

# Coccidiosis

## Immunization

S. A. Edgar, Ph.D.

THERE HAVE BEEN SEVERAL RECENT REFERENCES to a news release from the Alabama Polytechnic Institute with reference to the development of a combination coccidiosis vaccination procedure for immunizing chickens against cecal and three intestinal types of coccidiosis. There have been a good many inquiries about this method of coccidiosis control and the following report is an explanation of the procedure.

The vaccine is prepared specifically for immunizing chickens against cecal coccidiosis caused by *Eimeria tenella* and the types of intestinal coccidiosis caused by *E. necatrix*, *E. acervulina* and *E. hagani*. These are four of the eight species known to infect chickens in North America. It should be emphasized that the vaccine which includes these four species is of no value against the other four types of coccidia.

The vaccine is a carefully prepared suspension of live oocysts of the four above mentioned species of coccidia. Each is produced separately in a new coccidiosis laboratory building built and designed

for the production of inoculum in conformance with the rules and regulations set down in the Serum-Virus-Toxin Law for the production of virus vaccines. Each lot of each species is tested for purity and potency before being stored for bottling.

In general, the procedure for immunization, except for a few minor changes, is essentially the same as that explained by Dr. Hinshaw in the 1952 issue of VETERINARY MEDICINE for the cecal coccidiosis vaccine announced in 1952. The inoculum is administered in the feed to three-day-old chicks. Chicks should be fed as usual on the third day and then the feed is removed about 7:00 or 8:00 a.m. The inoculum or vaccine is carefully mixed as per instructions with a measured amount of water which in turn is mixed with feed, making a thick moist mash. This is scattered in hoppers or on papers throughout the house at about 11:00 or 12 o'clock, after the chicks have been starved 3 to 4 hours. This change from starvation overnight to morning feeding and then a shorter period of starvation has been made because it has been found that birds are more active late in the morning and all or nearly all of the chicks are more apt to eat some of the inoculum than they will early in the morning. This is especially true during

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cold weather, or in poorly lighted brooder houses. It is important that all chicks eat some of the inoculum because they will develop a substantial amount of early protection following the first cycle of infection even though they will not eat a sufficient number of oocysts to harm them in any way. By doing so they have added resistance to the effect of oocysts they may eat from litter they have seeded. On the 13th day following the initial feeding of oocysts the chicks are treated for 2 to 3 days with a sulfonamide, such as sulfaquinoxaline. This treatment is given to prevent losses that might occur in a very small percentage of vaccinated flocks by birds having eaten too many infective oocysts from the litter, producing an acute outbreak of the disease. It takes approximately 28 days for birds to develop solid immunity to enable them to withstand exposure they might encounter in nature. Actually, if the inoculum has been administered properly the majority of chickens will be immune by 17 days of age.

Before the combination vaccine was placed on the market, intensive laboratory, semi-field, and field studies were conducted in an effort to arrive at the proper species to include and the most satisfactory levels of inoculum to administer. The species to be included in the vaccine were selected only after cross immunity studies and laboratory studies on effect of species on weight gain had been completed. For example, *E. necatrix* is included because of its well known pathogenic and wide spread nature. It was demonstrated in our laboratory that chickens reared on the floor could be immunized against it and *E. tenella* without stunting. In early experiments involving 12 paired pens, doubly immunized birds each averaged .15 pounds more at market age than those in pens treated for coccidiosis when outbreaks occurred. Another of the constituents *E. acervulina* is considered by most to be non-pathogenic. However, studies at this Station have shown that, although birds are not killed, severe infections of this type alone can cause weight losses of as much as 1/2 pound per bird if outbreaks occur when

birds are 6 weeks of age or older. The same thing had been found true for chickens that suffered severe cecal coccidiosis outbreaks after six weeks of age. Surveys showed that, at least in the Southeast, *E. acervulina* is very prevalent and that nearly every flock tested had been exposed to it sometime during the growing period. This same, supposedly non-pathogenic species has been recognized as being wide spread and a serious problem by other investigators as for example some in the Northwest. Thousands of birds were immunized on a field trial basis with inoculum decided upon and an over-all average of less than 0.5% of the birds died of any type of coccidiosis during the broiler growing period.

The combination vaccine has some advantages over immunization for the cecal type alone in that it offers immunity against 4 species instead of one type and without any greater hazard. It may be that some of the species that have not been included may eventually be added to the inoculum, as for example *E. maxima* or *E. brunetti*. This will be true if studies now in progress reveal that other species are common enough, cause enough damage and if they can be included in the immunization process without danger.

From the standpoint of practicability, planned immunization by this method at first would appear to have some pitfalls. The product contains viable oocysts, some of which are pathogenic, and this necessitates careful and controlled administration of the product. In general this objection has been overcome, especially among large growers, because they have personnel that have gained experience in using it. The inoculum is easily administered in the feed but must be done carefully and one must make sure that all birds eat some of the mix. Some growers object to this, but actually one can mix the inoculum for a house of 5,000 birds in 15 to 30 minutes. Its use also requires that the grower be alert, especially during the stress period which sometimes occurs during the 14th to 15th days after inoculation. Immunization against coccidiosis can not be considered panacea, but rath-

er an adjunct to other methods of prevention and control. It can in no way replace starting with good chicks, proper nutrition and sound management practices.

Some advantages of vaccination are to immunize chickens (1) when they are least valuable, (2) when they are least susceptible, (3) before natural outbreaks occur, (4) to have these forms of the disease out of the way before birds may be subjected to other stresses and (5) when medication costs less. One of the advantages of planned immunization with medication at a specific time rather than waiting for natural outbreaks to occur is that in the latter case the drug is probably of no value to the bird showing symptoms and of no value to those that have not yet acquired the disease, whereas, with planned immunization the drug is administered when it will do some good.

The coccidiosis vaccine is not amenable to the Serum-Virus-Toxin Law as the law now exists. Thus, it comes under the jurisdiction of the Food Drug and Cosmetic Act. The procedure has been turned over

to the Auburn Research Foundation for distribution.

The procedure is made available to the public for around 1-1½¢ per bird depending upon the quantity used. Thus far, the new combination coccidiosis vaccine has been used throughout the U. S. and in several foreign countries on approximately 15 million birds since it was released in January of 1955. It is the opinion of the writer that planned immunization against coccidiosis has promise of becoming one of the standard practices for the control of one of the most important diseases of poultry. With the completion of a new coccidiosis vaccine laboratory the supply should be unlimited. For best results, it is desirable to have the product used under the supervision of well trained personnel.

Some have asked whether chickens can be vaccinated for coccidiosis at the same time they are vaccinated for other diseases. It has been our experience that

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Most Herefords have red pigmented eyelids; in some the pigment surrounds one eye only, the other being free of pigment; in other, both eyes are entirely free of pigment. It has been theorized, that a relationship exists between occurrence of cancer eye in Herefords and the nonpigmented eyelids. It seems reasonable that the sunburning of continuously moist, nonpigmented areas of the lower eyelids is a predisposing cause of cellular derangement, and this, combined with a possible hereditary predisposition, may result in malignancy. This carcinoma can cause blindness by becoming so large that it covers the eye, or, in extensive cases, the eye itself may become involved.

#### **MALIGNANT HEAD CATARRH**

This is an acute, highly fatal infectious disease of cattle characterized by inflammatory edema of the tissues lining the facial sinuses, the nose and the throat; often the eyes are involved. Malignant head catarrh is usually a limited enzootic disease in stabled cows in the spring months. Under natural conditions, the period of incubation appears to be about 1 month and the course of the disease from 4 to 10 days, ending in death.

The etiological agent is an ultra-visible but non-filterable virus closely associated with erythrocytes. The disease is not transmissible from sick to healthy cattle by contact, nor does infection follow the ingestion of virulent material. Under natural conditions the disease is believed to be conveyed to cattle by some blood sucking insect. Once in the blood stream, the virus is carried to the eye where it first causes lachrymation and swelling of the lids. Later on various changes may take place; in one case the eyes may remain normal; in another the lids swell badly; while in a third there may be closing of the pupils, bulging forward of the iris, nystagmus and total loss of sight.

#### **MUCOSAL DISEASE OF CATTLE**

This is an acute disease of unknown etiology characterized by erosive, ulcera-

tive, and cystic lesions confined primarily to the lamina epithelia and mucosa of the alimentary canal. Erosions and rarely shallow ulcers were present on the muzzle and in the external nares of about eighty per cent of the cattle. The lymph nodes in general were only slightly edematous and rarely showed significant enlargement or other lesions. Occasionally the disease involves the eye and slight opacity of one or both corneas may occur. If the eye is involved, the infection is probably carried there by the blood stream and then it localizes in the cornea where it produces this cloudy condition.

Treatment to date has been a complete failure, however there has been no recurrence in herds to date.

#### **CORNSTALK POISONING IN CATTLE**

This condition is caused by an unknown toxic substance obtained from uncut cornstalks, following a drought which prevents normal development of the corn. This toxic substance gets into the blood stream and is carried to the eye. Some of the symptoms have been lesions of the conjunctiva, completely contracted irises and pupils visible only as a mere slit; blindness was evident.

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This is the first half of a paper by Mr. Fertig. This paper was prepared, as a special assignment in pathology, under the direction of Dr. F. K. Ramsey.

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For an average one way fare of \$50.00, most passenger liners will now carry dogs and cats to Europe.

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#### **\*Coccidiosis**

*(continued from page 11)*

chickens can be vaccinated for Newcastle disease and/or infectious bronchitis at one to seven days of age and vaccinated for coccidiosis at three days. The inclusion of antibiotics and growth stimulants in the ration in no way interferes with the immunization process. It is not recommended that chickens vaccinated for coccidiosis be fed one of the coccidiostats continuously for the latter will retard the immunization process.