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A COMPARISON OF TREATMENTS WITH CHLOROMYCETIN AND WITH THE SULFAMERAZINE-SULFAGUANADINE COMBINATION FOR FURUNCULOSIS IN BROWN TROUT

By

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Furunculosis is a bacterial disease of trout caused by Aeromonas (Bacterium) salmonicida that may result in serious mortalities, especially in hatcheries. The disease is well known by trout culturists and has been fully described in the literature, so need not be described further here. Sanitary measures were the only means of controlling furunculosis until treatments with sulfonamides and antibiotics were introduced. Gutsell (1946, 1948), and Gutsell and Snieszko (1949) found that sulfamerazine was effective; sulfaguanadine (Snieszko, et al., 1950) was found to be effective but more slow in acting than sulfamerazine; a mixture of sulfamerazine and sulfaguanadine (Flakas, 1950) gave good results; terramycin and chloromycetin (Snieszko, et al., 1952) were also successfully used in the treatment of furunculosis.

At the State Fish Hatchery, Grayling, Michigan, a light dose of sulfamerazine (1 gram per 100 pounds of fish) gave good control for several years. Attempted prophylactic treatments of one or two days each, given semi-monthly during the warm months each year, apparently produced a resistant strain of bacteria and the dose had to be increased--finally, to 44 grams per 100 pounds of fish--to control the disease among brown trout. If the bacterium continues to become still more resistant to the sulfa treatment, eventually

it may not be possible to control the disease with the treatment. For this reason a more effective treatment was sought. Dr. S. F. Snieszko, Bacteriologist in Charge, U. S. Fish and Wildlife Experimental Station at Leetown, West Virginia, suggested using chloromycetin. Dr. F. E. Eads of Parke, Davis and Company, Detroit, Michigan, provided 150 grams of chloromycetin powder, free of charge, for experimentation with sulfa-resistant furunculosis among brown trout at the Grayling hatchery.

Experiments conducted at production hatcheries supplied with river water are unavoidably subject to variables not encountered at experiment stations. Water temperatures play a very important role in fish disease. Higher temperatures are generally more favorable for fish diseases than are lower temperatures. Optimum temperature for Aeromonas salmonicida is 71° F., although rapid growth of the organism begins at about 65° F. Consequently, when an experiment that involves treatment of fish disease with a certain drug is initiated in hatchery ponds supplied with river water, where fluctuations in water temperatures cannot be controlled, the effect of the treatment may be obscured by low temperatures during the test. As it happened, average water temperatures at the Grayling hatchery during the summer of 1954 were below normal. Had higher temperatures prevailed, a more marked comparison between treatments might have been possible.

Also, results of experiments conducted at hatcheries under full production may not be so clear cut as desired because of the necessity of sacrificing as few fish as possible. Since it was not possible to hold one pond of fish untreated as a control in the tests conducted with chloromycetin at the Grayling hatchery during the summer of 1954, the tests were designed to compare the effectiveness of one drug with another in controlling furunculosis.

The treatments were initiated on June 14, 1954. At that time, daily maximum temperature had been above 65° F. for six days and losses among brown trout due to furunculosis had increased sharply for three days.

Pond 24, containing 10,734 yearling brown trout, was chosen for treatment with chloromycetin at the recommended rate of 3.4 grams per 100 pounds of fish. This treatment was given on June 14, 15, 16, 17, and June 21, 22, and 23.

Pond 29, containing 1,625 yearling brown trout, was treated on June 14, 15, 16, 17, with a "hot-shot" sulfa dose (44 grams sulfamerazine and 22 grams sulfaguanadine per 100 pounds of fish). This dose is more than double the dose normally given in recent years for control of furunculosis at this station.

Ponds 22, 23, 28, 30, and 31, holding a total of 37,336 yearling brown trout, were treated with the "normal" dose of sulfas (18 grams of sulfamerazine and 9 grams of sulfaguanadine per 100 pounds of fish) on June 14, 15, 16, and 17. On June 21, a "hot-shot" sulfa treatment was given because, by this date, the mortality began to rise sharply again.

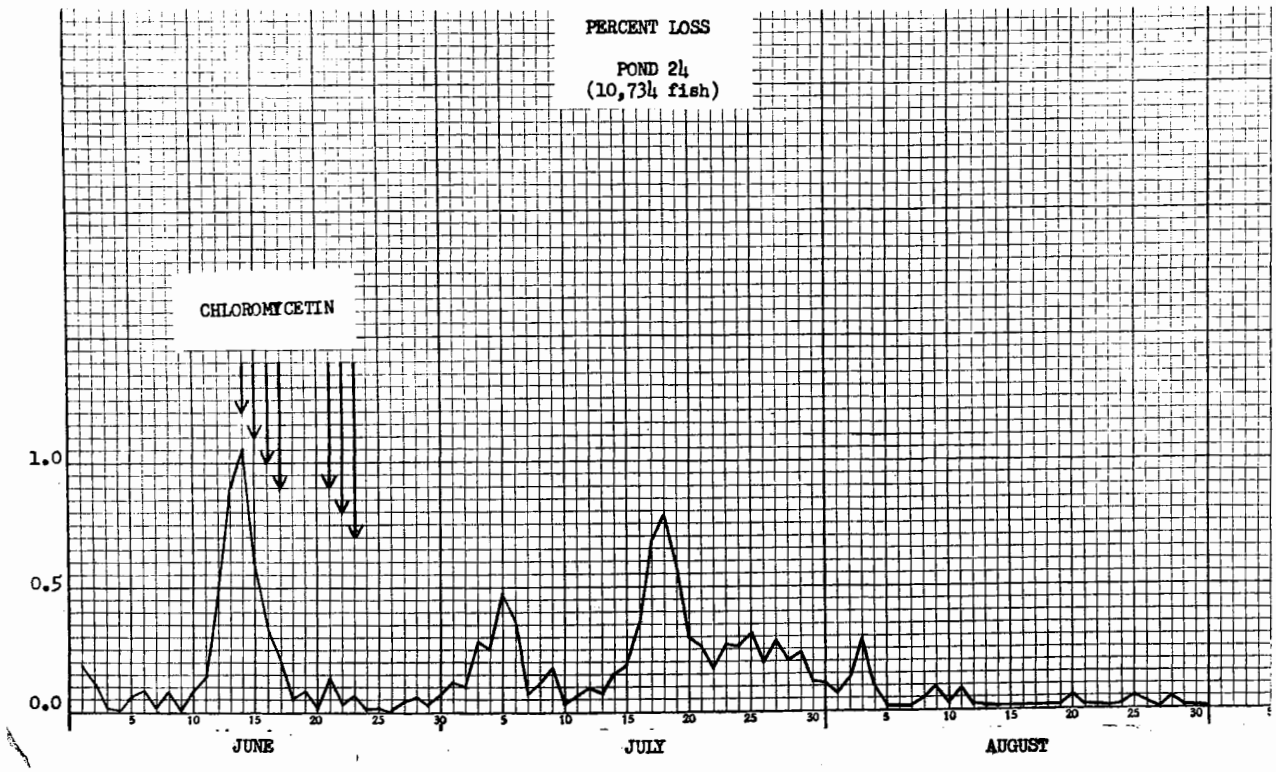
As may be seen from the graphs of percentage of loss (Figs. 1, 2, and 3), mortality dropped very rapidly in Ponds 24 and 29 on the first day of the treatments in spite of continued high water temperatures (Fig. 4).

In the ponds receiving the "normal" dose of sulfas, the mortality continued to rise during the treatment and for two days afterwards; then it dropped for one day, only to rise rapidly again the next day. A "hot-shot" of the sulfas was given on July 21 and the mortality declined.

There was no further medication given in July and August to the trout treated with chloromycetin and the "hot-shot" of sulfas. Although the mortality fluctuated to some extent among both groups of fish, the loss remained comparatively low for the remainder of the summer. Among the trout in the ponds treated with the "normal" dose of sulfas, mortality began to rise rapidly, especially in one pond, during the latter part of July, and another "hot-shot" of sulfas was administered on July 28th.

Fig.1(Upper). Percent loss among 10,734 brown trout in Pond 24 during June, July and August, 1954. Fish treated with chloromycetin on June 14, 15, 16, 17, 21, 22, and 23, 1954.

Fig. 2 (Lower). Percent loss among 1,625 brown trout in Pond 29 during June and July, 1954. Fish treated with "hot-shot" sulfas on June 14, 15, 16 and 17, 1954.


PERCENT LOSS
POND 24
(10,734 fish)
CHLOROMYCETIN
1.0
0.5
0.0
JUNE
JULY
AUGUST

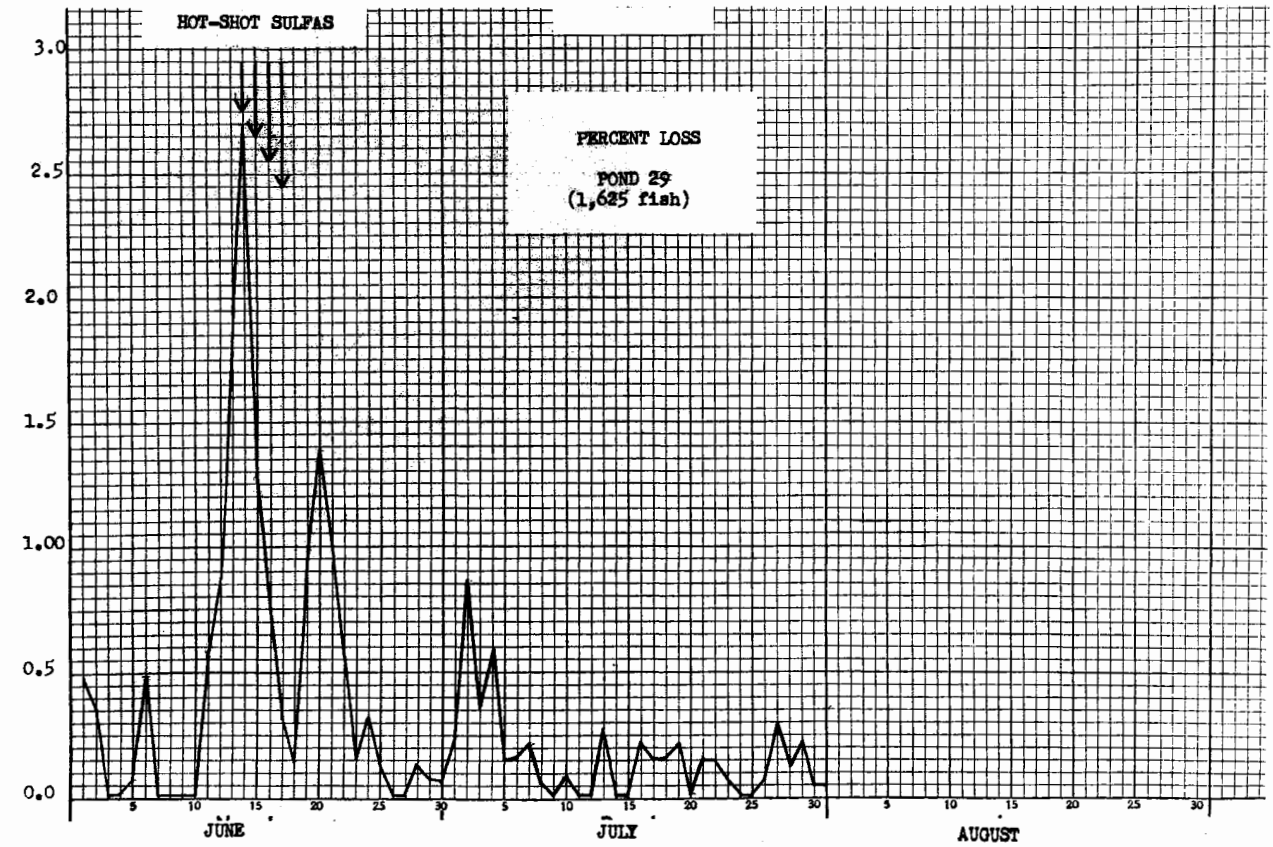
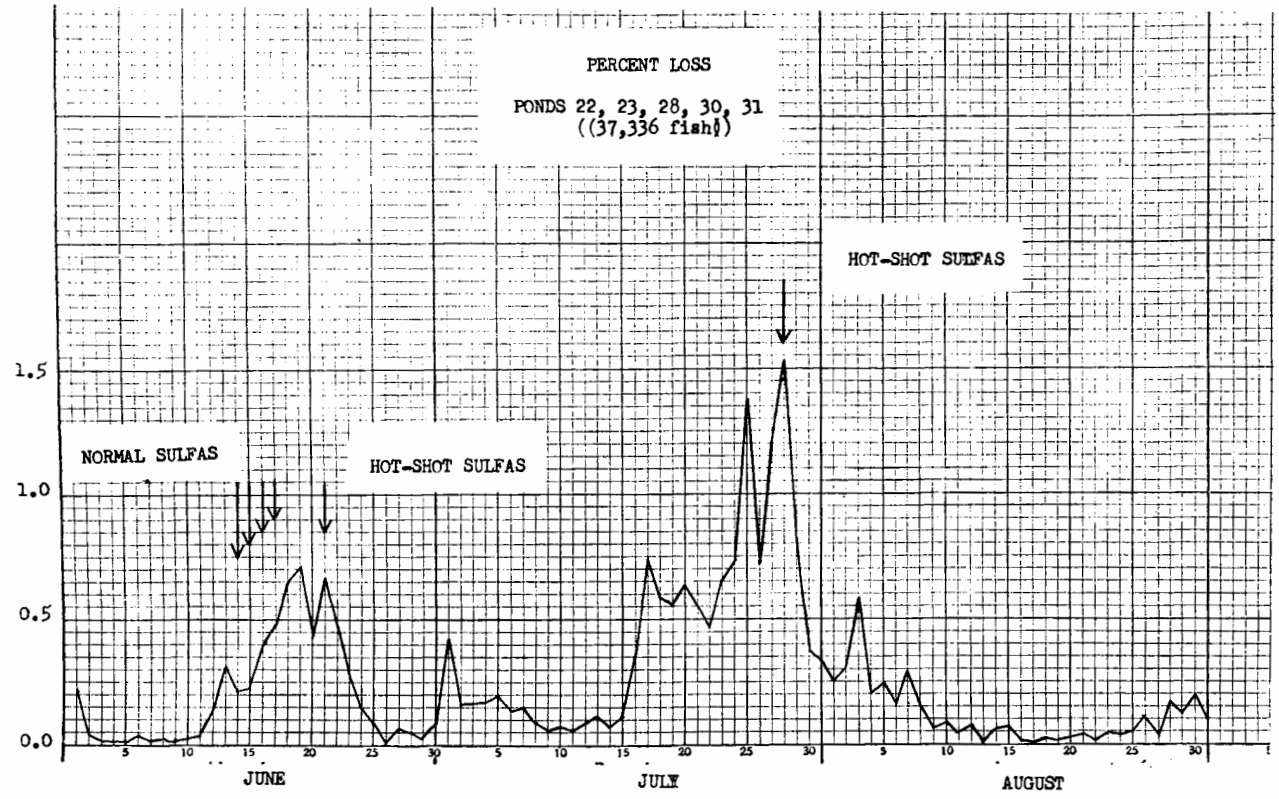
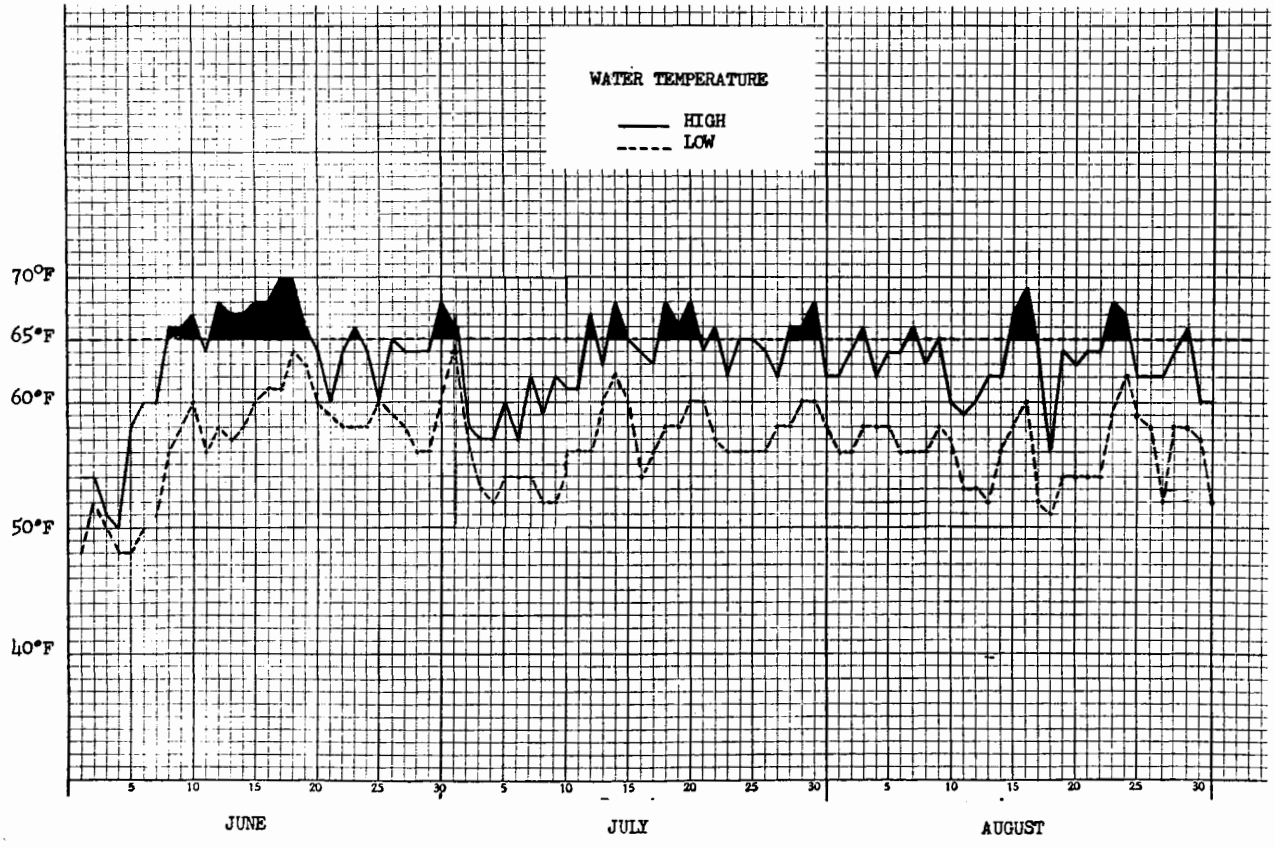

HOT-SHOT SULFAS
PERCENT LOSS
POND 29
(1,625 fish)
3.0
2.5
2.0
1.5
1.00
0.5
0.0
JUNE
JULY
AUGUST

Fig. 3 (Upper). Percent loss among 37,336 brown trout in Ponds 22, 23, 28, 30 and 31 during June, July and August, 1954. Fish treated with "normal" dose of sulfas on June 14, 15, 16, and 17, 1954, and with "hot-shot" dose of sulfas on June 21 and 28, 1954.

Fig. 4 (Lower). Daily high and low water temperatures at the State Fish Hatchery, Grayling, Michigan, for June, July and August, 1954. Shaded areas are above 65° F.


PERCENT LOSS
PONDS 22, 23, 28, 30, 31
((37,336 fish!)
HOT-SHOT SULFAS
NORMAL SULFAS
HOT-SHOT SULFAS
1.5
1.0
0.5
0.0
JUNE
JULY
AUGUST


WATER TEMPERATURE
HIGH
LOW
70°F
65°F
60°F
50°F
40°F
JUNE
JULY
AUGUST

Conclusions

Chloromycetin, given at the rate of 3.4 grams per 100 pounds of fish for four consecutive days and then three consecutive days with an interval of three days between, provided good control of furunculosis among yearling brown trout at the Grayling hatchery. The "hot-shot" of sulfas (44 grams of sulfamerazine and 22 grams of sulfaguanadine per 100 pounds of fish), given for four consecutive days, also gave good control of the disease. The "normal" dose of sulfas (18 grams of sulfamerazine and 9 grams of sulfaguanadine per 100 pounds of fish) was inadequate for control of furunculosis.

The heavy dose of sulfas is effective now in controlling furunculosis among brown trout, but it is quite possible that the bacterium may continue to strengthen its resistance to the medication. If this should happen, chloromycetin, although rather expensive, could be used to save brown trout.

The excellent cooperation of Mr. Barney Engel, hatchery superintendent, Mr. Alvin Moore, foreman, Mr. Basil Hubbell, and other members of the hatchery crew is greatly appreciated.

We are grateful to Dr. F. E. Eads of the Parke, Davis and Company for the chloromycetin supplied free for this work.

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