# Factors Affecting Egg Production in Backyard Chicken Flocks[1]

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The laying cycle of a chicken flock usually covers a span of about 12 months. Egg production begins when the birds reach about 18–22 weeks of age, depending on the breed and season. Flock production rises sharply and reaches a peak of about 90%, 6–8 weeks later. Production then gradually declines to about 65% after 12 months of lay. A typical production curve for a laying flock, showing changes in the level of egg production and in egg weight, over time, is given in Figure 1.

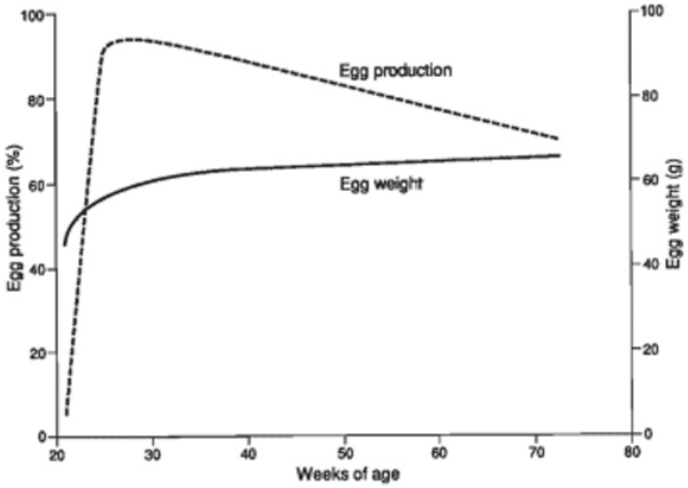


Figure 1. A typical production curve for a laying flock.

Many factors can adversely affect egg production. Unraveling the cause of a sudden drop in egg production requires a thorough investigation into the history of the flock. Egg production can be affected by such factors as feed consumption (quality and quantity), water intake, intensity and duration of light received, parasite infestation, disease, and numerous management and environmental factors.

## Noninfectious Causes

### Aging Hens

Chickens can live for many years and continue to lay eggs for many of these years. However, after two or three years many hens significantly decline in productivity (Figure 2). This varies greatly from bird to bird. Good layers will lay for about 50 to 60 weeks and then have a rest period called a molt. Poorer layers and older hens will molt more often and lay less consistently. See Figure 1. In recent years, there has been a trend to extend the egg production period for an additional 15 to 20 weeks and not molt due to welfare concerns over molting.

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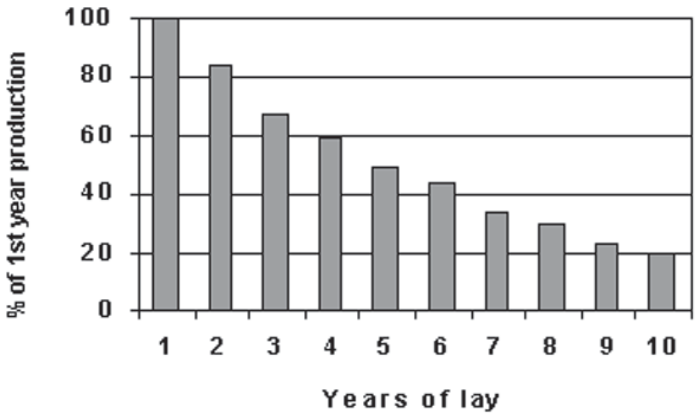


Figure 2.

## Improper Nutrition

Laying chickens require a completely balanced diet to sustain maximum egg production over time. Inadequate nutrition can cause hens to stop laying. Inadequate levels of energy, protein or calcium can cause a drop in egg production. This is why it is so important to supply laying hens with a constant supply of nutritionally balanced layer food. Feeding whole grains, scratch feeds, and table scraps will cause the birds' diet to become imbalanced and inadequate.

Many times these imbalances can cause other problems like oviductal prolapse. Prolapse may occur when the bird is too fat and/or an egg is too large and the bird's reproductive tract is expelled with the egg. Prolapse usually causes permanent damage to the hen and is fatal in many cases.

## Omission of Feed Ingredients

### SALT

Animals have an innate desire to consume salt. Feeding a salt-deficient diet will lead to increased feather pecking and a decline in egg production.

Most animal feeds will contain added salt, usually in the form of sodium chloride. Iodine is rarely added as a separate ingredient. Instead, iodized salt is routinely used. Cobalt iodized salt is often used in diets for swine and ruminants, and this can be used without any problems for poultry. This type of salt is usually blue.

Sodium is an essential nutrient, playing a major role in maintaining body fluid volume, blood pH, and proper osmotic relationships. A continuously low intake of salt can cause a loss of appetite. Sodium deficiencies adversely affect utilization of dietary protein and energy and interfere with reproductive performance.

Chlorine is also an essential nutrient. Hydrogen chloride (HCl) released from the true stomach (proventriculus) is important in digestion. Chlorine also plays a role in maintaining osmotic balance in body fluids. Birds deficient in chlorine are more nervous, showing increased sensitivity to sudden noise.

### CALCIUM

The eggshell is composed primarily of calcium carbonate. The pullet's requirement for calcium is relatively low during the growing period, but when the first eggs are produced, the need is increased at least four times, with practically all of the increase being used for the production of eggshells. Inadequate calcium consumption will result in decreased egg production and lower eggshell quality.

Hens store calcium in medullary bone, a specialized bone capable of rapid calcium turnover. As calcium stores are depleted, bones become brittle. In severe cases, hens are unable to stand. The condition is known as caged-layer fatigue. Birds on the ground or on litter floors recycle calcium and phosphorus through consumption of feces and do not have caged-layer fatigue.

Calcium can be supplied in the diet as either ground limestone or oyster shell. Particle size affects calcium availability. Usually the larger the particle size, the longer the particle will be retained in the upper digestive tract. This means that the larger particles of the calcium source are released more slowly, and this may be important for the continuity of shell formation, especially in the dark period when birds do not ordinarily eat.

Periodically, dolomitic limestone is offered to the feed industry. However, dolomitic limestone (which is used in the steel industry) should never be used in poultry diets. Dolomitic limestone contains at least 10% magnesium and this complexes with calcium or competes with calcium for absorption sites in the intestines. The consequence of feeding dolomitic limestone is induced calcium deficiency.

Young birds should not be fed a high calcium layer diet because the calcium/phosphorus ratio will be unbalanced, resulting in increased morbidity or mortality.

### VITAMIN D

Vitamin D is required for normal calcium absorption and utilization. If inadequate levels of vitamin D are fed, induced calcium deficiency quickly results and egg production decreases.

Feed grade vitamin D comes in two forms, D2 and D3. In most animals, both are equally potent. In birds, however,

D3 is substantially more active than D2. In poultry diets, therefore, vitamin D must be supplied in the form of D3.

### PROTEIN

Dietary requirements for protein are actually requirements for the amino acids that constitute the protein. There are 22 amino acids in body proteins, and all are physiologically essential. Poultry cannot synthesize some of these or cannot synthesize them rapidly enough to meet the metabolic requirement. Therefore, these amino acids must be supplied in the diet. Amino acid requirements vary considerably according to the productive state (i.e., growing, laying eggs, etc.), age, type, breed, and strain. Methionine is the amino acid most often deficient in laying rations.

When pullets begin laying, there is an increase in protein, vitamin, and mineral requirements per day due to deposition in the egg. If dietary protein is too low or the amino acid requirements are not met, poor egg production and hatchability will occur.

### FAT

Dietary fat is a source of energy and of linoleic acid, an essential fatty acid. A deficiency of linoleic acid will adversely affect egg production. Dietary fats also serve as "carriers" of fat-soluble vitamins, and some fat is necessary for absorption of vitamins. In fact, impairment of the absorption of fat-soluble vitamins (A, D, E, and K) is the most serious consequence of a dietary deficiency of fat.

## Toxicoses

### SALT

Although the salt requirement of birds is relatively low, adequate levels are essential, and excessive amounts are highly toxic and reduce egg production. Birds require a sensitive balance between necessary and toxic levels of salt (see Table 1).

Excess dietary salt intake readily causes wet droppings and wet litter. Several feed ingredients, such as fish meal, corn gluten meal, meat meal, whey, and sunflower meal, contain high levels of sodium. When such ingredients are used, the level of supplemental salt (NaCl) in the diet must be reduced.

### PHOSPHORUS

The nutritional role of phosphorus is closely related to that of calcium. Both are constituents of bone. The ratio of dietary calcium to phosphorus affects the absorption of both these elements; an excess of either one impedes absorption and can reduce egg production, shell quality, and/or hatchability.

In addition to its function in bone, phosphorus plays a primary role in carbohydrate metabolism, is active in fat metabolism, and helps to regulate the acid-base balance of the body.

### VITAMIN D

Excess vitamin D3 leads to increased calcium absorption resulting in hypercalcemia, which may reduce egg production. Most animal species appear to be able to tolerate 10 times their vitamin D3 requirement for long periods of time. For short periods of time, poultry can tolerate up to 100 times their requirement. An excess of vitamin D3 in the diet, therefore, is unlikely.

### MYCOTOXINS

Molds can produce mycotoxins that adversely affect egg production and general health. They can interfere with the absorption or metabolism of certain nutrients, depending on the particular mycotoxin. Apparent calcium and/or vitamin D3 deficiencies can occur when mycotoxin contaminated feeds are given to laying hens. In addition, some have hormonal effects which can cause a decline in egg production.

The major mycotoxin of concern with corn is aflatoxin, produced by the mold *Aspergillus flavus*. The mold infects corn both in the field and in storage. Aflatoxin fluoresces under ultraviolet light, so its presence can be detected by examining grain under "black light". Other mycotoxins sometimes associated with corn and other grains are zearalenone (F-2 toxin), ochratoxin, T-2 toxin, vomitoxin, and citrinin. More than 300 mycotoxins have been identified.

### BOTULISM

Botulism is an acute intoxication caused by consumption of a neurotoxin produced by the bacteria *Clostridium botulinum*. It commonly occurs when birds consume decomposing carcasses, spoiled feed, or other decaying organic materials. Ponds and other stagnant water sources are often areas of decaying materials that may contain this toxin.

### OTHER TOXINS

Numerous plants are toxic to varying degrees if plant parts or seeds are consumed by the bird. Production, hatchability, growth, and livability may be reduced. Examples of these plants include crotalaria, nightshade, coffeeweed, cotton seeds, chick peas, vetches, and many ornamentals. Other

potential causes of problems include pesticides, herbicides, disinfectants, fertilizers, drugs, antibiotics, and other chemicals, including oils and antifreeze.

## Anticoccidials

Anticoccidials (to prevent coccidiosis) are commonly used in diets for replacement pullets, meat birds, and young breeding stock that are reared on litter floors.

### NICARBAZIN

Nicarbazin is an anticoccidial drug that reduces reproductive performance when it's inadvertently added to layer or breeder diets at normal anticoccidial levels. The yolk membranes are weakened, resulting in mottling of the yolk. Nicarbazin fed to brown-egg layers turns their eggshells white within 48 hours, although this is completely reversible when the product is withdrawn from the feed. Even low levels of nicarbazin can cause some loss in shell color, mottling of egg yolks (see Fact Sheet PS-24, *Egg Quality*), and a decline in hatchability.

### MONENSIN

Monensin has been the most successful of the anticoccidials. Monensin, and other ionophore anticoccidials, have an adverse effect on egg production when used in conjunction with low protein diets.

## Management Mistakes

### OUT OF FEED

If hens are out of feed for several hours, a decline in egg production will probably occur. The amount of decline will be related to the time without feed. Be sure that all the birds have access to an adequate supply of a complete feed which meets all their nutritional requirements.

Feed stored on the farm longer than two weeks may become moldy. If feed becomes wet it should be discarded. In addition, vitamin potency decreases with prolonged storage.

### OUT OF WATER

Water is often taken for granted, and yet it is probably the most essential nutrient. Water is by far the single greatest constituent of the body, and, in general, represents about 70% of total body weight. Access to water is very important, and a lack of water for several hours will probably cause a decline in egg production. Hens are more sensitive to a lack of water than a lack of feed.

The amount of water needed depends on environmental temperature and relative humidity, diet composition, and rate of egg production. It has been generally assumed that birds drink approximately twice as much water as the amount of feed consumed on a weight basis, but water intake varies greatly, especially in hot weather.

### INADEQUATE DAY LENGTH

Hens need about 14 hours of day length to maintain egg production. The intensity of light should be sufficient to allow a person to read newsprint at bird level. The decreasing day length during the fall and shorter day lengths in the winter would be expected to cause a severe decline, or even cessation, in egg production unless supplemental light is provided. When production ceases, the birds may also undergo a feather molt. Hens exposed to only natural light would be expected to resume egg production in the spring.

### HIGH HOUSE TEMPERATURES

High environmental temperatures pose severe problems for all types of poultry. Feed consumption, egg production, egg size, and hatchability are all adversely affected under conditions of severe heat stress. Shade, ventilation, and a plentiful supply of cool water help reduce the adverse effects of heat stress.

## Ectoparasites

An ectoparasite is a parasitic organism that feeds on the exterior of the body of the host.

### NORTHERN FOWL MITE

The northern fowl mite (*Ornithonyssus sylviarum*) is the most common of the poultry mites. Refer to the publication ENY-290, *External Parasites of Poultry*, for information on identification and control of northern fowl mites.

Northern fowl mites are blood suckers and are irritating to poultry. Anemia occurs in heavily parasitized birds, reducing feed efficiency, egg production, and ability to withstand and overcome diseases.

### LICE

Several species of chewing lice may be found on chickens, especially those in small flocks or on range. Refer to the publication ENY-290, *External Parasites of Poultry*, for information on identification and control of lice.

Chicken lice feed on dry scales, feathers, or scabs on the skin. As lice crawl over the bird, their mouth parts and sharp claws scratch the skin. The constant irritation causes the bird to become nervous and behave abnormally, causing

a general unthriftiness and unkempt appearance in the bird. Egg production in infested flocks may drop as much as 10%, although some heavy infestations have caused egg production to fall as much as 20%.

### FLEAS

Stick-tight fleas are sometimes a severe problem in home flocks and may be difficult to prevent or eradicate. The adult female flea attaches to the skin around the face and head, causing severe irritation and, in some cases, blindness. Refer to the publication ENY-290, *External Parasites of Poultry*, for information on identification and control of stick-tight fleas.

## Endoparasites

An endoparasite is a parasite that lives and feeds inside the host animal.

Heavy infestations of endoparasites can cause unthriftiness, poor feed efficiency, poor growth, reduced egg production, and mortality in severe infestations. Infected birds may also be more susceptible to various diseases and stresses.

### NEMATODES

Nematodes, or roundworms, are elongated, cylindrical, unsegmented endoparasites. There are many species of roundworms, each tending to infect a specific area of the gastrointestinal tract. Refer to publication PS-18, *Nematode Parasites of Poultry*, for identificationand control of nematodes.

### TAPEWORMS

Tapeworms (cestodes) are white or yellowish, ribbon-like, segmented flat worms. They vary in size from 0.17 to 12 inches in length. Although tapeworms do not produce extensive lesions or damage to the intestines, they are nutritional competitors. A cestode does not digest its own food. Instead, it anchors itself to the inner wall of the bird's intestines, letting its segmented body dangle in the flow of digested material, absorbing nutrients before they can be utilized by the host. A variety of commercially available anthelmintics will effectively and safely eliminate both nematodes and cestodes from poultry.

# Diseases

## Fowl Pox

Fowl pox is a viral disease of chickens characterized by scab-like lesions on the skin of the unfeathered body parts and/or on diphtheritic (wet) membranes lining the mouth or air passages. Infection with the fowl pox virus will cause the chickens to have poor growth, poor feed conversion, and a precipitous fall in egg production. Fowl pox may affect any age bird. It is transmitted by direct contact with an infected chicken or by mosquitoes.

For more information on fowl pox, refer to publication VM65, *Prevention and Control of Fowl Pox in Backyard Chicken Flocks*.

## Coccidiosis

Coccidiosis is a protozoan disease characterized by enteritis and diarrhea in poultry. Unlike the organisms which cause many other poultry diseases, coccidia are almost universally found wherever chickens are raised. Coccidiosis outbreaks vary from very mild to severe infections.

Individual strains of coccidia attack birds differently, resulting in diverse symptoms. The overall symptoms may be one or more of the following: bloody droppings, high mortality, general droopiness, emaciation, a marked drop in feed consumption, diarrhea, and a drop in egg production in layers.

It is common to add a coccidiostat in the feed of broilers. In addition, live vaccines are currently available.

## Infectious Bronchitis

Infectious bronchitis is a highly contagious respiratory disease. The disease is caused by a virus which is moderately resistant but can be destroyed by many common disinfectants.

Infectious bronchitis occurs only in chickens (infectious bronchitis is different from quail bronchitis which affects bobwhite quail). All ages of chickens are susceptible to infectious bronchitis. In laying hens it is characterized by respiratory signs (gasping, sneezing, coughing) and a marked decrease in egg production. Egg quality is also adversely affected. Low egg quality and shell irregularities (soft-shelled or misshapen) may persist long after an outbreak. Chickens that have had infectious bronchitis, especially during the first week of life, may never be good layers.

There is no effective treatment for infectious bronchitis, although broad spectrum antibiotics for 3 to 5 days may aid in controlling secondary bacterial infections. Vaccines can be used for prevention, but they are only effective if they contain the right serotypes of virus for a given area. Infectious bronchitis vaccine is often combined with Newcastle vaccine in the same vial.

## Newcastle Disease

Newcastle disease is caused by a virus. The viruses vary in pathogenicity and are classified as lentogenic (mildly virulent), mesogenic (moderately virulent), and velogenic (markedly virulent).

Newcastle disease is characterized by a sudden onset and rapid spread through the flock. In adult laying hens clinical signs can include depression, loss of appetite, decreased water consumption, and a dramatic decline in egg production. Production may drop to zero. Newcastle disease runs its course in 10 to 14 days, but the hens do not come back into full production for 5 to 6 weeks.

There is no treatment for Newcastle disease. Antibiotics can be given for 3 to 5 days to prevent secondary bacterial infections. Chickens and turkeys can be immunized against Newcastle disease by vaccination.

## Avian Influenza

Avian influenza is a viral disease affecting the respiratory, digestive, and/or nervous systems of many species of birds. Avian influenza viruses are classified based on severity of disease, ranging from apathogenic to highly pathogenic. The mildly pathogenic form produces listlessness, respiratory signs (sneezing, coughing), and diarrhea. The level of mortality is usually low. The highly pathogenic form of avian influenza produces facial swelling, cyanosis, and dehydration with respiratory distress. Dark red/white spots (cyanosis/ischemia) develop on the legs and combs of chicks. Mortality can range from low to near 100%. The decrease in egg production is related to the severity of the disease and can be severe.

There is no specific treatment for avian influenza. Recovery is rather spontaneous. Birds slaughtered seven days after infection often have no significant increase in condemnations.

Infected flocks will be quarantined by the state. Quarantine is continued until the flock is depopulated. The course of the disease is 10 to 14 days, but recovered birds continue to shed the avian influenza virus in feces for 3 or 4 weeks. Eggs from layers are safe to eat, but the shell should be washed and sanitized. The poultry litter or manure should be composted before application to cultivated lands.

For more information on avian influenza refer to publication PS-38, *Avian Influenza in Poultry*.

## Avian Encephalomyelitis

Avian encephalomyelitis (epidemic tremors) is a viral disease usually affecting young poultry. It is characterized by incoordination and tremors, especially of the head and neck in chicks, and elevated mortality levels. Chicks that recover may later develop cataracts after sexual maturity. In affected hens, decreases in egg production and hatchability are noted.

Laying hens seldom show clinical signs when infection is going through the flock. However, good production records often reveal a slight drop in egg production (5% to 20%) lasting no more than two weeks. In breeding flocks, a corresponding decrease in hatchability is also noted.

There is no effective treatment. All replacement breeder and layer pullets should be immunized.

## *Mycoplasma gallisepticum* Infection

*Mycoplasma gallisepticum* infection (chronic respiratory disease, PPLO infection, airsacculitis, MG) is characterize by respiratory distress (coughing, sneezing, snicks, rales, discharge from eyes and nose). Feed consumption and egg production decline in laying hens. Mortality is usually low, but there may be many unthrifty birds.

The organism may be present in a flock and cause no disease until triggered by stress, e.g., changes in housing, management, nutrition, or weather.

Many broad spectrum antibiotics have been used for treatment and will suppress losses. However, relapses often occur when treatment is discontinued. Most antibiotics are given in feed or water, preferably in water. Tylosine and tetracyclines have been used extensively for treatment. Injectable antibiotics may be more effective if the disease is advanced and if the flock is small enough to be treated individually. FDA withdrawal periods for respective medications used must be strictly observed to avoid residual chemicals in the eggs and meat. Live and inactivated vaccines also are commonly used to reduce the adverse effects of the disease.

## Fowl Cholera

Fowl cholera is an infectious bacterial disease of poultry. With an acute outbreak, sudden unexpected deaths occur in the flock. Laying hens may be found dead on the nest. Sick birds show anorexia, depression, cyanosis, rales, discharge from eyes and nose, white watery or green mucoid diarrhea, and egg production is decreased.

As fowl cholera becomes chronic, chickens develop abscessed wattles and swelling of joints and foot pads. Cheesy pus may accumulate in the sinuses under the eyes.

Flocks can be treated with a sulfa drug. Sulfa drugs are not FDA approved for use in pullets older than 14 weeks or for commercial laying hens. Sulfa drugs cause residues in meat and eggs. Prolonged use of sulfa drugs is toxic and causes a decrease in production in laying hens. Antibiotics can be used, but require higher levels and longer medication to stop the outbreak.

Where fowl cholera is endemic, live and/or inactivated vaccines are recommended. Do not start vaccinating for fowl cholera until it becomes a problem on the farm and a diagnosis is confirmed.

### Infectious Coryza

Coryza is a respiratory disease of chickens. Common clinical signs include swelling and puffiness around the face and wattles, a thick sticky discharge with a characteristic offensive odor from the nostrils, labored breathing, and rales. There is a drop in feed and water consumption as well as egg production.

Sulfadimethoxine (Albon) is the preferred treatment for infectious coryza. If Albon fails or is not available, sulfamethazine, sulfamerazine, or erythromycin (Gallimycin) can be used as alternative treatments. The sulfa drugs are not FDA approved for pullets older than 14 weeks or for commercial laying hens.

A vaccine for infectious coryza is available. It is given subcutaneously (under the skin) on the back of the neck. Chicks are usually vaccinated four times, starting at 5 weeks of age (i.e., at 5, 9, 15, and 19 weeks with at least 4 weeks between injections). Vaccinate again at 10 months of age and twice yearly thereafter.

## Other Problems to Consider

There are a variety of other problems which can cause an apparent drop in egg production. They include:

1. Predators and snakes consuming the eggs.
2. Egg-eating by hens in the flock.
3. Excessive egg breakage.
4. Hens which are able to run free, hiding the eggs instead of laying in nests.

## Summary

There are numerous factors which may adversely affect egg production in backyard chicken flocks. If a drop in egg production occurs, investigate the cause by answering questions that follow. Also refer to Table 1, submit sick and recently dead birds to a state diagnostic lab, and/or consult with your local UF/IFAS Extension agent or a veterinarian.

1. How old are the birds?
2. How much feed are the birds consuming daily?
3. Has the level of feed consumption changed lately?
4. Has there been a change in the type of feed used?
5. Is the feed moldy?
6. How much light do the birds receive daily? Has it changed?
7. What is the light source?
8. What is the condition of the poultry houses?
9. Are the birds getting enough clean water?
10. What is the condition of the birds?
11. How active are the birds?
12. What is shell quality like?
13. What is interior egg quality like?
14. Are there any signs of disease?
15. Are the birds crowded?
16. Are there any signs of parasites?
17. Do the birds have access to different plants?
18. Have any pesticides or herbicides been used in the area?

State Diagnostic Laboratory:
**Kissimmee Diagnostic Lab**
US Postal Address:
PO Box 458006
Kissimmee, FL 34745-8006

Delivery & Service Address:
2700 N. John Young Parkway
Kissimmee, FL 34741-1266
(321) 697-1499
(321) 697-1467 Fax

Table 1. Non-infectious causes of reduced egg production.

| Causes of Decline | Signs/Symptoms |
|---|---|
| **Omission of Ingredients** | |
| Salt | Nervous flock, increased pecking, feathers in digestive tract |
| Calcium | Birds down in cages, increased incidence of shell-less eggs |
| Vitamin D3 | Increased mortality from calcium depletion, increased shell-less eggs |
| Protein | Increased nervousness, increased mortality (peck outs), poor albumen quality, feather eating |
| Fat | Low body weight gains, drop in egg size |
| **Toxicoses** | |
| Salt | Increased mortality due to urolithiasis, lowered feed intake |
| Phosphorus | Lower feed intake, soft bones, thin shells, increased shell-less eggs |
| Vitamin D3 | Increased shell-less eggs, soft bones |
| Mycotoxins | Nervousness, mouth lesions, fatty livers, biliary hyperplasia in liver tissue, reduced feed intake, thin shell |
| Botulism | Weakness, limp neck, neck feathers easy to pull out, prostration |
| **Anticoccidials** | |
| Nicarbazin | Shell-less eggs, loss of pigment of brown eggs, lowered hatch,  of fertile eggs |
| Monensin | Reduced feed consumption, birds lack coordination |
| **Management mistakes** | |
| Out of feed | Nervous flock, decreased feed consumption |
| Out of water | Blue combs, birds gathered around waterers |
| Inadequate day length | Unusual pattern of egg production |
| High ambient temperature | Reduced egg size, reduced feed consumption, increased water consumption, panting |
| **Ectoparasites** | |
| Northern fowl mite | Nervousness, finding mites on birds (usually around the cloaca) |
| Lice | Nervousness, weight loss, reduced feed intake |
| Stick-tight fleas | Fleas embedded in the fleshy parts of the chicken's head around the eyes, ulceration and irritation of skin around the eyes |
| **Endoparasites** | |
| *Nematodes (roundworms)* | Unthriftiness, poor feed efficiency, increased mortality (in severe infestations) |
| *Cestodes (tapeworms)* | General unthriftiness, dry and unkempt feathers, hearty appetite but weight loss |

Table 2. Typical diagnostic signs associated with common diseases and conditions that can cause a drop in egg production.

| Disease | Signs | |
|---|---|---|
| Fowl pox | scab-like lesions on the unfeathered body parts (especially face and comb) | |
| Coccidiosis | characteristic gross lesions in the intestinal tract<br>higher mortality in some cases<br>bloody droppings | |
| Infectious bronchitis | coughing, sneezing, and rales<br>egg production drops markedly (by as much as 50%)<br>soft-shelled or misshapen eggs<br>watery egg white<br>poor pigmentation of brown-shelled eggs | |
| Newcastle disease | Mild form:<br>reduction in feed and water consumption<br>dramatic drop in egg production<br>decreased shell quality | Acute form:<br>respiratory distress<br>twisted neck<br>increased mortality |
| Avian influenza | Mildly pathogenic form:<br>listlessness<br>sneezing, coughing<br>diarrhea | Highly pathogenic form:<br>facial swelling<br>dark red/white spots on legs and combs<br>respiratory distress |
| Avian encephalomyelitis | seldom show clinical signs<br>slight, transient drop in egg production | |
| *Mycoplasma gallisepticum* | coughing, sneezing, snicks, rales, nasal and ocular discharge<br>decrease in feed consumption and egg production | |
| Fowl cholera | sudden unexpected deaths<br>reduction in feed consumption<br>swollen wattles<br>nasal and ocular discharge<br>cyanosis of head<br>white water or green mucoid diarrhea | |
| Infectious coryza | swelling and puffiness around the face and wattles<br>thick, foul-smelling nasal discharge<br>labored breathing<br>decrease in feed and water consumption | |