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DISINFECTION OF THE SPRING SUPPLY PONDS AND RACEWAYS AT STATE FISH HATCHERY, ODEN, MICHIGAN

by

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Introduction

The disinfection of the Oden Hatchery was undertaken to eliminate two serious diseases of trout, furunculosis and gill lice. An epidemic of furunculosis, a bacterial disease caused by Bacterium salmonicida, occurred at Oden during the summer of 1942. Although the epidemic was not considered severe, many fish remained which were undoubtedly carriers of the disease. Experience has shown that furunculosis can cause heavy mortality and is very persistent after once becoming established in a hatchery. Authorities on fish disease agree that a complete sterilization of the infected hatchery is a necessity.

The two large spring ponds supplying the raceways contained brook trout heavily infected with the gill louse, Salmincola edwardsii. In the past, brook trout in the raceways have become infected with this parasite because of the infected fish in the supply ponds. The ponds had been poisoned out with rotenone but someone thoughtlessly restocked them with infected brook trout. The removal of all brook trout from these ponds was necessary to eliminate the gill louse.

Solutions containing from 100 to 200 p.p.m. available chlorine have been successfully employed in recent years for the disinfection of fish hatcheries. No treatment of this nature, however, had previously been carried out in Michigan and it was considered advisable to enlist the aid of someone experienced in this work to direct the operations. The Wisconsin Conservation Department had successfully disinfected several fish hatcheries with chlorine solution and very kindly extended to us the services of one of its biologists, Mr. D. John O'Donnell, to supervise the operations.

The treatment was scheduled to be undertaken during the fall of 1942. Although it is desirable for hatchery buildings and raceways to be disinfected at one time, the treatment of Oden Hatchery had to be divided into two parts. This was necessary because in the fall trout are held in the raceways for the spring stocking program, and in the spring the buildings contain trout fry. Obviously, then, the buildings had to be treated in the fall and the raceways in the spring.

Mr. D. John O'Donnell supervised the disinfection of the buildings in the fall of 1942 and reported on it in full detail. His report also outlined plans for the disinfection of the supply ponds and raceways. The present report concerns the treatment of the supply ponds and raceways which was carried out May 17, 18, 19 and 20, 1943.

Chemicals

A solution of sodium hypochlorite containing 15 per cent available chlorine (15X Klenzade) was used as a source of chlorine, one gallon of which will make 750 gallons of 200 p.p.m. chlorine solution. The disinfection required 2,105 gallons of 15X Klenzade. As a safety margin against breakage and possible additional treatment, 2300 gallons were ordered.

Since Hatchery Creek flows directly into Crooked Lake and chlorine is very toxic to fish, it was considered absolutely necessary to neutralize the chlorine solution before it reached the lake. Sodium thiosulphate was used as neutralizer; 19,731 pounds were ordered.

The following table gives the amounts of chemicals needed based on the capacity of the ponds and raceways:

Pond	15% Klenzade	Sodium thiosulphate
B. Spring Pond	200.0 gal.	1875.0 lb.
A. Spring Pond	258.0	2418.0
2	17.28	162.0
3	12.4	116.4
4	45.36	425.3
5	27.8	261.2
6	20.9	195.8
8 (Little A)	70.0	657.0
9	75.26	705.6
10	70.83	664.0
11	39.44	369.8
12	41.5	387.2
13	27.4	256.9
14	36.9	345.8
15	49.2	461.0
16	51.34	481.3
17	78.54	736.3
18	78.54	736.3
19	77.7	724.7
20	77.7	724.7
21	110.0	1031.9
22	110.0	1031.9
23	106.2	996.0
24	108.8	1020.6
25	38.0	356.3
26	175.9	1649.8
27	20.48	192.0
28	42.27	396.4
Under walks, etc.	37.54	352.0
TOTAL	2,105.2	19,731.2

Procedure

The spring supply ponds were treated first. Several weeks prior to the treatment these ponds had been drained down and allowed to stand (Figure 1). Immediately preceding the treatment the outlets of the ponds were closed and the ponds were filled approximately one-quarter full. Then the required amount of 15% Klenzade, which had been distributed around

the ponds in gallon jugs, was emptied into the ponds.

The sides of the ponds were kept thoroughly soaked for a least half an hour with the chlorine solution pumped from the pond. A pumping unit from the planting truck was mounted on a boat and propelled around the pond (Figure 2). The solution was spread by two garden hoses which were attached to the pumping unit.

A boat with an outboard motor was used to mix the solution in ponds A and Little A. A constant check for presence of chlorine was kept of the water in the waste ditch from these ponds and sodium thiosulphate introduced as neutralizer when necessary.

After the treatment was completed the ponds were permitted to stand overnight with the outlets closed and a surplus of neutralizer was placed in the waste ditch for the night. The seepage from the disinfected ponds was slight and when diluted by other spring water before reaching Crooked Lake, the chlorine content was negligible. By the afternoon of the following day these ponds had become neutralized by the action of the sun and wind so that the addition of sodium thiosulphate was unnecessary.

The raceways (Nos. 2, 3, 4, 5, 6) and the waste ditch from spring pond B to their union with the A series were disinfected the same day that the spring ponds were treated. The neutralizer was administered to the waste ditch at its junction with the waste ditch of the A series (Figure 3).

On the following day the series of raceways from spring pond A and Little A were disinfected, neutralizer being administered at the end of the waste ditch of this series (Figure 4). The disinfection of the raceways progressed in the direction of the flow of water.

After the 15% Klenzade was introduced into each raceway, a roll of chicken wire, weighted by a length of heavy chain was (Figure 6) drawn along the bottom a number of times (Figure 7). This turned over the gravel on the bottom of the pond to assure complete penetration of the chlorine

and also served to thoroughly mix the solution. The sides of each raceway which were above the waterline were kept wet for at least one-half hour by scrubbing with brooms (Figures 8 and 9).

The raceways had been filled to capacity at the beginning of the treatment and their outlets plugged. Surplus water was diverted into the waste ditch so that it did not enter the raceways to dilute the concentration of chlorine. After the treatment of the raceways was completed, they were allowed to stand overnight. Seepage was slight and the volume of water coming from spring ponds A and B, as well as others, was sufficient to dilute the seepage enough to render it harmless to fish life. However, a quantity of neutralizer was placed in the waste ditch overnight. The ponds were drained and neutralized on the following day.

Ponds 25, 26, 27 and 28 were disinfected and neutralized on the day after the raceways were treated.

Comments

All waters outside of the hatchery buildings pertaining to the rearing of trout were thoroughly disinfected to remove the furunculosis bacteria. All fish living in these waters were destroyed by the treatments, thus eliminating the gill louse.

Because of the unanticipated auto-neutralization of the spring ponds and, to some extent, the raceways, 375 pounds of sodium thiosulphate remained unused after the treatment. This chemical can be used at all hatcheries in which the chlorine-barrel disinfecting unit is set up. Since it was not possible to hold the raceways completely full of water, and because overflow from treated raceways added to the concentration of untreated raceways lower in the series, the amount of 15% Klenzade necessary was reduced. Consequently a surplus of 280 gallons of 15% Klenzade remained after the treatment was completed. Although 15% Klenzade does deteriorate

in time, it can also be used for the chlorine-barrel units, provided the units are frequently checked with chlorine indicator papers.

To prevent the migration of fish from Crooked Lake into the waste of ditches of the hatchery, a screen was installed at the lower end of the waste ditch (Figure 10. After this photograph was taken the top of the screen was covered to prevent fish from jumping over it.)

The use of a disinfecting solution packaged in one gallon glass jugs proved to be rather inefficient because of the fragility and great number of glass jugs to be handled (Figure 11). A disinfectant in powder form should be investigated for similar work in the future.

The precautions that Mr. D. John O'Donnell enumerated are repeated here for emphasis.

"PRECAUTIONS. The only method of eradicating furunculosis from a hatchery and be reasonably sure of success is that of removing all fish, cleaning and disinfecting the hatchery, restocking with disinfected eggs, and the prevention of recontamination from the outside.

"After a hatchery is once cleaned up, the prevention of recontamination assumes first rank in importance. The movement of any live fish into the hatchery should be absolutely forbidden. All eggs coming into the hatchery should be disinfected with 0.05 per cent neutral acriflavine solution (buffered to pH 7.5) for one-half hour. The hatchery must be protected from the water, packing, cases of shipped eggs and hands of the handlers of such eggs.

"All shipped-in equipment should either be destroyed or disinfected before it comes into contact with cleaned hatchery equipment and water. All loose equipment and the workers' hands should be cleaned and sterilized at intervals. All foreign trucks coming into the hatchery to haul fish should be disinfected on the road before reaching the hatchery. The spread

of furunculosis can be prevented only by the exercise of rigid cleanliness and operating room methods."

Acknowledgment

The lapse of time between the treatment of the buildings and the external treatment imposed strict rules of behavior upon all persons at the hatchery to prevent the contamination of the disinfected buildings by the untreated raceways through carelessness. Mr. H. L. Thompson, hatchery superintendent, and the crew at Oden hatchery are to be commended for their fine cooperation in this work.

Appreciation is expressed for the assistance of Walter R. Crowe, district fisheries biologist, in the application of the first treatment, and to Dr. A. S. Hazzard and Mr. M. J. DeBoer for assistance in applying the second part of the treatment.

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Figure 1. Spring Pond B.

Figure 2. Spring Pond B.

Figure 3. Spraying sides of Pond B

Figure 4. Administering neutralizer at each end of B raceway series.

Figure 5. Raceways 19, 20, 21, 22, 23, 24 of A series after treatment.

Figure 6. Roll of chicken wire and heavy chain for agitation of bottom of raceways.

Figure 7. Dragging roll of chicken wire.

Figure 8. Scrubbing sides of treated raceways.

Figure 9. Scrubbing sides of treated raceways.

Figure 10. Screen at end of waste ditch. The top was covered after the photo was taken to prevent fish from jumping over the screen.

Figure 11. Debris accumulates in handling 2000 one-gallon jugs.