ILLINOIS POULTRY SUGGESTIONS

Cooperative Extension Service
Department of Animal Science
College of Agriculture
University of Illinois at Urbana-Champaign

Volume 66, No. 4 October, 1990

SALMONELLA ENTERITIDIS INDEMNITY PROGRAM

The *Salmonella enteritidis* (Se) issue still receives attention in the news media, and everyone associated with the commercial egg industry is deeply concerned with this problem. The Illinois Department of Agriculture (IDOA) recently adopted a program to financially assist egg producers whose layer or breeder flocks have become infected with Se. The IDOA established the guidelines for this program in late January and enacted new regulations that became effective on September 10, 1990. The following discussion outlines the specifics of this flock indemnity program for Se.

Regulations pertaining to Se serotype *enteritidis*. On February 16, 1990, the U.S. Department of Agriculture amended regulations pertaining to poultry diseases by declaring that Se serotype *enteritidis* was considered a communicable disease in egg-type poultry. The IDOA then adopted these regulations which apply only to primary and multiplier breeder flocks, and to egg production flocks kept for producing table eggs.

The Illinois Se indemnity program states that all flocks found to be infected with Se serotype *enteritidis* shall be quarantined. The quarantine must remain in effect until the flock has been depopulated and the premises have been properly disinfected, or until the flock has tested negative for Se. The program also proclaims that intra- and inter-state movement of poultry, eggs, equipment, and manure from infected or test flocks (those suspected of being contaminated with Se and undergoing testing) will be restricted to certain conditions. Live chickens could be transported only to slaughtering facilities and must be slaughtered within 24 hours of arrival. Eggs could be moved only to a facility that would pasteurize the eggs. Cage equipment could be transported only if it is made of hard plastic or metal, and has been properly cleaned and disinfected. Finally, manure could be moved if it is enclosed in covered containers.

Conditions required for payment of indemnity. Under the new indemnity program, if a flock is determined to be infected with Se, the IDOA will pay indemnity provided State funds are available. All of the following conditions must be met for indemnity to be paid. They are:

1. The infected flock must be identified through testing procedures providing evidence that it caused a human disease outbreak.
2. The flock owner must agree to depopulate the flock with appropriate State indemnity.

3. The flock to be depopulated must have originated from a breeder flock classified as "U.S. Sanitation Monitored" under the National Poultry Improvement Plan (NPIP).
4. The flock owner must have been feeding the flock in accordance with the provisions of the NPIP.
5. The infected flock must be slaughtered at a federally inspected processing plant and be reported to the Department by the meat and poultry inspector at the plant.
6. The premises must be disinfected by procedures outlined in the Federal Register.
7. A replacement flock must come from flocks which are classified "U.S. Sanitation Monitored" under the NPIP.

Amount of indemnity. Indemnity paid by the State will be based on availability of funds, and be 75% of the fair market value of the flock at time of slaughter, minus the salvage value. The following conditions must be considered in determining the flock's market value: 1) initial purchase price of each bird, 2) age of the bird and rate of production, and 3) feed and medication costs. The flock owner and IDOA must agree on the value of the flock destroyed or indemnity will not be paid.

In conclusion. The indemnity program established by the IDOA for payment to a layer or breeder flock owner is a positive step towards assisting the poultry industry with the Se problem. Since this program is one of the few currently established in the country, it may serve as a model for other states to follow.

Ken W. Koelkebeck

Ken W. Koelkebeck
Extension Specialist, Poultry

Agricultural Newsletter Service
College of Agriculture
Cooperative Extension Service
116-N Mumford Hall
University of Illinois at Urbana-Champaign
1301 West Gregory Drive
Urbana, Illinois 61801

FIRST CLASS

Ag Library Serials Clerk
226 Mumford Hall
1301 West Gregory Drive
CAMPUS MAIL

ILLINOIS POULTRY SUGGESTIONS

Cooperative Extension Service
Department of Animal Science
College of Agriculture
University of Illinois at Urbana-Champaign

Volume 66, No. 3 October, 1990

INDUCED MOLTING: INFLUENCE OF FEED WITHDRAWAL TIME

Numerous methods are used to induce a molt in commercial layer flocks. One program restricts feed until a 30% loss in body weight occurs. Other programs utilize a 10-day fasting period irrespective of the amount of body weight loss. Recent research has focused on using a short feed withdrawal period of only 4 days to induce a molt. The following discussion compares results from several studies which have examined post-molt layer performance of hens subjected to a short vs. conventional fasting period.

Research at California and Florida. Recent studies by D. Bell and D. Kuney at the University of California have compared post-molt layer performance of hens subjected to a short 4-day fast vs. a 10-day conventional fast. As part of a larger experiment, 1008 hens of three commercial strains were molted by feed withdrawal for 4 or 10 days and then fed a cracked milo or layer diet. Hens fasted for 4 days returned to production sooner than those fasted for 10 days. About 75% of the groups that were fasted for 4 days reached zero production, and only 38% of the groups remained at zero production 4 or more consecutive days. Over the 36-week post-molt period, production was somewhat lower for the 4-day fasted group than for the 10-day fasted group (145 vs. 153 eggs per hen-housed). Egg weight was the same for both groups, but egg mass favored the conventional fasted birds.

At the University of Florida, R. H. Harms and R. B. Christmas conducted a study in which hens at 72 weeks of age were fasted for either 4 or 10 days. The 4-day fasted hens were then immediately fed a layer ration and the 10-day fasted hens were fed a 16% protein recovery diet for 24 days and then fed a layer ration thereafter. No differences were found in production between the two groups during a 20-week post-molt production period. Hens fasted for 4 days returned to lay 9 days after the initiation of fasting, while it took 19 days for the 10-day fasted group to return to egg production. Egg specific gravity did not differ between the treatments.

Research at the University of Illinois. An experiment conducted here recently evaluated post-molt performance of hens on the following treatments: (1) fasted for 4 days and then fed a 16% protein layer diet, (2) fasted for 10 days and then fed a 16% protein pullet developer diet followed by a 16% protein layer diet when production started, or (3) a control group which was not fasted. For this study, 252 White Leghorn hens at 65 weeks of age were used and post-molt performance was evaluated for 30 weeks.

The results of this study indicated that overall 30-week post-molt production for both fasted groups did not differ statistically. Production for the 4-day fasted group was 2.4% lower than the 10-day fasted group (72.2% vs 74.6). As would be expected, overall egg production was depressed for those hens which were not molted. During the last 10 weeks of the study, egg production for the 4-day fasted birds decreased and was about 5% below that of the conventional fasted birds. When comparing performance of the fasted groups from the initiation of the fast to the end of week 30, production for the 4-day fasted birds was only 1% lower than the conventional group.

Overall egg weight did not differ among the treatments. However, egg specific gravity was poorer for the hens not molted compared to the other two treatments. Specific gravity was not statistically different between the 4- and 10-day fasted groups throughout the study.

In summary, this study indicated that overall post-molt performance of hens fasted for only 4 days compared favorably to those fasted for 10 days. In addition, good egg shell quality was maintained throughout the study for both molted groups.

In conclusion. Based on the research results presented here, egg producers may want to examine the use of a short feed withdrawal period to induce their flock to molt. From these studies, it is apparent that good post-molt performance can result from a short fasting period if the flock is kept for 30 weeks of post-molt production or less. If the market demand for eggs is good, the short fast-induced molting method can be used to reduce down time between production cycles.

Ken W. Koelkebeck
Ken W. Koelkebeck
Extension Specialist, Poultry

Agricultural Newsletter Service
College of Agriculture
Cooperative Extension Service
116-N Mumford Hall
University of Illinois at Urbana-Champaign
1301 West Gregory Drive
Urbana, Illinois 61801

ILLINOIS POULTRY SUGGESTIONS

Cooperative Extension Service
Department of Animal Science
College of Agriculture
University of Illinois at Urbana-Champaign

Volume 66, No. 2 September, 1990

FEEDING CANOLA MEAL TO LAYERS

Canola seed is the third most widely grown oilseed in the U.S. Processed canola meal may be of interest to the commercial layer industry because of its relatively high protein content which makes it a possible substitute for soybean meal in layer rations. Dr. Jerry Weigel, Nutritionist and Vice President of Archer Daniels Midland Company (ADM) Bio-Chem Division, recently discussed applications of canola meal in laying hen diets at the 1990 Multi-State Poultry Feeding and Nutrition Conference in Indianapolis, Indiana. His comments are summarized here.

What canola meal is and how it is processed. Canola meal is the residue remaining after oil has been extracted from the seed. The processing of canola seed is similar to that of other seeds with a high oil content. First, the seed is thoroughly cleaned. Then, the oil is extracted by flaking the seed which breaks the outer coat and ruptures the oil cells. The flakes that remain are cooked to further crush any remaining oil cells. The flaked and cooked seeds are then pressed into large cake fragments. An extraction process then removes all of the remaining oil and a recovery system removes the solvent from the oil. Finally, mechanical devices separate the meal from the oil and solvent.

Composition of canola meal. The following table gives some of the nutritional specifications of commercially processed canola meal.

Crude protein	38%	Calcium	.68%
Crude fat	3.5%	Phosphorus	1.17%
Crude fiber	12%	Sodium	.03%
Ash	7%	Potassium	1.29%
Dry matter	88%	Magnesium	.64%

From these figures, it should be noted that canola meal has a good nutrient composition relative to soybean meal. Other factors relative to canola meal are that handling and storage presents no major problems. Dry and insect-free storage conditions must, of course, be used.

Use of canola meal in laying hen rations. Much of the research on canola meal has been done by workers in Canada. A study conducted by D. R. Clandinin and A. R. Robblee in 1983 summarized the results from eleven experiments involving 9,210 laying hens. Levels of 0, 5, 10, and 15% canola meal were used as partial replacement for soybean meal in rations containing wheat. The test period varied from 44 to 48 weeks. Results showed that values for the canola meal diets were comparable to those of diets not containing canola meal when examining hen-housed egg production, feed consumed per dozen eggs, egg weight, egg Haugh units, egg specific gravity and mortality. An experiment conducted in Mexico examined the use of canola meal in rations containing milo. In that study, laying hens were fed diets containing 0, 5, 10, and 15% canola meal. Egg production and egg weight were not adversely affected by 5 and 10% canola meal; however, the diet with 15% canola meal resulted in reduced egg production and egg weight.

When canola meal is included in rations for brown-egg layers, off-flavored eggs are produced. The compound sinapine, which is found in canola meal at a level of between 1 and 1.25%, is responsible for the off flavor. Therefore, if canola meal is included in rations for brown-egg layers, the level should not exceed 3%.

In conclusion. It appears that 10% canola meal may be included in rations for white-egg layers while not more than 3% should be used for brown-egg layers. Since good layer performance has resulted from the feeding of low levels of canola meal, egg producers should consider including this ingredient in laying hen diets as a partial substitute for soybean meal.

Ken W. Koelkebeck
Extension Specialist, Poultry

Agricultural Newsletter Service
College of Agriculture
Cooperative Extension Service
116-N Mumford Hall
University of Illinois at Urbana-Champaign
1301 West Gregory Drive
Urbana, Illinois 61801

FIRST CLASS

Ag. Library - Serials Clerk
226 Mumford Hall
1301 West Gregory Drive
CAMPUS MAIL

ILLINOIS POULTRY SUGGESTIONS

Cooperative Extension Service
Department of Animal Science
College of Agriculture
University of Illinois at Urbana-Champaign

Volume 66, No. 1 May, 1990

UROLITHIASIS: MORE THAN JUST A CONDITION

Until recently, urolithiasis was considered to be a problem that affected only a small number of pullets and layers. Now, the number of cases is increasing and the disease can be a major problem in large commercial layer complexes. Dr. Dwight Schwartz, Poultry Pathologist at Michigan State University, recently discussed various aspects of this disease in the December, 1989 issue of Vineland Update. His comments are adapted and summarized here.

<u>What the Disease is</u>. Urolithiasis is a disease which can affect layers and immature pullets, and can result in high mortality. When an outbreak occurs, the affected birds have kidney stones that actually form in the urinary system and in turn damage the kidneys, leading to their failure. The ureters which function to excrete uric acid (waste product from the breakdown of protein) become blocked, and uric acid accumulates in the bloodstream. The uric acid then invades important organs such as the heart and liver, damaging them. Birds that die are diagnosed as having visceral gout which is excessive uric acid in the blood.

<u>Causes of urolithiasis</u>. The most serious outbreaks of urolithiasis have been associated with at least two or more causes. There are several known causes of urolithiasis, and some of them are:

1) <u>Nutritional</u>: a) excess calcium in pullet diets, b) excess protein in diets for semi-mature and mature hens, and c) water deprivation.

2) <u>Disease complications</u>: a) avian nephritis virus, and b) infectious bronchitis (IB).

3) <u>Toxins</u>: a) mycotoxin-contaminated feed, b) toxic levels of sulfur drugs, and c) excess sodium in the diet or water.

When a major urolithiasis problem occurs, a nutritional and infectious disease is almost always involved. The most important nutritional factor which can cause kidney damage and contribute markedly to urolithiasis is the feeding of excess calcium to pullets. By the time the pullet is ready to come into production, permanent kidney damage may have occurred and whole sections of the kidney actually disappear.

There are four known infectious bronchitis viruses that have been identified in the U.S. as having the capability of producing urolithiasis. These viruses are of the nephrogenic type (affect the kidneys specifically). The respiratory type of IB virus seldom leads to urolithiasis.

The most common toxic substances which can help produce a urolithiasis problem are mycotoxins. Urolithiasis caused by these substances may be very damaging to a flock, but the problem can be cleared up if the right steps are taken. Inorganic toxins, such as agriculture chemicals, pesticides, and sulfa drugs, may also contribute to a urolithiasis problem.

When does urolithiasis start? Recent reports show that urolithiasis may start in a pullet flock but may not be manifested until the birds come into production. When pullets are moved to the laying house and fed a high-calcium diet as they are coming into production, the kidneys are overloaded with calcium which usually doesn't cause any damage. If the pullets are exposed to a live nephrogenic virus at this same time, then characteristic signs of urolithiasis are bound to occur.

In summary, urolithiasis is a disease that can have devastating effects in a commercial layer complex. In order for the disease to appear, two or more causes are necessary. If you suspect that your flock has urolithiasis, then several items should be looked at. They include: serological blood sampling at different flock ages for IB; analysis of the pullet feed for calcium and phosphorus levels; re-examining the transfer from pullet to layer feeding program; perform necropsy on birds that die daily; and submit suspected infected birds to a diagnostic lab for further analysis. If proper precautions are taken, urolithiasis should not be a major problem.

Ken W. Koelkebeck

Ken W. Koelkebeck
Extension Specialist, Poultry

Agricultural Newsletter Service
College of Agriculture
Cooperative Extension Service
116-N Mumford Hall
University of Illinois at Urbana-Champaign
1301 West Gregory Drive
Urbana, Illinois 61801

FIRST CLASS

ILLINOIS POULTRY SUGGESTIONS

Cooperative Extension Service
Department of Animal Science
College of Agriculture
University of Illinois at Urbana-Champaign

Volume 65, No. 6 December, 1989

DISEASE CONTROL MANAGEMENT OF MULTI-AGE COMPLEXES

Large multi-age layer complexes are becoming more common in the egg industry today. Generally speaking, these operations are very efficient. However, it is more difficult to control diseases in them than in single-age houses especially in proper disease control. Don Bell, Poultry Specialist, University of California, summarized a talk given there by Dr. Kenton Kreager, DVM, HyLine International, in the California Poultry Letter. His comments are adapted and summarized here.

Advantages and disadvantages of multi-age complexes. In the past two decades, the egg industry has moved more to large multi-age egg production units. There are many advantages of this type of housing, and some of them are: less investment in facilities because specific areas serve the entire complex; less labor in egg collection and processing by eliminating transportation of eggs from the house to the processing plant; and flock management is easier because managers are housed on the complex.

Multi-age complexes have many advantages, but they are not without their disadvantages. Some of these include: higher investment risk due to threats from fires and serious diseases; egg production monitoring may be difficult because of failures in egg counting devices; and transmission of serious diseases is greater. The risk of disease in a multi-age complex can be great because of several reasons. One, diseases can easily be transmitted throughout the complex by visitors. Another is that if a disease gets started in one house, it is difficult to keep it from spreading throughout the complex. And since workers move back and forth between different age flocks, it is virtually impossible to eliminate a disease without complete depopulation.

Prevention and control of diseases. One of the most important steps to prevent a serious disease from getting started is to follow a strict security program. This includes many measures but minimizing visitor traffic is the most important one. If people tour the facilities they should be outfitted with clean coveralls and plastic boots. Another disease control procedure is to make sure that replacement pullets are blood tested for certain diseases. Before the birds are brought onto the complex, serology testing of them for *Mycoplasma gallisepticum* (MG), *Mycoplasma synoviae* (MS), and *Laryngotracheitis* (LT) needs to be done. After they are housed, serology testing should be repeated every one to two months to obtain a pattern of blood titer levels to determine if a disease outbreak has occurred. In addition to the above diseases Newscastle and Bronchitis should be tested for.

Specific diseases found in a multi-age complex. The most troublesome disease in a multi-age layer complex is MG. Production losses from MG infection have been estimated at 15 to 20 eggs per hen. Since the MG organism cannot live outside the host bird, the disease can be eliminated by depopulation. However, depopulation of a multi-age layer complex is not practical. So, the MG cycle continues. It can be controlled by vaccinating a flock with a killed bacterin or a live F-strain vaccine, but this oftentimes does not cure the problem. Thus, most producers prefer to medicate a flock with antibiotics. Even then, the organism will still be present.

Another disease of concern in a multi-age layer complex is LT. It often occurs when vaccines are improperly administered or when an LT-vaccinated replacement flock enters an LT-negative complex. The virus can actually be shed from the vaccine, and thus, either all or none of the birds should be vaccinated. Newcastle and Bronchitis are two more diseases to be concerned about. Pullets are usually vaccinated for these diseases, but protection against them may not last the entire life of a flock. Immunity against Newcastle and Bronchitis needs to be kept at a maximum level because of their damaging effects on production and shell quality. To maintain protection, a live booster or killed Newcastle-Bronchitis vaccination should be given every two to three months.

In summary. Multi-age layer complexes are becoming the mainstay of the egg industry. In order to have a successful operation, egg producers must be aware of health aspects and practice proper disease control.

Ken W. Koelkebeck

Ken W. Koelkebeck
Extension Specialist, Poultry

ILLINOIS POULTRY SUGGESTIONS

Cooperative Extension Service
Department of Animal Science
College of Agriculture
University of Illinois at Urbana-Champaign

Volume 65, No. 5 December, 1989

NUTRITIONAL ASPECTS OF MOLTING PROGRAMS

Induced molting of laying hens is a management technique commonly used in the commercial egg industry. This technique can substantially increase the productive life of a layer and maximize profits. A number of different methods are used, and they differ not only in the way a flock is molted but also in the type of post-molt diet fed. The following discussion compares several recommended programs and summarizes recent research examining the effects of protein and methionine on post-molt performance.

Types of programs. There are basically three different types of nutritional molting programs. The California and Florida programs recommend feeding a low-protein molt ration made primarily of corn. It is fortified with vitamins and minerals and fed for 18 to 21 days following the molt. The Georgia and Virginia programs recommend a pullet-developer ration containing 14% protein and follows a restricted feeding program until the birds return to production. The North Carolina program uses a pullet-developer ration containing 16% protein and supplemental methionine. This ration is fed until the flock reaches 5% production. Then, a second molt ration containing 17.5% protein is fed until 50% production is reached.

Comparison of post-molt performance. In comparing post-molt performance of layers exposed to these programs, egg production does not differ very much after peak production. The major difference between these programs is the rate at which the hens return to lay. A flock fed the low-protein molt ration comes back into production much slower than one fed a pullet-developer ration.

Research at the University of Illinois. Recent experiments conducted here focused on feeding molt diets which varied in protein content with or without supplemental methionine. The objectives of these studies were to determine the effects of varying protein and methionine levels on subsequent early and long-term post-molt performance and to examine whether the time of year has an effect. Two separate experiments (summer vs. winter) were conducted in which White Leghorn hens, either 65 or 70 weeks of age, were induced to molt by feed restriction until 27% body weight loss occurred. Six different molt diets containing 16, 13, or 10% protein with or without .15% supplemental methionine were then fed to 500 hens in each experiment until production reached 5 to 10%. A 16% protein layer diet was fed for a 30-week post-molt production period.

Results. These studies indicated that post-molt layer performance was affected by the dietary treatments more when the hens were molted in the summer vs. in the winter. In the summer experiment, early post-molt egg production (weeks 1 to 10) was found to be lower for hens consuming the 10% protein diets vs. the 16 or 13% protein diets. Early egg weights (weeks 1 to 4 post-molt) were less for hens consuming the 10% protein diet vs. the 16 or 13% protein diets. In addition, body weight recovery or gain following the fasting period was slower for hens consuming the 10% protein diets. Long-term egg production and egg weights were not statistically affected by protein level although hens fed the 16 and 13% protein molt diets did maintain a numerical advantage of about 3% in egg production.

In the winter study, early egg production and egg weight were not influenced by any of the molt diets (1 to 20 or 1 to 30 weeks). Methionine supplementation did not affect any of the performance parameters in either the summer or winter experiments.

In summary, these studies suggest that early post-molt layer performance may be enhanced by increased protein levels in the molt diet (16 and 13% vs. 10%); however, these effects may be influenced by environmental temperature. Long-term post-molt performance may not be substantially affected by using molt diets ranging from 10 to 16% protein with or without supplemental methionine.

In conclusion. Before deciding on what type of molting program to use, egg producers need to examine carefully the effects of that program on the post-molt performance. Factors which may influence that decision may include: the timing of market demand, season of the year, cost of high protein ingredients (for example, soybean prices), and the length of time that a flock will be kept in production after the molt. These items and others should be taken into account before making a decision.

Ken W. Koelkebeck
Extension Specialist, Poultry

Carl M. Parsons
Associate Professor

Agricultural Newsletter Service
College of Agriculture
Cooperative Extension Service
116-N Mumford Hall
University of Illinois at Urbana-Champaign
1301 West Gregory Drive
Urbana, Illinois 61801

FIRST CLASS

Ag. Library - Serials Clerk
226 Mumford Hall
1301 West Gregory Drive
CAMPUS MAIL

ILLINOIS POULTRY SUGGESTIONS

Cooperative Extension Service
Department of Animal Science
College of Agriculture
University of Illinois at Urbana-Champaign

Volume 65, No. 4 November, 1989

ELIMINATING LARYNGOTRACHEITIS

Laryngotracheitis (LT) is a respiratory disease that can have damaging effects on a laying hen flock. If left undiagnosed and allowed to run its course, production can be greatly affected and high mortality may occur. Dr. Martin Smeltzer, Georgia Poultry Laboratory, recently discussed methods of eliminating LT in commercial layer flocks at the 1989 Tri-State Poultry Federation and Multi-State Health and Management Conference. His comments are summarized here.

Characteristics of the disease. LT is a highly contagious virus affecting the respiratory tract of chickens. A variety of respiratory signs are seen in birds. They include reddened eyes, crusty eyelids, coughing, and sneezing. Severely affected hens may cough up blood due to hemorrhages in the trachea. These respiratory symptoms usually appear between six and twelve days after the flock has become infected. Egg production is depressed, and high mortality may occur due to blockage of the trachea by tissue plugs. Birds that are less than four weeks of age seldom get the disease. LT spreads slowly and can easily be transferred to other houses in a multiple age complex. Birds that have recovered from LT are still considered to be potential carriers of the virus.

Reservoirs of the virus. A commercial layer flock may contract LT from a number of reservoirs. They are considered to be potential sources where the LT virus is maintained in an active state. Some possible sources of infection include: layer-breeder flocks, backyard flocks, gamebirds, gamecocks and broilers.

An infection may be maintained in any of the above reservoirs. However, the virus must still be transmitted by some means to the layer complex. This transmission usually involves people and/or equipment. Some of these may include: service people, neighbors, feed trucks, processing trucks, garbagemen, meter-readers, and visitors. Thus, the complex manager should keep a written record of all visitors and their prior visits before coming onto the farm.

Preventing LT outbreaks. The best way to prevent an LT outbreak is to follow good biosecurity procedures. Visitor traffic must be kept to a minimum, and proper cleaning methods should be followed on the farm. If producers practice good biosecurity and pay specific attention to the foregoing possible transmission methods, the chances for an LT outbreak will be greatly reduced.

Preventing LT by vaccination. The goal in an LT vaccination program is to enhance the birds' internal defense mechanisms against the disease. The vaccine can be given in several different ways. The eyedrop method is the preferred route, because it insures that every bird receives a dose. The water method may be used if labor is not available for individual handling of birds. In order for water vaccination to be effective, the vaccine must be mixed properly and the correct technique used. A large particle size is recommended for proper spray vaccination of LT vaccine. This is important because deep penetration of the vaccine into the birds' respiratory tract is not needed.

Vaccination program for LT. Several key items should be kept in mind when implementing the correct LT vaccination program. They are: 1) The preferred method is by eye drop, and each bird should receive one vaccination; 2) An LT vaccination should be scheduled three-four weeks prior to housing birds on multiple age farms; 3) LT vaccination should not be done within two weeks of a Newcastle-Bronchitis vaccination; 4) If it is necessary to vaccinate the birds before they are eight weeks of age, they will need to be revaccinated again prior to housing; and 5) Birds should be vaccinated when they are normally handled.

Steps to follow when LT occurs. If an outbreak occurs, there is still a short period of time when corrective action can minimize losses before the disease spreads. An accurate diagnosis must be made immediately. When LT is diagnosed, one of the first steps is to isolate the farm. Do not allow any visitors to come on the farm and follow correct biosecurity procedures. The next step is to vaccinate all houses as soon as possible. Use the water vaccination method because it is faster than the eye drop method. If these steps are followed, then LT can be effectively controlled before severe mortality occurs. Remember, the best way to eliminate the threat of LT on your farm is to practice good biosecurity and employ the proper vaccination program.

Ken W. Koelkebeck
Extension Specialist, Poultry

Agricultural Newsletter Service
College of Agriculture
Cooperative Extension Service
116-N Mumford Hall
University of Illinois at Urbana-Champaign
1301 West Gregory Drive
Urbana, Illinois 61801

FIRST CLASS

ILLINOIS POULTRY SUGGESTIONS

Cooperative Extension Service
Department of Animal Science
College of Agriculture
University of Illinois at Urbana-Champaign

Volume 65, No. 3 September, 1989

CAUSES AND CONTROL OF WET DROPPINGS

One of the most irritating problems that can occur in a caged layer operation is "wet droppings". It can produce unhealthy and insanitary conditions. Proper manure removal from layer houses is absolutely dependent on dry manure. The following discussion outlines some possible causes of wet droppings and offers a number of control measures.

Environmental temperature and humidity. The most important causes of wet droppings which poultrymen have little control over are outside temperature and humidity. Laying hens drink nearly twice as much water when the temperature is 90°F compared to 70°F. When water consumption increases this much, wet droppings result because the hens excrete large amounts of water. When high humidity accompanies high temperatures, it is more difficult to dry the droppings because air circulating over the manure is more saturated with moisture.

High rate of lay. When laying hens are at peak production, they eat considerably more feed and drink more water than when they are laying at 70%. This increased water intake will increase manure moisture.

Disease. Several diseases can cause wet droppings. When pullets are raised on litter a low level coccidia infection may remain after they are housed. The associated intestinal irritation may produce wet droppings. Also, when hens have bacterial enteritis and are not treated for it, wet droppings may occur.

Salt content of feed and minerals in drinking water. The most common perceived cause of wet droppings is the level of salt in the feed. However, unless a mixing error occurs at the feed mill, wet droppings rarely occur because of the amount of salt in the feed. If the sodium level in the diet exceeds .25% in the feed, wet droppings are likely to occur. Egg producers must also keep in mind that the sodium, magnesium and sulfate levels in drinking water be kept at a minimum. High amounts may have a laxative effect. Average levels of sodium, magnesium and sulfate should not exceed 32, 14, and 125 ppm, respectively.

Toxic feed components. Increased water intake, and consequently wet droppings, can occur if hens consume enough toxic compounds. Dr. Stan Savage, University of Georgia, recently reported that hens would be prone to producing wet droppings if they consumed moldy feed ingredients and weed seeds. He commented that mold digests the nutrients in finished feed and leaves behind mycotoxins which can irritate the intestinal tract.

Drinking water system. If the droppings are determined to be normal, but the manure pit is soft, then the drinking water system should be checked. Water pressure in the lines should be maintained according to the recommended specifications. And, any water infiltration from the outside must be stopped.

Ventilation. One of the key mechanical factors involved in keeping manure dry is the ventilation system. If proper air circulation over the manure pits is not maintained, then droppings will certainly stay wet. Since layer manure contains 75-80% moisture, air should move across the manure rapidly to evaporate water.

Fly control. If the fly population in a caged layer house is allowed to build up, any existing manure cones will be destroyed. This will reduce surface area and cause the manure droppings to stay moist.

Controlling wet droppings. To avoid having problems with wet droppings, poultry producers should be aware of specific items for its control. They include:

1. Keep the temperature in the house as cool as possible to avoid heat stress.
2. Make sure that pullets do not have any coccidiosis when they are housed, and treat promptly any enteritis problem that occurs.
3. Make certain that the feed contains recommended levels of salt, and keep sodium, magnesium and sulfate levels in the drinking water at a minimum.
4. Be sure the feed contains the least amount of mold or other toxic substances possible.
5. Look out for leaks in the drinking water system and be certain that no water penetrates the building from the outside.
6. Keep the ventilation system in proper working order.
7. Control fly infestation.

It is possible to prevent this problem from occurring if producers practice proper control procedures.

Ken W. Koelkebeck
Extension Specialist, Poultry

Agricultural Newsletter Service
College of Agriculture
Cooperative Extension Service
116-N Mumford Hall
University of Illinois at Urbana-Champaign
1301 West Gregory Drive
Urbana, Illinois 61801

FIRST CLASS

Ag Library Serials Clerk
226 Mumford Hall
1301 West Gregory Drive
CAMPUS MAIL

IL1

ILLINOIS POULTRY SUGGESTIONS

Cooperative Extension Service
Department of Animal Science
College of Agriculture
University of Illinois at Urbana-Champaign

Volume 65, No. 2 May, 1989

FEEDING LAYERS: MANAGEMENT ASPECTS AND CONTROL OF FEED INTAKE

Many factors must be considered in developing a good feeding program for commercial laying hens. Items such as water quality, environmental temperature, ventilation, age of the flock, and rate of egg production should be taken into account. Poor results will occur if any one of these is ignored. Dr. Paul Ruszler, Poultry Extension Specialist at Virginia Polytechnic Institute and State University, recently discussed this topic at the 1989 Multi-State Poultry Feeding and Nutrition Conference. His comments are summarized here.

Water. The nutrient aspect of water is usually ignored when laying hen diets are formulated. Good quality water is required for maintaining high production performance. Poor quality water can be a source of bacterial contamination and can also contain a high concentration of micro-nutrients that may alter feed intake. Laying hens will usually consume about two pounds of water for every pound of feed. Hens will drink much more water when the environmental temperature rises. At 70°F, a flock might drink 45 gallons of water per 1000 hens per day, but the rate of water consumption may rise to 70 gallons at 90°F. This increased water intake tends to flush the digestive system and actually lowers the absorption time of food in the gut. Even though the diet has been formulated correctly, the amount of nutrients received by the hen is lowered.

Temperature. It is well recognized that feed intake is directly affected by environmental temperature. Between 55°F and 80°F, the hen can regulate her normal body temperature with little change in body heat production. When the temperature falls below 55°F, the hen must increase feed intake dramatically to increase her body temperature. Conversely, the hen decreases feed intake and expends energy to cool herself if the temperature rises above 80°F. These variations in nutrient intake can have a detrimental effect on performance.

Controlling feed intake with temperature and ventilation. In controlled environmental facilities, feed intake can be altered with environmental temperature by varying air inlet vents and fan speeds. Caution must be used in extremely cold weather, however. When closing off vents to warm the house in winter, ammonia must not be allowed to build up. This would cause some eye irritation and possibly produce respiratory problems. It is also important to avoid having hot spots or dead air spaces because the hens in these areas will adjust their feed intake and perform differently than the rest of the flock.

Other measures of controlling feed intake. A flock's feed intake can be adjusted by changing the length and number of feeding periods. This is a fairly common practice. Another method that can be used is "clustering" or "stacking". This involves grouping several of the feeding periods close together so that the hens do not have enough time between periods to eat all the feed which is available to them. The feeding periods are usually clustered one hour apart and the same number of total periods are used.

Effect of management techniques. A good feeding program for layers can be confounded by various management factors. If hens are improperly beak trimmed, their feed utilization will be affected. A hen that is not beak trimmed will waste about 20 pounds of feed per year, but a severely beak trimmed bird cannot eat properly and will not produce at her maximum potential.

The feeding program during the pullet phase is also very important. A flock that does not have proper body mass and skeletal growth going into the laying house will have to be fed differently to support good egg production. Remember, the most crucial time in the life of a layer flock is from 0 to 20 weeks of age. However, poor results will also occur if a flock is fed improperly from onset of lay through peak production. Producers should monitor feed intake and body weight gain throughout this period to insure that the flock is being properly fed.

In summary, the proper feeding of a laying flock is not a difficult problem if the factors and management techniques mentioned here are considered. A balanced diet should first be formulated, then factors such as water quality, temperature, ventilation, and other management techniques need to be factored in. If all these items are dealt with, good production performance should occur.

Ken W. Koelkebeck
Extension Specialist, Poultry

Agricultural Newsletter Service
College of Agriculture
Cooperative Extension Service
116-N Mumford Hall
University of Illinois at Urbana-Champaign
1301 West Gregory Drive
Urbana, Illinois 61801

URBANA JUN 1 '89 ILL.
U.S. POSTAGE 0.25
6121169

FIRST CLASS

226 Mumford Hall
West Gregory Drive
CAMPUS MAIL

ILLINOIS POULTRY SUGGESTIONS

Cooperative Extension Service
Department of Animal Science
College of Agriculture
University of Illinois at Urbana-Champaign

Volume 65, No. 1 April, 1989

FATTY LIVER SYNDROME

Most diseases which affect laying hens have a common cause and can usually be treated effectively. But, there is one disease which affects caged layers that does not have a causative agent and is difficult to cure. This disease is fatty liver syndrome (FLS). It has been known for many years, and its occurrence is probably due to several factors. Dr. Peter Hunton, Poultry Specialist, Ontario Egg Producers' Marketing Board, recently discussed this disease. His comments are adapted and summarized here.

Signs, symptoms, and diagnosis. In flocks that have FLS, egg production may drop considerably soon after hens reach peak production. Feed consumption declines and hens going out of production appear to be unthrifty and sick. Hens that die from FLS are frequently overweight and have pale combs. Post-mortem examination reveals a pale yellow-colored liver, which has large blood clots on its surface. Deposits of fat will usually be localized in the abdominal cavity.

Causes of fatty liver syndrome. There are probably several contributing factors that lead to fatty liver syndrome. In a recent review, Squires and Leeson (University of Guelph) commented that hens which overconsume a high carbohydrate and low fat diet that causes obesity are more susceptible to FLS. A dietary deficiency in linoleic acid and selenium may also contribute to the problem. Hens which have high blood levels of estrogen and low thyroid hormone levels may be more prone to FLS. Additionally, general stress conditions and high house temperatures may lead to the disease. Finally, some strains of laying hens may develop FLS more than others.

Possible prevention of fatty liver syndrome. Most feeding programs for layers have been designed to produce maximum egg production and efficiency and have not been formulated to reduce the incidence of FLS. However, outbreaks of FLS seem to be related to feeding excessive protein. Thus, lowering the protein intake of hens without affecting egg production and egg size may be beneficial. When a feed is deficient in selenium, it should be supplemented to a level of .12 ppm. Although increased blood levels of estrogen may increase the incidence of FLS, there is no practical way of lowering this. Egg producers have little control over the genetic stock they receive, but it is unlikely that one strain of layers is more susceptible to FLS than others.

Curing fatty liver syndrome. Several research trials have been conducted to eliminate FLS in layers. Early work by Dr. Russell Couch at Texas A&M University demonstrated that a special premix could reduce mortality in layers. It contained an extra amount of vitamins E, B_{12}, and choline chloride. These ingredients were used because they were considered to be involved in fat metabolism. Some feed manufacturers sell an "FLS-Pack" which contains these ingredients along with some methionine and copper. Use of these packs in a normal feeding program have been found to decrease mortality caused by FLS.

Research conducted at the University of Missouri recently showed that fatty liver hemorrhages were reduced in hens that were fed 3.5% supplemental soybean oil. An additional reduction in hemorrhages occurred when hens were given a "cocktail" containing vitamins E and K, many B vitamins, an antioxidant, methionine, and some trace minerals. This research did not, however, indicate which of the ingredients were responsible for reducing the FLS-related hemorrhages.

In summary, fatty liver syndrome is considered to be a non-infectious disease which strikes caged layers that are in full production. The disease apparently has no common cure, but, modifying feeding programs may reduce the incidence of FLS. Thus, if a laying flock comes down with fatty liver syndrome, every possible step should be taken to eliminate the problem.

Ken W. Koelkebeck

Ken W. Koelkebeck
Extension Specialist, Poultry

Agricultural Newsletter Service
College of Agriculture
Cooperative Extension Service
116-N Mumford Hall
University of Illinois at Urbana-Champaign
1301 West Gregory Drive
Urbana, Illinois 61801

FIRST CLASS

Ag Library Serial Clerk
[illegible] Mumford Hall
1301 West Gregory Drive
CAMPUS MAIL

ILLINOIS POULTRY SUGGESTIONS

Cooperative Extension Service
Department of Animal Science
College of Agriculture
University of Illinois at Urbana-Champaign

Volume 64, No. 6 December, 1988

BEWARE OF AFLATOXIN IN LAYER FEED

Some molds that grow on grains can produce poisons called mycotoxins. There are approximately 200 different types of mycotoxins that are known to exist, and one of the most commonly recognized is aflatoxin. It is produced by the mold Aspergillus flavus. Extreme drought conditions during the growing season can help aflatoxin to grow. So, the 1988 corn crop may contain high levels. Egg producers need to be aware of the source and quality of corn used for their layer feed. In addition, producers should be on the lookout for possible formation of aflatoxin in mixed feed.

Effects of aflatoxin on layers. Aflatoxin-contaminated corn or prepared feed can lower the performance of laying hens. It will reduce hatchability in breeder birds. And, it increases embryonic mortality and decreases fertility among males. If enough is consumed, egg production, body weight, egg weight and egg shell strength will be adversely affected. Layers which have consumed aflatoxin will be less resistant to infectious diseases because of the depressing effect that aflatoxin has on the immune system.

Safe levels of aflatoxin for layers. This is difficult to determine. The Food and Drug Administration states that any poultry feed or feed ingredient containing more than 20 ppb (parts per billion) cannot be sold across state lines. The safe level for growing pullets should be lower than that for layers, since they are more susceptible to infections. So, do not give pullets feed that contains more than 20 ppb of aflatoxin. Laying hens should not consume feed with more than 50 ppb. Higher levels of aflatoxin will likely depress performance.

Detecting aflatoxin. It is particularly important that this year's corn be examined carefully for aflatoxin. If you can see mold on the corn or in the feed, it is probably heavily contaminated with aflatoxin. Feed mills can perform a black light test to determine if the mold is present. Then, a chemical test can be conducted in a laboratory to determine if the mold is aflatoxin. The procedure for sampling the suspected corn or feed is very important. A representative sample must be taken. If you are taking samples from a feed bin, take numerous samples from different locations and depths. Then, mix them together and subject a single sample to a black light test. Samples from feed sacks and feed troughs should also be tested if contamination is suspected.

Preventing and controlling aflatoxin-related feed problems. Because aflatoxin can proliferate in conditions of high moisture, egg producers should store their corn or mixed feed under low moisture conditions. Harvested grain needs to be dried to 15% moisture or lower and stored so that it will remain at this level. It is also a good practice to screen harvested corn. Cracked corn may contain more aflatoxin than whole kernels; therefore, sifting corn through a screen and storing only the kernels will help reduce the possibility and severity of aflatoxin contamination.

Egg producers should practice proper feed management techniques to insure that their flock is not exposed to aflatoxin. Clean feed troughs regularly and do not allow caked and moldy feed to accumulate in them. Use mixed feed within a short period of time.

Minimizing aflatoxin effects. Dr. Larry Vint of DeKalb AgResearch recently commented in their management newsletter that aflatoxin decreases nutrient absorption. If a flock has consumed aflatoxin, he recommends increasing the nutrient density of the diet by adding 25 pounds of unsaturated fat per ton and increasing the protein level by 1%. He also recommended doubling vitamin K and E levels and increasing the B vitamins and D_3 levels of the diet by 20%. According to Dr. Vint, changing the layer feeding program to include these items in this manner will help minimize harmful effects of aflatoxin.

If you know that your flock has been exposed to aflatoxin-contaminated feed, adding copper sulfate to the diet at the rate of two pounds per ton may be helpful. Giving a broad spectrum antibiotic in the water will also help the flock fight off associated infections.

Ken W. Koelkebeck

Ken. W. Koelkebeck
Extension Specialist, Poultry

Agricultural Newsletter Service
College of Agriculture
Cooperative Extension Service
116-N Mumford Hall
University of Illinois at Urbana-Champaign
1301 West Gregory Drive
Urbana, Illinois 61801

FIRST CLASS

ILLINOIS POULTRY SUGGESTIONS

Cooperative Extension Service
Department of Animal Science
College of Agriculture
University of Illinois at Urbana-Champaign

Volume 64, No. 5 December, 1988

WATER QUALITY FOR LAYERS

When formulating and balancing a diet for laying hens, the importance of drinking water is often overlooked. Since the amount of water in the body of a laying hen is about 55%, the nutrient quality of water she consumes is very important. If a hen does not receive good quality drinking water, her production performance will be adversely affected.

Sources of water and factors that influence the water requirement. Laying hens utilize water from three basic sources. The major source is the drinking water. It supplies about 75% of their needs. Feed sources provide about 5%, and the metabolism of nutrients supplies the other 20% of the total water needed.

There are numerous factors which increase a hen's requirement for water. Some of these factors are: 1) high temperature exposure; 2) feed ingredients such as meat scraps and soybean meal; 3) excess salt; 4) increased excretion of uric acid which is part of the feces; and 5) high protein level diets.

Water quality. A number of things determine water quality. These include bacterial contamination, acidity (pH), dissolved minerals, and dissolved nitrates and nitrites. Some of the impurities found in water are coliform bacteria, fluorides, aluminum, selenium, sodium, and iron.

Water analysis. When analyzing water for your laying hen operation, be sure that it is done properly and that the proper items are looked for. Some of these are:

1) Color - Good quality water is colorless. If soluble iron is present, the water will have a reddish tint.
2) Hardness - Calcium and magnesium salts will cause the water to be "hard", and this will produce scales on the inside of water pipes.
3) Minerals - The trace mineral content of water is important because these minerals can be present in toxic amounts.
4) Nitrogen - The nitrogen content of water which is present as nitrates or nitrites comes from surface water contamination by decaying organic material or from surface water runoff from fertilized fields.
5) pH - The pH (acidity or alkalinity) should be tested and should be between 6.5 and 7.2. A pH above 7.2 indicates an excessive amount of calcium or magnesium is present.
6) Sulfur - Contamination of water with sulfur can be determined by smell.
7) Turbidity - Water that contains many small particles is turbid and excessive turbidity suggests that surface contamination has occurred.
8) Bacteria - The presence of bacteria indicates surface contamination by organic material.

Some acceptable water quality standards for layers consist of the following: 1) turbidity - 5 ppm (parts per million); 2) iron - .3 ppm; 3) sulfate - 250 ppm; 4) nitrates - 45 ppm; 5) pH - 6.5-7.2; and 6) bacteria - none.

Control of contaminants. An efficient, but not necessarily an expensive, system is required to control contaminants in water supplies. For most water systems, using an in-line proportioner to dispense a known amount of chlorine will keep water free of bacteria. Because these bacteria can develop rapidly, watering systems should be flushed frequently with chlorine. A safe level to use in open water systems can be made by mixing one-half cup of household chlorine bleach in one gallon of water and then proportioning out at one ounce per gallon of flock water. For a closed system, it may be necessary to leave a residual level of chlorine of 1 ppm in the water at all times.

Hard water caused by calcium and magnesium salts may necessitate installation of a water softening device at the source of water. Such a system does not have to be elaborate, but it must be effective. These devices will add sodium to the water, but the salt level of the feed can be adjusted to offset this. Controlling high levels of nitrates may be difficult to do, but the drilling of a new well will probably correct this problem.

Analyzing the water and correcting problems. If you suspect a problem with dirty, contaminated water, then the source of that contamination must be located. A water sample should be submitted to your county or state water control lab for analysis. After testing the water, correcting the problem may be simple or may require the need to locate a new source of water. In any event, producers should strive to provide good quality drinking water to their laying flock in order to maintain good production performance.

Ken W. Koelkebeck
Extension Specialist, Poultry

Agricultural Newsletter Service
College of Agriculture
Cooperative Extension Service
116-N Mumford Hall
University of Illinois at Urbana-Champaign
1301 West Gregory Drive
Urbana, Illinois 61801

US POSTAGE 0.25

FIRST CLASS

ILLINOIS POULTRY SUGGESTIONS

Cooperative Extension Service
Department of Animal Science
College of Agriculture
University of Illinois at Urbana-Champaign

Volume 64, No. 4 November, 1988

POST-MOLT MILK FEVER SYNDROME

In the August 1987 issue of Poultry Tribune, Dr. Stan Savage, poultry nutritionist at the University of Georgia, discussed a problem that occurred in several flocks of layers returning to lay after an induced molt. The problem resembled the classic milk fever syndrome often seen in dairy cows. Dr. Savage commented that these commercial layer flocks were fasted for approximately 10 days and then immediately fed a normal laying ration during the post-fast prelay period of the molt program. Mortality in these flocks began to increase when egg production reached 5%. All affected hens exhibited severe cage fatigue and paralysis just before death. In one flock, mortality reached 70 hens a day out of 20,000 total, remained at this level for 10 days, and then declined. Dr. Savage believes that this problem occurred because the hens were fed a layer diet containing high calcium immediately following the fast.

We recently observed this same type of problem in a group of layers at the University of Illinois Poultry Research Farm. A description is provided below.

Background. On June 29, 1,640 70-week-old White Leghorn hens of a commercial strain were molted by feed withdrawal for 15 days. Lights were not restricted. A 27% average body weight loss was achieved by day 15. The hens were then fed a cracked corn diet fortified with minerals and vitamins for 20 days. At this time, the hens were switched to a 16% protein layer mash that contained 3.8% calcium and .45% available phosphorus. This ration was fed thereafter.

Mortality increases. After 10 days of feeding the laying mash, mortality began to increase dramatically. Mortality remained high for the next eight days and ranged from a low of five hens to a maximum of 63 a day. The total mortality for this period was 13.4%, reaching a peak of 3.8% on one day. Daily outside temperatures during this time peaked near 100 F, but this did not cause any mortality in 40-week-old hens located in the same house. Thus, the warm temperatures may have contributed to this mortality problem, but probably did not.

When mortality started to climb, egg production was about 10%. Production was increasing rapidly at this time and had reached 24% when mortality peaked. These patterns relative to onset of mortality were similar to those previously described by Dr. Savage.

Symptoms. When mortality began to increase, post-mortem examination revealed that all hens had a thin-shelled egg in the shell gland and that the ovary contained many developing ova. Additional necropsy of hens did not reveal any type of specific disease problem. Many hens showed signs of cage fatigue.

Blood samples were taken from a few birds which were down in the cage, and total calcium was compared to that of birds appearing to be normal and healthy. Total blood calcium of three weak hens averaged 14 mg% while blood calcium from normal hens averaged 24 mg%. Normal blood calcium usually ranges from 25 to 30 mg%.

Theory behind milk fever syndrome. The problem discussed above seems to sometimes occur when molted hens are returned to a high-calcium diet well before they are ready to come back into production. Dr. Savage commented that this apparently leads to the hens not being able to maintain normal blood calcium once they start to return to production. This possibly occurs because the parathyroid gland, which regulates blood calcium levels, becomes inactive and does not function properly. So, when egg production and egg shell calcification begin, blood calcium drops too low, and paralysis results. Although the hens in our study were fed a low-calcium cracked corn diet after the fasting period, they were still returned to a high-calcium layer diet at least 10 days before most of them were ready to come back into lay.

The results of this study and that described by Dr. Savage suggest that caution should be exercised when using molt programs in which hens will be consuming a high-calcium diet for several days before returning to egg production. Further work in our lab suggests that a safer alternative is to feed a nutritionally balanced diet containing 13 to 16% protein and 1 to 2% calcium for 14 to 18 days after the fasting period. This will allow the hens to regain body weight rapidly and come into production quickly once they are returned to a layer ration.

Ken W. Koelkebeck
Extension Specialist, Poultry

Carl M. Parsons
Associate Professor

Agricultural Newsletter Service
College of Agriculture
Cooperative Extension Service
116-N Mumford Hall
University of Illinois at Urbana-Champaign
1301 West Gregory Drive
Urbana, Illinois 61801

FIRST CLASS

Ag. Library - Serials Clerk
226 Mumford Hall
1301 West Gregory Drive
CAMPUS MAIL