PULLORUM DISEASE

---Whose Fault?
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The record of post-mortem examinations of poultry at Colorado State College shows that the organism which causes pullorum disease is the most frequently isolated organism in baby chicks. The poultryman whose chicks die of pullorum disease immediately wishes to know how and where the chicks contracted the infection. In order to answer such an inquiry, it is necessary to explain how this disease may spread.

**Method of Spread of Pullorum Disease**

The causative organism, *Salmonella pullorum*, is quite commonly found in mature birds, both male and female. In the adult bird the organism is usually localized in the heart, in the covering of the heart, or in the ovary of the female or the reproductive organs of the male. A high percentage of the eggs laid by infected hens contain the organism, and it is commonly spread through the droppings of infected birds. Thus, carriers may spread the organism throughout a poultry house and over any soil on which they range. It may also be quite readily spread if the birds are allowed to consume infected eggs. It is, therefore, easy to appreciate how infected birds in a flock may soon contract the disease through contact with infected litter, feed, or soil, or by the eating of eggs.

Since many of the eggs from an infected bird contain the disease organism, the hen commonly transmits the disease to her chicks. Such infected chicks may spread the disease to other chicks at the time of hatching, since the contaminated down is blown around the hatching compartment of the incubator as it dries.

Infected chicks can readily distribute the disease in the brooder house through droppings in the litter, in insanitary feed hoppers and water founts, and on the soil. It is also easy for chicks to contract the disease through access to soil infected...
by droppings from mature birds and from infection carried on the shoes of attendants. Feeding infected eggs to baby chicks is another means of spreading the disease.

Used feed bags from other farms or from the mill frequently have been in contact with infected birds and may be a source of danger.

Natural resistance is an important factor. Many of the infected chicks survive and grow to maturity and consequently readily spread the disease through contact with other birds and to chicks hatched from their eggs. The rapidity with which the disease may spread and the amount of mortality which it may cause are also directly related to the resistance of the chicks or hens. Resistance is influenced by heredity and by such environmental factors as incubator conditions, brooding conditions, housing, feeding, and general management. The important factor in the control of pullorum disease is the hatching of chicks from eggs laid by pullorum-tested flocks with a low or negative percentage of reactors. Next in importance is the maintaining of a high resistance to disease through proper brooding, feeding, housing, and management.

It can be readily appreciated that tracing the cause of an outbreak of pullorum disease is not simple and that the producer of hatching eggs, the hatcheryman, and the person brooding and rearing chicks each have important responsibilities in the control of pullorum disease.

Control of Pullorum Disease

The symptoms and post-mortem findings in baby chicks are not by any means constant or recognized with certainty in an outbreak of pullorum disease. To secure an accurate diagnosis, it is necessary to have a bacteriological examination made by a properly equipped laboratory. The organism can usually be isolated from the internal organs, the yolk sac, and the bloodstream.

The following symptoms usually accompany pullorum outbreaks but may be taken only as indicative of the necessity for expert laboratory diagnosis:

A. Chicks.—Heavy mortality in chicks, particularly the first 10 days. May or may not be accompanied by diarrhea and "pasting up behind." Chicks droop, chirp plaintively, are weak and dull, and lose their appetites.

B. Mature Birds.—Occasionally the disease is seen in the acute form in mature birds. In these instances the mor-
tality rate is high. The chronic type of the disease is not recognized by the general appearance of the birds of a given flock. These carriers, however, do not generally possess the resistance to disease that is possessed by normal birds, and therefore they suffer a higher rate of mortality than do healthy individuals. Carriers also tend to lay fewer eggs.

**Treatment.**—No cure is known for pullorum disease. All sick and runty chicks should be killed and burned immediately.

**Prevention.**—The fact that the disease is readily spread by carriers in a flock, and by the egg to the baby chick, and that the organism may contaminate the hatchery, the brooder house, and other places where infected birds are kept, indicates that prevention should be the joint responsibility of everyone in the poultry business.

While the rapid whole-blood stained-antigen test for pullorum disease, described in the United States Department of Agriculture Miscellaneous Publication No. 349, is highly efficient for detecting carriers in mature birds, it is not 100 percent effective. A few incipient or intermittent reactors may remain undetected. Constant testing and retesting of flocks at frequent intervals prior to the hatching season, with the immediate disposal of infected birds, should be practiced until no reactors remain or until they are reduced to a minimum. Even under the most rigid conditions of testing and of sanitation there is always the probability of a carrier or two in a parent flock. Since the organisms of pullorum disease are present in most flocks and on most farm premises, it is possible that every flock, every case of eggs, and every hatch of chicks contains some carriers. Everyone engaged in the production and rearing of poultry has a responsibility in controlling this scourge through removal of carriers, prevention of mass infection by practicing rigid sanitary control, and maintenance of resistance.

**I. Responsibilities of the Flock Owner**

The care the flock owner uses in following a complete and adequate program of disease control, of flock management, and of breeding is the very foundation of the success of the hatchery and of poultrymen purchasing chicks. The pullorum-control program should include the following points:

**A. Housing and Feeding Practices to Maintain Resistance and Keep Down Contamination.**

1. House the layers in quarters that are roomy, light, well-ventilated, and clean.
2. Use feed hoppers, shell hoppers, and water founts with guards or reels to keep birds out and have them sufficiently elevated that litter and droppings cannot be scratched in.

3. Place water founts on squares of 4-inch or 6-inch boards covered with 1-inch mesh. 16-gauge netting to keep the birds out of the damp spot under each waterer.

4. Keep at least 4 inches of litter on the floor.

5. Provide at least two 5-foot feed hoppers, two shell hoppers, and at least one 3-gallon water fount or bucket for every 50 hens.

6. Be sure droppings pits or boards are strongly and fully covered with 1½-inch mesh, 16-gauge netting to keep the birds out of droppings.

7. Clean the water founts every day and refill with clean, fresh water suitable for human consumption.

8. Feed all mash and grain in sanitary feed hoppers. Never let the mash, grain or shell hoppers run out of feed or the water founts go dry.

9. Use a good breeding mash in place of the laying mash during the hatching season. See Bulletin 366-A for further information on feeding management.

10. Keep the laying flock confined to the house entirely, or have two yards to be alternated from year to year, the idle one being used as a vegetable garden or otherwise cropped.


1. Have the flock blood-tested each year by an experienced, properly trained flock tester at least 60 days before saving hatching eggs. If more than 2 percent of reactors are found, retest the flock again after 30 days and repeat as often as necessary until all carriers are eliminated.

2. Market or can all reactors and culls the day testing is done.

3. The day the test is completed, thoroughly clean out the droppings, litter, and nests in the house with fork, shovel, scraper, and broom; sweep all walls, ceilings, and windows free of all dust and dirt. Scrub the floor, droppings
pits or boards, nests, sidewalls, and wood equipment with lye solution (1 lb. in 6 gal. water), using an old broom. Spray all equipment, floor, sidewalls, and ceiling with compound cresol solution (3 percent). (Ask your County Agent for a list of government-approved disinfectants.) After drying, paint all perches and droppings boards with creosote, crank-case oil and kerosene, or a commercial preparation containing anthracene oil. Allow the house to dry. Put in 4 inches of new litter.

4. If double-yarding is used, change to the alternate yard.

5. Do not purchase males or hens unless found free of pullorum disease previous to introduction.

6. Always use clean, sound fillers and flats for hatching eggs.

7. Do not keep turkeys, ducks, geese, or guinea fowls with chickens. Test all such poultry and remove reactors as with hens.

8. Follow the brooding program described under III.

II. Responsibility of the Hatchery

The hatcheryman occupies a keystone position in the poultry industry since he must be sure that all flock owners supplying his hatching eggs are following the proper program and he must be careful to carry the benefits of the program through to the chick buyer. He cannot stop there, but must be sure the chick buyer understands and follows proper brooding and rearing practices.

A. Hatching Eggs.

1. Obtain hatching eggs only from flock owners following the aforementioned practices to the letter and spirit.

2. Refuse eggs from any kind of poultry for purchase or for custom hatching unless they come from flocks under such control.

3. Supply flock owners with clean, sound egg cases, fillers, and flats.

4. Have your testing and selection crew pick up reactors and culls immediately on the day testing is completed and buy or market them for the flock owner.

5. Encourage improvement by paying an adequate and graded premium commensurate with the improvement work of the flock owner.
B. **Incubator Sanitation.**

1. Keep the hatchery in a neat and sanitary condition. Your customer measures your attention to detail by the condition of your hatchery.

2. Thoroughly clean, disinfect, and fumigate the incubator and all equipment and rooms at the beginning and end of each season.

3. Do the same in the hatching compartment after each hatch. All filth and dirt must be removed before disinfecting.

4. Fumigate each hatch by the approved formaldehyde method. Send to the college for special directions and precautions.

5. Dispose of all refuse and candle-outs, “dead germs,” and crippled chicks in a sanitary manner, immediately.

C. **The Chicks.**

1. Cull the chicks carefully and sell only those that are husky, vigorous, and well-hatched.

2. Use only new chick boxes and pads.

D. **The Customer.**

1. Sell your customer on your sound method of pullorum control and breed improvement.

2. Supply approved recommendations for brooding and rearing the chicks. Offer aid and advice and otherwise express your interest in the success of your customer. Such an interest actively and cheerfully followed through the entire year is the cheapest and soundest advertising investment.

3. Make reasonable guarantees. Usually guarantees of safe delivery of strong, vigorous chicks from your truthfully described production is soundest in the long run. You cannot produce chicks that will stand undue abuse and hence your guarantee cannot reasonably go beyond delivery.

III. **Responsibility of the Chick Purchaser**

The final phase of a chick program is in the hands of the customer or purchaser and his job is an important one. In order to complete the cycle of satisfaction, the purchaser of chicks must follow a program that will insure maintenance of health
and the normal development of the chicks he receives. This means:

A. Buy chicks from the nearest reliable hatchery that supplies chicks according to the responsibilities listed here for flock owners and hatcheries. Ask the hatcheryman to explain his program. Visit some of his customers and flock owners to obtain their opinion and to observe conditions. Patronize only hatcheries on which you can obtain such first-hand information.

B. Check and report immediately to the hatchery the condition of chicks upon arrival. This report should include mention of any abnormal conditions of the chicks as well as the number dead, general appearance of chicks, and time of arrival and delivery.

C. Keep down the concentration of contamination, avoid the spread of disease, and maintain vigor and disease resistance by putting into practice the brooding program described in mimeographed circular 1688, “Chick Brooding Rules.” Read this circular before buying the chicks so as to have everything in proper preparation before the chicks arrive.

The health of the chicks and their resistance to disease is greatly lowered by overheating, chilling, lack of ventilation, fumes from the brooder stove, filth and improper feeding. It is possible to find pullorum organisms in chicks which have died from such mal-practice rather than from pullorum disease. It is evident that the purchaser of chicks must maintain them in the highest state of health by following proper brooder practices.

D. In event of trouble, find out what is wrong; do not guess. Consult your local veterinarian or county agent, or send several of the typically afflicted chicks to the Pathology and Bacteriology Section, Colorado State College Experiment Station, Fort Collins. Such shipments should be made early in the week and should be preceded by a letter giving details regarding purchase, management and extent of loss. This diagnostic service is free.

It should be apparent from the foregoing discussions that it is exceedingly difficult always to trace the cause and fix the responsibility for an outbreak of pullorum disease. There are entirely too many factors which may be concerned. Your college and county agent are glad to be of any possible assistance in solving your poultry problems.