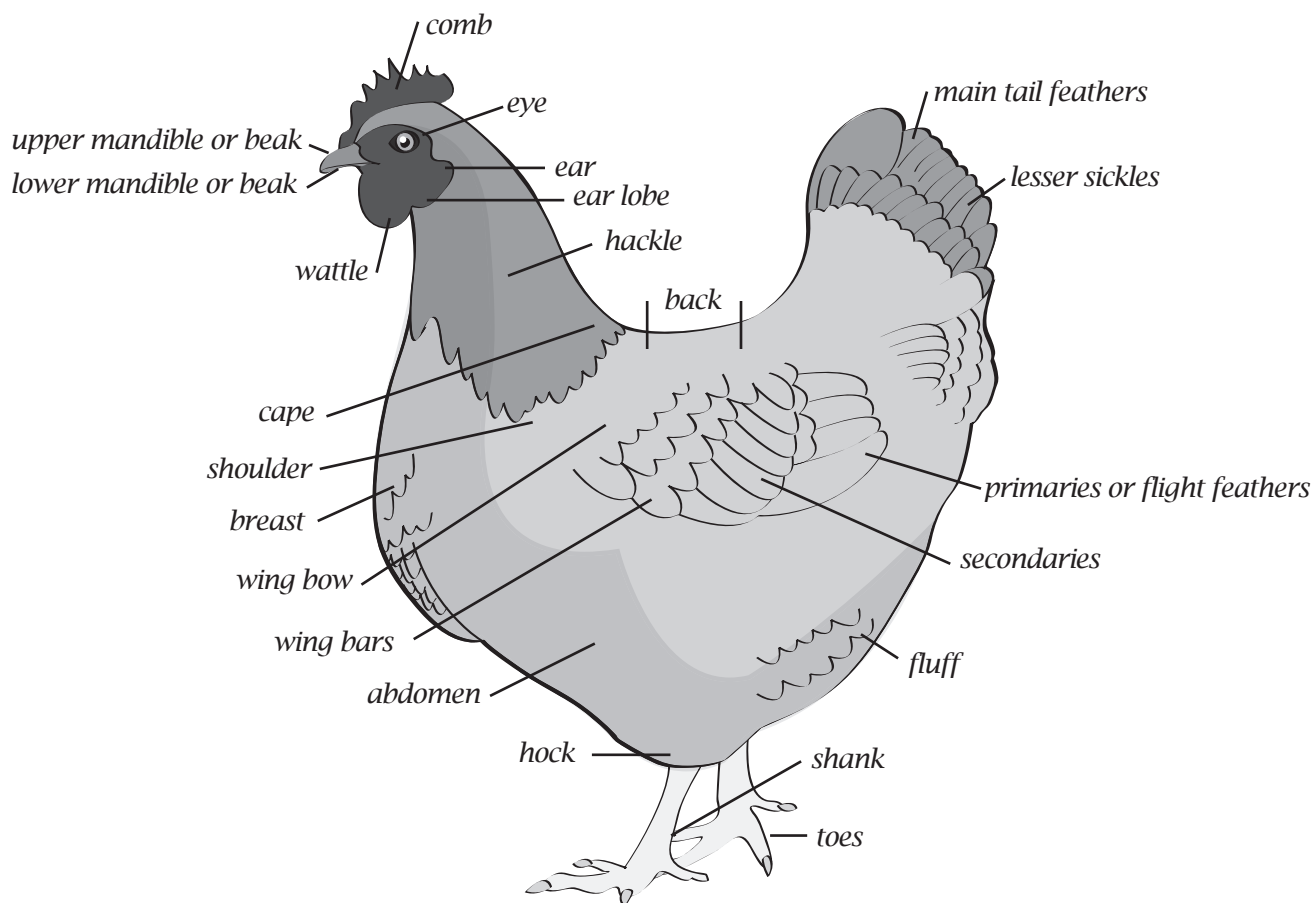
Waterfowl are not only popular for exhibition purposes, but useful and profitable for the production of meat and eggs. Waterfowl raised for commercial egg production is very limited both in British Columbia and elsewhere in Canada as duck eggs are not very popular with consumers. The many variations in size, type and colour patterns give breeders of ducks a wide range to choose from.





Project Selection

Conformation is the key to selecting project animals and how they will perform. Before knowing what to look for, it is important to know your poultry parts.



When selecting your 4-H project animal there are some characteristics that will be desirable in all breeds:

- Breed type - shape of bird's body as to the ideal breed type.
- Variety characteristics - colour of shanks, plumage, and ear lobes and kind of **comb**.
- Condition and vigour of bird and free from disease and/or injury.
- Freedom from breed and general disqualifications.

This is a guide for evaluating physical appearance; additional factors to consider are:

- The type of poultry most suitable for the unit(s) you plan to enroll in.
- The temperament of the bird.
- The breeding qualities, in case you decide to keep it for future breeding projects.



Poultry Selection

A male chicken less than 1 year old is a cockerel, and over 1 year of age it becomes a cock. Female chickens less than 1 year old are pullets, and over 1 year of age they become hens.

SELECTING COCKERELS (MALE CHICKENS LESS THAN 1 YEAR OF AGE)

Alert, strong head and eye; well defined red comb and **wattles**; yellow **beak** skin and legs for all yellow pigmented breeds; broad, lengthy and deep body; stand straight and firm on feet; legs medium in length as characteristic of the particular breed.

SELECTING PULLETS (FEMALE CHICKENS UNDER 1 YEAR OF AGE)

Alert head and eye; head comb and wattles bright red; beak, skin and legs yellow for all yellow pigmented breeds; full, deep and wide body and abdomen; medium short legs, stand well and firm on feet; plumage rich in luster and slick for pullets not yet in production, worn if already laying.

SELECTING HENS (FEMALE CHICKENS OVER 1 YEAR OF AGE)

Alert head and eye; red, velvety coloured comb and wattles, beak, skin and legs bleached white for high production; no yellow pigment should show when hens have been in heavy production; large and soft **abdomen**; body deep, lengthy and wide; feathering worn and tattered for heavy production, but no off-coloured feathers such as black feathers in red varieties or red feathers in Barred Rock varieties.

SELECTING BROILERS (MEAT PRODUCTION)

Select chickens with a compact, well rounded, fairly deep and thickly fleshed body. The **keel** bone should be straight, fairly long and heavily fleshed. The wings and legs should be well-rounded and short. **Finish** 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. The chickens should be well feathered and free from pin feathers.

SELECTING CAPONS

A capon is a castrated male chicken that has had its reproductive organs removed at a young age. **Capons** and unsexed males are readily distinguished by the undeveloped comb and wattles, the profusion of long, narrow **hackle** and **saddle** feathers and low tail.

Capons should be selected on their meat producing ability. They develop larger frames than cockerels during their growing season from six to eight months. Capons for exhibit should not have a comb, and the wattles should be extremely small. Only a very small, dull colour comb and wattles are present in true capons. If the caponized chickens show signs of developing combs and wattles, they are known as “slips” and should not be exhibited in a capon class. Weight and large body type are the most important points in judging this class of meat producing chickens.

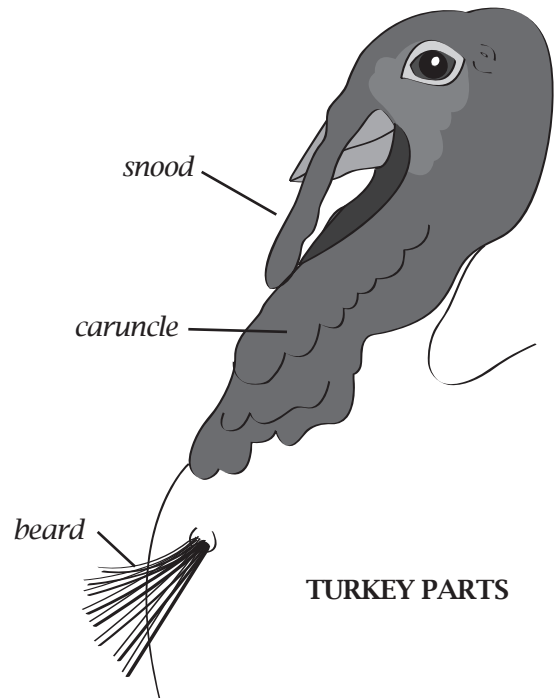
For more information on what to look for in desirable conformation and undesirable characteristics, consult Publication #427 Livestock Judging Guide. This publication provides information for judging poultry. The following section includes some differences in turkeys and waterfowl and points to look for when selecting your project.



Turkey Selection

Turkeys are similar to chickens with a few differences, as noticeable by the following picture. They do not have a comb on top of the head. There is a fleshy growth at the base of the beak, known as a snood. On males, this part is very long and hangs down over the beak. In addition to a wattle, turkeys also have red, bumpy, fleshy tissue covering the head and neck called **caruncles**. Another difference is that male turkeys have a tuft of long, bristly, black, coarse fibres attached to the **breast**, known as the **beard**.

A young turkey is a **poult**. A male turkey of any age is a tom and female turkeys are hens.



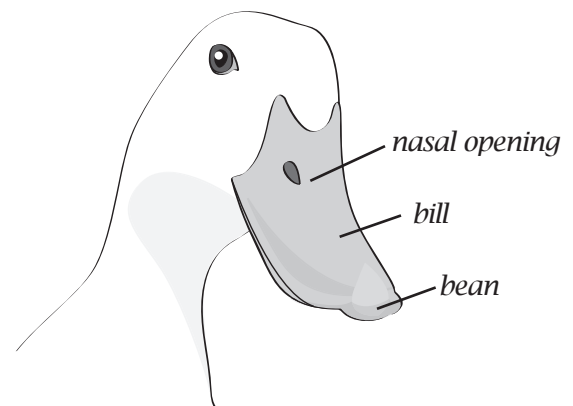
Waterfowl Selection

This section outlines the major differences that waterfowl have from chickens, and some features to look for during project selection.

The differences in ducks can be seen in the following picture. They do not have combs or any other head covering. The **bill** is flatter than a chicken's beak, with an extra part on the end called a bean. Ducks have webbed toes, which are used for swimming. There is also a difference between male and female ducks. Males have curled feathers at the base of the tail and they only make a hiss, where the female can also make a squawking sound when handled.

A young duck is a **duckling**. A male adult duck is a **drake** and a female adult is a duck.

DUCK PARTS





General Characteristics to look for in Ducks

- **Head:** short, round and wide. Prominence of cheeks and condition of head plumage.
- **Eyes:** good size and colour, no blindness.
- **Bill:** colour true to its breed or sex, short and wide shape.
- **Neck:** length and strength (ducks generally have strong necks); arch of neck; feather condition for abnormal colouring.
- **Back:** length and width. Meat varieties have a long and wide back. Back feathers for under colour and signs of **moulting** 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 free of abnormality.
- **Toes and Nails:** colour, length and if any toe nails are missing; abnormalities and abscesses.
- **Webs:** freedom from damage, abnormalities and parasites.
- **Breast:** length of keel (breast) bone, free from defects; feather condition and amount of meat on breast area for meat birds.
- **Wings:** spread each one open and look at condition of primary and secondary feathers. Check for signs of moulting.
- **Crop:** fullness and free from abnormalities.

In judging Rouen and Gray Call Drakes in the summer or fall, allowance must be made for the summer moult common to males of these varieties.

Benefits of having Ducks for 4-H Projects

- **Easy to Raise** - ducks are seldom bothered by sickness or **parasites**.
- **Resistant to Cold, Wet and Hot Weather** - mature waterfowl are mostly immune to wet or cold weather. Ducks can remain outside in the wettest weather, and can winter comfortably outdoors with only a windbreak, even with temperatures below - 18°C. Ducks also do well in hot climates if they have access to shade and drinking water.
- **Insect, Snail and Slug Exterminators** - ducks are excellent at getting rid of any unwanted insects in your garden.
- **Productive** - they are one of the most efficient producers of animal **protein**.
- **Easy to Feed** - ducks will eat almost anything that comes out of the kitchen.

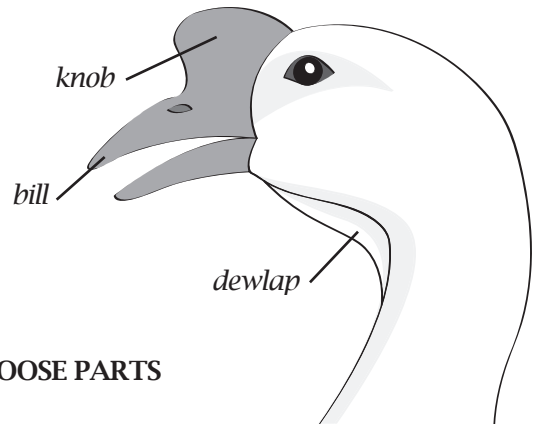
Their feathers and manure can be used in by-products, they have gentle dispositions and are very entertaining as pets.



Goose Selection

Geese have some distinguishing features. Some breeds have a horny knob at the base of the bill. In addition, some geese have a dewlap, a fleshy growth of skin extending from the base of the lower bill along the top of the throat.

A young goose is a **gosling**. A male adult goose is a **gander** and a female adult is a goose.



GOOSE PARTS

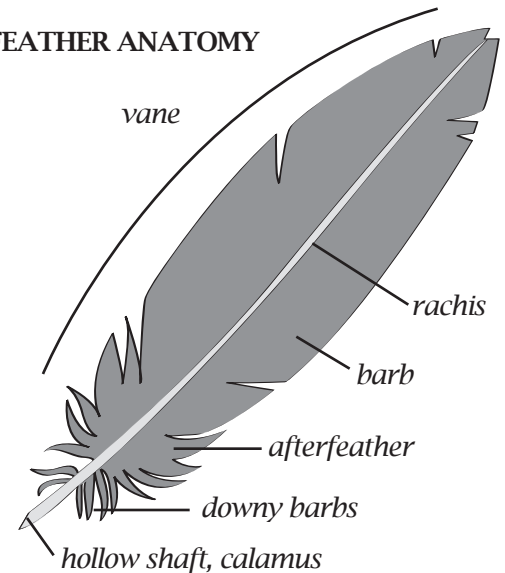
Feather Anatomy

Feathers are unique to all birds, and have many functions. They are used in place of fur, and so provide insulation for the bird. Feathers also allow for flight. They are made up of **keratin**, a type of protein that is also used for horn and hair in other types of animals. Bird beaks are also made of keratin. Once feathers are produced, they are sealed off at the base and are dead matter controlled by the muscles underneath the skin.

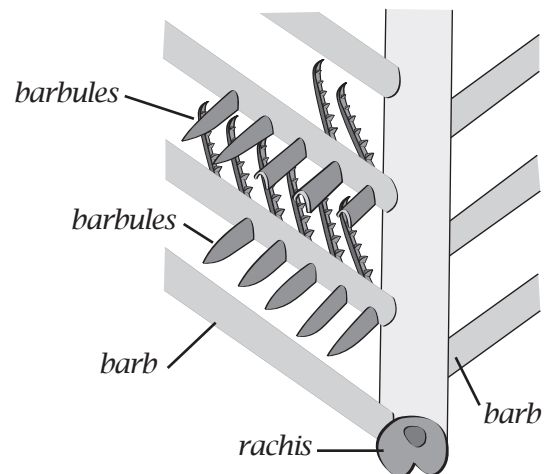
The anatomy of the feather can be seen in the following diagrams, one is of the overall feather while the other shows the anatomy up close. The **rachis** is a hollow supporting shaft for the side branches, or **barbs**. **Barbules** branch off of the barbs and create a gripping effect between barbs. As can be seen on the up close diagram, the upper barbules have hooklets, whereas the lower barbules do not have hooklets but can hook onto the upper barbules. There are different types of feathers depending on their use, including flight, contour and tail feathers. These kinds of feathers depend on the hooking action of the barbs and barbules. A feather type that does not have barbules and therefore no gripping action, is down feathers. Their use is different as they provide insulation for the bird, and therefore need to trap air around the body to keep it warm. Feathers will vary in colour depending on breed of chicken.

Feathers act as a protective covering for waterfowl, protecting it from cold, rain, sun and injury, also aiding in short flight. It is important that the feather be broad, the web of good firm texture, with a strong shaft, the barbs, barbules and barbicels closely and tightly knitted together, except a very few ornamental breeds such as Sebastapol Geese.

FEATHER ANATOMY



FLIGHT FEATHER CLOSEUP





Feeding and Nutrition

Food and its Use

Poultry (and all other living things) need **nutrients** from food in order to produce energy to live and function. Proper nutrition is very important for all poultry, but particularly for young growing chicks. Poultry owners must care for their animals and feed them properly to give them a chance to grow well, maintain good health, produce quality meat and eggs, and reproduce and hatch healthy offspring that will develop to their full potential.

Animals require food for three main purposes:

- 1. Maintenance:** to give heat and energy to the body. Maintenance takes first priority on the use of the feed. If fed below maintenance needs, the bird will use up its body reserves of **fat** and other nutrients, dropping off rapidly in weight or egg production. Eventually, when these are used up, starvation or serious malnutrition sets in and its health is affected. Maintenance requirements are approximately proportional to the bird's weight. The nutrients needed for maintenance will be about the same.
- 2. Growth:** to provide essentials for building various body tissues as the bones, muscles, and organs increase in size. Growth requires an abundance of protein, minerals, vitamins and energy.
- 3. Work:** includes reproduction and egg production. Poultry do not work like we think of work, but they need energy to move, roost, and play. The laying bird requires nutrients for manufacturing the eggs she produces. Eggs are high in protein, minerals, vitamins and energy. Requirements, therefore, are very heavy for these nutrients. The laying birds also require a great deal of water for their body needs and for egg production. Hens fed a uniform **balanced ration** will produce rather uniform coloured yolks. Excessive green feed will darken the yolk and make it less desirable to the consumer who is used to a light yolk.

It is important to know the nutritional requirements for the kind of animal being raised. This means knowing what and how much of each nutrient is needed by that animal to be able to live and grow. A nutrient is like an ingredient in a recipe. If we leave a required nutrient out of an animal's diet, it will cause some type of **deficiency** (a shortage). This will result in problems such as slow growth, disease, dead in shell, reproductive failure, low egg production, higher mortality rates, or poor carcass quality.

Although the majority of producers now rely on purchased complete feeds, it is important to know what is in the food you are feeding your animals and why. This section will also help you to spot any deficiencies your animal might be experiencing. The primary food nutrients required by all animals are classified as carbohydrates, fats, and proteins. Secondary food nutrient classes consist of minerals and vitamins. Another nutrient of importance is water; however, it is obtained primarily from sources other than foods.



What's in Feed?

1. PROTEIN

ESSENTIAL FOR:	SUPPLIED BY:
<ul style="list-style-type: none"> · Growth · Development of muscles, bone and feathers · Repairing body tissues · Reproduction and egg production 	<ul style="list-style-type: none"> · Legume hays · Fish meal · Soybean meal · Canola meal · Barley · Wheat Bran

Proteins are complex compounds, containing carbon, hydrogen, oxygen and nitrogen. Most proteins contain sulphur and some contain phosphorus. Feed proteins are broken down into amino acids. Tissues that mainly consist of protein are muscles, nerves, cartilage, skin, feathers and beak. The albumin (white) of the egg is also high in protein.

Proteins are especially needed by the young growing birds for production of body tissues. The younger bird is growing at a greater rate than the older bird, thus the percentage of protein in the ration must be greater. Protein is supplied in the legume hays (alfalfa, clover), linseed meal, milk, wheat bran, oats, and pasture grasses. Animal by products, such as meat and bone meal, are also rich in protein. Since **protein supplements** are an expensive portion of the ration, their use should be limited to providing a balanced ration depending on the growth stage of the chickens.

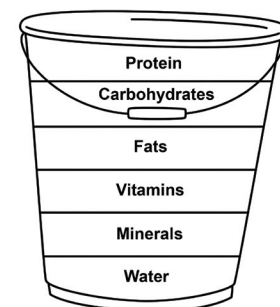
2. CARBOHYDRATES

ESSENTIAL FOR:	SUPPLIED BY:
<ul style="list-style-type: none"> · Energy for body <ul style="list-style-type: none"> · Heat · Growth · Fattening 	<ul style="list-style-type: none"> · Grains (Oats, Barley, Wheat, Corn) · Soybean meal

Carbohydrates include starches, sugar and cellulose. Carbohydrates are the most important source of energy in the ration. Energy is the most expensive nutrient in the diet and it affects feed intake. A high energy diet will contribute to a low feed intake, whereas a low energy diet will contribute to a high feed intake.

3. FATS

ESSENTIAL FOR:	SUPPLIED BY:
<ul style="list-style-type: none"> · Concentrated energy source for body (2.25 times more than carbohydrates) <ul style="list-style-type: none"> · Heat · Growth · Fattening 	<ul style="list-style-type: none"> · Animal fats (hard, inexpensive) · Vegetable oils (liquid, expensive) <ul style="list-style-type: none"> · Flaxseed · Small Quantities in Grains (Oats, Barley and Wheat)





4. VITAMINS

ESSENTIAL FOR:	SUPPLIED BY:
<ul style="list-style-type: none"> · Maintenance of health · Growth · Reproduction 	<ul style="list-style-type: none"> · Animal fats (hard, inexpensive) · Vegetable oils (liquid, expensive) · Flaxseed

Although vitamins occur in feeds in small amounts, they are absolutely necessary for growth, reproduction and the maintenance of health. They occur in feedstuffs in varying quantities and in different combinations. They unlock other nutrients that can be used. Some vitamins are produced by microorganisms of the intestinal tract. Vitamin D

can be produced by sunlight on the bird's skin. Other vitamins must be supplied in the ration because they are not formed by the birds. It is most likely that your commercially obtained feed will contain all of the essential vitamins needed, but you should check the label just to be sure.

Vitamins are often separated into two groups: (1) fat soluble and (2) water soluble, as demonstrated in the table below.

	Vitamin	Use	Source	Deficiency
FAT SOLUBLE	Vitamin A	<i>Health and proper functioning of the skin and lining of the digestive, reproductive and respiratory tracts. Turkeys need twice as much vitamin A than chickens.</i>	<i>From carotene in green forages and yellow corn; fish oils</i>	<i>Chronic respiratory disease; weakness Ducks: imbalance, lameness and sometime paralysis</i>
	Vitamin D	<i>Plays an important role in bone formation and the metabolism of calcium and phosphorus.</i>	<i>Exposure to sunlight; fish oils; supplementation</i>	<i>Weak legs, ruffled feathers and unhealthy condition; rickets; egg paralysis in production of eggs</i>
	Vitamin E	<i>Normal reproduction and growth. Involved with selenium for maintaining cell structure.</i>	<i>Wheat germ oil; soybean oil</i>	<i>Reproduction and hatching problems; loss of muscular control and staggering. Turkeys: lesion in gizzard</i>
	Vitamin K	<i>Blood clotting.</i>	<i>Green vegetables and grass; supplementation</i>	<i>Rare; chicks can bleed to death in the absence of blood clotting</i>
WATER SOLUBLE	B vitamins (B2, Pantothenic Acid, Biotin, B12)	<i>Involved in energy metabolism and in many other metabolic functions. General health.</i>	<i>Supplement</i>	<i>B-1- rare; affects nervous system, especially in young birds; weakness, weight loss, jerky movements B-5-lesions on face</i>
	Folic Acid (B9)	<i>Takes part in the synthesis of amino acids and nucleic acids.</i>	<i>Green leafy vegetables, soybeans</i>	<i>Lack of body growth and feather growth; anemia. Turkeys: neck paralysis and mild anemia</i>
	Vitamin C	<i>Involved in normal metabolic activities. Potential anti-stress effect.</i>	<i>Produced in the body; not typically supplemented.</i>	<i>Rare.</i>

Many necessary vitamins are partially supplied by feed ingredients such as alfalfa meal and distillers' dried solubles. A vitamin premix, however, is included in the commercial ration to provide additional supplements such as vitamin A, B12, D3, E, K, riboflavin, niacin, pantothenic acid and choline.



5. MINERALS

ESSENTIAL FOR:	SUPPLIED BY:
<ul style="list-style-type: none"> · Bone and teeth formation · Parts of enzymes and hormones · Egg Production (calcium and phosphorous) · Stimulates appetite and water intake (salt) · Maintenance of health 	<ul style="list-style-type: none"> · Trace Mineralized Salt (Cobalt, Iodine, Selenium) · Dicalcium phosphate · Meat and Bone Meal

Four minerals of the greatest importance are sodium and chlorine (combined in common salt), calcium and phosphorus. Other minerals utilized and likely to be lacking in certain localities are iron, cobalt, sulphur and copper. Their need in the diet varies in certain areas.

The uses of minerals are many. They aid in the proper functioning of the body processes; the manufacturing of blood, digestion, muscle action and bone building. Minerals are stored in the skeleton and tissues.

Calcium and phosphorus are obtained from legume hays and green forage and considerable phosphorus is obtained from cereal grains. Bone meal is a well-known source of these minerals. Limestone is a source of calcium. Several commercial mineral supplements are available on the market containing calcium and phosphate along with iron, iodine, molasses, protein or high protein or high percentage of salt. It is recommended that locally formulated mixes be used as they are designed to meet local needs.

6. WATER

ESSENTIAL FOR:	SUPPLIED BY:
<ul style="list-style-type: none"> · Transportation of nutrients · Control of body temperature · Digestion · All vital processes 	<ul style="list-style-type: none"> · Must be supplied at all times, at a temperature of at least 2°C to 10°C

Notes about Water

Water is the most essential nutrient to any animal, but unfortunately it is usually the most neglected. Water is used in poultry, as in humans, to transport nutrients from one place in the body to another. Without water, all areas of a bird's normal functions are affected, including egg production and rate of gain.

It is important to ensure that your water supply is clean, and within acceptable concentration levels or free of such contaminants as algae, nitrates, sulphates, high mineral levels, salinity and **bacteria**. Algae growth in ponds can make water smell and taste bad; it can even make it toxic. You should also monitor your water for the presence of nitrates and sulphates. Nitrates often indicate the presence of bacteria that may be harmful to your birds. Large amounts of sulphates may create health problems affecting performance of your poultry.

Waterers with brightly colored bases help the chicks find the water. For the first few days, take the chill off the water and have water available near each feed trough. If using a waterer built for adult birds, a ring of rubber hose in the base may be necessary so that chicks cannot fall in and drown. Rocks placed in the outer ring of the base can serve the same purpose. Waterers can be made using juice cans in combination with tin plates. Make two holes on opposite sides of the can about 2 cm from the lip. Fill the can with water and place on top. Tip them over and the waterer will maintain its own water level.



A continued supply of fresh 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. Water is also one of the cheapest nutrients. Water for chicks should be maintained at temperatures between 10-21°C. If it is outside this range, the chicks will reduce their consumption and not do as well. Generally, birds will consume water in a 2:1 ratio to feed consumption. This ratio can change if extremes of climate temperatures occur.

The animal caretaker should know how much water is consumed daily, as it is often a good indication of the bird's health. When the waterers no longer can handle a half-day supply for the flock, it is time to either add more waterers or use larger waterers. Raise the waterers as the birds grow so that the bases are level with the backs of the birds. This not only helps prevent litter from getting into the water supply but also limits spillage. Place the waterers on stands so that the birds cannot get into any damp litter that may develop beneath the waterers. The water should be changed twice a day. The waterers should be cleaned with disinfectant once a week so that there is no slime build-up.

Classes of Feeds

Feeds can be classified into two main groups: **Concentrates** and **Roughages**.

CONCENTRATE FEEDS

Concentrate feeds include whole grains, milled feeds and manufactured supplements. They are feeds low in fibre and high in digestible nutrients. They are able to supply large quantities of energy for the bird to use quickly.

Some of the common concentrates are: oats, barley, wheat, wheat bran, shorts or middlings, corn, molasses, linseed meal, fish meal, cottonseed meal and soybean meal.

Several manufactured feeds for poultry are on the market. They are mainly composed of concentrates to which minerals have been added. They are generally of the following types:

1. **Starting Ration** - high in protein (20%).
2. **Growing Ration** - lower in protein than starting rations (16%).
3. **Laying Ration** - high in calcium and Vitamins A and D.

SUCCULENT FEEDS

Succulent feeds are those fed in a green or preserved stage - silage and green grass are examples. Succulent feeds are usually roughages. This means they are high in fibre. They cannot be eaten in large enough quantities by poultry for them to receive their total nutrient needs.

Fresh grass, weeds and discarded vegetables are well liked by poultry and can be fed to supplement a complete grain ration.



Digestive System of Poultry

Unlike many animals that are found on the traditional farm poultry are not ruminants, but rather monogastrics, meaning that they have only one stomach.

Mouth/Beak: Gather and break down feed. The tongue moves back and forth to force food down the esophagus because birds cannot swallow.

Esophagus: Tube from mouth to stomach that is open at the mouth end.

Crop: Feed storage and moistening.

Stomach:

1) **Proventriculus:** The chemical part of the stomach. The site for digestive juices (HCl and gastric juices) to be secreted. The digestive juices have a breakdown action on the feed materials preparing them for absorption into the bloodstream.

2) **Gizzard:** The physical part of the stomach. It is muscular and food is broken down by movement of the stomach.

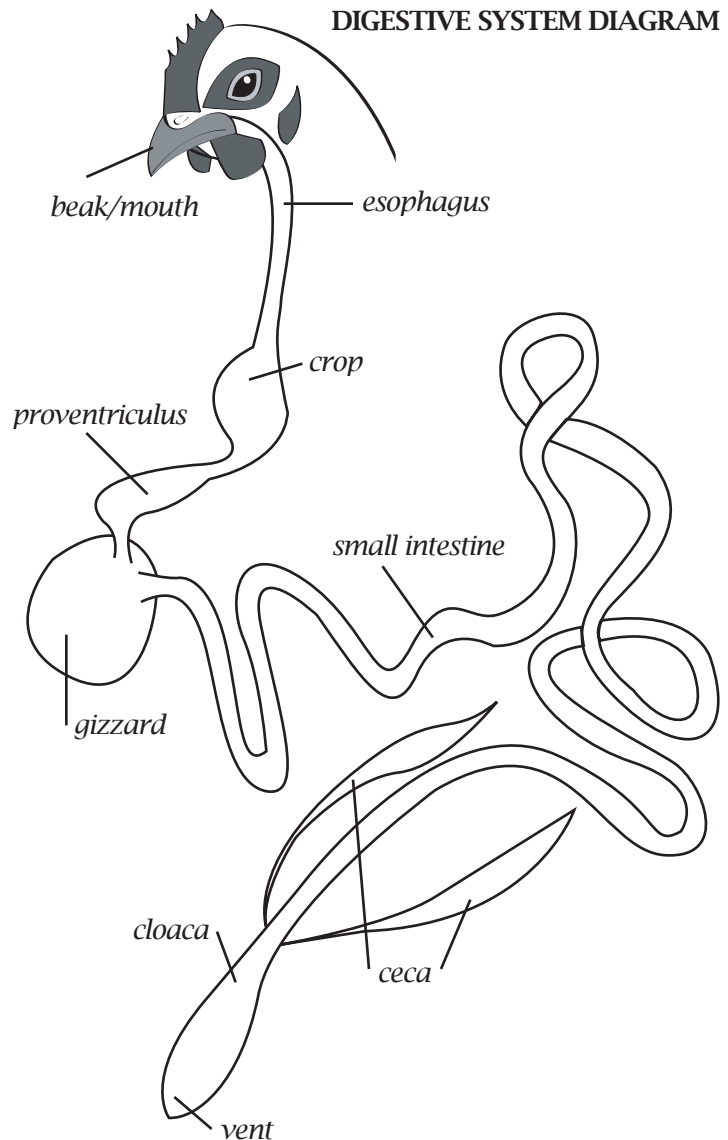
Small Intestine: Digestion of proteins, carbohydrates, and fats; absorption of the end products of digestion. Enzymes aid these processes and are found in the small intestine.

Ceca: Pair of tubes that allow fermentation of undigested feed and breakdown of dietary fibre. This process produces fatty acids and B vitamins that have very few absorbed because of the location of the ceca close to the end of the digestive tract.

Large Intestine: Bacterial activity, water absorption and waste storage.

Cloaca: Common chamber for gastrointestinal and urinary tracts.

Vent: Common exit for gastrointestinal and urinary tracts.

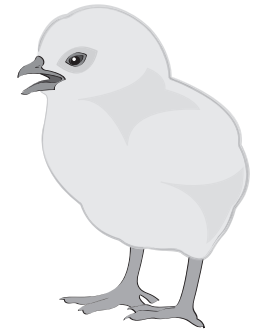




Feeding Methods

FEEDING CHICKS

Feed and water should be given to chicks as soon as they arrive. Baby chicks should be given feed within thirty-six hours after hatching to prevent loss of weight and vitality. The first feeders should be flat for ease of access, such as paper plates or egg flats. At the same time feed should be supplied in regular feeders. Make sure that the chicks have found the waterer or feed consumption can lead to dehydration and eventual death. Once the chicks have learned to feed, the first feeders may be removed.



Faulty nutrition can lead to tremendous costs. Relating the growing stages of a chicken to the type of feed used is important. Chicks should be fed a good starter for the first 4 to 6 weeks of age. Starters sold by reputable feed manufacturers are formulated to meet the nutrient requirements of the birds. Only starters should be fed during the first few weeks. Adding ingredients such as grains, skim milk or greens will only upset the balance of the ration's nutrients.

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 around the heat source to allow chicks freedom to move towards or away from the heat without piling up against the trough and being smothered.

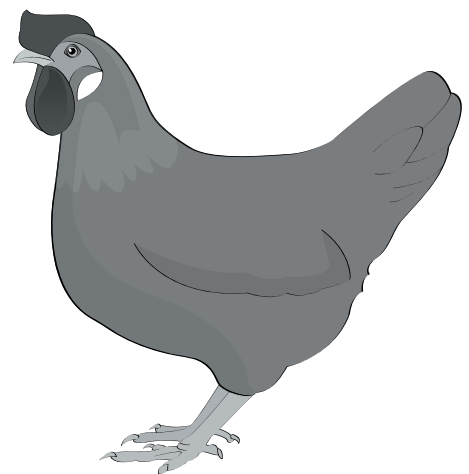
Each class of birds should be fed the starter formulated for them because the levels of minerals, **vitamins**, protein and energy differ depending on whether the feed is a chick starter, a broiler mash or a turkey starter. The changeover to growing and finishing rations should be gradual and the growing mash should be fed according to the manufacturer's directions.

In addition, young birds can be fed insoluble chick size **grit**. However, when on a commercially prepared feed many nutritionists feel it is not necessary. During the first few days the grit is best mixed on the top of the starter but later should be provided in a separate hopper. Chickens should receive intermediate size grit after they are 6 weeks of age. Gravel is not recommended because it is too smooth and does not grind the feed. Oyster shells and limestone should not be fed to growing chicks, but can be fed as grit for laying hens to replace calcium.

FEEDING LAYING HENS

A laying hen's nutrient requirements are different from that of a young chick or a growing chick. Laying hens should be fed a complete commercially prepared laying ration. Keep the ration in front of the birds at all times.

A complete 16 percent protein laying ration or **breeder ration** should always be kept in front of the birds. No other food is needed. If the feeder space is adequate, you will only have to feed once a day.





Calcium is an important mineral needed by laying hens for egg shell formation. About 10 percent of the egg weight is shell. The shell is almost 100 percent calcium carbonate. Most of the complete high energy laying mashes available contain 3.5 percent calcium. Oyster shells, which are a good source of calcium, can be fed to the layers to ensure they have adequate calcium. By providing more calcium to the layer in a pre-lay diet, the producer makes sure that this calcium is stored in the hen's bone. This calcium can later be used by the bird to make up for the high amount of calcium needed to produce eggs.

A granite grit or coarse sand helps the bird's digestion. They retain this for long periods so feeding every two weeks is sufficient. This grit and oyster shell can be fed in the mash feed. A handful or two is needed for each.

FEEDING BROILERS

Broilers can be raised to the 1.3 - 1.5 kg weight on 0.9 - 1.0 kg of feed per kg of gain. Thus, each broiler raised to market will consume approximately 3 - 4 kg of feed. The following table shows the differences between feeding layers and broilers.

Amount and Type of Feed Required for One Chicken by Age and Purpose		
LAYERS (BROWN EGG TYPE)		
Age	Total Amount of Feed (kg)	Ration Type
Day old to 6 weeks	1.8	Starter
7 weeks to 18 weeks	21	Grower
19 weeks to 70 weeks (from lay to end of use)	47	Layer
LAYERS (WHITE EGG TYPE)		
Age	Total Amount of Feed (kg)	Ration Type
Day old to 6 weeks	1.4	Starter
7 weeks to 18 weeks	5.4	Grower
19 weeks to 70 weeks (from lay to end of use)	37	Layer
BROILERS		
Age	Total Amount of Feed (kg)	Ration Type
Day old to 3 weeks	1	Starter
4 weeks to 7 weeks	3	Finisher



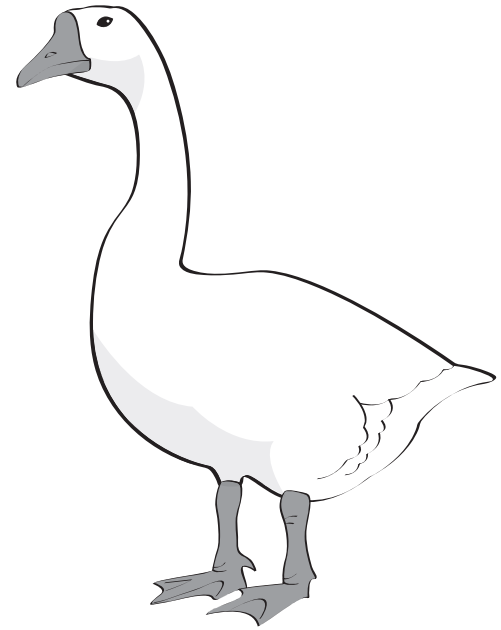
FEEDING TURKEYS

Turkey should be fed with the same feeding methods as described above for chickens. The difference is the type of feed, as turkey poults should be started with a good turkey starter containing at least 26 percent protein. From seven to 14 weeks, the turkeys can be adjusted to a turkey grower or developer with 16 to 24 percent protein. After 14 weeks, the grower can still be fed, or switched to a turkey finisher at 14 to 16 percent protein.

FEEDING WATERFOWL

In feeding ducks, regardless of age, it is easier to feed pellet type rations to minimize feed wastage. Starting ducklings should be fed a starter diet with 0.3 cm pellets of 20-22% protein for the first 2 weeks of age. Following this period, they may be placed on a finisher type diet with an increased pellet size of 0.5 cm and 16-18% protein until market age. Potential breeders should be placed on a developer diet 1 month before the date of expected egg production. Keep in mind that young waterfowl require 2-3 times more niacin in their diet than chicks, so a niacin supplement should be added if they are not getting enough through the feed.

As noted with ducks, geese should receive pelleted type diets. Goslings should receive a starter type feed at 16-18% protein for the first 3 weeks of life, followed by a suitable grower type feed containing 15-16% protein. Pellet size may be similar to that used with ducks. Since geese are known as excellent foragers, they can be expected to obtain a good portion of their feed by this means by the time they are 5-6 weeks of age. From 12 weeks to market age, the birds should have access to pellets on a free choice basis. Either an all mash or a mash scratch system of feeding may be used, providing the system meets the bird's protein requirements of at least 15% after the initial 3 week period. Geese are marketed when they are about 5 to 6 months of age. Those used for breeding purposes should be provided with a suitable breeder type ration containing approximately 18% protein. This level is somewhat higher than normally required for other kinds of breeders but, since geese tend to forage extensively, a portion of their diet may consist of material containing less protein.



TIPS FOR FEEDING

- Fill feeders half full to avoid spilling out and ensure freshness of feed.
- Do not put new feed on old feed.
- Let the birds clean out the feeders once or twice a week.
- Always keep feed in front of birds.
- Keep feed troughs free of litter and mouldy feed.



Cannibalism

Both feather picking and **cannibalism** are common and can develop when the chicks are growing. A similar type of problem is toe picking that can start in a flock of chicks soon after they are put down under the heat lamp. Some factors that can cause this are overheating the birds, lack of feed or water, boredom, and overcrowding.

The easiest and most satisfactory method of controlling cannibalism is cutting the bird's beaks. Beak trimming involves trimming slightly more than one-half of the upper beak and blunting the lower beak. Do this only if the birds are picking one another. If beak trimming is needed, this is best done before the birds start to lay and should be done by 16 weeks of age. **Since the birds used in 4-H are for exhibition, we do not cut their beaks.**

The following are some solutions to the causes of cannibalism:

1. The low fibre content of commercial feeds and the pellet or crumble preparation allows birds to consume their daily nutrient requirements in a short time. They may get bored not having to forage for food and could start pecking each other. Hanging cabbage heads or lettuce heads and putting a few spruce boughs in the pen can create the necessary diversion to prevent pecking. If the litter is kept dry, then sprinkling some oats on the floor will encourage the birds to stay active by scratching.
2. Ensure that the birds are not overcrowded. Close confinement can cause them to become aggressive toward each other. Make sure that there is also adequate feeder space.
3. A nutrient imbalance can cause birds to become cannibalistic. It is important that you give the birds a balanced ration. Commercial rations are formulated to be balanced to the birds' nutrient needs.
4. Birds in pens with windows are sometimes more prone to cannibalism or feather picking. It usually starts on a sunny day when the birds see the dust particles that are in the air. The particles land on another bird's feathers and a bird trying to pick up the dust particle accidentally pulls a feather or draws blood. Sunspots on the floor can also cause toe picking. Therefore, using artificial light will prevent this.
5. Once the chicks get a taste of blood, they seem to want more. If the problem has started in your flock, the victim should be removed and injured parts painted with pine tar or another preparation with a bitter taste.

Sometimes, even when the chicks apparently have had good care, cannibalism will break out but most often it is due to poor management.



Facilities

In the poultry industry the type of housing will change depending on what type of operation it is and the size of the operation. To have a successful operation there must be a warm dry bed, fresh air, and enough food for the birds. In Canada we usually keep our poultry in a controlled environment, meaning that people are responsible for making sure the pen is clean, at the right temperature and that the birds have access to food and clean water. Space requirements for different birds, including feeder and waterer space, should be taken into consideration when preparing facilities. A useful resource containing this information is the *Recommended Code of Practice for the Care and Handling of Poultry from hatchery to processing plant*, available through the National Farm Animal Council and online at www.livestockwelfare.com/codes.htm

Whatever type of poultry house is used, be aware of the potential for **predators**. A predator is considered anything that can cause harm to your birds. Examples of predators for chickens include dogs, raccoons, owls and coyotes. Make sure you take predators into consideration when designing your facility. Block potential entrances, such as windows, with netting or screens. Predators may enter through the housing or they could affect your flock if you allow it in an outdoor pen. If your flock is allowed outside of the poultry house, use adequate fencing, such as a wire mesh that can close off all areas to potential predators.

In all poultry housing, sanitation is very important to keep the birds healthy. To prepare for new chicks or birds, the facilities should be cleaned and disinfected well in advance of the birds' arrival. All equipment (roosts, nests, feeders, waterers) should be taken out of the building. Remove all traces of dust from the ceiling and walls. Once the bulk of the manure and dirt is out, if appropriate, a hose should be taken to the entire building. Any droppings that have been dried and are stuck in areas should be soaked and removed. The manure and dirt that is cleaned from the building should be directed to an area away from the building to prevent re-contamination.

Once the building has been thoroughly cleaned, it must then be disinfected. Your local hatchery will be able to advise you as to the type of disinfectant to use. After the area is disinfected and the floor has dried, bed the area with litter. Use the same cleaning procedure for equipment and clean, disinfect, rinse and dry all water and feeding equipment before refilling them.

The success or failure of any flock of poultry is determined during the brooding period – the time from a few days before the birds are received until they are about 4 weeks of age. The flock requires care and attention after this time, but the brooding period is the most important. Things that must be provided during the brooding period are:

- warm, dry, clean place to live
- plenty of clean water
- fresh air but no drafts

Choosing a brooding pen is the very first decision a 4-H member must make. How much room is needed will depend on whether you plan to raise the chicks in the same pen as they are brooded. For twenty chicks, five square metres are more than ample space to see them through to maturity.



Features of a Brooding Pen

The house you choose for your 4-H poultry project may be part of a building you already have. Within that house, you can construct a smaller brooding area to help keep your chicks or ducklings warm and safe. Where you decide to have the brooding pen, a chick guard of 38-45 cm (15-18 inches) high should be placed around the **brooder** (heat source) approximately 1 m around.

The most common type of chick guard is made from corrugated cardboard and is available at your hatchery. The circle will prevent the chicks from wandering away from the heat source and eliminate any corners. Chicks huddle when cold and can pile up by crowding in the corners. Those that end up on the bottom of the pile will be smothered. The circle will prevent this as well as floor drafts if the cardboard is entrenched in the litter. As the birds get older the circle can be widened and usually at the end of the first week it can be removed.

Once the area is in place for a brooding pen and it is clean, there are important features to consider before bringing your chicks in. These are litter, temperature, ventilation, feeding and watering space.

LITTER REQUIREMENTS

The brooder house should be completely dried out from the cleaning and disinfecting. It is recommended that the brooder be turned on for a day or two to warm up the floor directly beneath it. The litter can then be spread approximately 10 to 15 cm thick and allowed to warm up. There are quite a number of different types of litter available. Perhaps the best and most economical is source of litter is coarse wood shavings. Fine wood shavings will absorb moisture quite well but the birds may start to eat the litter and considerable mortality due to impaction may result. In all cases, club members are cautioned to make sure that the litter they decide to use is completely dry. Damp litter can become moldy and inhalation of the mold spores by the birds may cause pneumonia. Considerable numbers of deaths may result. You may want to put paper on top of the shavings for the first few days for ease of cleaning the pen.

TEMPERATURE

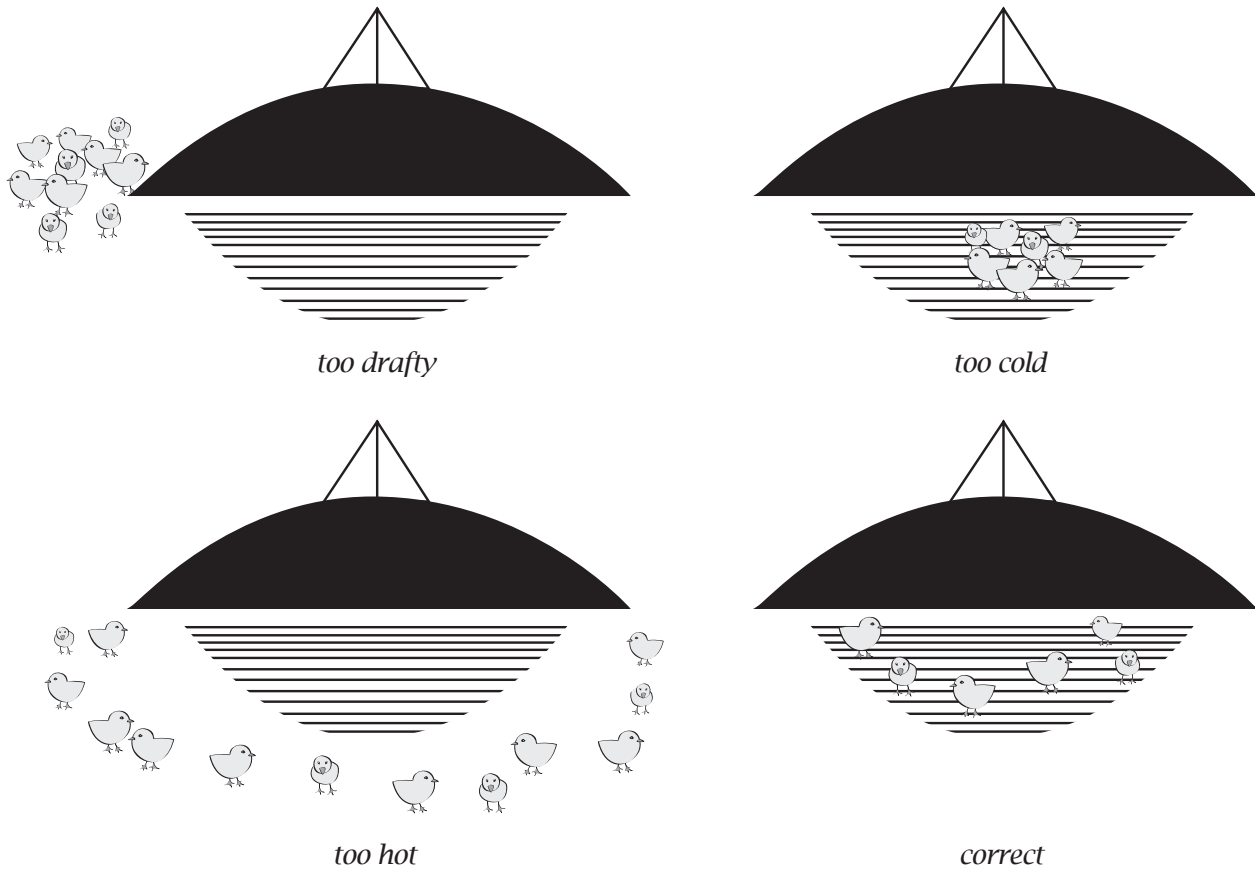
You will need a brooder, or heating device, to keep the chicks warm. There are many types of brooders and the size of your project will decide the type of brooder you need. This can range from an infrared heat lamp to a self-contained unit, depending on the number of chicks you will brood at one time.

Experience and experimental work have shown that a brooding temperature of 35°C at the edge of the brooder hood and 5 cm above the floor is the most suitable for baby chicks. When chicks hatch, their body temperature is the same as the **incubator** temperature but soon begins to rise and by 10 days of age reaches the normal temperature of 42°C. Keeping this fact in mind, club members can understand the importance of accurate temperature control during the early brooding period.

The brooder stove should be set up 4-5 days previous to the arrival of the chicks so it can be regulated to maintain a uniform temperature of 35°C to 38°C. The temperature is then dropped 2°C weekly until a temperature of 21°C is reached. At this time, the heat may be discontinued if the weather permits. The temperature is best checked by the use of a thermometer hung on the edge of the brooder hood approximately 5 cm above the litter. The chick brooder thermometer can be checked for accuracy against a clinical thermometer. The temperature of the brooding rooms should be approximately 21°C to 24°C for the first week but may be reduced to 18°C after this time. A cool yet comfortable room seems to promote better feathering and also encourages the birds to exercise.



You can tell if the temperature is correct by the action of your chicks. If at night the birds spread out in a circle, just under the inner edge of the brooder hood, the temperature is correct. When chilled, the birds will huddle together under the hood and chirp. Overheated chicks tend to move away from the hood, so allow sufficient space for the chicks to get away from the heat source if they become too hot. Chilled or overheated birds grow poorly and often develop diarrhea. The number of deaths will vary with the amount of chilling or overheating. Deaths may continue to occur for several days after the temperature has been corrected.



Ventilation and Protection

The room must be free from drafts for they will only cause condensation and litter problems that could also lead to health problems. Avoid drafts, but try to provide fresh air through proper ventilation. Ventilation will also help keep litter dry by removing excess moisture.

The brooding house should be inaccessible to dogs and cats. Rats can also be a problem if there is a large infestation, but normally the brooding circle will discourage them. Wild birds can also be a danger to chick health. One never knows where they have been or what they may have been into so keep wild birds out. Even older chickens should be isolated from day old chicks.



Feeding and Watering

FEEDERS

During the first few days, broiler chicks are usually fed from the tops off chick boxes, on egg flats or paper plates. Remove this temporary feeder when chicks start eating from the regular feeders.

The feeders designed for chicks are placed directly on the floor and are covered by tops with holes big enough for the chicks to peck and eat. The feed must be covered since the chicks walk on the feeders. The birds should have access to 2.5 cm of feeder space per bird for the first two weeks. Allow 5 cm per bird for ages 4 to 6 weeks, and 10 cm per bird from 6 to 12 weeks.

As your chicks grow, the feeders will need to be raised to the correct levels. There are different types of feeders and you will need to research this more by asking your 4-H leader or a poultry producer in your area. For more information on what to feed your chicks, refer to the “Feeding and Nutrition” section of this manual.

WATERERS

For the first few days it is best to use the portable 4.5 litre water fountains. Three to four of these placed around each brooder stove will be sufficient. Fill the waterers before the chicks arrive so the water will be warm, as they do not like cold water. Always provide clean, fresh water for your chicks and clean the waterers regularly to help prevent diseases.

When the Chicks Arrive

It is best if one can start brooding chicks in the early afternoon so that they 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 make sure 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.

CARE DURING THE GROWTH PERIOD

During the growth period, besides feeding and watering, there are many other jobs to be done.

- Keep the pens clean. Manure should be removed at least once a week and clean shavings added as needed.
- The birds should be watched for signs of disease (See “Husbandry and Health” section).
- Generally, you should check the birds to see if they are lively and the combs are bright and healthy looking. Observe how they behave and make notes on anything you find interesting.

Meat type breeds may be processed as broilers at 8 - 9 weeks of age or as roasters at about 14 weeks. Pullets will start to lay when they are 20 to 24 weeks of age.

SWIMMING WATER FOR WATERFOWL

It is not necessary to have swimming water for ducklings. It is safest to keep them out of the water until they are at least two weeks old.

To protect ducklings from drowning, all water containers which they can enter should have gently sloping sides with good footing to allow tired and wet swimmers to exit easily.



PROBLEMS IN THE BROODER PEN

The poultry producer should watch for the conditions in the following chart when trying to prevent problems in the brooder pen.

Condition	Problem	Remedy
<i>Young birds are spread uniformly over the floor area and are at the feeders and waterers.</i>	<i>None</i>	<i>Okay, no remedy needed.</i>
<i>Birds are crowded along the perimeter of the chick guard or along the wall.</i>	<i>Too hot</i>	<i>Lower Temperature</i>
<i>Panting and gasping</i>	<i>Respiratory disease or too hot</i>	<i>Lower temperatures if too hot, otherwise have a veterinarian examine a few of the ill birds.</i>
<i>Birds are huddled to one side of a heat source.</i>	<i>Too drafty</i>	<i>Eliminate drafty conditions</i>
<i>Birds are huddled under heat source.</i>	<i>Too cold</i>	<i>Raise temperature</i>
<i>Birds are huddling and piling in small groups or in corners.</i>	<i>Too cold or too drafty</i>	<i>Raise temperature or eliminate draft conditions</i>
<i>Small, scrawny birds and some dead after two days of brooding.</i>	<i>Possibly dehydrated from not finding water and dying of thirst or starvation from not finding feed.</i>	<i>Check that all young birds are in close proximity of water and feed. Ensure that lighting is adequate. Dip beaks in water when placed.</i>
<i>Vent pasting (fecal material sticking to the vent)</i>	<i>Birds could be too hot, too cold, or feed could cause laxative condition.</i>	<i>Rise or lower pan temperature. Sprinkle some finely cracked wheat or corn on top of feed if laxative condition.</i>
<i>Birds are crowded after six weeks of age.</i>	<i>There is not enough space causing unevenness in size of birds.</i>	<i>Provide more space</i>
<i>Crowded feeders and waterers</i>	<i>There is not enough feeding and watering space causing some birds to become thin.</i>	<i>Provide more feeders and waterers</i>
<i>Wet litter</i>	<i>Too many birds for space provided.</i>	<i>Provide adequate space. Also, provide good ventilation. If litter very wet, replace with new litter material.</i>
<i>Strong ammonia odours</i>	<i>Poor air movement. Too many birds for the space provided.</i>	<i>Provide good ventilation.</i>
<i>Feather picking cannibalism. (Cannibalism is the habit of one bird pecking at another)</i>	<i>Causes unthrifty birds, injuries and mortality.</i>	<i>Provide plenty of space. Good ventilation. Reduce light intensity in pen. If all else fails, call a professional to trim beaks.</i>
<i>Birds have poor feathering and lack uniformity at five to six weeks old.</i>	<i>Poor watering or feeding system or not enough pen space.</i>	<i>Provide good quality feed and water and increase space per bird.</i>



Ventilation

Ventilation of poultry buildings is necessary to

- (a) Control the temperature and **humidity** of inside air
- (b) Remove dust, harmful gases and odours
- (c) Maintain a fresh supply of air

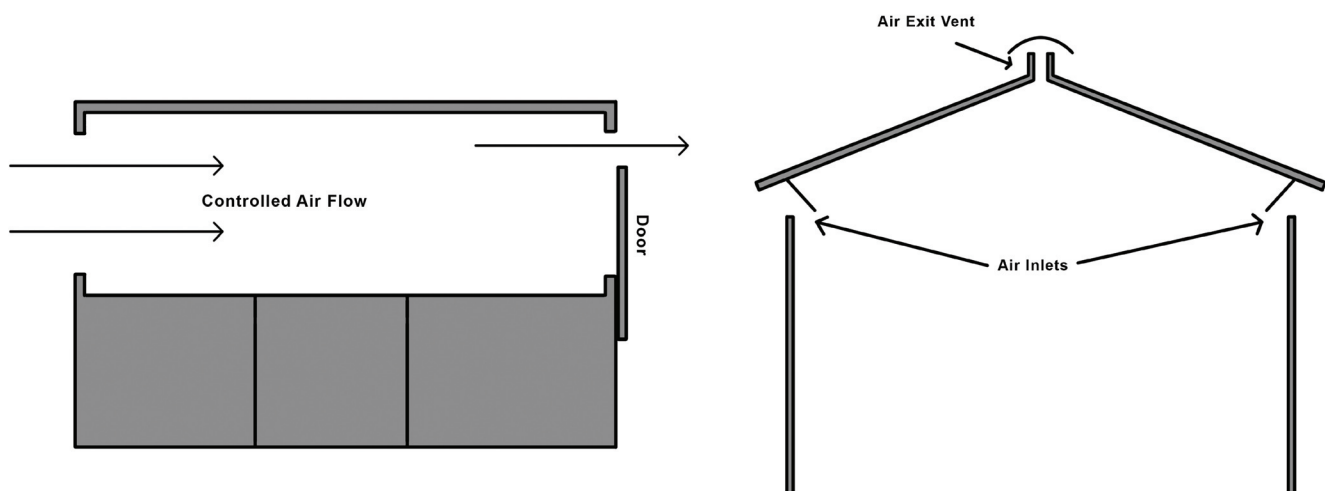
Any system which performs all of the above under all weather conditions is acceptable. Use of windows to control ventilation is likely sufficient in a small building with a small poultry flock. Direct drafts must, however, be avoided. With larger flocks in a large building a well-planned fan ventilation system should be used.

A barn with warm, humid air will provide the ideal conditions for growing harmful bacteria. Also, stale air contains carbon dioxide and ammonia. Good ventilation will remove odours, stale air and moisture, and replace these with fresh air.

These are some of the ways to provide fresh air while avoiding drafts:

1. The use of windows that are hinged at the bottom so that they open outwards at the top.
2. The use of ventilation inlets at the top of the walls (such as between the roof trusses). Air can exit at the top of the roof through a covered ventilation outlet.
3. A barn with a single pitch roof (sloped in only one direction) can be ventilated by leaving ventilation inlets and outlets at the top of the walls between trusses.
4. If you are using windows or doors to ventilate a building, try not to create a “wind tunnel”. This happens when a large amount of air can flow directly into and out of a building through large openings. For example, this diagram shows a barn with a large door on each end of the central aisle. If these doors are left wide open, a very strong wind will blow through the barn. A strong wind blowing along the barn floor will pick up dust and chaff and blow this into the pen. Dust and chaff can cause eye and respiratory irritations. Also, a strong wind could also chill animals if the weather is cool.

A better way to ventilate this barn would be to leave one of the doors partly opened, and to open a side window instead. Or, you could close the door on the leeward side (the side away from the wind) most of the way so that it will limit the air that can flow out of the barn. This will limit the air that flows into the barn as well.





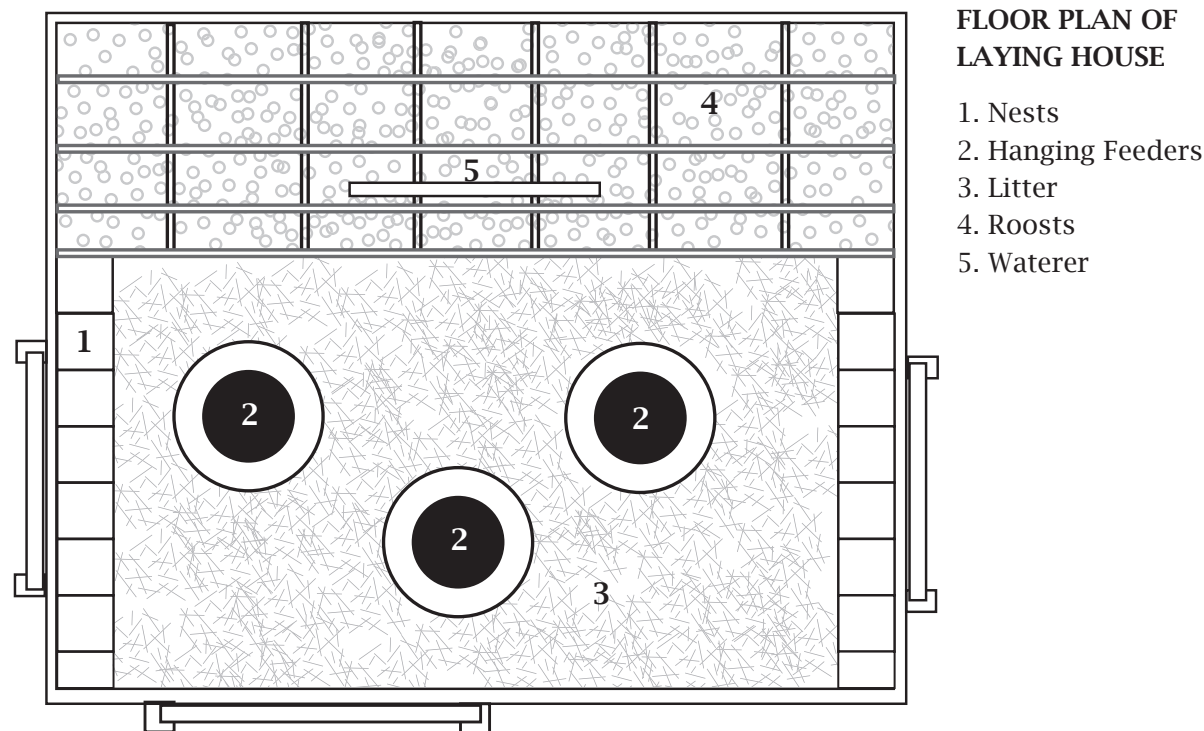
Laying Hen Management

OBTAINING THE LAYING FLOCK

The two methods by which to obtain laying stock are:

1. Obtaining day old pullet chicks from a hatchery.
2. Obtaining ready to lay pullets from a hatchery or commercial pullet raiser.

4-H members should obtain day old pullets from a commercial hatchery or if hatching the eggs themselves or as a club project, separate the pullets from the **roosters** at about five weeks of age.



PREPARING THE PEN

Between flocks, the hen house should be thoroughly cleaned. Take the manure out and clean and disinfect the equipment and interior of the house. Make any repairs to the house or equipment at this time.

FACILITIES NEEDED FOR THE FLOCK

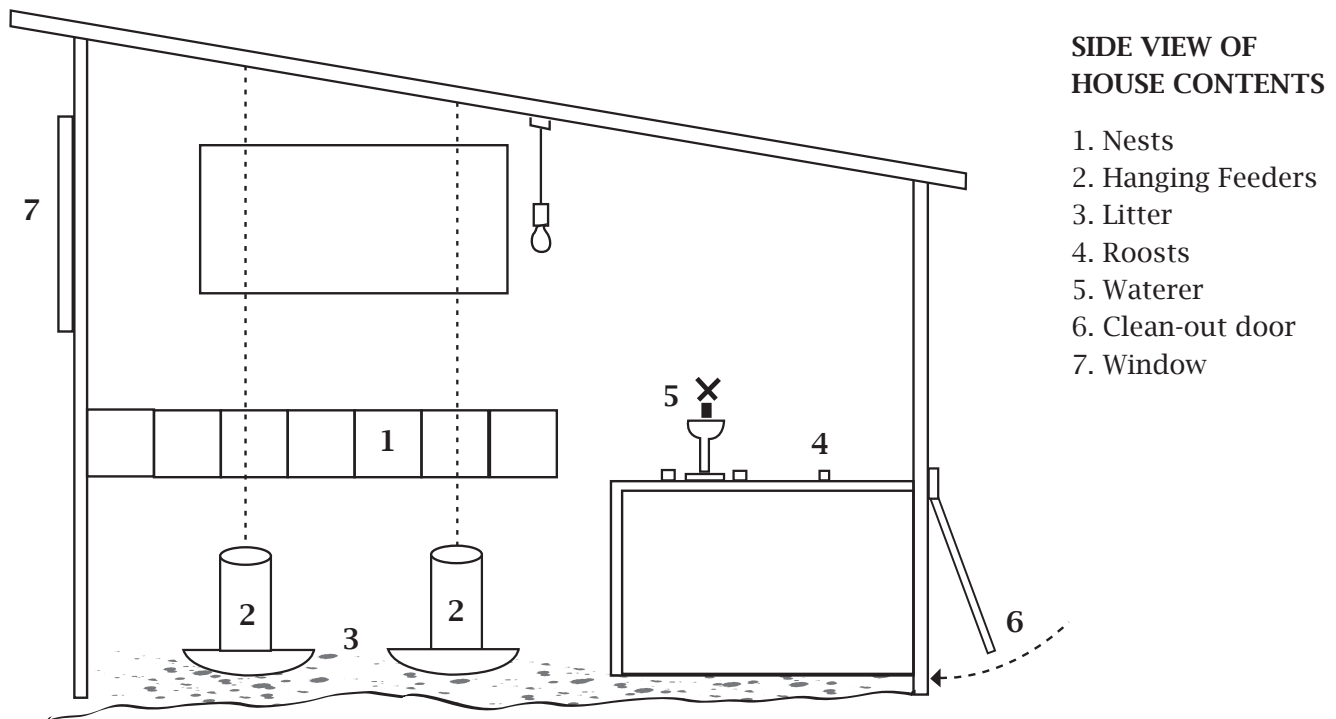
Housing requirements should allow for 0.3 square metres per bird. This would mean 3.25 m² for ten laying hens or a 2 x 1.5 m area. A separate breeding pen for one rooster and one or two hens would also be required. The house must be waterproof and insulated for protection against drafts and cold in winter and to hold in existing heat.

An inlet that can be open or closed as the climate dictates is necessary for ventilation. There should be no windows in the laying pen. Supply light using a 25 watt incandescent bulb connected to a timer.



Much of the equipment can be homemade or second-hand equipment can frequently be purchased. The feeders should be adequate to supply the day's feed for the flock without wasting feed. Feeders should be 15 cm deep with a guard to keep hens out of the feed and a lip to prevent hooking out of feed.

For more information on what to feed your layers, refer to the "Feeding and Nutrition" section of this manual. If the feeder space is adequate, you will only have to feed once a day. For feed storage, a barrel, box or bin to keep feed in will help reduce feed wastage that occurs when feeding out of a bag. Also, the danger of rats or mice destroying feed is reduced.



Provide one oyster shell hopper for each 75 to 100 pullets. Placing some of the hoppers on the back wall above the dropping pits will increase shell consumption. Birds need a good supply of oyster shell in order to put a good sound shell on the eggs. Hen size granite grit or coarse bank run gravel should be provided at all times. Grit has no feed value but acts as a grinding agent in the gizzard and the birds are able to utilize the feed more efficiently. Geese should be offered an insoluble grit at all times. The waterer can be an open pan, a pail or a fountain on a platform.

If the laying pen is large enough, a yard is not necessary. When hens are allowed into a yard to run, there is greater chance of loss from predatory animals and eggs will be dirtier. A yard should be fenced tight and the hens should be shut in the house during the night.

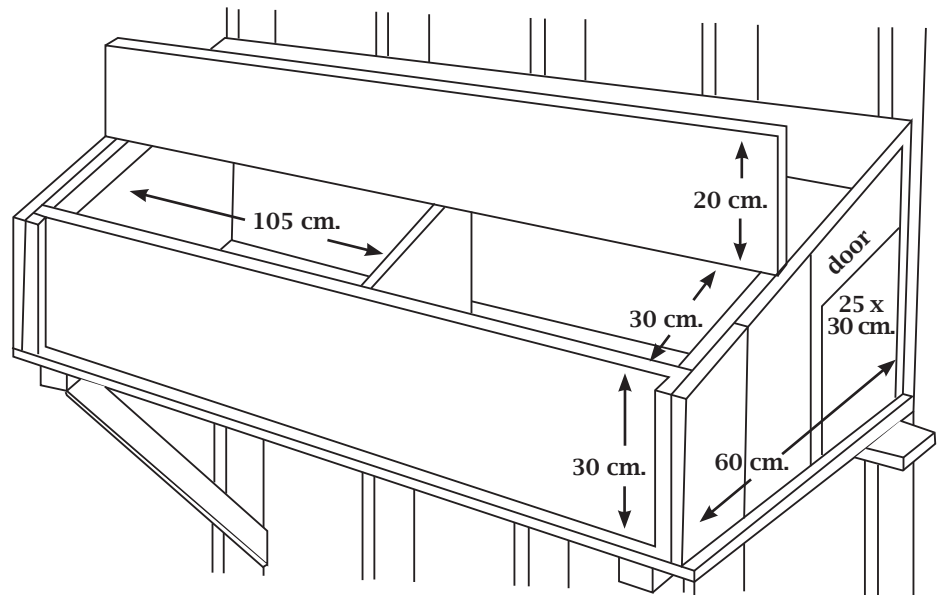


NESTS

The nests should always have clean litter. This will prevent dirty, cracked or broken eggs. Remove droppings, broken eggs and soiled material promptly and replace with clean nest material. Eggs should be gathered two or three times a day. Frequent gathering reduces the number of dirty eggs and improves the egg quality.

There should be at least one nest for every five birds. These should be 0.3 x 0.3 x 0.3 m and have a slanting roof to prevent roosting on it. An 8-10 cm board on the front will keep in litter. There also should be a perch in front of the nests and the nests should be 46-60 cm above the floor. The nest in the breeding pen can be a 0.3 metre square box filled with clean nesting material.

Keep in mind that the nest size will be different for turkeys, ducks and geese. A goose nest should be provided at ground level for easy access and one nest can be provided for five to six geese.



LITTER

Many litter materials are used such as shavings, sawdust and chopped straw. During the winter, deep litter 10-15 cm deep is important. Wet litter or caked litter should be removed and replaced with clean litter to prevent dirty eggs. Do not remove dry, loose litter. During warmer months less litter is needed, which helps keep the building cooler.

LIGHTING

The use of lights in the hen house is to stimulate the hen to lay. Light stimulates the **pituitary gland**, which in turn secretes hormones that stimulate the **ovary** of the hen to release more eggs. Pullets need fourteen 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 laying productively and at the same rate. One 60 watt light bulb for every 13 square meter of floor area should supply enough light.

During the fall and winter, daylight hours are too short. It is necessary to maintain 13 to 14 hours of light per day for the flock to maintain high production. The time of day and lights used are not so important as long as the lighting period is uniform. Time switches are used to regulate and control timing of additional light.



Broiler and Turkey Management

Almost all of commercial broiler flocks are raised in total confinement. The main reasons are:

1. Flocks are easier to manage.
2. More efficient use of labour.
3. Complete environmental control.
4. More control of disease.
5. Prevents losses due to predators.
6. Makes it possible to rear more uniform flocks.

OBTAINING BROILER CHICKS

Broiler chickens should be ordered from local hatcheries so as to maximize convenience and minimize stress during transport. Registered hatcheries in B.C. handle chicks under a brand name. These birds come from selected strains and strain crosses which are produced by multiplier breeding flock owners, who obtain parental stock from primary breeder flocks.

Give the hatchery sufficient notice on orders. It takes 21 days to hatch a chick. Broilers are often best raised on dry litter in a permanent poultry house. Each bird should have about 1.0 m² of floor space. Any clean, absorbent material may be used for litter; e.g. wood, shavings, sawdust. The litter should be dry and as free from dust as possible. Apply fresh litter prior to housing a new flock of birds.

BROILERS AND LIGHTING

It is possible that broilers can be grown under continuous light from chicks to market age. This lighting method can be hazardous since the flock could panic if all the lights go off in a power failure. It is a good practice to shut off the lights for at least 1 hour each day, so they will become used to darkness.

Incandescent bulbs are considered superior to other light sources because they give off soft light. White light that is too bright may be a cause of feather picking which can lead to cannibalism. It is important to be able to dim lights, yet provide enough light for the birds to find their feed and water. Explore lighting options, as the dimming of fluorescent lights is possible and compact fluorescent bulbs are also available.

Waterfowl Management

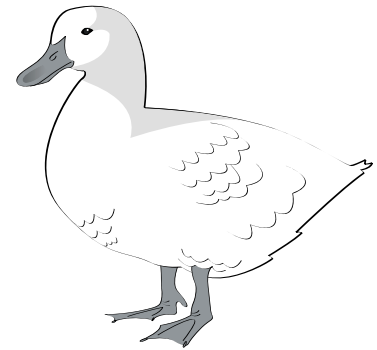
Domestic ducks adapt well to a wide range of environmental conditions and accordingly a variety of satisfactory housing systems have emerged. A small farm breeder flock of ducks does not require as elaborate housing as is needed for chickens and turkeys. A pen in a barn or small building that is well lighted, well ventilated and dry will prove satisfactory. Insulation is not necessary because breeder ducks do not require a warm pen. The pen or house should have easy access to the outside yards as ducks prefer to be outdoors during the day, even in winter.

It is important to keep litter in the pen dry. This is difficult with waterfowl and often requires extra attention and the frequent addition of dry material. Straw and wood shavings are good bedding material.



On commercial duck farms, breeders are usually housed in special breeder houses with access to outside yards. Each breeder duck should have 0.36 - 2.70 m² of floor space. A pen 6 x 6 meters in size is suitable for 80 to 100 breeders. Smaller flocks tend to be quieter, have fewer broken and soiled eggs, and are not as apt to develop cannibalism.

When feeding mash or pellets in hoppers, allow approximately 2.1 to 3 m of feeding space per 50 ducks. Wooden or tubular metal hoppers used for other poultry are quite suitable for pellet or mash feeding.



Environmental Concerns

Every year there is more and more concern over agriculture activities and the environment. Farm waste that is handled properly can be of great benefit, but if it is poorly managed it can end up in places where it is not wanted, polluting the land, air and water.

Two important documents through the BC Agriculture Council that you should make yourself aware of are the “BC Environmental Farm Planning Guide” and the “Farm Practices Protection (Right to Farm) Act”. These two documents will help you to understand the effects that agriculture can have and how to properly manage your production to avoid polluting the environment around you.

ENVIRONMENTAL CHECKLIST

I'm already doing	I want to improve	Care
		<i>Manure is properly stored and covered to prevent leaching and runoff and any runoff is directed away from water sources.</i>
		<i>Manure pile is located far (15m from water, 30m from water to be consumed) from water sources (wells, creeks) and neighbours to prevent contamination.</i>
		<i>If manure is used as a fertilizer, it is applied in the appropriate quantities and at the appropriate times.</i>
		<i>Pollution of concern to neighbours is minimized, such as constant or loud noise, strong gas emissions or odours, or dusty air.</i>
		<i>Paddocks and other high density enclosures are located far (at least 30 m or 100 ft) from water sources (wells, creeks) to prevent contamination.</i>
		<i>Chemicals (pesticides, herbicides, fertilizers) and fuels are properly stored to prevent spills and properly disposed of when outdated.</i>
		<i>Agricultural wastes (straw, wood) are being composted and away from water sources.</i>
		<i>Dead stock is disposed of in an approved and timely manner (varies by cause of death but may include incineration or burial).</i>



Biosecurity Measures – Today’s Reality¹

In recent years, people have become much more aware and concerned about biosecurity issues. Everyone wants to prevent the spread of animal disease as much as possible, and no one likes the possibility of animal diseases contaminating our food supply or affecting our health.

The simplest biosecurity measures are aimed at the possible transmission of animal diseases or pest from one farm to the next. Here are some possible sources of transmission:

- People who travel from one farm to another (for family visits, or for work), unintentionally carrying disease agents on their vehicle, shoes, or clothing.
- Equipment that is moved from farm to farm, carrying dirt, seeds, or micro-organisms.
- Animals from one farm that come into contact with animals from other farms during transport, or during participation at events such as shows, sales, or fairs.
- Farm animals that come into direct contact with infected wild animals, such as rats, mice, raccoons, or others.
- Farm animals that come into contact with airborne disease-causing agents or with fecal matter from infected birds flying overhead.
- Water from streams or irrigation ditches that may have become contaminated upstream from your animals.

Consider the routes of transmission that could affect biosecurity on your farm. Here are some of the general recommendations for farms concerned with biosecurity:

- Restrict human access to the farm property (with signs, fences, and gates) so that farm visitors enter at a single spot.
- Provide disinfectant footbaths or disposable plastic booties for visitors to wear while walking around your farm.
- Provide a graveled or paved parking area for farm visitors (to reduce the carrying of mud from one farm to another).
- Keep containers of disinfectant on hand if equipment, or vehicle tires or undercarriages, need to be washed off.
- Encourage the use of disposable overalls if visitors will come into direct contact with the animals.

The best disinfectant method for hands is vigorous and thorough hand-washing with lots of soap and hot water. If this is not possible, anti-microbial waterless cleansers may be used as a temporary measure, but these cleansers must be rubbed in thoroughly, including under the nails. As soon as hot water is available, hands should be re-washed. If visitors will be in direct contact with animals or hard surfaces on your farm, encourage them to vigorously wash their hands at the start and end of the visit.

Note that it is not possible to provide up-to-date information on all aspects of biosecurity, as the situation can change rapidly. For more information about biosecurity, look into the BC Poultry Bio Security Program through the BC Agriculture Council.

¹ Taken from "A Health and Safety Guide for Handling Farm Animals and Poultry," FARSHA, 2006



Husbandry and Health

The term animal husbandry refers to the management and care of animals. When raising poultry, proper husbandry practices are of vital importance to ensure the health and happiness of your animals. Poultry husbandry includes identification, selection of **breeding stock** and brooding practices.

POULTRY IDENTIFICATION

Bird identification is essential to keeping records and to allow traceability of a bird. For poultry, the most common methods of identification are wing clips or leg bands. The method you choose will depend on your area and what the 4-H club requires. Options for your 4-H project are non-removable leg bands or an alternative form of permanent identification. Leg bands can be used for any type of poultry or water-fowl, including chickens, turkeys, ducks and geese.

SELECTION OF BREEDING STOCK

Also known as culling, when it is time to breed your birds, it is important to select only the best birds. To do this, refer to the **Standard of Perfection** for your breed and compare your birds to this standard. Useful resources to help you in this process are the “History and Project Selection” section of this manual, the Livestock Judging Manual (publication #427) and the American Poultry Association Standards of Perfection.

BROODING PRACTICES

As brooding practices are an important component of poultry farms, there is extensive information about brooder pen setup and management in the “Facilities” section of this manual.

Tips About Poultry Behaviour²

This section generally applies to chickens, turkeys, and fowl such as ducks and geese. You may be raising small flocks of poultry for meat or for eggs, or both, and you may be using indoor confinement, outdoor enclosures, or full free-range methods.

Poultry that are stressed by fear, change, climate, or any other concern will be more difficult to handle and pose a greater risk of deliberately or inadvertently hurting you. Birds are easily affected by changes in their immediate environment. For example, heat or cold will prompt a response in the birds and may generate health concerns. Poultry show their alarm and distress with sudden flight, sharp squawks, and they may seek hiding locations.

Flock behaviour means that some birds may begin to turn on those they perceive as weak or defenseless. Be aware that this behaviour may not only be directed at other birds – children can be at particular risk for injury by chickens or turkeys. Additionally, if you are ever cut, injured, or taken ill inside an enclosure with poultry, you must leave immediately, as you are at increased risk of attack. This is particularly true if you are bleeding.

² Tips about Behaviour is taken from “A Health and Safety Guide for Handling Farm Animals and Poultry,” FARSHA, 2006



Flock Health

Well cared for small flocks are not very likely to have many disease problems. However, trouble can occur in any size flock. When considering flock health, you should know what the positive signs are of when a bird is healthy:

- bright eye
- dry nostrils
- good weight
- alert and active manner
- red comb
- shiny feathers (with most of them there)
- clean feathers under the tail

Normal Ranges for Poultry	
Heart Rate - Chick	350-450 beats per minute
Heart Rate - Adult chicken	250-300 beats per minute
Temperature	39.8°C - 43.6°C

Source: Merck Veterinary Manual

Your flock may appear unhealthy but not actually have parasites or diseases, so it is important to know about other factors such as heat stress and flock behaviour.

HEAT STRESS

A heat stress problem can occur any time during the year if the ventilation system fails. In winter, when large fans are covered, and outside doors on air intakes are closed, it is important to ensure that there is enough back-up or emergency fan capacity to cool the barn. An equipment failure is just as serious in winter as in summer. The birds may show unhealthy symptoms, so it is important to recognize the signs of heat stress.

Laying hens continually adjust their feed intake according to the environmental temperature. When the barn temperature rises above 27°C, the hen's body temperature begins to rise and she eats much less. As eating declines, the egg weight declines. This seems to be due to the smaller amount of protein eaten at higher temperatures. When temperatures rise above 32°C, the number of eggs laid will also decline, since the hen is not eating enough nutrients to continue to lay normally.

Symptoms of Heat Stress

1. Panting
2. Stretched-out neck
3. Raised wings
4. Decreased activity
5. Death

The most frequent result of heat stress is a decline in shell quality. As the hen pants to keep cool, excess carbon dioxide is exhaled. This causes the blood to become more alkaline and reduces its ability to hold and carry calcium for shell formation.



Because the birds drink more, the moisture content of their droppings will increase as well in hot weather. This can cause increased soiling of egg shells and difficulties in handling and storage of manure, because it is very wet.

The immune system of the bird is also affected by heat stress, so vaccinations should not be given in very hot weather. When birds are under stress, their resistance to disease is lowered. Just as doctors do not give us vaccines when we have a cold, poultry vaccinations are not given in times of stress.

FLOCK BEHAVIOUR

A bird may look unhealthy due to flock behaviours such as cannibalism, feather picking and egg eating. These habits are sometimes hard to stop. These behaviours may be due to stress or boredom. When this happens, keep the hens busy by adding litter or feeding green feed, increasing area per bird, change the intensity of light or use another method to check the problem. Remember your show birds are never de-beaked.

Lack of feathers may be due to the annual moult, which occurs in the late summer/fall. Missing feathers at the tail may be from other hens pulling them out, a mineral deficiency, or stress. Fewer feathers on the sides of the neck may be from other hens, or the de-pluming mite.

Prevention of Parasites and Diseases

Prevention is the easiest and most economical way to combat diseases and parasites. Always practice the following:

- Learn to recognize the most common parasites and diseases of poultry. Learn how these are spread and how to prevent their spread.
- Try to purchase poultry from a registered hatchery to ensure chicks have few, if any disease, and do not have pullorum.
- Isolate all new poultry from others for at least two weeks. Watch them carefully for any signs of disease. Do not put them into your flock until you are quite sure that they are healthy.
- Keep adult birds separate from young chicks.
- Eliminate the risk of parasite and disease spread by routinely and thoroughly cleaning barns, cages, egg trays, and water and feed containers. No equipment should be shared with or borrowed from other bird owners. Always clean your hands, clothing and footwear before and after handling birds. Promptly and properly dispose of dead birds, litter and unused eggs.
- When treating sick poultry, keep them separate from the rest of the herd. At chore time, handle the sick animals last.
- Prevent contact with wild birds and other animals.
- Birds are tagged during vaccination with their numbers recorded. All birds entering shows must have current tags as proof of vaccination.
- Limit exposure to visitors. Caution should be taken when taking birds to shows.
- Ventilation and Air Temperature – air should be fresh, not too humid and of the correct temperature.
- Keep bird stress to a minimum by providing appropriate conditions and handling techniques.



There is no equal to good management in preventing disease. Good management means not only keeping clean facilities, but also ensuring that the birds are not stressed. There could be a stress when the chicks are transported from the hatchery to your homes. Find out how long the birds have been in transit and when they were hatched. If there has been more than three or four hours of transit time, put some vitamins and electrolytes in the chicks' water supply for the first 48 hours after arrival. Later, if a lack of colour or liveliness becomes evident in the flock, administering a vitamin-antibiotic mixture in the water might be advisable. Remember, stress usually predisposes sickness, so being attentive is best and always try to offer an ideal environment to the flock rather than try to offset poor management with drug supplements.

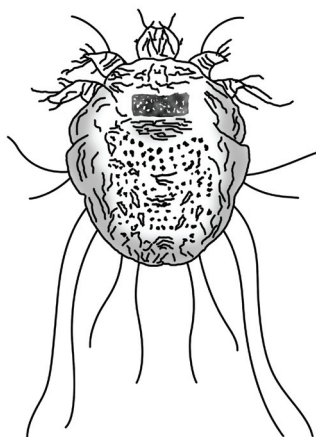
Culling sick and unthrifty birds is an important practice in disease prevention. Sick birds are carriers of disease and their culling eliminates one source of disease spread. Unthrifty birds present another type of problem; they are usually the birds to first contract disease. To have an idea of what to look for and the signs of parasites or disease, the next section outlines common parasites and diseases.

Poultry Parasites

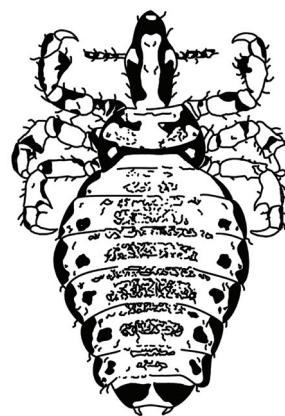
Parasites live on wild birds that can carry them to your flock. Parasites do not live on people or other animals. Parasite infestations will put the animal under stress and make it more susceptible to secondary infections. Parasites exist in two forms: external and internal. Poultry with internal parasites will have poor feed efficiency, tend to be nervous and generally not do as well as birds without parasites. External parasites on poultry cause discomfort, interrupt feeding habits and cause the animal to be less productive than poultry treated for external parasites.

COMMON EXTERNAL PARASITES

External parasites such as lice or mites live on the birds. In addition to being very uncomfortable for the animal, they can also cause damage to the skin, reduce the effectiveness of the immune system and lead to other problems.



mite



tick



Parasite	Description	Transmission	Effects
Northern Fowl Mite	<i>Small, spider-like insect; grey when empty and red when full of blood.</i>	<i>Spend entire life on birds, most commonly below vent and around tail. Females lay eggs on feathers and young will grow without ever leaving bird.</i>	<i>Suck blood, burrow in skin or live on or in the feathers. Lower vitality of birds until they do not grow or produce eggs.</i>
Common Chicken Mite	<i>Small, spider-like insect; red and grey, can only be seen with a magnifying glass or microscope.</i>	<i>Can live in poultry house up to five months when there are no birds present. Mites feed on wild birds, which may spread infestations. Specks of blood suggest these mites.</i>	<i>Suck blood from poultry at night and hide in wall cracks during the day. Cause loss of blood and irritation may lead to anemia in birds.</i>
Scaly-Leg Mite	<i>Very small parasite.</i>	<i>Spreads slowly through flock. Lives and works under the scales on the shanks and toes of the chicken. Spends its whole lifecycle on birds and spread mainly by direct contact.</i>	<i>Burrows beneath scales into skin, causing irregular-shaped eruptions or crusts to form on the shank. Mite may also attach to comb and wattles.</i>
Depluming Mite	<i>Small, spider-like insect.</i>	<i>Spread by crawling around the birds and going from bird to bird.</i>	<i>Burrows into skin near bases of feathers, causing feathers to be pulled out or broken.</i>
Lice	<i>Seven species for chickens, three species for turkeys. Common louse is yellow in colour and flat in shape.</i>	<i>Live on birds their entire lives, starting with eggs attached to the feathers, mostly under the tail.</i>	<i>Irritation to skin, cause loss of appetite and lower birds' resistance to disease.</i>
Fowl Tick, also known as blue bug	<i>Ticks are larger than mites, but overall have a similar shape.</i>	<i>Live in cracks and crevices of poultry housing and feed on birds at night. Hard to get rid of and require thorough treatment.</i>	<i>Ticks suck blood, which can result in same problems as with mites - weakened birds, reduced egg production, even death.</i>

TREATMENT OF EXTERNAL PARASITES

Another pest, not a parasite, around poultry facilities is house flies. They can be controlled with fly tapes and traps. Also, a certain type of wasp can be used to biologically control flies.

To keep mite populations to a minimum and to completely eliminate them, it is important to inspect your birds and poultry houses regularly. A spraying program is also useful, both on the birds and all facilities, especially cracks and crevices. Treatment of lice is similar to mites; however, it is more important to apply the insecticides directly on the bird's body rather than the premises.

There are many insecticides in the form of dusts and sprays available to control external parasites. Some examples are: Carbaryl, Malathion, rotenone dust, tetrachlorynphos and permethrin. These products are available ready-to-use, as dusts or sprays. With any of these products, use with adult supervision and according to the manufacturer's recommendations.



Common Internal Parasites

Internal parasites live in the bird's body in areas such as the digestive system and the lungs. Almost all parasites feed on the bird's body and drain away nutrients. In large enough numbers, most parasites can kill the host (the animal that they live on).

Parasite	Description	Effects
<i>Large roundworms</i>	<i>Long, yellow-white worms in intestine</i>	<i>Droopiness, weight loss, diarrhea, death.</i>
<i>Capillary worm</i>	<i>Hair-like worms in crop and upper intestine</i>	<i>Droopiness, weight loss, death.</i>
<i>Cecal Worm</i>	<i>Short worms in the ceca</i>	<i>Unthrifty, weak, loss of flesh</i>
<i>Tapeworm</i>	<i>Long, white, flat, segmented worms in intestine</i>	<i>Unthrifty, slow growth, weakness</i>
<i>Gapeworm</i>	<i>Red, forked worms in trachea</i>	<i>Gasping, coughing</i>

Source: Wabeck, CF 1995. Raising your home chicken flock. MEP-300 University of Maryland: College of Agriculture and Natural Resources.

TREATMENT OF INTERNAL PARASITES

The easiest way to control all types and stages of parasitic worms is a powder that can be added to feed. Dewormers can also be found in tablet form and given to individual birds.

The best management program for worm infestation is routine diagnosis along with routine treatment. Diagnosis can be made by submitting manure samples to your local Veterinary Services Lab three or four times a year. After worms are diagnosed then treatment should occur based on the advice of your local veterinarian. A combination of routine treatment and submission of manure samples might be most practical.

Poultry Diseases

A disease is a condition that affects the birds' body functions and can be divided into protozoan, bacterial, and viral diseases. Signs or symptoms of diseases are:

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

Any sign that is not normal may be an indication of disease. To minimize losses, early diagnosis of the disease is important. Any of the above symptoms call for immediate action. If disease is suspected the club member should call the club leader, poultry specialist or a veterinarian. Correct diagnosis and immediate and proper treatment are very important.



PROTOZOAN DISEASES

Disease	Age Commonly Affected	External Appearance	Internal Appearance	Prevention	Treatment
<i>Caecal Coccidiosis</i>	<i>1-12 weeks, occasionally older.</i>	<i>Chicks appear cold, wings droopy, feathers ruffled. In acute cases, free blood appears in droppings and feed consumption drops rapidly.</i>	<i>Caecal enlarged, containing blood-stained material.</i>	<i>Clean, dry litter. Low-level feeding of preventive drugs.</i>	<i>Drugs as recommended by veterinarian.</i>
<i>Intestinal Coccidiosis</i>	<i>8 weeks & over.</i>	<i>Reduced feed consumption, birds lose weight, some lameness may occur, combs and wattles pale, bloody droppings may occur in acute cases.</i>	<i>Noticeable thickening of intestinal wall with minute white spots on inside. Small haemorrhages may occur in intestine.</i>	<i>Range rotation. Dry litter in laying-house. Low-level feeding of preventive drug.</i>	<i>As above.</i>

Unlike external parasites there is no highly effective treatment of coccidiosis. Sulfa drugs and antibiotics are used with some success but they do not always result in a cure. The key to prevention is a dry, clean environment.

BACTERIAL DISEASE

Disease	Age Commonly Affected	External Appearance	Internal Appearance	Prevention	Treatment
<i>Fowl Typhoid</i>	<i>Usually young adult birds.</i>	<i>Droopiness, listlessness, comb and wattles pale, green droppings.</i>	<i>Enlarged spleen, swollen liver, gallbladder distended.</i>	<i>Pullorum testing removes most typhoid carriers. Obtain a replacement stock from tested flocks only.</i>	<i>Same as for pullorum, also nihydradzone.</i>
<i>Pullorum and Paratyphoid (turkeys & chickens)</i>	<i>1 day to 4 weeks acute state.</i>	<i>Chicks appear cold, sleepy, chirping, pasting around vent.</i>	<i>Acute, none. Sub-acute, small spots on liver, lungs, and (or) heart.</i>	<i>Blood test all breeding stock to remove pullorum carriers. Detection of paratyphoid carriers is difficult.</i>	<i>Sulpha drugs, Furazolidone or antibiotics according to the veterinarian's recommendations.</i>



VIRAL DISEASES

Disease	Age Commonly Affected	External Appearance	Internal Appearance	Prevention	Treatment
<i>Fowl-pox (chickens & turkeys)</i>	<i>Rarely in chicks or poults under 6 weeks. All other ages susceptible.</i>	<i>Wart-like scabs on face, wattles, comb and occasionally on feet, legs, and skin.</i>	<i>Yellowish raised patches in mouth and throat in respiratory type.</i>	<i>Vaccination; quarantine all new adult stock for at least two weeks.</i>	<i>Isolate the infected birds; remove objects that may cause comb and wattle injury.</i>
<i>Marek's Disease</i>	<i>Any age.</i>	<i>Attacks the nervous system, paralysis of one or more limbs, lesions, difficulty breathing.</i>	<i>Tumours in skin, skeletal muscle, and organs such as spleen, liver and kidneys.</i>	<i>Vaccination according to veterinarian's recommendation.</i>	<i>No cure once bird contracts.</i>
<i>Newcastle Disease</i>	<i>Any age.</i>	<i>Coughing, drooping wings, swelling of eyes and neck, diarrhea.</i>	<i>Lesions in respiratory tract, build-up and blockages in intestinal tract, lesions in intestine.</i>	<i>Vaccination, quarantine infected birds, sanitation.</i>	<i>None.</i>
<i>Infectious Laryngo-tracheitis (ILT)</i>	<i>2 months and over. Highly infectious.</i>	<i>Watery eyes followed by violent fits of coughing, gurgling sound during breathing. Birds raise and extend neck when breathing.</i>	<i>Bloodstained mucous adhering to the walls of the windpipe.</i>	<i>Test all birds and vaccinate all replacement stock at 8-12 weeks of age.</i>	<i>None.</i>
<i>Infectious Bronchitis</i>	<i>Any age.</i>	<i>Milk coughing and sneezing. Crackly breathing sometimes heard. Low mortality in adult birds. Losses in chicks may be heavy.</i>	<i>Mucous plug in lower windpipe.</i>	<i>Vaccination according to veterinarian's recommendation.</i>	<i>Raise brooder house temperature. Antibiotic helpful to control complications.</i>

TREATMENT OF DISEASES

Check with your local veterinarian or poultry producers for what diseases you should be keeping an eye out for and vaccinate against. If you would like to give the birds vaccinations yourself, learn from your veterinarian to make sure you are using proper techniques. Prevention is the best way to avoid diseases contaminating your flock.

Vaccinations provide the birds with immunity to the disease. All birds in the flock must be vaccinated and there is a 30-day quarantine period. During this time, the birds should be confined. Do not visit other poultry owners or allow them onto your property for fear that the disease gets transmitted to unvaccinated flocks. Try to have adequate feed supplies on hand to last the quarantine period as entering farm supply stores during that period would be hazardous.



Avian Influenza³

Influenza (flu) is a broad term for many hundreds of related types of viral infections. To avoid confusion about the different types of influenza, here are three important distinctions:

- 1) Seasonal (or common) flu is a respiratory illness that can be transmitted from person to person. Most people have some immunity, and a vaccine is available.
- 2) Pandemic flu is virulent human flu that causes a global outbreak, or pandemic, of serious illness. Because there is little natural immunity, the disease can spread easily from person to person. Currently, there is no pandemic flu.
- 3) **Avian** (or bird) flu is caused by influenza viruses that occur naturally among wild birds. The H5N1 variant is deadly to domestic fowl and can be transmitted from birds to human. There is no human immunity and no vaccine is currently available.

Currently H5N1 avian flu has affected domestic poultry in many parts of the world, and the rare human cases have generally been linked to very close contact with infected birds. Avian flu is beyond the scope of this manual, as the situation can quickly change. You can find regular updates on the development of avian flu at the British Columbia Centre for Disease Control website at www.bccdc.ca.

Administration of Medications

Keep in mind that it takes a lot of time and experience to be able to recognize and correctly diagnose diseases. Do not hesitate to seek the help of an expert such as an experienced poultry producer or veterinarian if you suspect your birds are ill, especially when purchasing and administering medications. The wrong type or dosage of medication can do a lot of harm so always be sure to double check. Develop a treatment plan for the various clinical signs that you may see in your birds. There are five ways to administer medications:

Orally - given in water, feed or as a drench

Inhaled - sprayed in the air surrounding the flock

Eye Drop - vaccine is applied to eye through drops

Topical - salves, cream or ointments

Injection - not as common with poultry, as the above methods are usually used successfully. When this method is used, for large flocks a multi-dose vaccination gun can be used. Make sure that you use the appropriate sized syringe and needle depending on injection type and bird size. There are three types of injections:

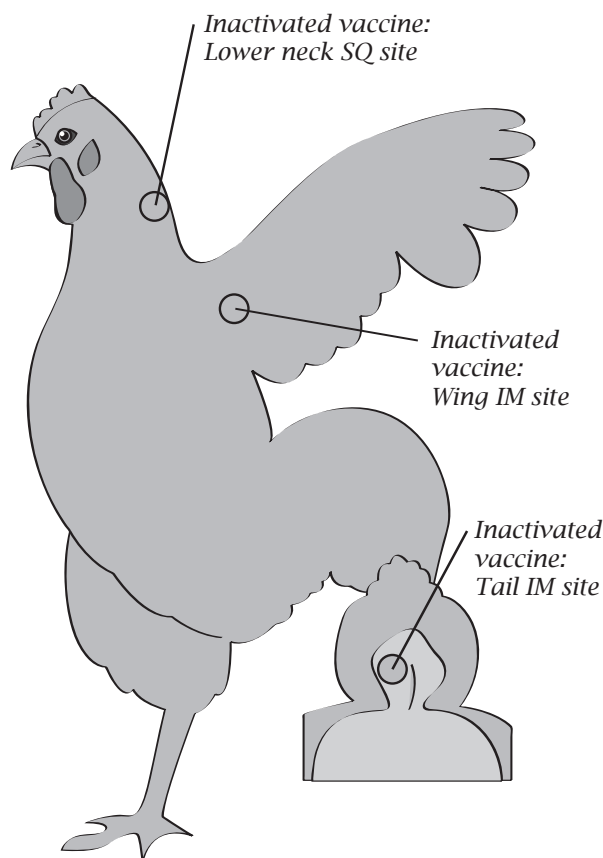
1. Intramuscular (IM) – in the muscle

- There are four sites for giving IM injections: breast, leg, tail and wing. See the diagram below for proper injection sites.
- 12.5 mm x 19 gauge needles are commonly used in automatic syringes.

³ Taken from "A Health and Safety Guide for Handling Farm Animals and Poultry," FARSHA, 2006



- You will need two people: one person to hold and the other to give the injection. Hold the bird firmly so that the person injecting can access the injection site.
- Injection into tail – point needle towards the bird’s head and to the side of the tail.
- Injection into wing – insert needle into underside of the wing, into the muscle group closest to the body.
- The needle should be inserted into the muscle with a quick thrust. Care should be taken to make sure the needle is inserted in the muscle, not just under the skin. You should pull back on the plunger to make sure the needle has not been inserted into a blood vessel, as evidenced by blood appearing in the syringe. The medication should be slowly injected into the muscle.



2. Intravenous (IV) – in the vein

- Sometimes IV injections are necessary to get medicine directly into the bloodstream for a quick response. These are given in the jugular vein. Most producers rely on their veterinarian for this type of injection.

3. Subcutaneous (SQ, Sub-Q) – under the skin

- SQ injections should be given in the lower neck. A SQ injection is given by making a “tent” with the skin and injecting the solution under the fold of the skin, parallel with the line of the neck. The medicine should be slowly injected. The size of needle should be similar or smaller than that used for intramuscular injections.

Use the smallest gauge needle possible when giving injections. Thin solutions will need a smaller gauge than thicker ones. A clean needle should be used (each time) when drawing medications or vaccines from a bottle.

Each time you administer any form of medication you should keep a record of it. Recommended label withdrawal times must be strictly adhered to. Additional safety precautions when administering medication would be wearing a mask and/or gloves.



Poultry Reproduction and Breeding

When beginning with a poultry project, you will learn how to raise young birds. As you advance through the poultry project, you will want to explore more about the production of poultry, leading you to breeding stock.

When you select breeding hens look for breed characteristics and healthy, productive hens. You should learn to distinguish between productive layers and those hens which are not producing eggs (non-layers). The following information will help you look at key characteristics:

Character	Laying Hens	Non-Laying Hen
<i>Vent</i>	<i>Large, dilated, oblong, moist, bleached</i>	<i>Small, contracted, round, dry, pigmented</i>
<i>Pubic Bones</i>	<i>Wide apart</i>	<i>Close together</i>
<i>Comb</i>	<i>Large, red, full, glossy, warm</i>	<i>Small, pale, scaly, cold</i>
<i>Wattles and Earlobes</i>	<i>Prominent, soft, smooth</i>	<i>Inconspicuous, rough, dry</i>

Source: Nova Scotia 4-H Poultry Leaders Guide

Chickens that are well cared for will lay eggs for about one year. After your hens have laid eggs for a year, you may want to pick out the non-layers and dress them for eating. The entire flock should be replaced after twelve to fourteen months of production. The only reason to keep hens or roosters longer would be for show if no offspring were developed.

Breeding Methods

1) Rooster runs free with hens

You will need one rooster for 7 to 14 hens. It is recommended to have two roosters on hand in case something happens to one of them. This type of breeding system does not guarantee top quality chicks because hen selection is up to the rooster.

2) Individual breeding of hens

This breeding method allows for more accuracy and hen selection. For individual breeding of hens, a separate pen is required. Allow 0.3 m² (3.5 ft²) per bird. The pen should have clean litter at all times and an open nest available along with water and feed. After placing the rooster with the hen, allow three days before saving eggs for hatching. Use your best male and best female to ensure hatching of top quality chicks.





3) Artificial Insemination (AI)

Artificial insemination is expensive for poultry producers and is very labour intensive. Therefore, for chickens the above 2 breeding methods are more commonly used. For breeding turkeys, however, commercial breeding for turkeys has resulted in a large size difference between males and females. This makes it hard for normal mating to be successful and artificial insemination is almost always used. When breeding turkeys, you will need special feeds and handling. Breeding toms may become hard to handle. The commercial selection of female turkeys has not selected for brooding and mothering ability, so you will require an incubator.

Production of the Egg

It takes a hen approximately 23 to 26 hours to produce and lay an egg. The hen's reproductive system consists of the ovary and the oviduct. The embryonic chicken has two sets of these reproductive organs; however, only one set will survive to reach maturity and produce eggs. A mature ovary looks like a cluster of grapes, containing follicles at various stages of production. Inside of the follicles are the ova which can develop into yolks of the egg. It takes approximately 10 days for the yolk to develop inside the follicle, which provides the nutrients for growth. Ovulation is the process of ovum (yolk) release from a ruptured follicle.

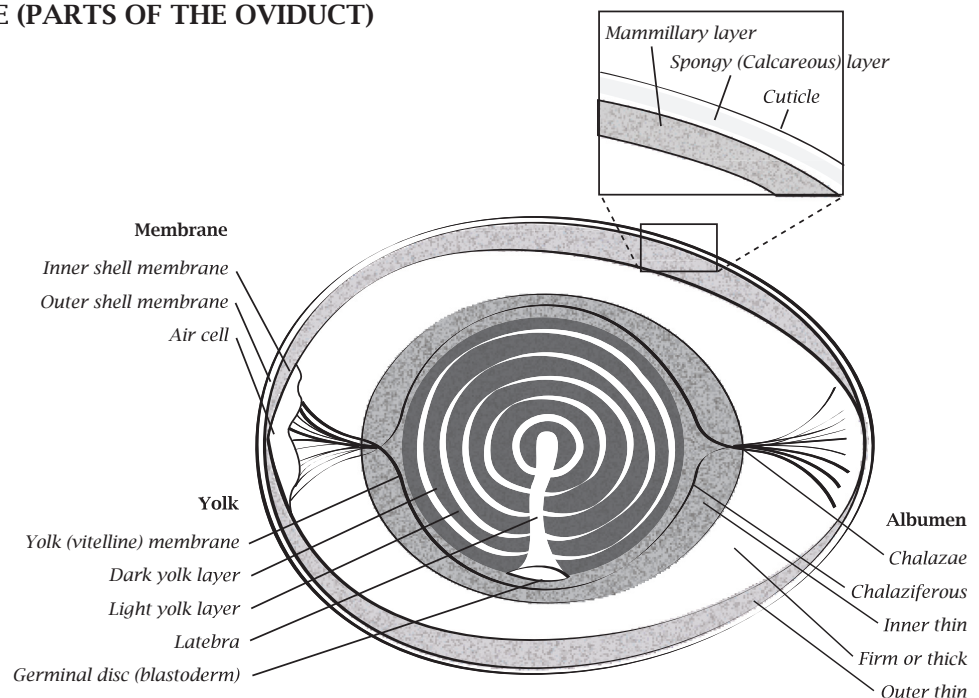
EGG FORMATION TIMELINE (PARTS OF THE OVIDUCT)

- 1) Infundibulum: 1 hour
- 2) Magnum: 2-3 hours
- 3) Isthmus: 1 hour
- 4) Uterus: 20-26 hours
- 5) Vagina: just a few minutes

(Source: Latour, MA et al. 1998)

Upon release from the ovary, the yolk falls into the hen's abdominal cavity and is captured by the infundibulum. The infundibulum looks like a big funnel and is the start of the oviduct. If the infundibulum does

not catch the yolk, the yolk is reabsorbed into the hen's body. In total, the oviduct is approximately 65 cm long and is made up of five parts. In the first part, the infundibulum, the egg is fertilized if sperm are present and also the first layer of albumen is deposited around the yolk. The next section of the oviduct is called the magnum. In the magnum, the majority of the albumen is deposited to protect the yolk and provide nutrients for the embryo if the egg is fertilized. The layers of albumen in an egg can be seen in the Parts of the Egg diagram.





The next section of the oviduct is the isthmus, where the inner and outer shell membranes are added. In the fourth section, the uterus, the egg spends most of its time. The remaining albumen is added to the egg and then the shell is formed around the egg. The shell is made up of calcium carbonate and the thickness of the shell will be affected by the hen's diet and nutrition. If the hen lays brown eggs, the pigment is added to the shell at the end of the time in the uterus. The end of the oviduct is the vagina, which passes the egg through to the cloaca to be excreted. When the egg moves through the oviduct, it passes with the small end first. In the vagina, the egg is turned to allow for laying of the egg large end first.

An egg can only become fertilized in the presence of sperm in the magnum and a chick will develop. If the egg is not fertilized, there is no chance of a chick developing and the result is a table egg for eating. The colour of the eggshell depends on the breed of the chicken. In general, white breeds lay white eggs and red coloured breeds lay brown eggs. The egg colour does not affect the flavour or nutritional content of the egg. Breed and environmental factors can affect the size of egg laid. Also, the hen's age can affect the egg size, as older birds usually produce larger eggs. Table egg sizes are outlined in the "Marketing" section of this manual.

Egg Management for Breeders

CLEANING

Eggs for table use or for hatching should be collected frequently, cleaned and stored. Use clean nest eggs for hatching purposes. **Hatching eggs** must always be handled gently so that the **embryo** is not injured or the protective shell cracked. Before the eggs are incubated make sure that they are clean. Eggs can be wiped with a clean cloth or fine sandpaper.

Washing eggs is not recommended for small flock owners, especially for hatching eggs. Table eggs can be washed in 46-48°C water containing an egg detergent-sanitizer (i.e. 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.

HATCHING THE EGG

It takes some poultry eggs longer to hatch than others. The following table shows the differences in incubation periods of various birds:

Bird	Incubation Period	Bird	Incubation Period
<i>Pigeon</i>	<i>18 days</i>	<i>Pea fowl</i>	<i>28 days</i>
<i>Chicken</i>	<i>21 days</i>	<i>Turkey</i>	<i>28 days</i>
<i>Pheasant</i>	<i>23 to 28 days</i>	<i>Goose</i>	<i>28 to 34 days</i>
<i>Guinea</i>	<i>26 to 28 days</i>	<i>Muscovy Duck</i>	<i>35 to 37 days</i>
<i>Duck</i>	<i>28 days</i>	<i>Ostrich</i>	<i>42 days</i>
<i>Peafowl</i>	<i>28 to 30 days</i>	<i>Bobwhite Quail</i>	<i>23 to 24 days</i>
<i>Grouse</i>	<i>25 days</i>	<i>Canada Goose</i>	<i>35 days</i>
<i>Canary</i>	<i>14 to 15 days</i>	<i>Parakeet</i>	<i>19 to 20 days</i>
<i>Partridge, Chukar</i>	<i>23 to 24 days</i>	<i>Swan</i>	<i>42 days</i>



STORING EGGS

Eggs for hatching should be collected three or four times daily. Avoid exposing hatching eggs to blasts of extreme cold or hot air, rain or snow. Hatching eggs must be cooled slowly to room temperature. After collection, hold the eggs at room temperature (21-24°C) for three to four hours. To keep eggs fresh, store them in a refrigerator at 15-18°C. Storing eggs in a low humidity refrigerator will allow the air cell to enlarge rapidly. Eggs should be kept at humidity from 70-80 percent. Hatching eggs should be stored on their sides and turned three times daily so the chalozza does not stretch.

Keeping hatching eggs more than seven days before incubation will reduce the chance for a good hatch. Hatching eggs should not be stored more than seven days before setting. If you have more eggs than you can use, dispose of them weekly, thereby guaranteeing top-quality eggs. Eggs over two weeks of age should not be used for hatching. Egg quality declines as the egg gets older. In hatching egg management, be concerned with prevention of bacterial or mold infection and controlling temperature and humidity.

STORING WATERFOWL EGGS

Eggs must be stored away from direct sunlight in a cool, humid location. Cellars or basements are ideal places; refrigerators are usually too cold. The ideal storage temperature for hatching eggs that are held for ten days or less seems to be 13-18°C. Eggs held for five days or more should be turned by leaning one end of the container against a wall or on a block at an angle of 30 - 40 degrees each day alternating the end that is raised.

Incubation

Two ways to **incubate** an egg are with a broody hen or in an incubator. A chick grows inside an egg the same way a gosling or duckling does and it does not matter if the egg is hatched naturally or in an incubator.

1) BROODY HEN

If you are not using an incubator to incubate the eggs, duck, goose, turkey and chicken hens can be used. They are called broody hens. A broody hen is a hen that has stopped laying eggs so it can set on eggs to hatch them. Using a 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 the bantam breeds that have not had the broodiness instincts bred out of them. If chickens are used for hatching waterfowl, the eggs should be sprinkled daily with lukewarm water. If a duck or goose is used for hatching, water which comes from their feathers after a swim provides enough moisture for a good hatch.

To entice a broody hen to set, darken an area of the pen or a separate area where a nest with eggs is present. The broody hen prefers a darkened, comfortable, draft-free area. Allow 21 days from the time the hen begins to set on the eggs until the day the eggs will hatch. To break a hen of its broodiness, the idea is to do the opposite of what was done when you enticed her to set. That means making her uncomfortable, in bright light and having to move around.

A chicken hen or female duck can set on nine to eleven eggs of their own eggs. As Muscovy ducks are bigger, they can set on 16-20 eggs. A goose will cover nine to eleven eggs. If there is more than this amount, remove the oldest and dirtiest eggs. Eggs must be positioned in a single layer to hatch well. Place the nest where it will not be disturbed during the incubation period and provide a convenient source of feed and water for the bird.



Basic Brooding Guidelines

- Keep the hen warm and dry and protect from drafts.
- Maintain birds on dry bedding that provides good footing.
- Supply fresh, non-medicated feed that provides a balanced diet.
- Provide a constant supply of fresh water.
- Furnish adequate floor space and fresh air.
- Protect them from predators. Keep ducklings from becoming soaked during their first several weeks outside the shell.
- Bother the birds as little as possible.
- Confine the hen and chicks/ducklings each night until the chicks/ducklings are 6 to 8 weeks old.

ARTIFICIAL BROODERS

The most common artificial brooder that 4-H members use is a heat lamp, although other brooders can be used such as a battery brooder, hover brooder, and a homemade brooder. More information on setup of a brooder and brooding pen is provided in the “Facilities” section of this manual.

2) INCUBATORS

Incubators are heated containers used to hatch eggs. The temperature inside a still air incubator should stay at 39°C and for a circulating incubator, 37.5°C. A big hatchery can have between 14,000 and 100,000 eggs in incubators. Hatcheries that are this size use mechanized incubators but you can hatch eggs just as well in a small incubator.

TYPES OF INCUBATORS

Still-Air Incubators: Available with electric or oil heat. Simple to operate, dependable, nearly maintenance free.

Forced-Air Incubators: Equipped with fans or beaters which move warmed air around the surface of the eggs, and normally have multiple layers of egg trays. Better suited to automatic turning of eggs, and take less floor space for larger quantities of eggs. More complicated and require greater maintenance and sell for higher price. When using an incubator for duck eggs, follow the manufacturer’s instructions for the machine being used.

HOMEMADE INCUBATORS: These can be made from a cardboard box and light bulbs for heat. In emergency situations it is possible to hatch eggs in an electric frying pan or heating pad.

KEEPING THE EGG HEALTHY

When you are incubating eggs, you have to:

- Keep the egg warm so the chick, or embryo, inside will grow. Temperatures for the incubator vary, a still air incubator has a temperature of 39°C (103°F) and a circulating air incubator has a temperature of 37.5°C (99.5°F).



- Keep the air inside the incubator moist or humid.
- Have good air ventilation inside the incubator but make sure it does not have drafts.
- Turn the eggs regularly. This stops the chick from sticking to the shell. In a small incubator, the eggs should be turned at least four times daily. In large setters, the trays of eggs are usually automatically turned every hour. The eggs should not be turned during the hatching period.

WHERE TO PLACE THE INCUBATORS

Place the incubator in a room where the temperature does not fluctuate more than 5-10 degrees over a 24 hour period. Constant temperatures are especially important for still air incubators, which should be located in a room with an average temperature of 16-21°C. Do not position your machine where it will be in direct sunlight, or near a window, heater or air conditioner. Make sure the incubator is level.

SETTING THE EGGS

Start the incubator 48-72 hours before you put the eggs in. Make all necessary adjustments to temperature before eggs are set. Before placing eggs in the incubator, the eggs need to be warmed for 8-10 hours at room temperature. Always set them on their sides with the large end slightly raised. Do not disturb the eggs within the first 24 hours in the incubator.

TEMPERATURE

In still air machines the correct temperature is 38.6°C, 39°C, 39.1°C and 39.4°C respectively for the first, second, third and fourth weeks of incubation. Satisfactory results may be obtained by operating the incubator at 39°C for the entire period. It is essential that thermometers be positioned properly in still-air machines or an incorrect temperature reading will be given. In forced-air machines temperature is maintained at 37.5°C - 37.7°C, since the sides of the eggs are warmed equally. Lowering the temperature by 1-1.5 degrees for the final two days is beneficial for ducklings, since they generate considerable internal heat in their struggle to free themselves from their shells.

HUMIDITY

Moisture is usually supplied by water evaporating pans. To control humidity, the water surface area is increased or decreased, and the amount of ventilation regulated. The best indicator of whether the contents of the eggs are dehydrating at the correct rate is the size of their air cells. The air cell volume can be observed by candling the eggs. If the air cells are too large, increase the moisture by adding more water surface, and/or decrease ventilation. If the air cells are too small, do the opposite.

TURNING

Turning the eggs three times daily at approximately eight hour intervals is the minimum for high percentage hatches. Duck eggs need to be rotated at regular hours and revolved at least 1/3 of the way around at each turning. Begin turning 24 - 36 hours after the eggs are set, and discontinue turning three days before the scheduled hatch date. When eggs are turned manually it is helpful to mark them with an X and an O on opposite side with a wax or lead pencil.



COOLING

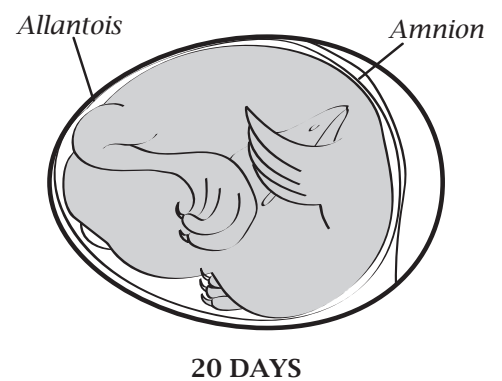
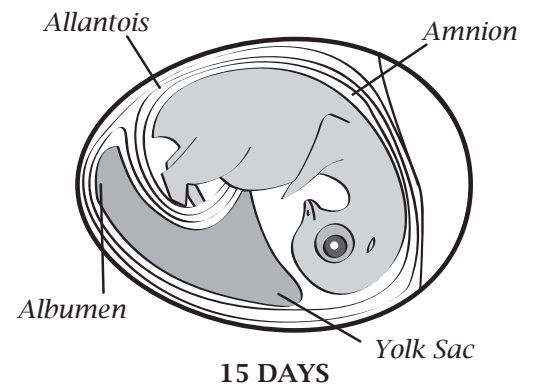
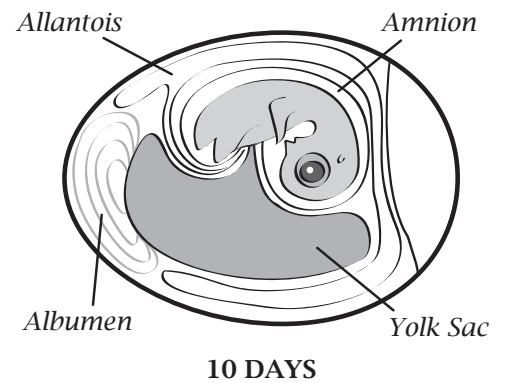
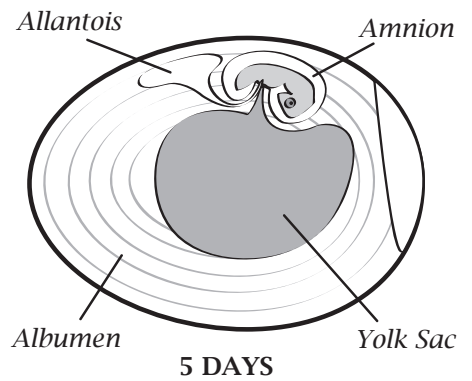
For best results in still air incubators, eggs should be cooled once a day, except during the first week and the last three days of the incubation.

SPRINKLING

Most waterfowl benefit from higher humidity than poultry and require more frequent sprinkling for a successful hatch. To prevent the egg **membranes** from drying out and becoming tough during the hatch, it is necessary to sprinkle the eggs with warm water from day 2 to 26 of incubation.

How a Chick Develops

Before egg laying	<i>Fertilization Division and growth of living cells</i>
Between laying & incubation	<i>No growth</i>
DURING INCUBATION	
Day 1	<i>- First sign of resemblance to a chick embryo - Appearance of digestive tract - Nervous system, head and eyes start to form</i>
Day 2	<i>- Heart and ears start to form - Heart begins to beat</i>
Day 3	<i>- Nose, legs, and wings start to form</i>
Day 4	<i>- Tongue starts to form</i>
Day 5	<i>- Sex organs start to appear</i>
Day 6	<i>- Beak starts to form</i>
Day 8	<i>- Feathers start to form</i>
Day 10	<i>- Beginning of hardening of beak</i>
Day 13	<i>- Appearance of scales and claws</i>
Day 14	<i>- Embryo gets into position to break the shell</i>
Day 16	<i>- Scales, claws, and beak become firm</i>
Day 17	<i>- Beak turns toward air cell</i>
Day 19	<i>- Yolk begins to enter body cavity</i>
Day 20	<i>- Yolk sac completely drawn into body cavity. - Embryo occupies practically all the space within the egg except the air cell.</i>
Day 21	<i>- Hatching of chick</i>





Candling Eggs

Eggs for table use will be unfertilized and are candled to check for cracked shells and to see the condition of the air cell, the yolk, **albumen**, blood spots or meat spots. For care of table eggs, refer to the subsection labelled "Management of Table Eggs". Candling is done in a dark room with the egg held in front of a strong light that lets you 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. A suitable light can be made by cutting a hole 3.2 cm (1¼ inch) in diameter in the end of a coffee or juice can. Insert a light fixture through the lid, using a 40-watt bulb. The interior of the egg can be viewed by holding the large end up to the hole cut in the bottom of the can. As light passes through the egg, twirl the egg several times. If blood spots, cracks or embryo development are present, you can detect them. Remember to candle eggs in a darkened area.

White chicken eggs should be checked for fertilization on the third day. Brown chicken eggs should be checked on the fifth or sixth day because seeing the blood vessels before this is difficult. The best time to check **fertility** or embryonic development for waterfowl is on the seventh day of incubation, unless they have dark-coloured shells; then waiting until the tenth day is better. If eggs are candled prematurely, it is more likely that **fertile** eggs will be accidentally discarded.

If an egg has been fertilized, you can see a small reddish area, or dark spot, with blood vessels running away from it. This resembles a spider in the center of its web.

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. Infertile eggs are clear with the yolk appearing as a floating shadow when the egg is moved from side to side.

Hatch Day

The hatch day is an exciting day. Seeing your next generation of birds starting their life is quite an experience. Towards the end of the incubation period, the chick or duckling will push its head forward and break the shell membrane with its **egg tooth**, on the beak. The chick or duckling then starts to breathe the air in the air cell. This is called **pipping**. The following day, the chick will break out of its shell by using its beak to chip out of the egg shell. Assistance can be given to ducklings which are having trouble breaking out of their shells by carefully breaking away the shell just enough so that the duckling will be able to exit under its own power.

Newly hatched birds are wet and tired. They should be kept in the incubator 4-12 hours while gaining strength and drying off. If your incubator is equipped with air vents they should be regulated to give your chicks/ducklings extra air. You may find it necessary to place extra water containers in the machine to maintain a good level of humidity. If you are doing this, provide humidity with a clean soaked sponge or place marbles in a tray of water to prevent drowning. After most of the chicks/ducklings are hatched, the **relative humidity** can be lowered to 50 percent so they will fluff out properly. Remove the chicks/ducklings from the incubator when they are dry to a clean container prepared with soft bedding.





This is usually about 24 hours after the hatch is completed. At the end of the hatch, thoroughly clean and disinfect the incubator and store it in a dry, sanitary location.

If hatched with a broody hen, the chicks can be left with the hen a day or two but should be removed soon after and put in their own brooder. The broody hen can then be used to continue incubating other eggs.

Most 4-H members are going to raise day-old chicks through to adult birds. Your responsibility will be to care for them as they grow and mature. Ensure chicks have lots of water and feed, stay warm and have a clean pen to live in. Observe the stages of growth and see that the birds are healthy. More information on chick and duckling management practices can be found in the “Feeding and Nutrition” and “Facilities” sections of this manual.

Management of Table Eggs

A hen can produce an egg without mating, which makes the egg unfertile and edible. The eggs should be managed effectively to ensure quality and cleanliness.

It is easier to produce clean eggs than it is to clean dirty eggs. A properly insulated and ventilated house with deep litter is a big help in producing clean eggs. Gather the eggs often and keep the nest litter clean. Do not let the birds roost on the nests at night. Provide about 1 nest 1000 cm² of nest area for each 4 or 5 hens in a nesting room away from the heavy traffic in the house.

Even with best care and management a few eggs will be slightly soiled. These can be cleaned with steel wool or sandpaper on a block of wood and should be cleaned soon after they are gathered.

GATHER EGGS FREQUENTLY IN A WIRE BASKET

Eggs should be gathered at least three times a day and more often in extremely cold or hot weather. Most of the eggs will be laid by noon. A good schedule for gathering is 9:00 a.m., 12:00 noon and 4:00 p.m.

The eggs should be placed in a cool, humid place, free from stale or musty odours as soon as they are gathered. Ideal temperature and humidity are 4°C - 15°C and 79% - 80% humidity. A cool basement or root cellar is probably the most practical place for egg storage on the farm. Leave the eggs in the wire basket overnight to cool thoroughly and pack them in the cases the following day.

PACK EGGS PROPERLY

Always pack eggs point down in the case. They will deteriorate very rapidly when packed small end up. Sort out odd shape, small, extremely large, cracked and extremely dirty eggs and use them at home.



Showing Poultry

Showmanship is defined as the ability to present something in an attractive manner. The purpose of showmanship classes is to present your bird and yourself to your best advantage. Showmanship should be employed in all classes regardless of whether they are conformation classes or those specially designated as showmanship classes. In order to excel in showmanship, a 4-H member should start with the basics of handling, training, selecting and preparing birds for show.



Good Practices Around Poultry⁴

Approach birds in a quiet, confident, easy-moving manner that does not raise an alarm. Unalarmed birds will not try to take flight. However, poultry flying about an enclosure can cause unintentional injury through their panicked flight. Calm birds can be gently moved in a “herding” movement along the ground.

Catching poultry involves important skills – both for the birds’ wellbeing and your own. It is easiest to catch birds in low or blue light. Birds older than thirteen weeks should be carried by both legs or both wings; when releasing them, try to place them on their feet. Turkeys and larger breeds of chicken require greater support, and should be carried by both legs and one wing.

Never handle a chicken or turkey by the head, one wing, or one leg. This will create an out-of-control panic response in the bird, may injure it, and will almost certainly result in scratching or pecking injuries to the handler. The fear and distress of the one bird will rapidly communicate itself through the whole flock.

Use care when placing the birds into cages, and insert each bird head first. Be aware of the door closures to avoid pinching injuries, and file down any sharp edges on cage doors.

When moving chicks from the hatching tray, lift each chick gently and place it down, rather than tipping the whole tray. Chick trays can be heavy and awkwardly-shaped. Lifting these trays can cause back strain, so be sure to let your bent legs carry most of the weight as you lift.

When gathering eggs, pay attention to the behaviour of the roosting hen – she may try to peck as you retrieve the eggs. This can be particularly frightening to children who are asked to bring in the eggs; be sure that any child working around poultry is mature and confident enough to move a roosting hen.

TIPS FOR HANDLING TURKEYS

- Darken room for picking up individual turkeys, as a way to calm them.
- If you work closely with your birds as poults, they will learn to trust you and be easier to handle.
- Stampingeding can be a problem when something disturbs them and they feel threatened. Stampingeding birds will run or fly wildly, crashing into walls and other objects; they might also pile up in a corner and smother each other.

4. Taken from “A Health and Safety Guide for Handling Farm Animals and Poultry,” FARSHA, 2006



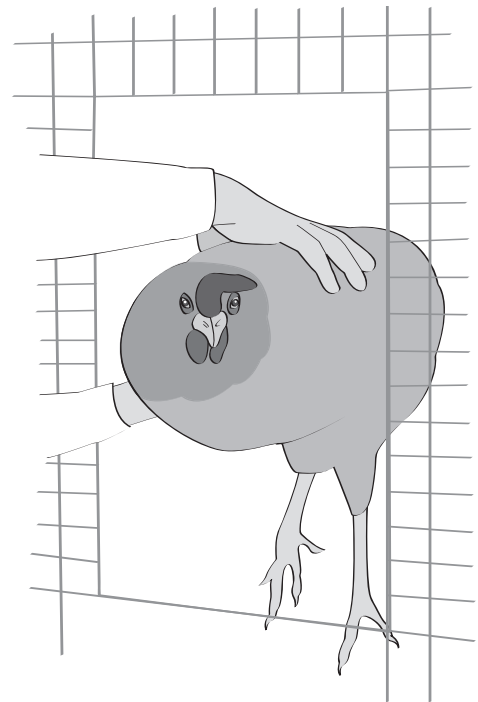
Training and Handling Birds

Handle the birds as often as possible, to get them used to you and trusting you. Pick up the birds by spreading your fingers and placing your hand palm up under the bird's breast as it faces you. As your palm touches the breast, you will find that the bird's legs will be between your fingers. As you lift the birds gently, grasp the legs by closing your fingers. You can now lift the birds without having it squirm and fight. When you have lifted the bird, you will find that it rests comfortably on the palm of your hand.

When taking the bird out of the cage, a large fowl especially, turn it to face the door and then gently take hold of the left wing with your right hand. At the same time, place your left hand under the bird to grasp the legs between your thumb and fingers.

For waterfowl, turn it to face the door and gently take hold of the bird with your right hand around the neck, close to the body. At the same time, slide your left hand under the bird's body placing your fingers between the bird's legs. You are supporting the bird along the length of its body with your forearm and palm. Handle geese the same way, being careful to hold the wings so the goose cannot fly. Geese have to be handled carefully to prevent damage to their powerful wings.

If properly taken out of the cage, the bird will not struggle too much. To return it to the cage, hold the bird in the basic hand position, as above, open the cage door, turn the bird and gently put it into the cage head first.



Selecting Poultry for Show

Showing poultry does not begin when you enter the judging ring. It starts at least several weeks before with these steps. For more information about project selection, refer to the "History and Project Selection" section of this manual.

- *Choose your bird for show.* Start by looking at all parts of the bird as a whole picture. What you want is a blending of all parts of the bird viewed as a whole. A quality called symmetry.
- *Go over your bird carefully.* Go over each part carefully so you do not miss some defect or disqualification that the judge will probably find. If your waterfowl has any broken or damaged feathers, pull them out carefully to allow new feathers to grow into their place by show day. Sometimes it may take longer than 12 weeks for replacement feathers to grow back.
- *Your bird should be cage trained* if it is to be at its best with a judge. Place it in a coop for a week or so before you wash it or show it. Teach it to stand quietly and properly to show itself to the best advantage. Handle it daily, moving it gently about the cage. After the bird has quieted down and does not get excited easily, take it out of the cage. Handle it quietly, smoothing down its feathers and extending the wing, much as a judge will do. Ducks learn very fast and will know what is to be expected of them when it comes time to show if you prepare first.



SHOW CAGES

Cages are one of the most important parts of exhibiting your poultry and waterfowl at an Achievement Day, exhibition or fair. Remember to cage-train your bird before the show so that it will be shown to the best of its ability at the show.

The cage should be:

- Easy to maintain and keep clean.
- The correct size for your poultry or waterfowl. Make sure that it meets the recommended requirements and allows freedom of movement for normal bird growth.
- Economical and of good quality.
- Sturdy and durable so your bird does not get out.
- Structurally sound and in good repair with no sharp edges or abrasive surfaces in contact with your birds.
- Allows food and water to be provided so that spillage is not a problem.
- Allows for ease of seeing birds.
- User friendly.

Preparing Poultry for Show

WASHING BIRDS

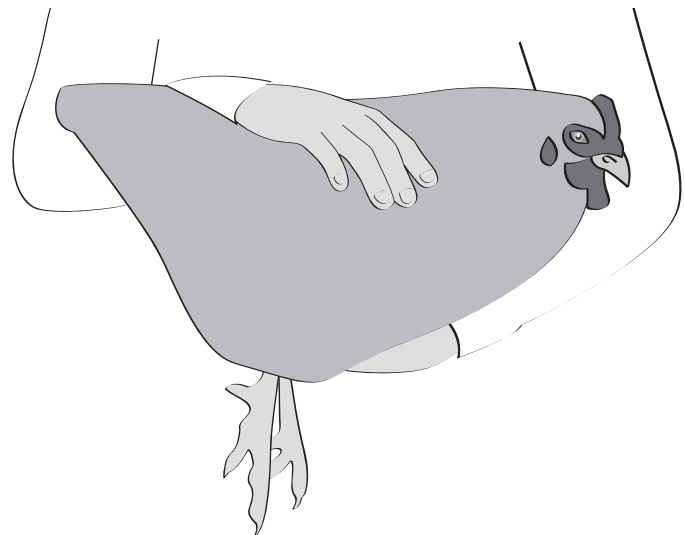
Learning to wash birds is not a difficult task. With a little practice on birds you do not intend to exhibit, you will soon learn how it is done. Wash birds only the day or night before they are to be exhibited or shipped to the show.

Wash Room and Coop – The room in which birds are to be washed should be warm (21°C - 27°C) and free from drafts. Coops should be provided in which to place the birds after they are washed. Plenty of clean straw or shavings should be placed in the coop to keep the washed birds from becoming soiled.

Equipment Needed for Washing

- tub with warm water
- mild shampoo or specially formulated soap
- bluing
- toothbrush for scrubbing feet, legs and toes
- towels or soft absorbent cloths

It is easiest to use up to four tubs when washing, so that one tub can be used for washing and the others for rinsing. Fill the first two tubs with lukewarm water, and third and fourth with cold water. Place a few drops of bluing in the fourth tub to give the water a slight blue color, but take care not to get the water too blue for it will give the plumage a bluish tinge.





Washing consists of three parts: washing, rinsing and drying.

1) WASHING

- Check the water temperature of the soapy water, it should be about the temperature of your arm.
- Keep your bird upright and push it up and down in the water, keeping its head above water, holding the wings and get it thoroughly soaked right down to the skin. When the bird's feet rest on the bottom of the tub, release one hand but hold the bird firmly with the other. With the free hand, gently work the feathers over all parts of the body so soap and water will penetrate to the skin. Wash the bird carefully, always working your fingers with the feathers, never against, so as to not break any feathers.
- Scrub the feet and legs with the toothbrush while the legs are under water. The toothbrush can also be used to clean the vent area.

2) RINSING

- After the bird has been well soaped and washed, it should then go through the rinse process in the next two tubs. Be sure to get all of the soap out of the feathers. If you do not, the bird will be sticky and look worse than before washing, and the feathers just will not work. The last rinse tub should be cooler but not cold. It helps to put 125 ml (1/2 cup) of lemon juice in this water as it will help to cut any soap left.

3) DRYING

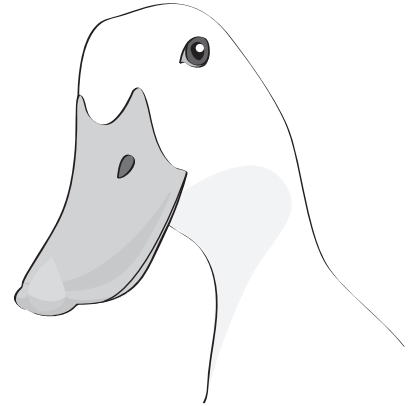
- When the washed bird is removed from the final rinsing, dry the plumage as much as possible. First, work out as much water as possible with the hands, then dry with a towel. Once you have dried the bird as much as possible, place it in a clean coop to dry. Have the temperature warm enough so that the bird will not shiver but so that the feathers will not dry too fast. The washing should be done in the morning so that the bird will not sleep on its damp feathers and get them out of shape.
- Birds should be watched as they dry to make sure that the feathers smooth out and do not curl. Dusting the bird with cornstarch when they are nearly dry will whiten the feathers and help the drying process. Coloured birds can be improved by gently rubbing the feathers with your hand or a silk cloth at least once a day to give them a glossy shine.
- Ensure that the shanks and toes of the bird are clean. If there is some dirt, remove it carefully with a toothpick from under the scales. Use a toothbrush, or moisten a small piece of cloth with olive oil or Vaseline, and rub it over the combs, wattles, beaks and shanks of the birds. Do not apply too much or the plumage may become stained.

TAKING BIRDS TO ACHIEVEMENT DAY – A good, solid but light shipping coop should be used. Never carry birds to a show in a flimsy coop. Put plenty of clean, dry straw or shavings in the coop and fasten a cup in one corner for water, making sure it will not spill and stain the bird's plumage.



Preparing Waterfowl for the Show

Keep in mind that waterfowl are different than poultry, and bathing them is different. **DO NOT USE SOAP when washing your duck because soap can cause the duck to dry out and die.** The steps for washing, rinsing and drying a duck are outlined below.



1) WASHING

- To bath your duck, use three tubs of lukewarm water. Use a soft cloth to wash the feathers and a toothbrush to scrub the bird's bill, shank, toes and feet.
- Keep the duck upright and move it up and down in the water to get it thoroughly soaked right down to the skin. Be sure to keep its head out of the water.
- Wash it carefully with your hand, always working your fingers with the feathers, never against.
- Scrub the feet and legs with the toothbrush while the legs are under water. The toothbrush can also be used to clean the vent area.

2) RINSING

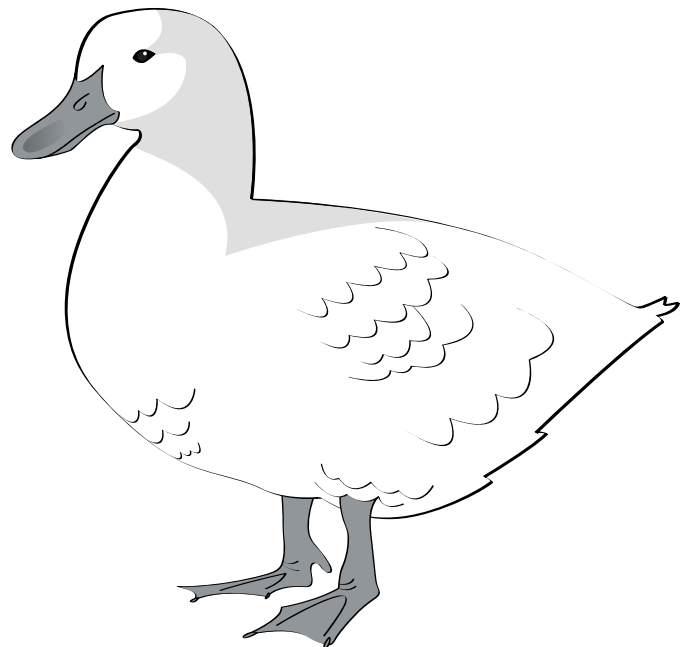
- After the duck has been cleaned, it should then go through the rinse process in the next two tubs.

3) DRYING

- After rinsing, use towels to remove as much water as you can, before placing it in a clean cage.
- After you finish drying the bird, keep it at a temperature warm enough so the bird will not shiver but so that the feathers will not dry too fast.

If only some of the birds' feathers are dirty, it does not need a complete bath. For white birds, gently work cornmeal through the feathers from the bird's head to its tail. Do not go against the feathers.

The day before your show, you may want to place a little mineral oil or petroleum jelly on a soft cloth and apply it to the bird's beak or bill, shanks and toes. Be careful not to apply too much or to touch it to the bird's plumage. After you are finished cleaning your bird, be sure its pen is clean so the bird does not get dirty again.





Showmanship

After selecting your show birds, put them in a cage or coop for an hour or so at a time. Feed them in the coops so they feel at home. Handle them carefully. Put them into and take them out of the coops head first, making sure to use both hands.

A show person has learned the art of selecting, fitting and presenting birds to advantage at a show. The more you work with your bird at home, the more confident you will be with it at the show, and this will be noticeable by the judge. The more you learn about project selection, parts, defects, disqualifications, breed and variety characteristics, and appearance of the bird by fitting and showing, you will be able to easily answer any questions the judge may have.

SHOWING BIRDS IN 4-H

- The birds should be displayed in neat, properly constructed cages. The name or number of the exhibitor should be on each cage. The cage should have a hinged or sliding door on the side to enable ease of removing birds from the cage. A wire cage is suitable and should meet all requirements for size and mesh size.
- The show person should be wearing white clothes, a lab coat or club uniform. 4-H members exhibiting in an outdoor ring are permitted to wear a sun-safe hat. Wearing hard soled boots or shoes is encouraged.
- Birds should be removed head first from the cage. This is done by placing your hand under the bird, along the keel bone, and this manner of removing a bird from the cage avoids excitement and gives better control. Do not pull the bird from the cage by grabbing the legs.
- When showing the bird, hold it in either hand. The bird should rest along the flat of the arm from the wrist to the elbow. The hand holds the legs tightly to avoid escape by the bird. The other hand can be used to stroke the bird along the back or to open the wing or turn the head, if requested by the judge.
- The bird should be placed back in the cage head first. Gentle handling of the bird is important. Considerable previous handling by the owner will avoid much confusion and excitement of the birds at the show.

SHOWMANSHIP TECHNIQUE

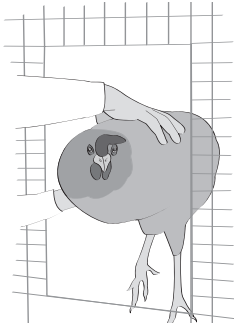
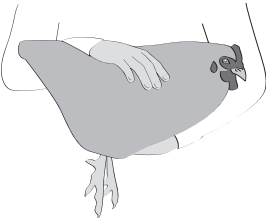
- Explicitly follow the directions of the judge.
- Make sure the bird looks its best from the time it enters the ring until it leaves.
- Never stand between the judge and your exhibit.
- Place the bird to its best advantage. You should be aware of the conformation faults of the bird, so show it to minimize faults.
- Move from one position to another, whether up or down in a class.
- Make room for a contestant, who has been moved ahead of you. Being discourteous in this regard may result in disqualification.
- When changing birds with another member, the conformation of the new bird should be observed quickly but carefully to show it to its best advantage. Place the bird properly.
- Take the job of showmanship step by step so that you get the procedure clearly in mind.



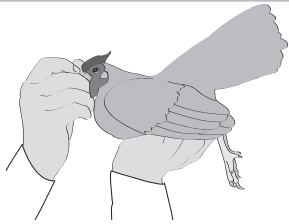
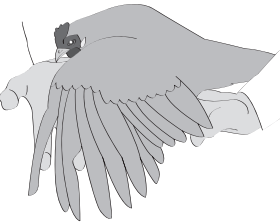
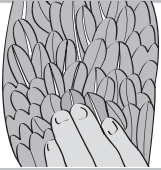
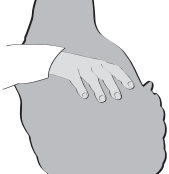


Poultry Showmanship

In poultry showmanship, the show person carries the bird directly to a table where the show person presents the bird to the judge. At the show table there is every opportunity to see differences in quality, hear all the comments of the judges on your exhibit and to learn by observation the finer points of poultry showmanship. The audience, too, can follow the judging and learn from the experience.

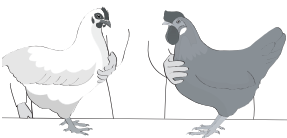
The important thing is that the handling of the bird is natural and comfortable for both the show person and the bird and helps the judge to see what he or she is looking for. Contests, however, must have some basis for judging correctness and often judges prefer to use the recommended procedures available to all participants as a basis for correct handling. The recommended procedures are outlined in the following chart.

STEP	YOU WILL DO	JUDGE WILL DO
1.	Place birds in exhibition coop for showing.	
	<i>Put one hand around the bird's legs and the other over the bird's back. This avoids fright, prevents birds getting loose and keeps feathers smooth.</i>	
2.	Pose birds in the exhibition coop.	
	<i>Pose from rear of coop with short pointer to keep birds in position so that they will look their best. Keep head, tail and wings in normal position.</i>	<i>Judge will be able to see the bird more clearly.</i>
3.	Remove the bird from coop and carry to the show table.	
a)	REMOVE THE BIRD FROM THE EXHIBITION COOP	
	<i>Take the bird from the coop by grasping the left wing with your hand and turn bird's head toward the door. Place left hand beneath body with the index finger between the legs and the remaining three fingers grasping one leg and using the thumb to grasp the other leg. Place right hand on the back and remove head first.</i>	<i>In a large show, the judge will often not see the show person removing the bird from the coop but will see that show person for the first time as he/she approaches the judging table carrying his/her exhibit. If the coop is visible, watch for the proper removal of the bird.</i>
b)	CARRY THE BIRD TO THE JUDGING TABLE	
	<i>The proper way to carry a bird is to use the same left-hand hold as in removing from the coop with the head under the elbow with right hand placed on the back. Do not place the bird on the table until the judge asks.</i>	<i>Observe the way the show person is holding and carrying the bird. When you ask the show person to move their birds at the table, they should pick up the bird in carrying position before moving.</i>



4.	Show your bird to the judge. When asked by the judge, show the following:	
a)	THE HEAD	
	<i>Holding the bird in the left hand, show both sides of the bird at shoulder height. Use your right-hand thumb on the beak to turn the head while also turning your left hand slightly when showing the right side of the bird's head.</i>	<i>Check head for defects, disqualifications and for outstanding features.</i>
b)	WINGS	
	<i>Spread wings to show feather pattern and condition. Showing bird's right wing requires crossing right hand over bird with thumb up. Open left wing with the free hand. Open right wing with free hand by switching the free hand across the front of the bird. Remember, the right wing is the bird's right wing and left wing is the bird's left wing.</i>	<i>Check wings for broken or missing feathers and for colour pattern in certain breeds.</i>
c)	UNDER COLOUR; BODY PLUMAGE	
	<i>Show under colour of back and body feathers.</i>	<i>Observe under colour and determine if defects or high qualities are present.</i>
d)	WIDTH OF BODY	
	<i>Show width by using span of right hand over back.</i>	<i>Observe the width of the bird.</i>
e)	BREASTBONE	
	<i>Show breastbone by turning the back of the bird against your body with the left hand. With right hand, grasp legs and pull to your right while sliding left hand to breast to expose breast between fingers of the left hand.</i>	<i>Observe straightness of the breastbone and general condition of the bird.</i>
f)	FEET AND LEGS	
	<i>Show feet and legs by placing bird against your body with head up using left hand. With right hand, show feet and spread toes.</i>	<i>Observe feet and legs and check for stubs on clean-legged breeds and proper feathering on feather-legged breeds.</i>



g)	POSE THE BIRD	
	<p>Pose the bird on the table. It is most natural to place bird on the table facing your left. Pose the bird to show it to its advantage. This is the most important part of showing a bird. You should have the chicken placed on a square of carpet (18"x 18") to help the bird maintain footing.</p>	<p>Check depth of body and general conformation especially as it relates to the breed and the standards for the breed.</p>
h)	HAND BIRD TO JUDGE	
	<p>Always hand bird head first.</p>	<p>Check and verify any points.</p>
5.	Appearance, actions and knowledge of show person.	
a)	APPEARANCE	
	<p>Be neat and appropriately dressed for the occasion.</p>	<p>Observe suitability of clothing for occasion and neatness and cleanliness of the participant.</p>
b)	ACTIONS	
	<p>Carry out actions confidently always being considerate of your bird, fellow show people and the judge. The judge should have your attention at all times so that he/she does not have to get your attention to move your bird or do some other action.</p>	<p>Observe confidence of movement. If participants are constantly watching their neighbour before taking action it is indicative of a lack of homework.</p>
c)	KNOWLEDGE	
	<p>Be prepared to answer questions about your bird with reference to parts, defects, disqualifications, breed and variety characteristics.</p>	<p>Ask questions if time permits. Questions should be general in nature and on the breed exhibited.</p>
6.	Carry bird from table and return to coop	
a)	RETURN BIRD TO COOP	
	<p>Carry birds away and return to coop, always head first.</p>	<p>Observe the way the show person picks up the bird and carries it away. If you can see the coop, notice how the person places the bird in the coop.</p>
b)	RETURN TO POSITION BEHIND THE EXHIBITIONS	
		<p>Judge has better opportunity to see the birds and make final decisions.</p>

Always stay on the alert! Never stop showing your bird!



Waterfowl Showmanship

The order of steps when showing waterfowl is similar to showing chickens, as outlined in the previous sub-section. Similarities with ducks include taking in and out of the cage, picking up and carrying, showing the head, and showing width of body. The differences in technique that the judge may ask for with ducks at the showmanship table include:

- a) **Show the Tail** - With your right hand, gently push the tail feathers upwards and then downwards.
- b) **Show the Color** - Brush back the feathers just above the tail.
- c) **Show the Wings** - same as with chickens; however, when showing the wings, younger members can reach over the top of the duck, but the judge will deduct from the showmanship mark.
- d) **Show the Keel** - To show the keel you must tuck your hand under to flip the duck so its back is resting against your body. Place the keel bone between your first two fingers. The judge may feel the keel.
- e) **Show the Feet** - Shown in the same position as the keel. Reach down and show the judge one foot after the other, the top and the bottom.



The Judge may ask you to switch ducks or pick up your duck and walk around the table. Remember when walking around the table to always keep your eye on the judge. **Please Note:** all steps for showing a duck are to be done with the duck picked up, not on the table.. The duck is only on the table when it is being posed.

The difference between duck and geese showmanship is that the goose show person does not have to hold the gander in the left hand during showing and in between elements; however, the duck show person is required to do this. Instead of holding the heavy or medium-sized gander, it will be allowed to remain on the table for displaying different parts.

Techniques for Showing Large Birds

Unlike small ducks or small geese, large geese and turkeys may be shown on the ground. These are the steps for walking a bird in showmanship:

- a) Walk in a clockwise direction as indicated by the judge.
- b) Use a cane to guide the bird: forward, right, left and to slow down (with handle) as required in order to keep the bird moving clockwise around the ring.
- c) When the judge asks you to pose the bird, calmly stop the bird, squat or kneel (on one knee) beside the bird.
- d) Place your left hand in the front of the neck with an open palm, do not grasp the neck. Place the bird's feet with your right hand.
- e) Show the parts of the bird as requested by the judge.

**TIPS TO REMEMBER WITH LARGE BIRDS**

- Just before entering the ring, remember to wipe of any dirt stuck to the bird's legs and anything that may have collected around the vent.
- Take a mat or carpet to the ring with you for your duck or goose to stand on. It should not be a crazy colour that will detract attention from your bird.
- If you have been holding your bird for a while waiting for a class, just before your class put your bird down as they may need to go to the bathroom before you enter the showing.
- It is acceptable to use either hand while showing, but advisable to use your left hand to hold the bird and right to show the parts of your bird.

General Poultry Showmanship Scorecard

Member Appearance	
- Appropriate dress (lab coat, club uniform)	15
- Hair - neat and tidy	
- Clean clothing, hands and general appearance	
Member Attentiveness/Interaction with Judge	
- Eyes watching judge at all times	10
- No playing with birds while waiting	
- Confidence responding to judge	
Member's Knowledge of own project	
- When hatched / purchased	15
- What feed, how much, milestones	
- What unit & purpose of unit	
- What is correct / needs improvement with member's project	
Member's Knowledge of Breed	
- Standards, Disqualifications	15
- History of breed, parts of bird	
Control of project	
- Place in cage (3)	30
- Pose in cage (3)	
- Remove from cage (4)	
- Control of bird while showing parts (10)	
- Pose and walk on table (10)	
Condition of Project	
- Clean, healthy, pest free	15
TOTAL	100

**GENERAL SHOWMANSHIP TIPS TO REMEMBER**

- Be neat and clean. Do not chew gum.
- Be alert, polite and courteous to the judge and fellow show people.
- Do not be late entering the ring and never cause delays by visiting with other show people or spectators.
- Always remember to control your emotions and appear keen but relaxed despite where you are placed. Accept the decision of the judge like a true sports person. Keep in mind that the class is not over until the final decision is made.
- Be prepared to answer questions that would normally be asked by a judge as outlined below.
- Be prepared to show any bird the judge designates.
- Make sure the bird is clean, well groomed and well-trained.
- Always keep the bird under control and make frequent glances at the judge to watch for directions.

PRACTICE MAKES PERFECT

You should be able to answer questions about your project when asked by the judge. Typical questions that might be asked:

1. When were your birds hatched?
2. How much do your birds weigh at the present time?
3. How much feed have they eaten?
4. How much money have you invested in them up to the present time?
5. When do you expect your pullets to start laying?
6. Name five disqualifications.
7. What are the strong points you see in your birds? What are the weak points you would change if you could improve them?
8. What are the large wing feathers called? How many feathers are in the normal wing?
9. Name five parts of the head.
10. How should you fit your birds for Achievement Day?
11. What is the most important thing you have learned about poultry or waterfowl?
12. How many toes do the common breeds of chickens have?



Marketing

What is Marketing?

Marketing is the activities involved with getting a product from the person who grows the product (the producer) to the person who buys the product (the consumer).

The selection, breeding, feeding and management programs that have been discussed in this manual are designed to put a high quality chicken and egg product on the market. If growers do not produce the kind of chicken consumers will buy, the consumers will look to other meat products to fill their demand for meat.

In Canada, poultry are marketed in various ways. Regardless of your marketing method, go to the market when your birds are sold and learn all you can about poultry marketing. If you can, follow birds through the slaughtering process and examine the poultry carcasses hanging in the meat coolers. Official meat graders will evaluate poultry carcasses and explain the differences in carcass quality. Arrangements need to be made in advance for this.

The Poultry Industry in B.C.

British Columbia's poultry industry is made up of four major sectors: chicken (meat) growers, the layer (egg) industry, broiler breeders and turkey producers. Other smaller sectors include breeder pullet growers, layer pullet growers, layer breeders and turkey breeders. Waterfowl and other poultry types that are produced are ducks, geese, squab, pheasant, quail and silkie chickens. The Fraser Valley region is the primary area for chicken, turkey and egg production. Other regions that have production are Vancouver Island and the Interior.

When looking at the poultry industry, it is important to look at how production and consumption of poultry meat and eggs have changed. If you are interested, you will need to research this information and look into the statistics further.

Supply Management

The poultry industry in Canada is under a supply management marketing system. This is where producers control the production of a certain commodity. Supply management is done to make sure that farmers grow enough food to match what consumers need and want, and that the farmers get stable prices. Supply management for poultry and eggs is through an agreement within the province, as well as nationally.

There are 4 poultry products that are supply-managed: eggs, turkey, chicken and broiler hatching eggs. The following marketing boards look after this system for poultry and eggs in B.C.:

- **The B.C. Broiler Hatching Egg Commission**
- **The B.C. Chicken Producers/ B.C. Chicken Marketing Board**
- **The B.C. Egg Marketing Board**
- **The B.C. Turkey Marketing Board**

For more information about supply management and the poultry products, start with the different marketing boards and ask producers that are currently working with these systems. For the purposes of the 4-H project, your flock size is small enough to not require quota to get started.



Meat Products

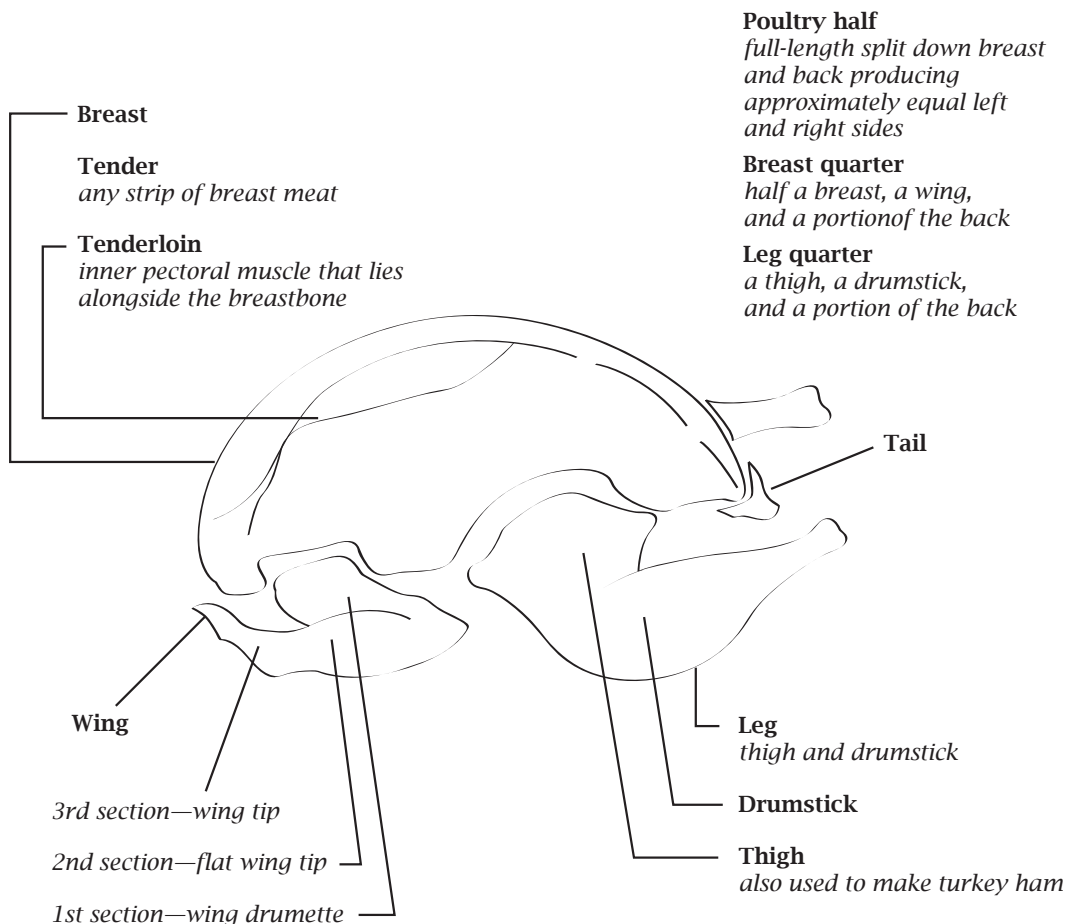
Consumers are fortunate to have a variety of poultry meat cuts to choose from. They can choose from a whole chicken, half chicken or quarter chicken depending on how the poultry carcass is cut up. Other poultry products include only part of the chicken, including, chicken wings, **thighs**, breast meat and the list goes on from there. There are also many different preparations of the meat, from fresh or frozen meat, to ones prepared with different sauces, processed in different ways, and ready to cook poultry.

There are different ways of growing your birds to appeal to different consumers. These are free-run, free-range and organic chicken. Free-run means that the chicken can run around freely and is not confined in a cage. Free-range means that chickens are allowed access to the outside for part of the day. Organic is a broad term, but for chickens it means that the at least 80% of the chicken's diet must be from organic sources.

Consumers may prefer other types of meat including turkey, duck and goose meat. Some of these are available seasonally at the grocery store, while others are more specialty meat and consumers will have to search out where to buy the meat. These meat types may be more preferred with different ethnic markets, and therefore may be more of a niche market to work towards.

MEAT CUTS

Knowing the various cuts of chicken will help you learn what to look for in a broiler bird and what is important when feeding and conditioning.





QUALITY GRADING OF MEAT

When grading poultry carcasses, bird size affects what class the carcass will fall under and the classes are listed below.

CHICKENS	TURKEYS	DUCK	GOOSE
<ul style="list-style-type: none"> - <i>Rock Cornish</i> - <i>broiler/fryer</i> - <i>roaster</i> - <i>capon</i> 	<ul style="list-style-type: none"> - <i>fryer/roaster</i> - <i>medium/young hen</i> - <i>heavy/young tom</i> 	<ul style="list-style-type: none"> - <i>broiler/fryer</i> - <i>broiler/fryer</i> 	<ul style="list-style-type: none"> - <i>young</i>

Poultry carcasses are quality graded at slaughter. Factors affecting meat quality in poultry are the bird age, whether it is a male or female, any stress or strains that it may have been through and diet. Any extreme stress put on the birds, whether environmental or due to inappropriate handling, will affect the meat colour. Bruising can also discolour the meat.

The main poultry classes in Canada are Canada A, Utility and Canner. Canada A has a complete carcass, has no deformities, adequate meat coverage on the leg bones and sufficient fat at the base of the neck and over the breast and thighs. The utility grade applies to carcasses with moderate removal of damaged parts from the carcass. If there is extensive removal of damaged parts, the canner grade applies.

QUALITY ASSURANCE

In Canada, poultry production is under high standards of food safety and quality. This is to make sure that consumers are getting a safe and high quality product. Programs are in place for the poultry industry for on-farm production practices, animal feed manufacturers, and processing of the finished product. If you want to learn more about on-farm food safety, look for the Chicken Farmers of Canada's on-farm food safety program called *Safe, Safer, Safest*. Also refer to other sections in this manual for proper feeding and medication practices so that you can make sure you are taking the appropriate actions with your project animals.

While withdrawal times for antibiotics are important to keep track of, there is more you can do to make sure that your bird brings quality meat to the market. The way that live birds are handled affects their meat quality. Bruised meat lowers the value of the meat, as it must be cut off the carcass. Ways to avoid bruising include taking care when handling and transporting animals.

MEAT INSPECTION

In September 2004, the Province of British Columbia enacted a new Meat Inspection Regulation under the Food Safety Act. Under the new regulations, all B.C. abattoirs that produce meat for human consumption will have to be either provincially or federally licensed. Only meat from livestock slaughtered in a licensed abattoir can be sold for food. All animals processed in licensed abattoirs will be inspected both before and after slaughter.

In addition to provincially inspected plants, there are federally inspected ones. The Canadian Food Inspection Agency (CFIA) is responsible for federal inspection, which includes veterinarians and inspectors. A Canada stamp will identify meat products processed in federally inspected plants. Federal inspection is not always necessary for a local market, but is important when the meat is exported.



Egg Products

EGG PRODUCTION

A good flock of ten laying hens will produce three to four dozen eggs per week. This will supply the needs of most families. Waterfowl raised for commercial egg production is limited in B.C. as there is little consumer interest in purchasing duck or goose eggs for consumption.

If you are collecting eggs for hatching, select those from parents selected for show bird conformation, productivity, vigour, size, health and freedom from any physical abnormalities. The birds must meet breed standards without any disqualifying traits present.

Just as there are different ways of growing your birds for meat, there are different methods for egg production. Egg types available in BC are classic white, brown, omega-3 enhanced, free-run, free-range and certified organic.

QUALITY GRADING OF EGGS

Eggs are graded to ensure a quality product and so that they are safe for consumers. When grading, eggs are judged on: interior quality, weight, cleanliness and shell construction. Grading is done in a registered egg station to make sure handling and packing is done in a clean manner. The grade standards have been set and monitored by the Canadian Food Inspection Agency. In 2003, Health Canada made nutrition labelling of foods mandatory. Egg cartons need to be labelled with nutrition facts and nutrition and health claims for the consumer’s information.

WHAT HAPPENS AT AN EGG GRADING STATION?

There are six stations in B.C. that eggs can be sent to be graded, or farmers may have their own license to do it themselves. When the eggs arrive at the station, they are washed and candled, then weighed and packed into cartons. The eggs go into cartons with their matching federal grade name. At the station, everything is clean and gets inspected regularly.

GRADE	GRADE CHARACTERISTICS	DESTINATION
Grade A	<i>Egg has a thick white, a well centered yolk, a very small air cell, and a clean, sound shell.</i>	<i>Eggs are sold to retail stores and restaurants, usually within four days of being laid.</i>
Grade B	<i>Egg may have a flat yolk, or a thin, watery white, or a rough shell.</i>	<i>Eggs are used in commercial baking, or sent to breaking plants to be used in further food processing.</i>
Grade C	<i>Egg has a loose yolk, the white is thin and watery, and the shell may be cracked.</i>	<i>Eggs are sent to breaking plants to be used in food processing or used in non-food items. These eggs are not sold to retail stores.</i>

Source: BC Egg Marketing Board



Only Grade A eggs are sized according to their weight, with the size categories outlined below:

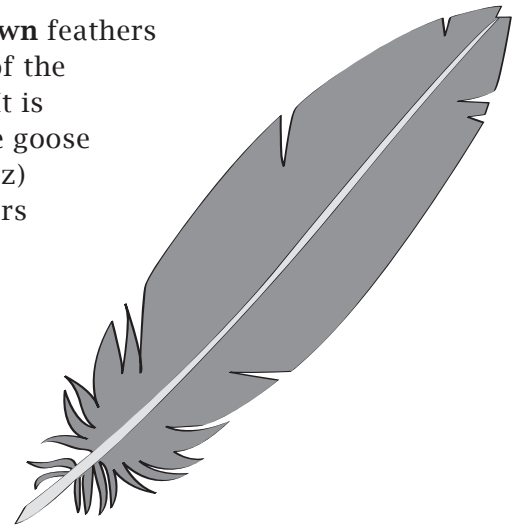
SIZE	WEIGHT RANGE
Peewee	under 42 g
Small	42 g - 48 g
Medium	49 g - 55 g
Large	56 g - 63 g
Extra Large	63 g - 69 g
Jumbo	over 70 g

Source: BC Egg Marketing Board

Please note that grading and the egg grading regulations do not apply “to a producer who produces and sells eggs direct to a consumer at the producer’s farm or place of residence” under the *Shell Egg Grading Regulation*.

Feather Products

Feather products from birds mainly come from geese. The **down** feathers are the most valuable and are obtained from the breast area of the goose. The next most valuable feathers are the fine feathers. It is possible to harvest these feathers from live geese or when the goose is slaughtered. A goose can yield up to 100-200 g (3.5 - 7.04 oz) of feathers, depending on harvesting conditions. Down feathers are used in making pillows, comforters and sleeping bags of the very finest quality. To prepare feathers for this market, 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.



Traceability of Poultry

WHAT IS TRACEABILITY?

A *poultry traceability system* is a poultry identification system that allows for the tracing back and forth of live animals and their products.

There are three important parts to traceability:

1. Identification of product
2. Identification of farms and animals
3. Tracking movement of animals and products

**WHY IS THIS IMPORTANT?**

Traceability is important in proving to consumers that poultry meat and eggs are safe products, which are produced under controlled conditions and carefully monitored. The avian influenza outbreak pointed out the value of traceability to support crisis management, but showed some gaps in the system, which have been identified and worked out.

IS THERE A POULTRY TRACEABILITY SYSTEM CURRENTLY IN PLACE?

The poultry industry is evaluating needs for programs at a provincial level. The B.C. poultry industry initiated a Premise Identification Program in response to avian influenza. This includes locating, identifying, geo-referencing and mapping all commercial poultry operations in B.C. This is an ongoing process that will put the livestock sector in a position to identify all premises in Canada where animals are raised, quarantined, auctioned and slaughtered.

Avian Influenza

As a member interested in poultry, you may have wondered about the current events surrounding avian influenza, also known as bird flu. The symptoms and information of how avian influenza affects poultry is located in the “Husbandry and Health” section of this manual. It is also important to think about the effects on the poultry industry in B.C., Canada and the international community.

Avian influenza is a reportable disease under the Health of Animals Act, meaning that all cases have to be reported to the Canadian Food Inspection Agency (CFIA).

CFIA’S ACTIVITIES

- Setting import restrictions on poultry, poultry products and birds from other countries.
- Surveillance of domestic poultry and wild birds in Canada.
- Promoting awareness and adoption of biosecurity best practices in the poultry industry, international travel and commercial importing.
- Developing and implementing foreign animal diseases emergency response plans
- Contributing to international efforts to combat avian influenza in affected countries

THE EFFECT ON CANADA

With past outbreaks in 2004 and 2005, 410 commercial poultry farms and 553 backyard flocks were affected, totaling 14.9 million commercial and 18 thousand backyard birds. This had a big impact on the industry, and economically it cost over 300 million dollars.

Inspection, control and prevention toward avian influenza are still important and will continue to happen, with the hope of Canada getting back the disease free status. This status is important for the international market and Canada’s exports of poultry products.

Source: Report on the Canadian Poultry Industry Forum, 2004



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www.bcchicken.ca

BC Egg Marketing Board
#150-32160 South Fraser Way, Abbotsford, BC V2T 1W5
www.bcegg.com

BC Broiler Hatching Egg Commission
#180-32160 South Fraser Way, Abbotsford, BC V2T 1W5
www.bcbhec.com

BC Turkey Marketing Board
#106-19329 Enterprise Way, Surrey, BC V3S 6J8
www.bcturkey.com

Chicken Farmers of Canada
350 Sparks Street, Suite 1007, Ottawa, ON K1R 7S8
www.chicken.ca

Egg Farmers of Canada
21 Florence Street, Ottawa, ON K2P 0W6
www.eggs.ca

Turkey Farmers of Canada
7145 West Credit Avenue, Building 1, Suite 202, Mississauga, ON L5N 6J7
www.turkeyfarmersofcanada.ca

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Glossary

A

Abdomen: area between the keel and pubic bones.

Albumen: the whitish watery substance (88% water, 11% protein) that surrounds and contains the yolk in the center of the egg shell.

Allantois: an embryonic membrane which in birds serves as a respiratory organ and 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.

B

Bacteria: microscopic single-celled plants, some of which cause disease.

Balanced Ration: a ration which supplies the necessary nutrients - protein, carbohydrates, fats, minerals, vitamins and water in proportion to properly nourish an animal.

Barbs: series of branches attached to the rachis (stem) of the feather.

Barbules: branches off of feather barbs that create a gripping effect between barbs.

Barring: alternate strips of light and dark across a feather.

Beak: upper and lower parts of the mouth of chickens, turkeys, etc.

Beard: growth or wiry hairs on the front portion of the breast of a male turkey.

Bill: upper and lower parts of the mouth of waterfowl.

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.

Breast: the forward part of the body between the neck and the keel bone.

Breed: a group of fowl related by ancestry and breeding. Birds of a breed all show certain characteristics such as body shape and size.

Breeder Ration: feed used for the production of hatching eggs.

Breeding Stock: adult birds used to produce young.

Broiler: usually a young chicken 6 to 7 weeks of age or sometimes a young turkey processed for meat.

Brood: baby chicks hatched from one nest (setting) of eggs.

Brooder: a heated shelter or cover for raising young birds.

Broody: maternal instinct causing the female to want to hatch eggs.

**C**

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.

Cannibalism: the habit of birds attacking other birds due to overcrowding, diet deficiency or other reason.

Capon: an unsexed male bird, distinguished by the undeveloped comb and wattles, the presence of long, narrow hackle and saddle feathers, and low tail.

Caruncles: on a turkey, the red, bumpy, fleshy tissue covering the head and neck.

Carcass: the major portion of a meat animal remaining after slaughter. Varies among animals, but usually the head and internal organs have been removed.

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 fiber that are twisted like a rope at each end of the yolk. They anchor the yolk in the center of the egg shell 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.

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.

Cock: male bird over 1 year old.

Cockerel: a male chicken less than 12 months of age.

Comb: the fleshy part on top of the head of chickens, usually a reddish colour.

Concentrate: feeds low in fibre and supplying large amount of digestible nutrients, e.g. cereal grains, oil meals.

Conformation: the body type, or physical characteristics of the fowl.

Culling: process of selecting for most desirable animals and removing undesirable animals.

D

Deficiency: when talking about nutrition, a lack of certain nutrient in the diet.

Down: the soft, fine, fluffy covering of young birds. Down feathers may also be present on adult birds.

Drake: a male duck.

Dressed Poultry: bird with blood and feathers removed.

Duck: female duck.

Duckling: young duck of either sex.

**E**

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 is capable of developing into a new individual.

Egg Tooth: the temporary horny cap on the chick's upper beak which 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.

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.

Eviscerated: slaughtered bird with feather, head, feet and inner organs (viscera) removed.

F

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 pounds of feed consumed by pounds 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.

Finish: relates to the meat quality of a dressed or eviscerated bird.

Fleshing: the meatiness of a bird, the ratio of meat to bone.

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

Forced-Air Incubator: a container for hatching chicks that is equipped with fans or beaters which move warmed air around the surface of the eggs, and normally has multiple layers of egg trays.

Fryer: a young chicken of either sex that weighs from 1 - 1 ¼ kg.

Full-feathered: when a bird has a complete set of feathers.

G

Gander: male goose.

Gene: an element in the chromosome of the egg or sperm cell that transmits hereditary characteristics.

Germ: developing embryo inside an egg.

Gizzard: the muscular organ that contains grit for grinding the food eaten by birds.

Gonad: a gland that produces reproductive cells; the ovary or testis.

Goose: female goose.



Gosling: young goose of either sex.

Grit: fed to poultry, has no feed value but acts as a grinding agent in the gizzard and allows birds to utilize feed more efficiently.

Growing Ration: feed that is formulated to stimulate fast growth in chicks/ducklings over two weeks old.

H

Hackle: plumage on side and rear of the neck.

Hatchability: refers to number of fertile eggs that hatch; usually expressed as a percentage.

Hatching Egg: a fertilized egg with the potential for producing a chick.

Hen: a female chicken more than 19 weeks old.

Hereditary: the transmission of genetic or physical traits of parents to their offspring.

Hock: the joint of the leg between the lower thigh and the shank.

Hormones: a chemical messenger sent from one part of the body to another.

Humidity: see relative humidity.

I

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.

K

Keel: the breast bone.

Keratin: a fibrous protein that makes up feathers, beaks and claws on birds. On other animals, this protein makes up hair, hooves and horns.

L

Laying Ration: feed that is formulated to stimulate high egg production.

M

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.

Moult: to shed old feathers and grow new ones.

**N**

Nutrient: compound or group of compounds of the same general composition that aid in the support of animal life.

O

Oil Sac: a large oil gland (preen gland) on the base of the tail used to preen or condition the feathers.

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.

P

Papilla: in the rooster, tiny projections in the cloaca through which semen is ejected.

Parasite: internal or external organism which lives in or on the host animal at whose expense it obtains food and shelter.

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.

Pipping: what a chick does as it breaks through the shell to hatch.

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.

Poult: a young turkey.

Predators: anything that can cause harm to your birds. Examples of predators for chickens include dogs, raccoons, owls, coyotes.

Primaries: the long, stiff flight feathers on the outermost half of the wing.

Processed Poultry: dressed or eviscerated poultry.

Protein: a nitrogenous compound composed of amino acids.

Protein Supplement: feeds high in protein, mixed with grains to provide a balanced ration, e.g. soybean meal, fish meal.

Pubic Bone: thin posterior portion of the hip bones that forms part of the pelvis.

Pullet: female chicken less than 19 weeks old.

R

Rachis: the main hollow shaft of a feather.

Ration: amount of feed fed to an animal over a 24 hour period.



Relative Humidity: the amount of moisture in the air compared to the amount the air could contain at that temperature; expressed as a percentage.

Roaster: a young chicken of either sex from 5 - 9 months old, weighing 4 lbs. and up, used for meat.

Rooster: a male chicken.

Roughages: feeds low in total nutrients and usually high in fibre content, e.g. hay, straw, silage.

S

Saddle: the upper back portion of the bird, just before the tail section.

Secondaries: the large wing feathers adjacent to the body.

Semen: the fluid that carries sperm, secreted by the male reproductive organs.

Sex-Link: chickens that can be sexed at hatching due to feather development.

Shank: the leg portion from the toes to the hocks.

Sickles: the long, curved tail feathers of the rooster.

Sperm: the male reproductive cell.

Spur: the stiff, horny growth on the inside of the shank of older poultry, more pronounced in males.

Still-air Incubator: a container for hatching chicks that does not have mechanical ventilation.

Standard of Perfection: conformation standards set out by the American Poultry Association.

Starting Ration: feed that is high in protein formulated for young chicks/ducklings.

Straight Run: young poultry that have not been sexed.

Succulent Feeds: feeds that are fed in a green or preserved stage, e.g. silage and green grass. These feeds are typically roughages meaning they are high in fibre and cannot be eaten in large enough quantities by poultry for them to receive their total nutrient needs. Fresh grass, weeds and discarded vegetables are well liked by poultry and can be fed to supplement a complete grain ration.

T

Testes: the male genital glands (singular: testis or testicle).

Thighs: the feathered parts of the legs between the hock and where the leg joins with the body.

Tom: a male turkey.

Trio: used for showing purposes, consists of one male and two females of the same age and breed.

U

Urban Trio: consists of three females of the same age and breed and is for members who live in urban areas where municipal or city by-laws prohibit them from raising a rooster or cockerel.



V

Variety: subdivision of a breed distinguished either by plumage colour, plumage pattern or comb type.

Vent: excretory or fecal opening at the tail area of birds.

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.

W

Waterfowl: birds that naturally spend most of their lives on and near water.

Wattles: the thin, fleshy skin at either side of the base of the beak and upper throat.

Web Foot: thin, rubbery layer of skin between the toes of waterfowl.

Y

Yolk Sac: a yellow globular mass of nutrients contained in a transparent membrane (vitelline membrane) in the center 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.

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