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SULFAMERAZINE PROPHYLAXIS AT GRAYLING HATCHERY

MAY THROUGH SEPTEMBER, 1947

by

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This experiment was designed to determine whether small daily doses of sulfamerazine would protect trout from attacks of furunculosis without building up in the fish sensitization to the drug or a lethal accumulation. If protection was accomplished, the result would mean considerable saving of fish during the summer, since losses from furunculosis are experienced every summer at the Grayling hatchery. Although control is effected within four days by treatment with sulfamerazine, there is a loss of fish during the time the loss is building up to sufficient proportions to warrant treatment. The treatment is effective but it does not protect the fish from subsequent attacks. If the water supply is free of contamination by fish carrying furunculosis, a single three-week treatment will cure the fish and they will not become infected again, unless the disease is carried into the hatchery by fish transporting units or some other mechanical means. However, if the water supply comes from a stream

containing wild fish carrying the bacteria, as is possible at Grayling, the water will be a constant source of infection.

Furunculosis may infect fish but remain nearly dormant and cause no appreciable loss of hatchery fish. However, when proper conditions arise, as a sudden increase in water temperature, or the shock of handling and transportation, the bacteria may multiply very rapidly, resulting in a heavy loss before treatment can be initiated. If prophylaxis could be used, this constant threat of a "sneak attack" could be eliminated.

At the time this experiment was planned, no experiments on prophylactic uses of sulfamerazine in treating fish were known to have been undertaken, so the dosage was set at 3 grams sulfamerazine per 100 pounds of food, an amount small enough to be reasonably certain that a lethal accumulation would not occur and to be within reasonable economic limits.

Due to the lack of facilities for detailed study, the experiment was set up to interfere as little as possible with the production schedule of the hatchery. For a more complete study it would be desirable to conduct experiments in which various amounts of the drug would be given concurrently to separate groups of fish. By so doing, a greater amount of data could be obtained in one season and the results could be evaluated with greater significance.

Materials:

1. Four ponds of equal dimensions, physical conditions and water supply. Ponds above the wheel-house on the lower hatchery grounds are satisfactory.
2. Brook trout: 6,000 at least four and not greater than six inches long.
Brown trout: 6,000 at least four and not greater than six inches long.
3. Sulfamerazine: Amount necessary to provide three grams sulfamerazine per 100 pounds of food for 6,000 four-inch brook and brown trout for six months, fed five days per week. (Approximately 27.4 ounces total for 130 days).

Procedure:

1. Distribution of fish:
 - A. Ponds #1 and #2 shall contain 3,000 brown trout each.
 - B. Ponds #3 and #4 shall contain 3,000 brook trout each.
2. Ponds #1 and #4 shall receive the regular hatchery diet; ponds #2 and #3 shall receive the regular hatchery diet, with the addition of three (3) grams of sulfamerazine per 100 pounds food.
3. The experiment shall begin on May 5th, or as near that date as possible, and continue through October, 1947.
4. The experiment ponds shall be cared for in the same manner as all other ponds at the hatchery, except that the loss records will be kept separate and an accurate count made of fish graded out of the ponds.
5. If furunculosis breaks out in any of the four experiment ponds no treatment will be given. Other diseases will be treated as usual.

Results:

The experiment was begun on May 12, 1947, and terminated on September 30, 1947.

Following are the daily loss records and temperatures for the period.

MAY

Daily loss	Brown trout		Brook trout		Water temperature		
	Pond 28	Pond 29*	Pond 30*	Pond 31	6 A.M.	12 Noon	6 P.M.
May 12	48	52	60
13	54	52	50
14	...	1	...	1	44	48	50
15	48	50	50
16	50	54	60
17	49	50	50
18	48	52	60
19	52	58	60
20	2	2	52	54	58
21	50	52	56
22	...	2	...	...	48	52	56
23	54	56	60
24	48	53	59
25	50	50	54
26	1	...	50	53	58
27	48	49	50
28	1	...	...	1	46	46	46
29	42	44	45
30	42	45	48
31	44	50	56
Total	1	3	3	4	...	...	...

* Ponds receiving sulfa treatment.

JUNE

Daily loss	Brown trout		Brook trout		Water temperature		
	Pond 28	Pond 29 [★]	Pond 30 [★]	Pond 31	6 A.M.	12 Noon	6 P.M.
June 1	52	52	54
2	...	1	...	...	50	56	58
3	1	...	48	54	60
4	1	...	...	...	50	54	56
5	2	52	56	58
6	54	58	64
7	2	54	54	60
8	1	...	54	60	64
9	54	60	64
10	60	66	72
11	62	60	60
12	50	54	56
13	52	52	53
14	50	52	52
15	50	51	54
16	48	54	61
17	51	54	60
18	1	...	52	57	61
19	...	1	...	...	52	55	58
20	55	58	60
21	1	...	...	...	53	58	64
22	1	1	...	...	54	60	66
23	56	62	67
24	...	1	...	4	57	57	62
25	1	6	56	62	65
26	2	...	58	62	69
27	2	2	60	64	70
28	2	9	62	66	72
29	1	1	1	20	64	61	64
30	...	1	1	12	56	62	66
Total	4	6	12	57	...	...	...

★ Ponds receiving sulfa treatment.

JULY

Daily loss	Brown trout		Brook trout		Water temperature		
	Pond 28	Pond 29 [✓]	Pond 30 [✓]	Pond 31	6 A.M.	12 Noon	6 P.M.
July 1	1	...	1	23	60	62	66
2	2	1	...	23	59	62	66
3	...	...	...	7	57	62	68
4	...	...	...	4	58	63	68
5	...	...	1	9	61	60	64
6	...	...	1	7	58	58	60
7	...	...	...	4	56	60	67
8	...	...	...	...	57	62	68
9	1	...	1	3	58	62	67
10	...	...	1	2	60	61	62
11	...	...	2	2	60	61	64
12	...	2	1	4	56	60	66
13	...	...	...	...	58	62	68
14	...	1	1	3	62	64	66
15	1	1	...	5	60	62	66
16	1	...	1	5	62	65	68
17	...	...	...	2	63	65	66
18	1	1	1	2	56	60	65
19	...	...	...	...	56	54	56
20	1	...	...	3	60	64	68
21	1	3	...	4	52	56	60
22	2	1	...	4	52	56	60
23	1	1	...	1	53	60	64
24	...	...	...	2	56	61	65
25	3	...	1	1	57	60	66
26	...	...	...	2	58	62	68
27	...	...	1	1	62	64	66
28	...	1	1	1	59	64	70
29	...	...	...	...	62	67	72
30	...	...	...	...	64	66	70
31	...	...	...	...	60	62	66
Total	15	12	14	124	...	...	...

✓ Ponds receiving sulfa treatment.

AUGUST

Daily loss	Brown trout		Brook trout		Water temperature		
	Pond 28	Pond 29 [↓]	Pond 30 [↓]	Pond 31	6 A.M.	12 Noon	6 P.M.
August 1	...	...	1	...	53	56	62
2	...	...	...	...	54	55	63
3	...	...	...	...	58	62	66
4	2	2	...	1	60	64	72
5	...	...	2	1	64	66	72
6	...	...	1	6	64	68	75
7	2	...	1	2	67	70	74
8	1	1	...	2	62	66	70
9	...	...	...	...	62	63	68
10	1	...	...	1	60	63	70
11	1	...	...	1	62	66	72
12	3	2	...	...	64	70	72
13	...	...	1	...	66	68	72
14	...	...	1	1	66	69	73
15	3	...	2	...	63	64	68
16	...	...	...	1	58	60	67
17	...	6	...	3	60	62	69
18	3	1	...	...	66	70	78
19	...	...	1	1	66	70	73
20	...	...	1	...	66	67	66
21	...	...	...	...	62	66	70
22	...	...	1	...	66	70	73
23	...	...	2	...	66	70	72
24	...	1	...	...	66	70	74
25	4	1	1	...	66	67	70
26	...	...	...	...	62	64	68
27	1	...	...	...	58	61	66
28	...	...	1	1	60	62	68
29	...	1	...	...	58	58	59
30	...	...	...	...	58	60	65
31	...	...	...	...	55	58	64
Total	21	15	16	21	...	...	...

↓ Ponds receiving sulfa treatment.

SEPTEMBER

Daily loss	Brown trout		Brook trout		Water temperature		
	Pond 28	Pond 29 [*]	Pond 30 [*]	Pond 31	6 A.M.	12 Noon	6 P.M.
September 1	1	...	54	56	56
2	56	60	65
3	56	60	64
4	56	60	64
5	60	62	64
6	1	...	58	62	68
7	...	1	1	...	59	62	66
8	60	62	67
9	62	64	68
10	1	64	64	65
11	2	...	64	63	67
12	1	...	63	66	68
13	1	...	62	64	65
14	58	62	65
15	1	...	53	60	60
16	52	52	52
17	50	54	59
18	4	...	...	...	52	56	62
19	58	58	58
20	1	...	...	...	54	56	60
21	54	55	54
22	50	52	52
23	46	50	52
24	50	50	52
25	42	46	50
26	41	42	44
27	40	43	48
28	44	44	46
29	48	46	50
30	45	45	48
Total	5	1	8	1	...	...	...

^{*} Ponds receiving sulfa treatment.

Totals:	Pond				Temperature at 6 P.M.
	28	29 [✓]	30 [✓]	31	
May	1	3	3	4	54.3
June	4	6	12	57	61.6
July	15	12	14	124	65.7
August	21	15	16	21	69.4
September	5	1	8	1	58.6
Grand totals	46	37	53	207	...

✓ Daily treatment with 3 gm. sulfamerazine, 100 lb. food.

As may be seen from the totals, the brown trout escaped any exceptional loss due to disease. The loss in the control pond was more by ten fish than the loss in the pond being treated with the drug. The difference in loss is too small to have much significance. Considerable difference in the losses of the two ponds of brook trout is apparent. The control, or untreated pond lost 207 fish while the pond under daily treatment lost only 53 fish. A light attack of furunculosis occurred in July in the untreated pond but abated before causing a serious loss. In contrast, the pond receiving treatment showed only normal loss. No evidence could be found to indicate that daily treatment with three grams per 100 pounds of sulfamerazine had caused a mortality from sulfa poisoning.

No beneficial effects of a daily treatment with three grams of sulfamerazine per 100 pounds could be demonstrated among the brown trout because no loss from furunculosis could be demonstrated in either control

or treated ponds. The drug appeared to have been beneficial in the brook trout studied, since the loss in the control pond exceeded that of the treated pond by 154 fish.

Further experiments are to be made to determine whether sulfamerazine can be used at hatcheries with reasonable cost as a prophylaxis for furunculosis. The writer has heard of unpublished experiments at the Leetown Hatchery (U. S. Fish and Wildlife Service) in which six grams of sulfamerazine per 100 pounds of fish was used successfully for prophylaxis against furunculosis. A continuous prophylaxis with a dose as high as the above mentioned one might well cost more than trout lost through furunculosis, since a four-day treatment after the fish have the disease will stop losses. The most important benefit to be derived from prophylaxis would be the prevention of serious mortalities when fish carrying a sub-clinical infection (no external symptoms and small loss) are suddenly subject to shock, as in transfer operations, or to sudden natural rises in temperature.

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