

FOWL CHOLERA

The Disease

Fowl cholera is an infectious disease of poultry and other birds. It usually appears as an acute, systemic disease with high morbidity and mortality, but chronic conditions with localized infections can occur. This disease has been recognized for over 200 years and has been the subject of vast amounts of research. Despite this attention, fowl cholera still remains a problem in the modern poultry industry.

Fowl cholera is caused by the bacteria Pasteurella multocida. P. multocida is a gram negative, nonmotile, nonspore forming rod that can grow both aerobically and anaerobically. Unlike most gram negative bacteria, it does not grow well in MacConkey's agar and some strains are sensitive to penicillin. Sixteen serotypes of P. multocida are currently recognized. Serotypes 1, 3, 4, and 3X4 are the most common isolates in poultry. Some isolates are hybrids of two or more of these. For example, Clemson University strain, a commonly used vaccine strain, is classified as a 3x4 (read three cross four).

Virulence among isolates is highly variable. Encapsulated strains, when the cells are surrounded by a capsule, are typically more invasive than strains that lack capsules. This accounts for increased virulence in the encapsulated organisms since they are better able to reproduce in the tissues and produce more toxin. Also, recent work suggests that encapsulated strains are better able to avoid the immune system of the bird than are nonencapsulated strains.

Clinical signs of P. multocida infection vary according to the organism involved. In acute cholera, mortality may occur suddenly and increase rapidly. Birds may be found dead in the nest. Sick birds may be depressed and cyanotic. On necropsy, hemorrhage, congestion and edema are usually evident. The liver is generally more affected than other organs and may appear swollen, streaked with light and dark bands, and contain yellow spots of necrosis.

Chronic fowl cholera usually develops in birds surviving an acute attack. The infection becomes localized and produces swellings in the wattle, joints, foot pads, sternal bursa and tendon sheaths. These areas often contain a consolidated cheesy exudate. Twisted necks and incoordination are occasionally seen if the infection reaches the brain.

P. multocida is believed to be harbored by wild birds and some rodents and mammals. Also, some previously infected chickens may harbor the organism in the nasal cleft. Methods of dissemination include rodents, cannibalism of infected carcasses and contamination of water systems.

An inherent resistance to fowl cholera exists in chickens less than 16 weeks of age. In areas where cholera is a problem, chickens should be immunized before point of lay with a duration of immunity to protect through the laying cycle. Fowl cholera is a bacterial disease and can be treated with appropriate antibiotics. However, once the disease is diagnosed, mortality and egg production drops occur rapidly. Most producers agree that it is less expensive to vaccinate for cholera than to treat it with antibiotics.

Vaccination

Two types of vaccines are available for immunization against fowl cholera:

1. Live vaccines are a strain of live P. multocida organisms that have been found to be non-pathogenic. The original CU strain was discovered at Clemson University and has been used as a vaccine for several years. A milder, temperature sensitive mutant of the CU strain is the PM-1 strain. M-9 is an even milder strain than PM-1 and is also commercially available.
2. Killed bacterins are preparations of one or several serotypes of P. multocida that have been chemically inactivated and placed in oil emulsion adjuvants. These bacterins, given properly, offer a high level of immunity if the challenge is of the same strain. Killed bacterins offer little cross protection between serotypes.

Both of these vaccines have some advantages and disadvantages. Live vaccines produce good protection by stimulation of cell mediated immunity, but vaccine reactions are common. These include localization of the organism in the joints, lung infections and general unthriftiness. M-9 strain has less side effects than CU strain, but it (M-9) is milder and produces less of an immune response. M-9 is not effective in high challenge areas, but is adequate in areas of low challenge.

Bacterins give a high level of immunity, but only to that particular strain contained within the product, usually serotypes 1, 3, 4 and 3X4. Bacterins can create local reactions at the injection site. Care should be used when administering this product as improper injections in the neck muscle or too high on the neck can cause stiff necks and swollen heads.

Humoral immunity is not as important in the body's defense against fowl cholera as is cell-mediated immunity. In other words, antibodies, as measured by the ELISA test, do not necessarily correlate with protection against infection. Antibody titers do however, give some indications of cell mediated response, i.e., high antibodies usually mean good protection, but low antibodies do not always mean poor protection.

When a flock breaks with cholera, there are several things that can be done. Depopulation should be considered since carrier birds develop and could serve reservoirs. If eradication is impossible, treatment is indicated. Since vaccination is usually considered a part of treatment, the decision should be made to either vaccinate and treat or to treat and then vaccinate. One example of this would be to give the bacterin and treat with antibiotics simultaneously. Hopefully, this would immunize the unexposed birds while controlling the disease in the affected birds. Live vaccines can also be used as part of therapy, but antibiotics should not be given three days prior to or three days post-vaccination. One approach is to vaccinate immediately upon diagnosis and treat three days later. This works better in turkeys than chickens. Obviously, it is better to have the flock immunized than to try to treat an outbreak.

Several combinations of live vaccines and killed vaccines have been proposed for vaccination programs. Since the discovery of the CU live vaccine strain, many broiler breeders used vaccination schedules consisting of administering the live CU strain in the wing web at 10 to 12 weeks of age followed by either live CU vaccination in the wing web or a bacterin at 18 to 20 weeks. It has been found that some of the undesirable effects of CU vaccination in turkeys can be buffered by first vaccinating with a bacterin. If this can be extrapolated to chickens, then breeders and layers in high challenge areas should be vaccinated first with a killed bacterin at approximately 10 to 12 weeks followed by a CU wing web live vaccine at 18 to 20 weeks. Still others use only killed bacterins given twice. When using a killed program, the first bacterin is given at 10 to 12 weeks of age and then again at 16 to 18 weeks of age. Killed programs eliminate the problems of chronic cholera brought on by the live CU vaccination. These programs have been shown to establish protection in birds throughout the laying cycle until about 56 weeks of

age. Keep in mind that molted hens will need to be boosted.

Pullets vaccinated at 18 to 20 weeks of age often have other vaccines administered at this time such as Newcastle disease, infectious bursal disease, infectious bronchitis and infectious laryngotracheitis. This should be avoided as much as possible since any stresses along with live vaccination can decrease the immunity produced and increase vaccine reactions. Many broiler breeder growers treat routinely with antibiotics one to two weeks following administration of live vaccines to try to prevent chronic cholera.

Like other diseases such as fowl pox and ILT, fowl cholera vaccination is difficult to monitor with laboratory tests. Recently, more work has been done with ELISA testing to compare antibody titers to protection levels. While promising, this procedure needs more standardization before accurate judgments can be made

Fowl cholera continues to be a problem in the poultry industry. The fact that so many vaccination programs exist is indicative that no good program has been found for every situation. Fowl cholera must be considered on an individual basis. What works for one area might not work for another. Consider prevalence, management conditions and individual preferences when designing a cholera prevention program for your operation.