

# Egg Production in Canada

---

Modern domestic strains of egg-laying chickens (also called 'layers', 'laying hens', or simply 'hens') originate from Jungle Fowl and we know that in the wild, these hens would build a nest in which to lay their egg, would forage for food and would perch up high at night. While modern strains of hens are different from their ancestors, they still retain many of the behaviour patterns of their ancestors and are strongly motivated to perform those behaviours.

## The Life of an Egg-Laying Hen

In B.C., more than 2 million hens are raised for egg production each year.

Chicks are hatched at hatcheries where the male and females are separated soon after hatching. Female chicks are kept at the hatchery for up to 2 days where they are vaccinated against diseases.

Beak trimming is routinely performed on flocks destined for commercial production. This is a painful procedure that involves removing a portion of the beak using either a blade (hot or cold) or a laser and is performed within the first week of life.



Male chicks of egg-laying breeds are of little economic value as they will not produce eggs, and, due to genetics, grow much slower than breeds of chickens raised for meat. As a result, they are all killed after hatching.

Female chicks are either transported directly to the farm or, more commonly, to a pullet grower who rears the chickens until they reach approximately 19 weeks of age. At that time, the pullets are transported to the farm.

The average hen will begin laying eggs at between 18 - 20 weeks of age (depending on the season and the breed of hen that is raised). Over a period of one year, a hen will lay approximately 320 eggs, or one egg every seven out of 8 days. This level of egg production represents a significant increase over what the ancestors of these modern strains of hens produced, and is the result of genetic selection.

After laying eggs for nearly one year, a hen's egg production declines, as does the quality of the egg shell and contents, and the hen is considered "spent". On most farms in Canada, one-year-old hens are taken to slaughter. As such, a hen's life span on-farm is much shorter than her natural life expectancy of 5-11 years.

In some countries, egg laying hens at one year of age may instead be "force to molt" to extend their laying capacity into a second or third cycle. This process involves withholding or reducing feed and light for up to 18 days and attempts to mimic natural molting – a process whereby chickens shed then grow a new set of feathers. Natural molting is stimulated by the reduction in day length that occurs in the fall combined with any kind of stress to the chicken, and is associated with a sharp decline in egg production. The chicken's reproductive tract is rejuvenated during the molt, and the hen will again begin to lay eggs, albeit at a somewhat reduced level.

The artificial lighting provided to chickens on most commercial farms prevents the hens from molting naturally, so some farmers induce it by lowering the light and using the withdrawal of food as the stressor. Most people

agree that forced molting is an unacceptable practice as it denies the birds the food and light they require. Forced molting is not commonly done in Canada.

Once the hens reach the end of their laying cycle, the entire flock is removed all at once so that the barn can be disinfected and left vacant for a downtime of at least 7 days before a new flock of chicks or pullets is placed on the farm. The meat from egg laying breeds is considered to be of low quality and is not generally used for human consumption. Sometimes it is used in soups or processed foods, and often it is used in pet foods.

## Housing Systems for Egg-Laying Hens

The various types of housing systems used to raise egg-laying hens on-farm are listed below. The method of housing strongly impacts a bird's ability to perform natural behaviours and therefore impacts on their welfare. When we consider the various methods of housing, it can be useful to evaluate them in the context of what we know to be the natural behaviours of egg-laying hens.

### ***Conventional Battery Cages***

These systems house egg-laying hens in small barren cages. Hens have access to feed and water and their droppings fall through the wire cage floor onto a belt or into a pit for disposal. The space provided for each hen varies across farms but may be as little as 432 cm<sup>2</sup> (67 square inches) per bird, which is less than a standard-sized piece of notebook paper. Generally, 4-6 birds are housed in each cage and cages are stacked vertically on top of each other (hence the term “battery”) to allow thousands of hens to be housed in one barn.



*Access to food and water* is good and consistent in these systems with automated units providing adequate food and water for the birds throughout the laying cycle.

*Thermal comfort:* Barn temperatures can be well-maintained so that birds are in an environment that consistently has appropriate temperatures.

*Physical comfort:* There is broad consensus that the physical comfort of birds in conventional battery cages is poor. For example, hens can experience chronic pain associated with injuries to their feet caused by standing on the wire floor of the cages.

*Catching and transport:* Due in part to the lack of exercise caged hens can engage in, their bones are weak and brittle making them susceptible to painful fractures of the wings and legs as they are pulled from the cages at the end of their laying cycle. In fact, studies show that 20% of caged hens suffer broken bones after being removed from cages and transported - this equates to more than 400,000 hens who suffer from these injuries each year in B.C. alone.



*Emotional well-being:* Birds in battery cages are less likely to experience fear because they are in a small stable group of hens and predation is not an issue. However, much research suggests that hens in conventional cages experience severe frustration due to their confinement in these barren environments and their inability to nest while laying an egg. When we observe modern strains of hens around the time of egg-laying, we see behaviours symptomatic of frustration, including pacing and increased aggression.

*Ability to perform natural behaviours:* These cages severely restrict freedom of movement – the cages are barren and too small to allow the hens to perform important movements they are strongly motivated to perform, including dust bathing (grooming), wing flapping, perching, foraging and nest building.

### ***History of the battery cage***

The first half of the 20<sup>th</sup> century saw tremendous specialization in animal agriculture. In the egg-laying sector, operations were scaled up to coincide with scientific breakthroughs in nutrition and breeding that allowed for increased productivity; however, the traditional free range and deep litter systems did not scale up easily. The layout of such systems was not easily automated so the cost of labour was high. Additionally, scaling up of free range and deep litter systems led to hygiene challenges and increased transmission of diseases like Avian Tuberculosis and Salmonella, and parasites like coccidia and worms.

In the 1950's the battery cage system emerged and seemed to solve these problems. At first one hen was kept to a cage, but it was soon realized that profits could be increased by keeping up to 4-6 hens per cage. Keeping hens in cages allowed for automatic feeding, drinking, egg collection and manure removal. Because the wire flooring enabled separation of the hens from their feces, caged housing broke the cycle of infection.

It appeared that the welfare of hens had been increased by keeping them in battery cages - disease incidence had diminished, annual mortality rates dropped from 20% to less than 6%, and the hens laid more eggs. Farmers and veterinarians generally felt this was a victory for animal welfare, but the public was soon in disagreement.

In 1964, Ruth Harrison published her momentous book *Animal Machines*. The book was very critical of intensive farming in general, and of battery cages in particular because the cages restricted the hens' behavioural freedoms. This spurred an increasing amount of research into the broader welfare implications of battery cages.

### ***Enriched and Furnished Cages***

These systems are diverse in their design and may provide:

- More space per hen than a conventional battery cage
- Resources that enable hens to perform natural behaviours (e.g. nesting and perching)

In the European Union (EU), the conventional battery cage will be phased out by 2012, and egg producers must raise their hens in either a free range, free run or enriched cage system. In the EU, the enriched cages must, at a minimum, provide 750 cm<sup>2</sup> of floor space per bird (compared to 432cm<sup>2</sup> required in Canada), a nest, litter, perches and suitable claw shortening devices.





*Access to food and water:* Is good and consistent in enriched cages. It is recommended that feed be provided in ground form rather than pelleted form, in order to encourage food-directed pecking behaviour and to decrease the likelihood of feather pecking.

*Thermal comfort:* Barn temperatures can be maintained so that birds are in an environment that has appropriate temperatures throughout their laying cycle.

*Physical comfort:* The enriched cage will still restrict a hen's ability to roam freely as the space provided may not be much more than that of traditional battery cages. If the flooring is litter rather than wire, the birds will not suffer from the pain associated with foot injuries. However, this is not a guarantee, and any litter provided must be properly maintained so that it doesn't cause skin problems, such as foot pad dermatitis.

*Emotional well-being:* Variable. Birds are less likely to experience fear in these enriched cages because they are in a smaller stable group of hens and will not be fearful of predation. While a nest may be provided in an enriched cage, the lack of space to move about freely may negatively impact the hen's ability to access the nest when she wants to.

*Ability to perform natural behaviours:* Variable. If the enriched cage has a perch and dust bathing area, the hens may be able to perform those behaviours provided also that there is adequate space. In situations where space is limited, dominant birds may guard these resources preventing others in the group from accessing them.

### **Cage-Free Systems - Free Run**

Hens are raised free from cages and are kept entirely indoors on a barn floor. Free run housing that provides deep-bedding is often referred to as a deep-litter system.

Free run housing does not necessarily provide more space per hen than conventional battery cages, and is not required to provide resources such as nest boxes, perches, or a substrate for dust-bathing. While free run hens do not have access to the outdoors, the barns may be designed to allow natural light to enter.

*Access to food and water:* Is good and consistent in these systems. It is recommended that feed be provided in a ground up form rather than in a pelleted form in order to encourage food-directed pecking behaviour, which decreases the likelihood of feather-pecking.



*Thermal comfort:* Barn temperatures can be maintained so that birds are in an environment that has appropriate temperatures throughout their laying cycle.

*Physical comfort:* Variable, depending on the space provided per bird. If the litter is well maintained, painful foot injuries will not be a problem.

*Emotional well-being:* As the birds in a flock establish their hierarchy, some may be aggressive which may cause fearfulness in some birds; therefore it is important to provide the hens with escape areas and enough space to do so.

*Ability to perform natural behaviours:* Well-managed free run facilities with appropriate stocking densities allow the hens to roam freely in the barn and explore their surroundings. If these systems provide nest boxes, perches and dust bathing areas in sufficient quantity, the hens in the flock will be able to fulfill their full range of natural behaviours. Studies show that birds who use perches regularly have stronger bones and are therefore less likely to suffer from painful injuries common in their battery-caged counterparts.

Note: The "free run" label that may be seen on some broiler (meat) chicken can mislead consumers by suggesting that meat chickens are raised in cages. In fact, no meat chickens are raised in cages; they are always free run or free range.



### ***Cage-free Systems - Free Range***

Hens are free from cages and are allowed access to the outside. As with free-run housing, free-range systems do not necessarily provide more space than conventional battery cages, and are not required to provide resources such as nest boxes, perches, or a substrate for dust-bathing.

*Access to food and water:* Adequate feeders and drinkers must be available to the flock to ensure that all birds have good access. It is recommended that feed be provided in a ground up form rather than in a pelleted form in order to encourage food-directed pecking behaviour and to decrease the likelihood of feather pecking.

*Thermal comfort:* Will be variable in these systems; however, since hens can choose whether to be indoors or outdoors, their thermal comfort will likely be good. Flocks with access to the outdoors also require shade during the summer as well as shelter from rain.



*Physical comfort:* Variable depending on the space provided per bird, as per "free run" above.

*Emotional well-being:* As the birds in a flock establish their hierarchy, some may be aggressive which may cause fearfulness in some birds and providing escape areas will help alleviate that. Any flock with access to the outside must be protected from external threats such as predators.

*Ability to perform natural behaviours:* As with "free run" above. Access to the outside also gives the birds the opportunity to forage for food as they like.

## **Fast Facts About Eggs and Egg-Laying Hens**

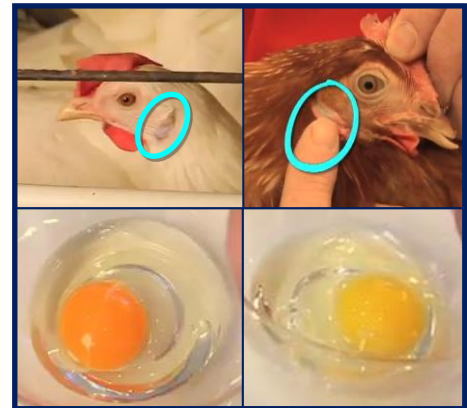
### ***Hen facts***

- A hen can lay about 320 eggs per year at her highest production. This number decreases as the hen ages.
- In the wild, chickens can live for 5-11 years, but their life is many years shorter (usually 1-2 years) on a farm.

- Chickens can recognize and remember about 100 other chickens.
- Chickens clean themselves by taking dust baths.
- Chickens have nerve endings in their beaks, meaning de-beaking (beak trimming) is painful, unlike many people believe.
- More than 90% of Canada’s egg-laying hens are confined in small cages called “battery cages”. They are often grouped 4-6 to a cage.
- Free-run eggs are from hens that are housed on litter and/or slatted floors. They can roam about indoors on the barn floor but free-run hens do not go outdoors.
- Free-range eggs are also from hens that are housed on litter and/or slatted floors, but free-range hens can access an outdoor area with vegetation when the weather is nice.
- Certified organic eggs are from free-range hens (weather permitting) fed a certified organic diet and raised according to Canadian Organic Standards. Organic eggs in British Columbia are certified by such groups as the Certified Organic Associations of British Columbia (COABC) or by OCPP/Pro-Cert Canada.
- Free roaming chickens walk about 3 kilometres a day.

### ***Egg color***

- Egg shell colour depends on the breed of hen. White-shelled eggs are from hens with white earlobes (e.g. White Leghorn). They have the same nutritional value as brown-shelled eggs, which are from hens with pinkish-red earlobes (e.g., Hyline Brown, ISA or Lohmann). Shell colour is not dependent on feather colour.
- The colour of an egg’s yolk is determined by what the hen eats. Feeding corn and alfalfa-based diets and diets high in carotenes to egg laying hens typically produces the popular yellow-orange yolk. Wheat-based feeds and diets low in carotenes produce a pale yellow yolk. Feeding cottonseed meal produces green yolks, popular in the world of Dr. Seuss! Yolk colour does not affect flavour and is not indicative of nutritive value or quality of the egg.



### ***Egg handling, grading and sale***

- At the farm, eggs are collected daily then placed in coolers. They are picked up by refrigerated trucks and taken to federally-licensed egg grading stations where they are refrigerated before and after grading. Eggs are usually washed, graded, and packed into cartons within 24 hours of arrival. Refrigerated trucks deliver the eggs to retail stores soon after grading. BC eggs usually arrive at the store within 4-7 days of being laid by hens.



- Eggs are graded by weight and quality (shell quality, interior quality, and the size of the air cell located at the larger end of the egg). Eggs are classified as Grade A, B or C.
- Grade A eggs are sent to retailers and restaurants. Grade B eggs are used in commercial baking or sent to breaking plants to be used in further food processing. Grade C eggs are sent to breaking plants to be used in food processing or used in non-food items. Grades B and C eggs are not sold to retail stores.
- Grade A eggs are electronically weighed to further classify them as Jumbo (70 gram or more), Extra Large (63-69 grams), Large (56-63 grams), Medium (49-55 grams), Small (42-48 grams), and Peewee (under 42 grams).



- Egg cartons are stamped with a “best before” date, which is typically 35-40 days after the date of egg grading. It indicates the length of time that eggs will maintain their Grade A quality if stored properly in the refrigerator. After that time, the eggs will still be safe to eat but will slowly lose quality. Most people prefer to use older eggs in cooking and baking.

### ***Egg nutrition***

- Health Canada’s Food and Drug Act on nutrition labeling requires nutrient information about calories, fat, saturated fat, trans fat, cholesterol, sodium, carbohydrate, fibre, sugars, protein, vitamins A and C, calcium, and iron to appear on all prepackaged foods. Some of these nutrients will have a value of zero on egg cartons because they are not present in eggs (e.g., trans fat, fibre, sugars, vitamin C). The nutrient values will vary depending on the size of eggs in the carton (jumbo, extra large, large, medium, small or peewee).
- Eggs naturally have many essential and critical nutrients, such as high quality protein, vitamins A, B6, D, E, thiamine, riboflavin, folate, pantothenic acid, iodine, phosphorous, magnesium, iron, calcium, and zinc. Lutein and zeaxanthin, two antioxidants occurring naturally in eggs, are important for healthy eyes. Choline contributes to healthy mental development and attention span. About half of the egg’s protein is in the whites, but almost all of the egg’s nutrients are in the yolk, so eat the whole egg if you want to gain all of its health benefits.
- Omega-3 enhanced eggs are from hens that are fed an all-vegetarian diet with significant amounts of ground flaxseed. As a result, these eggs are a source of omega-3 fatty acids.
- Since the 1960's it has been illegal in Canada to give hormones or steroids to egg-laying hens. Antibiotics and medication are only given under the direction of a veterinarian. If hens become sick, their eggs are not used for public consumption until the hens are well again. Young laying hens are vaccinated for the same reason we vaccinate our children: to prevent specific diseases. This is true for all types of Grade A eggs available at Canadian grocery stores.

### ***Egg storage***

- Eggs lose more freshness in one day at room temperature than they do in one week in the fridge, so keep your eggs refrigerated! They should be kept in their original cartons so they don’t lose moisture or absorb odours from other foods. Keep them on one of the refrigerator’s shelves rather than in the door to avoid frequent temperature changes.



## ***Cooking eggs***

- When preparing raw or lightly cooked eggs (e.g. eggnog or Caesar salad), you must use proper food handling methods. Use only Grade A eggs with clean, uncracked shells that have been kept refrigerated. Wash your hands in hot, soapy water before and after handling the eggs. Eat the dish immediately after preparation or immediately refrigerate it until served, keep it cold during serving, and consume it the same day it is prepared. Throw out the leftovers.
- A hard-to-peel hardboiled egg means that it is really fresh! Air has had little time to enter the pores in the shell and get between the shell and its membrane. The membrane allows the egg white to cling tightly to the shell. Hard boil eggs after they have been in your refrigerator for at least a week to ensure they are easier to peel.
- Getting that greenish-greyish ring around the yolk of your hardboiled eggs? Cooking for too long or at too high a temperature may cause a chemical reaction between the naturally-occurring iron in the yolk and sulphur in the egg white. The result is the formation of a harmless greenish or grayish coating on the yolk's surface. Proper cooking methods and chilling hardboiled eggs in cold water as soon as they are cooked prevent the formation of this discolouration.
- What are those stringy things in egg whites? Known as chalazae (shay'-zee), those thick strands of egg white protein attach the top and bottom of the yolk to the shell to keep it centred in the egg. They become unnoticeable once the egg is cooked.

