MSD ANIMAL HEALTH

General Management Considerations for Coccivac® Live Coccidial Vaccines

Coccivac®

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General Management Considerations For Coccivac® Live Coccidial Vaccines

Coccivac® vaccines are a suspension of live sporulated coccidial oocysts representing the common pathogenic *Eimeria* species. They are designed to infect the bird with a controlled number of organisms, which stimulate an immune response.

Chickens are susceptible to coccidiosis at any age and are invariably infected to some degree within the first two weeks after placement. This early exposure generally results in immunity, even if no obvious signs of disease are noted. With repeated, low-level exposure, persistent immunity can be maintained. The immunity is species specific. That is, immunity to one *Eimeria* species will not provide protection against other *Eimeria* species.

Effective live coccidial vaccination programs depend on an initial controlled exposure of live sporulated oocysts. Following initial controlled exposure, coccidia must achieve two or more subsequent life cycles in the bird for full immunity to develop. Although the initial dose and route of administration are controlled, subsequent cycling of the vaccine is heavily influenced by poultry house management conditions as well as the general health of birds and their immune status.

This document is intended to highlight general management considerations for broiler chickens reared on Coccivac-B, although many sections will also have some relevance to birds reared on a Coccivac-D2 program.

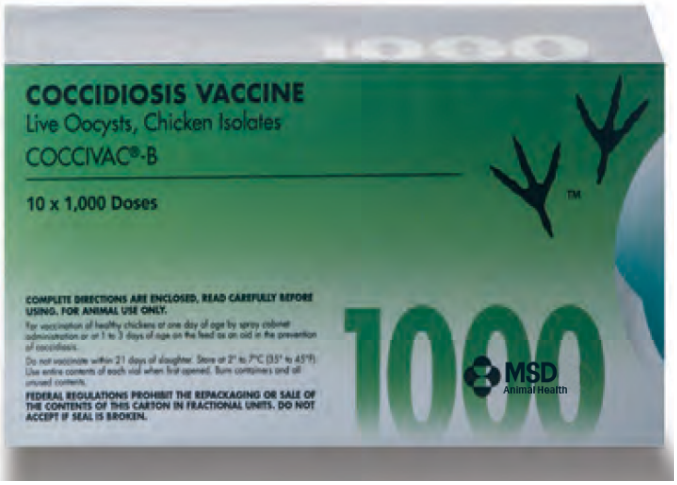
There are two chicken lines of Coccivac vaccines:

Coccivac-D2

Coccivac-D2 contains live oocysts of the following species of coccidia: *Eimeria tenellla, E. mivati, E. acervulina, E. maxima, E. brunetti* and *E. necatrix*, to aid in the prevention of coccidiosis in chickens.

Coccivac-B

Coccivac-B contains 4 coccidial species *(Eimeria acervulina, E. maxima, E. mivati and E. tenella).* It is intended for use in broiler (meat-type) chickens.



Vaccination

Vaccine Storage and Handling

Coccivac vaccines are formulated to provide an adequate initial dose of live sporulated oocysts to the bird. Sporulated oocysts are very sensitive to adverse environmental conditions, especially temperature.

- Carefully read and follow label instructions for storage, mixing and administration of live coccidial vaccines to prevent unnecessary loss of vaccine dose titers.
- **Do not freeze Coccivac vaccines!** Freezing will kill or damage sporulated oocysts, resulting in an ineffective vaccine. If the vaccine has been accidentally frozen (even if only a few ice crystals are visible in the liquid), **discard the vial(s) immediately.** Do not use any questionable vaccine.
- Coccivac vaccines should be maintained at a temperature between +2°C and +7°C (35°F to 45°F) throughout shipping, storage and subsequent transport to farms or hatcheries.

Vaccine Administration

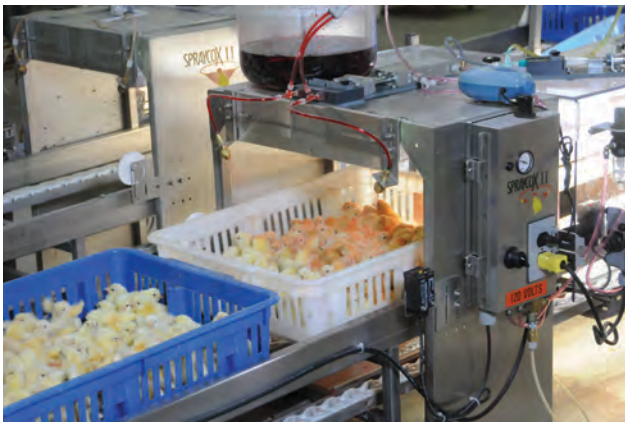
Uniform Vaccine Administration and Effective Oocyst Ingestion are Essential

- Uniform initial vaccine coverage and ingestion will ensure that all birds begin the cycling process together and it will encourage uniformity in the subsequent cycling and development of immunity in the field.
- Each serial of Coccivac is observed via light microscope and carefully titrated to ensure serial-to-serial consistency for uniform field performance. Vaccine safety, quality and consistency are further backed up by live bird testing of each serial prior to release for sale.
- Coccivac vaccines are approved for hatchery application via the SprayCox® line of vaccination equipment, or via on-feed application in the field. Uniform vaccination results will be easier to achieve using the approved hatchery application method.

Vaccine Application Methods

Hatchery Spray

A variety of SprayCox spray cabinets and hand-held sprayers have been designed to accommodate hatchery design and chick processing volume. Only approved application equipment should be used for Coccivac vaccines.



- The SprayCox sprayer delivers a uniform 21 ml of very coarse spray for each box of 100 chicks. Monitor the equipment daily to ensure proper calibration.
- Chicks will be wet following vaccination. Allow at least 15 minutes to dry before introducing chicks to chilling conditions, such as loading the stacks onto the chick delivery vehicle.
- Chicks will begin to clean, dry and oil their feathers after vaccination (an instinctive behavior called “preening”). Preening should be encouraged, since this is the method by which oocysts are ingested.
  - Hatchery holding rooms should be well lighted and maintained at comfortable temperatures to encourage preening behavior.
  - Red dye mixed with the vaccine will attract the chicks’ attention and stimulate preening. Use only an approved dye, since some dyes or coloring agents may be harmful to the sporulated oocysts in the vaccine.
  - The recommended dye concentration is 1 ml of red dye per 1,000 ml of diluted vaccine.

Feed Spray Application

When hatchery application of Coccivac via SprayCox is impossible, feed spray application is an effective, though less uniform, alternative. With this application method, post-vaccination treatment with amprolium is often necessary to maintain acceptable post-vaccination reactions.

Every effort must be made to encourage uniform ingestion of vaccine oocysts when the vaccine is applied via feed spray. This includes both the application technique and overall brooding management. **Chicks must be comfortable to consume feed uniformly!**

- Consult your MSD veterinarian regarding timing of on-feed vaccination.
- **Do not** withhold feed, feed starve or vaccinate the chicks first thing in the morning. All of these procedures encourage over-consumption of feed by the most aggressive chicks, leaving no oocysts on the feed surface for the rest of the flock.
- **Do not** use any medicated drinking water or water disinfectant during, or for 24 hours before and after, vaccination.
- Dilute the vaccine at a ratio of 1,000 doses/400 ml of non-chlorinated water.
- Mix the vaccine well and place it in a clean garden-type pressure sprayer designated for vaccine use only.
- Throughout the vaccination procedure, the vaccine in the sprayer should be agitated at frequent intervals to prevent the heavy oocysts from settling out of the solution.
- Spray half of the diluted vaccine uniformly over the surface of the feed in feed lids or on brooding paper and in feed pans. All feed available to the chicks should be covered with vaccine at a rate that just darkens the color of the surface feed (the feed should be damp, not wet).
- When coverage is complete, repeat the process with the other half of the vaccine. The feed will have dried enough to allow the vaccinator to observe the darkening of the surface feed with reapplication. **Two complete passes over the feed will improve the uniformity of coverage.**
- Allow the chicks adequate time to consume the vaccinated feed before placing more feed in the feed lids, on the paper or in the pans.
- Post-vaccination reaction and response **should be monitored.**

If concerned regarding post vaccination reaction, please consult your veterinarian.

Poultry House Management

Brooding Considerations

Placement Density

Coccivac vaccines will produce the most uniform results if the initial stocking density is 0.07m^2 – 0.09m^2 (0.75 ft^2 – 1.0 ft^2) per bird. Heavier bird concentration may result in litter moisture control problems and high litter oocyst density. Special management programs may be designed to accommodate high-density operations.

Bedding

Bedding material is very important to help maintain proper bird temperature by insulating the birds from cold subflooring material and by absorbing moisture.

- A good base (4 to 6 inches) of absorbent fresh, dry bedding material such as wood shavings or rice hulls is highly recommended.

Brooding Temperature

Brooding temperatures should follow guidelines recommended by the specific poultry integrator or by the hatchery that supplied the chicks.

- Air and floor temperatures in the poultry house should encourage good bird activity at placement and not impair feed and water consumption.

Supplemental Feeders/Drinkers

Supplemental feeders and drinkers are important to help young birds get a good start in their new environment and should be easily and readily accessible to birds. In birds, feed consumption is highly correlated with water consumption. A bird will not consume the appropriate amount of feed if it is deficient in water and vice versa.

- It is crucial that an appropriate number of supplemental feeders (feed lids) be used or brooding paper during the initial stages of coccidial immunity development.
- Supplemental feed should not be reduced or discontinued until the birds are at least 7 days of age. Supplemental feed and/or water should be continued until the birds have fully acclimated to the standard house feeding and watering equipment.
- Supplemental feed should be removed gradually to avoid spikes in mortality or encouragement of litter eating.
  - Chicks that consume large amounts of litter also will be consuming too many oocysts during the immunity-building phase of vaccination and may be consuming high levels of harmful bacteria such as *Clostridium* spp. The result may be excessive vaccination reaction or necrotic enteritis with poor overall flock uniformity and performance.

Partial House Brooding

Half-house brooding encourages proper Coccivac cycling for the first 7 to 14 days. To ensure an adequate initiation of the vaccine life cycle:

- Bird density should be at least 1.74 kg/m^2 (0.60 lb/ft^2) at 7 days, but
- Bird density should be no more than 8.50 kg/m^2 (1.75 lb/ft^2) at 14 days of age.
- The litter moisture content should be a minimum of 25%.
- The litter temperature should be 28°C to 29°C (82°F to 85°F).

Low-density flocks may require more restrictive brooding than half-house brooding. High-density flocks may require release from the half-house earlier than 14 days, even during winter.

Beyond Brooding: Management of Coccivac Life Cycles for Performance

Litter Moisture

Although a minimum litter moisture content (25%) is necessary to stimulate the coccidial life cycle, excess litter moisture is a major contributor to poor Coccivac results. Excessive litter moisture promotes heavy cycling of the coccidia and overgrowth of bacteria that can cause necrotic enteritis (*Clostridium* spp), IP (cellulitis) and airsacculitis *(E. coli).* Excess litter moisture also will promote high ammonia levels, resulting in blindness and poor flock uniformity.

- Nipple drinkers will reduce the amount of litter moisture created by spillage.
  - Nipple drinkers must be managed correctly to avoid excessive moisture under the water line.
- The initial life cycles of Coccivac often induce "flushing" or wet droppings. This is most noticeable between 7 and 14 days post vaccination.
  - Litter type and depth must accommodate the expected moisture.
  - Bird density can be controlled by adjusting the age for movement from partial house to full house. This will avoid concentration of moisture on the brood end of the house.
  - Ration formulation may be able to reduce the amount of excreted moisture.
  - Ventilation must be adjusted to control litter moisture within the house.

Lighting Programs, Feeding Programs and Stress Management

- Remain alert to all forms of accidental feed restriction or inconsistent house management on a farm-by-farm basis. Coccivac cycling may exacerbate performance and uniformity issues resulting from sub-optimal house management during the first 3 weeks.
- Avoid highly restrictive lighting or feeding programs that could interfere with the compensatory gain growth phase once immunity to coccidiosis is complete.

Ration Formulation and Milling

Ration Formulation

Ration formulation can be designed to maximize the growth pattern expected from Coccivac vaccinates as well as minimize any secondary bacterial challenges that could induce enteritis.

- Rations must consider the early protein requirements of vaccinates: Information from Agristat data analysis suggests that improved levels of total sulfur amino acids in the first 2 to 3 weeks may be linked to better performance in broilers receiving Coccivac-B vaccine.
- Extra fortification with fat-soluble vitamins (D and E) during the peak of vaccinal oocyst cycling may improve performance. Vitamin E supplemented at 40,000 to 60,000 IU in the starter feed is recommended.
- The ration must be formulated to enhance growth from day 28 through slaughter, maximizing the compensatory gain effect. Avoid extremely low protein diets.
- Special attention must be paid to the digestibility of raw materials in the starter feed to preserve gut integrity.
- In consultation with your veterinarian, the addition of a feed additive with anti-clostridial activity may be considered to reduce the incidence of necrotic enteritis during the immunity-building phase of vaccination.
- If wheat, barley or rye is a significant ration component, appropriate enzymes should be incorporated to minimize the incidence of necrotic enteritis.
- Removal of fish meal or animal proteins may reduce the incidence of necrotic enteritis in high-challenge areas or when sub-therapeutic levels of antibiotics are not used.
- Do not use any anticoccidial drug or any antibiotic with anticoccidial activity during the first 2 weeks post vaccination (for standard broilers).

Feed Milling and Delivery

Feed intended for delivery to Coccivac-vaccinated houses must not contain anticoccidial medication. The accidental introduction of anticoccidials will disrupt coccidial cycling and the immunity-building process.

communication between live production and feed mill personnel regarding chick placement schedules. Advance feed delivery may preclude last minute placement changes.

- Care must be taken to avoid the mixing of feeds containing anticoccidials and unmedicated feeds in storage bins, delivery vehicles and on the farm.
- Some mills may choose to deliver all of the final starter feed containing anticoccidials to the field prior to beginning production of unmedicated starter feed.
- Accidental delivery of feed containing anticoccidials to a vaccinated house will disrupt vaccine cycling and the development of immunity if such delivery occurs within the first 3 weeks in broilers and 4 to 5 weeks in breeders or layer replacements.
  - Flocks subjected to a feed delivery error during the critical time period should be placed on an anticoccidial ration for the duration of that flock.
- Accidental delivery of feed without anticoccidials to an unvaccinated house can result in coccidiosis breaks. Consult your veterinarian on-record in the event of a coccidiosis break.
- Some producers may find it helpful to mark feed bins of vaccinates during the transition from anticoccidial to unmedicated feed or to use an in-feed marker to distinguish the feeds.

Monitoring Coccivac Life Cycles and Development of Immunity

A successful Coccivac vaccination program is dependent upon proper vaccine handling, uniform vaccine application and three (Coccivac-B) or four (Coccivac-D2) controlled life cycles under field management.

- A representative number of Coccivac vaccinates should be monitored via postmortem exam when the first vaccinated flocks reach 21 days of age. Vaccinates should demonstrate coccidial lesions within the expected vaccination profile.
- Vaccinates 7 through 21 days of age also should be observed in the field at this time to look for signs of necrotic enteritis or management practices that are incompatible with controlled vaccine cycling.
- A representative number of Coccivac vaccinates should again be monitored via postmortem exam when the first vaccinated flocks reach 28 days of age. Vaccinates should demonstrate resolution of coccidial lesions within the expected vaccination profile.
- Thereafter, flocks should be monitored with monthly postmortem sessions encompassing representatives from 14 days of age through slaughter, with an emphasis on ages 21 through 35 days.

Troubleshooting Guide

If the monitoring program above yields a vaccination profile that does not fall within Coccivac guidelines or if necrotic enteritis is a problem, use the checklists below to aid in troubleshooting.

Minimal coccidial lesions at postmortem exam followed by coccidiosis breaks:

- Vaccine handling: Was the vaccine frozen or partially frozen at any time? Be alert to uneven refrigerator temperatures resulting in a handful of frozen vials.
- Vaccine application: Was the proper dose administered?
- Anticoccidial medication: Did the starter feed contain anticoccidial medication?
- Bird density: Is bird density too low to allow the vaccine to cycle properly?
- House conditions: Is the litter too cool or too dry to encourage oocyst sporulation?
- Bird management: Were birds exposed to excreted oocysts or did confinement or cleanout prevent adequate access to litter oocysts for in-house vaccine cycling?

Excessive coccidial lesions at postmortem or early coccidiosis breaks (14 to 28 days):

- Early coccidiosis breaks may occur due to field strain if the vaccine does not cycle properly. Review all of the troubleshooting steps for "minimal coccidial lesions" above.
- Early coccidiosis breaks may occur due to the vaccine strain if uneven cycling occurs or if house conditions favor heavy coccidial cycling.
- Vaccine application: Was the proper dose administered? Was the vaccine uniformly distributed? Did the chicks have adequate lighting, temperature and time to preen?
- Was red dye used at the correct level?
- Bird density: Is bird density too high, resulting in excessive litter moisture or concentration of oocysts in the litter? (This may be corrected by introducing birds to the full house at an earlier age).
- House conditions: Is the litter too wet? Thin or non-absorptive litter, minimum ventilation, condensation in cold weather, heavy bird concentration and incorrect ration formulation also may result in litter with high moisture content or caking.
- House management: Does house management (including lighting and feeding programs) encourage litter-eating? Birds may consume excessive oocysts and bacteria with the litter.

Necrotic enteritis breaks:

- Coccivac lesion profile: Were there heavy coccidial lesions?
- Feed antibiotic: Is an antibiotic with anti-*Clostridium* activity included in the starter ration? The grower ration? At what level? How long has the antibiotic been used at this facility and is resistance building?
- House conditions: Is the litter too wet? High litter moisture favors *Clostridium* bacterial growth. Review bird density, litter type and depth, ventilation and ration formulation.
- Ration formulation: Does the ration contain high levels of wheat, barley or rye?
- Are appropriate enzymes included at sufficient levels? Does the ration contain meat or fish meal with high *Clostridium* spore counts?
- Geography: Does this region have high soil or water pH? High pH favors *Clostridium* bacterial growth.

For further information, please contact MSD Animal Health- Gulf & Levant Poultry Team

Pathogen Control

Pathogenic microorganisms such as viruses, bacteria and protozoa can be minimized in poultry houses by following good management practices.

- A good, sound biosecurity program should be developed and implemented to minimize the introduction of pathogens onto the poultry premises.
- Water treatments with buffered products such as citric, lactic, proprionic, benzoic, tannic, acetic acids and chlorine compounds have been shown to help minimize necrotic enteritis problems. Water treatment products should be used continually throughout the grow-out cycle, but discontinued 24 hours prior to water vaccination against diseases such as infectious bronchitis, Newcastle disease and infectious bursal disease.
- Maintain healthy immune status of flocks through the use of sound vaccination programs against diseases such as Marek's disease, infectious bursal disease, reovirus and chick infectious anemia virus.
- The administration of vitamin and trace mineral supplements at higher than normal recommended levels during the peak vaccinal oocyst cycling is recommended.
- The administration of competitive exclusion (CE) products (probiotics) also can be used to keep the balance of healthy normal micro-gut flora. CE products need to be introduced into the bird as soon as possible before delivery to the farm to ensure their establishment in the chicks' intestinal tract.

Special Considerations for Coccivac-D2

- Additional life cycles may be required to develop full immunity against *Eimeria necatrix*. This species produces few oocysts and requires at least four life cycles for complete immunity. House conditions and attention to cycling must be maintained through at least 4 weeks of age.
- Replacement pullets are placed at lower density than broilers. Care must be taken to ensure adequate density to allow the required completion of four or more coccidial life cycles.
- Farm-to-farm management of replacement pullets is often variable. Very dry litter conditions will prevent vaccine cycling and very wet litter conditions (either throughout the house or just under bell drinkers) will promote excessive cycling.
- The birds should not be introduced to restrictive feeding programs before immunity to *Eimeria necatrix* has fully developed. Stress and litter eating at this point could induce excessive *E. necatrix* lesions or necrotic enteritis.
- Please consult your veterinarian on record in the event of a clinical coccidiosis break.
- Large postmortem sessions to monitor vaccination in replacement pullets are impractical. Determining whether amprolium treatment is needed should be based on postmortem examination of saved mortality from days 16 to 19. If the ceca of dead birds are heavily blood-filled, please contact your veterinarian on record for treatment options.

For additional information regarding special considerations for Coccivac-D2, please contact your MSD Animal Health Technical Service Team.

Coccidiosis vaccines have been successfully incorporated into coccidiosis management programs worldwide. The vaccination program has proven successful under a wide variety of management and housing conditions, yielding the same farm-to-farm performance consistency as in-feed anticoccidial programs. These guidelines are designed to minimize farm-to-farm variation while maximizing the performance potential of Coccivac - vaccinated flocks.

Coccivac®

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