HEALTH MANAGEMENT OF THE MODERN BROILER BREEDER MALE

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INTRODUCTION
The health of the Ross Male must be properly managed and this article describes how to maximize flock performance by minimizing or preventing poultry diseases through good husbandry, biosecurity and welfare practices.

Early detection through regular monitoring of production parameters, prevention and treatment of health issues are essential to an effective on-farm disease control program. Closely review production parameters and compare with company targets. Trained veterinary personnel should conduct a proper investigation when monitored parameters do not meet established goals.

VACCINATION
Along with a robust biosecurity program, an appropriate vaccination program can be very effective in controlling endemic diseases and potential disease threats within an operation. Any vaccination program should be developed in consultation with trained poultry veterinarians.

- Base vaccination programs on local disease challenges and vaccine availability.
- Implement vaccine programs so that every bird receives the intended dose of vaccine.
- Follow manufacturer recommendations in terms of product handling and method of administration.
- Properly train vaccine administrators to handle and administer vaccines.
- Regular audits of vaccine handling, administration techniques, and post-vaccinal responses are critical to control challenges and improve performance.
- Replace needles, applicators, and/or vaccine bottles often to help reduce bacterial contamination from the environment.
- Optimize ventilation and management post-vaccination – especially during times of vaccine induced reaction.

Do not rely on vaccination alone to protect flocks against overwhelming disease challenges and poor management practices. Vaccination is more effective when disease challenges are minimized through well-designed and implemented biosecurity and management programs.

HEALTH CONCERNS FOLLOWING HANDLING OR VACCINATION

Vaccine Administration Sites
Examine vaccine administration sites for proper placement and administration amount. For instance, live fowl cholera and pox vaccines given in the wing web should leave a reaction or ‘take’ (see Figure 1). This examination should be done immediately following vaccination and again later to observe tissue reactions. Inaccurate vaccination leads to minimal or no takes.

Figure 1: Wing Web Vaccine Take

Monitoring vaccine takes is an easy way to assess the accuracy of a vaccination program. The most accurate time to evaluate a take is 5-7 days post-vaccination at which time there should typically be a 0.25-0.50 cm take. The standard to ensure proper immunization of a flock is 40-50 birds with a minimum of 95% administration accuracy.

Administration and dose are critical. The two prong applicator (see Figure 2) has been extremely effective, provided the correct administration technique is implemented. The proper placement is on the underside of the wing in the center of the webbing. Be sure to avoid the wing muscles as this can lead to excessive takes. It is also important to avoid feather contact in order to prevent feathers from wicking off the vaccine during administration.
Secondary Bacterial Infections
Vaccination hygiene is extremely important. Failure to change needles, applicators, and/or bottles often enough can lead to environmental contamination, tissue reactions and/or excessive vaccine takes (see Figure 3).

Change needles or prong applicators frequently during the vaccination of a flock and do not refill vaccine bottles as this can cause contamination. For instance, fowl cholera vaccine bottles or applicators often become contaminated with *Staphylococcus* if these steps are not followed. If bacteria enter the blood stream, systemic infection and secondary bacterial infections, especially in the legs, will subsequently develop (see Figure 4).

Vaccine Induced Disease
Vaccines that are too virulent or ‘hot’ may actually induce disease (e.g. viral arthritis or fowl cholera). Males may need to be vaccinated with a milder vaccine than the females, especially for fowl cholera. Males experiencing severe feed restriction are most likely to develop vaccine-induced disease. Rough handling of males during vaccination and/or catching also increases the likelihood of vaccine induced disease. Avoid catching and carrying males by one leg or wing (see Figure 5).

Trauma
Improper bird handling is a major cause of trauma. Monitor bird handling by vaccination and live haul crews and assess the experience level of the crew. In addition, the equipment used to handle or catch birds should be in good condition (see Figure 6). Also consider weather conditions during handling, catching or transport.

Improper bird handling can lead to:
- Broken bones.
- Damaged joints, muscles and tendons.
- Re-activation of prior disease or infection.
COMMON HEALTH ISSUES

During the Growing Period (0-22 weeks)

Coccidiosis

Chickens are susceptible to coccidiosis at any age. Exposure eventually results in immunity and the goal in a breeder program is to attain an early controlled exposure. This is achieved via coccidiosis vaccines at one day of age. Birds are exposed to live, potentially pathogenic coccidia when vaccinated with coccidiosis vaccines.

Primary concerns for broiler breeders include *Eimeria acervulina*, *E. maxima*, *E. tenella*, and *E. necatrix*. The site of replication in the intestinal tract and the number of replication cycles to generate immunity differs.

Protective immunity development:
- 2 reproductive cycles → *E. acervulina* and *E. maxima*.
- 3 cycles → *E. tenella* (see Figure 7).
- + 4 cycles → *E. necatrix*.

Development of proper immunity is dependent on several factors including the control of management parameters such as litter quality and ventilation, and careful attention to minimizing concurrent immunosuppressive diseases (e.g. Mareks, IBD, CAV, and reovirus). Adequate nutrition and feed restriction management play a crucial role, as feed restriction encourages litter consumption and therefore oocyst ingestion.

Investigating field conditions through careful monitoring of vaccine reactions during the peak reaction time period of 2-6 weeks of age will help to avoid excessive vaccine reactions and future problems.

Lesion-scoring systems are most commonly used. Normal scores in vaccinated birds should not exceed scores of +2.

Monitoring should include inspection of the flock for signs of intestinal disease, such as feed passage, loose or bloody droppings, poor flock uniformity, increase in mortality, inadequate weight gains, and/or secondary bacterial infections.

Use of amprolium and vitamin supplementation may help to reduce negative effects of improper coccidiosis control, particularly from *E. tenella* and *E. maxima*. Amprolium 10 days post vaccination at a level of 10 ounces per gallon of stock solution, given for 2-3 consecutive days, may serve to buffer the reaction without interfering with immunity development.

Vitamin supplementation (water soluble and particularly the fat-soluble vitamins A, D, E, and K) for 3-4 days after amprolium administration is suggested. In situations of intestinal disease, such as with a break of coccidiosis, absorption of vitamins is decreased due to intestinal damage associated with the vaccine reaction.

Histomoniasis (blackhead)

The primary agent in this disease process is the protozoal organism, *Histomonas meleagridis*. Disease transmission in chickens occurs primarily via ingestion of infected cecal worm eggs, so reducing primary vectors (i.e. cecal worms) is key in the strategy for blackhead control.

Consistent, early, and frequent worming with benzimidazole type products will help reduce exposure to cecal worms/eggs and the histomonads they carry. Biosecurity measures (removal of old litter, thorough cleanout and disinfection) aimed at reducing populations of vectors are also recommended.

*See Aviagen Technical Update, Vol. 1 (June 2005)*, written by Dr. Suzanne Young and Dr. Jim Dawe for more information on worming programs.

Clinical signs (listlessness, unkempt feathers, and discolored cecal discharge) develop 7-12 days after infection. Lesions include liver lesions as shown in Figure 8 (highly variable circular depressed target-like areas up to 1 cm in diameter) and/or swollen ceca with thickened walls and possibly cheesy cecal cores as shown in Figure 9.
Upon suspicion of blackhead, submit birds to a diagnostic lab for differentiation from infections with agents such as salmonellosis and coccidiosis.

Nitarsone (Histostat) is approved for prevention of blackhead in the United States, however in most countries there are no approved drugs for blackhead treatment.

Coccidiosis caused by *E. tenella* has been identified as a contributing factor, so prevention strategies to control *E. tenella* are important. Some companies are having success with various programs that include salting dirt floors (granular feed grade only). Like with coccidiosis, vitamin supplementation, especially with fat-soluble vitamins A, E, D₃, and K is a good practice when there is intestinal disease.

See Aviagen Technical Update, Vol. 2 (June 2005) written by Dr. Kelli Jones for more information on blackhead.

**Infectious Laryngotracheitis Virus (ILTV)**

ILTV is a highly contagious respiratory α-herpes virus of chickens and other fowl. Virus enters the host most commonly via the upper respiratory or ocular route.

Clinical signs include:
- Gasping (see **Figure 10**).
- Coughing.
- Nasal or ocular discharge (see **Figure 11**), lacrimation, and/or expectoration of blood tinged mucus.
- Lesions include tracheitis (see **Figure 12**), with or without blood tinged mucus, conjunctivitis and sinusitis.

**Figure 8: Liver Lesions**

**Figure 9: Cecal Cores**

**Figure 10: Signs of Respiratory Distress**

**Figure 11: Tracheitis Lacrimation (Ocular Discharge)**

**Figure 12: Tracheitis**
Economically, ILTV is of concern because of the associated mortality and decrease in egg production that this virus induces. If ILTV is a concern in the area, vaccination during rearing is essential for protection.

Breeders are most commonly given a modified live virus that has been passaged in tissue culture (TC vaccine). This vaccine is a very mild attenuated virus so there is minimal risk of spread to naïve birds. Vaccination is done via eye-drop (see Figure 13) at 4 weeks of age and again at 10 weeks of age in areas of high challenge.

Figure 13: Eye Drop Vaccination

If necessary, the vaccine may be used to aid in limiting the spread of an outbreak; however, only birds not yet infected with the virulent outbreak virus can be protected.

In areas where ILTV is prevalent, some customers are administering another type of modified live vaccine in the water, at about 4 weeks of age; this has been cultivated in chicken embryos (CEO vaccines). CEO vaccines are less stable and more virulent than TC vaccines, and can easily revert back to virulence. CEO vaccines have shown to be the source of many ILTV outbreaks, so extreme caution must be observed when this vaccine is used in breeders.

Intestinal worms
Intestinal worms (round, tape, cecal [see Figure 14], and Capillaria worms) are commonly diagnosed during necropsy of pullets, cockerels and adult broiler breeders.

Figure 14: Cecal Worms

Clinical signs commonly seen with intestinal worm infestations include rough feathering, retarded growth, pasty vents and pale birds. Severe intestinal worm infestations can cause diarrhea, poor absorption of nutrients, enteritis, and other infectious diseases, including blackhead (*Histomonas meleagridis*).

Cleaning out houses and using new litter with every flock will minimize exposure to intestinal worms. A preventative worming program is suggested in rearing breeders to reduce the incidence and severity of intestinal worms.

Effective products for treatment are available only via an off label written prescription from your veterinarian. Economic benefit of treatment should be considered prior to treatment, especially in flocks already in production.

A monitoring program that includes examining intestines during necropsy is important for monitoring the effectiveness of a worming program. Sex slips make ideal candidates for worm checks. Always screen for *Capillaria* worms, as they are not readily apparent without special screening procedures (see Figure 15).

See Aviagen Technical Update, Vol. 1 (June 2005), written by Drs. Young and Dawe for more information on worming programs and effective products.

Figure 15: Screening for Capillaria Worms
Leg/Joint Staphylococcus Infections

Staphylococcus infection, or *staphylococcosis*, refers to a variety of diseases in poultry caused by staphylococci bacteria. *Staphylococcus aureus* is the only *staphylococci* of veterinary importance in poultry.

Outbreaks of staphylococcal lameness are usually caused by management practices that cause stress and or joint and tendon trauma (see Figures 16 and 17 for examples). Staphylococcus infections tend to occur more frequently during the following four periods of a breeder’s life:

- **0-2 weeks** — Omphalitis and femoral head necrosis are often related to egg or hatchery contamination and minor hatchery treatments (e.g. toe treatments).
- **4-6 weeks** — Infected hock and stifle joints secondary to harsh vaccine reactions, or coccidiosis due to intestinal wall damage that allows bacteria to enter the bloodstream and later settle in the joints.
- **10-20 weeks** — Infected hock and stifle joints secondary to the stress of vaccination, feed restriction and sexual maturation. Overcrowding, poor feed distribution and insufficient feeder space exacerbate these problems.
- **24-30 weeks** — Infected hock and stifle joints and “bumblefoot” (plantar abscess) secondary to the stress of moving, mating and onset of egg production. Male aggression and injuries associated with feed equipment, nest boxes and slats also contribute to the development of staphylococcal infections during this period.

Economic losses in male broiler breeders are typically due to joint or tendon infections that lead to decreased uniformity and weight gain, decreased mobility and mating ability, and a decrease in overall competitiveness of affected birds.

In all cases of bacterial bone and joint infections, the response to antibiotic treatment is poor to variable, because bacteria are located in a site that is poorly vascularized and they are therefore located in sites and able to multiply where the immune defense system can have little effect.

Preventative measures include:

- Stress management (e.g. avoid excessive stocking densities, feed restriction, and aggressive bird handling).
- Environmental management (e.g. removing sharp equipment or objects, encouraging exercise, minimize slat height, manage litter and water quality).
- Monitoring vaccination and health programs (e.g. monitor and control coccidiosis, utilize appropriate vaccination programs, ensure proper biosecurity in hatchery and on farm, ensure vaccine and vaccine equipment hygiene is practiced).

In addition, specific management programs and guidelines may be found in the breeder management guide provided by your primary breeding stock supplier.

For further information regarding *Staphylococcus* infections in broiler breeders, please refer to Aviatech Article Vol. 1, No. 1 (October 2001), written by Dr. Carolyn Miller and Dr. Eric Jensen.
Spinal Abscesses (Vertebral Osteoarthritis- VOA)
Outbreaks of spinal abscesses caused by the bacteria *Enterococcus cecorum* in young broiler breeder males are a distinct condition that differs from sporadic spinal abscesses and other previously described spinal pathologies. Mortality levels vary, but can be as high as 20% due to heavy culling of affected birds. Morbidity of a flock may be as high as 50% or more.

Clinical onset is around 6-12 weeks of age and in a flock usually lasts for 4-6 weeks. The condition can be recognized by the characteristic lameness and clinical signs, especially arching of the back, paralysis, and birds sitting down on hocks, as shown in Figure 18. Figure 19 illustrates how when an abscess grows it compresses the spinal cord of the affected birds, leading to characteristic clinical signs.

**Figure 18: Typical Presentation of Affected Birds**

**Figure 19: Abscess Causing Spinal Cord Compression**

Confirmation is by necropsy and finding the typical abscesses in the spine, combined with isolation and identification of *E. cecorum* in the lab. Abscesses can easily be seen during a necropsy exam near where the lungs and kidneys meet along the spine, as shown in Figure 20.

**Figure 20: Abscess at Junction of Lungs and Kidneys**

Prevention and treatment methods for affected flocks are limited, due to an incomplete understanding about how this condition occurs. Until more is known about spinal abscesses in young breeder males, it may be prudent to pay careful attention to intestinal health and minimize or modify procedures that may create mild back injuries in the birds. *E. cecorum* has been shown to be extremely sensitive to both penicillin and virginiamycin, but once infection occurs in the spine, antibiotic penetration is poor. Perhaps treating a flock showing only early signs of infection may be helpful.

**During the Breeding Period (23 - 64 weeks)**

**Fowl Cholera**
*Pasteurella multocida* is the bacterial agent responsible for fowl cholera, an acute or chronic bacterial septicemia of fowl. It is more prevalent in late summer, fall and winter.

Clinical signs of acute septicemic infection are typically missed due to the rapid progression of mortality that follows. In chronic infections, clinical signs and lesions appear as more localized infections (e.g. swollen wattles [see Figure 21], sinuses, leg or wing joints or foot pads). The respiratory tract is another common site for chronic infections (see Figure 22).
Fowl cholera is one of the most costly diseases in many broiler breeder operations due to mortality, production losses, and persistent localized infections. Because of this, nearly all broiler breeders in the United States are vaccinated. However, even in the face of vaccination, fowl cholera may still be a problem, especially if vaccine type, technique or hygiene practices are inadequate.

Fowl cholera typically occurs within a few days or weeks of vaccination, then temporarily regresses, then reoccurs in a chronic form after movement to the hen house and during peak production.

Focus should be on reducing the fowl cholera field challenge and proper vaccination during rear. Because other animals may harbor this bacterium, any effective cholera control program must include control of rodents and of other potential hosts such as cats, skunks and other mammals.

Control programs should also include vaccines. Both live and inactivated products are available. Vaccine titers should be monitored. Inactivated vaccine titers tend to decline after 40-50 weeks. Live vaccines offer protection against multiple serotypes, but every bird must be injected. All live vaccines have the potential to induce fowl cholera in certain circumstances and males appear to be more susceptible to vaccine-induced fowl cholera than females. Contact your vaccine supplier for technical support on optimizing vaccine response and avoiding potential secondary problems.

Culture and sensitivity testing should be performed prior to treatment as there is some resistance reported to commonly used antibiotics. Effective antibiotic therapy should stop mortality within 24 hours.

For more information regarding fowl cholera in broiler breeders, please refer to the Ross Tech document “Protecting Broiler Breeders Against Fowl Cholera” (June 1996) by Dr. John Glisson.

Northern Fowl Mites
Northern Fowl Mite infestations in commercial poultry can vary from a simple nuisance to a severe economic headache. Mites can reduce production by over 2% and can lead to weight loss and a decrease in feed intake.

Mites are commonly introduced to flocks via wild birds and rodents and are usually seen in the cooler months of the year. The best way to control a mite infestation is by early detection of mites by routine monitoring.

The vent area is the typical site of infestation; however males will have more of a scattered infestation pattern that will usually involve the shanks. Mites are very small, brown or light red in color, and can be easily observed crawling on the birds. Their excretions typically become caked on feather shafts and feathers appear dirty (see Figure 23). Treatment typically involves applying chemicals or pesticides on birds, nests, slats, litter and other areas in the house.

![Figure 21: Swollen Wattles](image1)

Photo by Dr. H. John Barnes

![Figure 22: Pneumonia in Lungs](image2)

Photo by Dr. H. John Barnes

For more information regarding fowl cholera in broiler breeders, please refer to the Ross Tech document “Protecting Broiler Breeders Against Fowl Cholera” (June 1996) by Dr. John Glisson.
Spike Males
One major issue concerning spike males involves pre-existing disease being passed to the naïve flock. Biosecurity becomes of utmost importance, especially when spike males are distributed from a common site to many sites. Potential disease threats common with spiking males include fowl cholera, Mycoplasmas, fowl mites, ILTV and Salmonella. Laboratory and farm monitoring are important for disease diagnosis prior to the introduction of spike males.

CONCLUSION

Knowing what to expect at what age and how to detect what is abnormal for the flock is crucial. When health problems are seen or suspected in breeder flocks, seek veterinary advice at the earliest possible opportunity. In investigating the cause of disease, care must be taken in associating a bacterium or virus isolated from the infected flock as the cause of the disease. Many non-pathogenic bacteria or viruses may also be isolated from healthy birds.

Continuous improvement of male health within a breeder operation requires good record keeping and sample collection throughout the lives of the flocks and across the whole production process. In addition, it is extremely helpful to keep abreast of local and regional health concerns in order to prepare for the unexpected.

The recognition of health problems may involve several steps. In diagnosing a disease problem, and planning and implementing a control strategy, it is important to remember that the more thorough the investigation, the more thorough the diagnosis. Early disease recognition is critical.