

Prepared for
American Fisheries Society

ORIGINAL: Fish Division ✓
CC: Education - Game
Institute for Fisheries
Research
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Report No. 1237

November 23, 1949

White blindness in hatchery brook trout ✓

✓ Contribution from the Michigan Institute for Fisheries Research

by

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Abstract

White blindness is a hitherto unreported dietary disease in which brook trout assume a very pale body color, the crystalline lens of the eye softens and becomes an opaque, milky color and which results in blindness. Normally, blind trout become dark in color. Loss from the disease, however, is only moderate in hatchery ponds. It was first observed in the spring of 1946 at the Baldwin Trout Rearing Ponds, Baldwin, Michigan, among yearling fish. It appeared at certain other trout stations in Michigan in 1947 and 1948 in fish of the same age. An analysis of the diets in use at the stations where the malady appeared and at stations that were free of it was made. This study demonstrated that white blindness of brook trout was

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present where the fish were fed 27.2 percent, or more, horse products and absent where 18 percent, or less, horse products were fed. One station feeding 90 percent horse liver showed a high percentage (30 percent) of blindness among brook trout. Experiments are now in progress to determine whether any single horse product (hearts, liver, meat or skeletal muscle, or cooked meat) may be responsible for the disease. Brown and rainbow trout are not affected.

During the spring and early summer of 1946, Mr. Don Gilbert, fish culturist in charge of the state trout rearing station, Baldwin, Michigan, reported that yearling brook trout were becoming blind and turning very pale in color. After death trout regained normal coloration. Brown and rainbow trout on the same diet and held at the same stations were not affected. The crystalline lens of the eyes in blind fish was opaque, milky in color, and very soft. Dissection of the lens failed to reveal any parasites present. The occurrence of the unusual pale color of the blind trout (trout normally become dark in color when blind), and the large number of trout affected led us to believe that a disease of some kind was present. Since the pale color of the fish was due to constant contraction of the melanophores, it was suspected that the nervous system was involved and the diet was changed to include 5 percent brewers' yeast. However, after several months on this diet the condition of the affected fish remained unrelieved.

The same malady appeared again at the Baldwin station in yearling brook trout during the spring of 1947 and of 1948. In the beginning it was thought that some peculiarity of the water supply had developed at the Baldwin station that might have been responsible. However, in the spring of 1948 brook trout at other stations were checked and the same affliction was found in varying degrees at Grayling, Harrietta, Thompson, Watersmeet and Wolf Lake. Since the stations mentioned are located at widely separated places throughout the state, the theory that water supply might be the cause was discarded.

Hess (1937) produced dietary blindness in rainbow trout by feeding an exclusive diet of pig spleen. However, the fish in his experiment changed to a darker color as they became blind.

Diet was suspected as a cause of the blindness reported here, but analysis of the previous diet at Baldwin did not show an excess of pig products. However, since the malady was not present at several stations in the state (Oden, Cooks Run, Marquette) and since large amounts of horse products were being fed to trout (due to the prohibitive costs of the customary beef and pork meats) an analysis of the diets of all stations was made. The horse products in use were hearts, livers, meat or skeletal muscle, and cooked, canned meat. Supervisors of the stations submitted monthly totals of foods used from September, 1947 to May, 1948. This period was chosen because the trout first became noticeably affected during the spring of each year.

Since dietary blindness had been produced in rainbow trout by Hess, who fed pig spleen, both pig and horse products were included in the analysis of the diet (Table 1).

Table 1.--Percentage composition of total diet at Michigan trout hatcheries, September, 1947 to June, 1948.

Diet	Watersmeet ¹	Thompson ¹	Harrietta ¹	Wolf Lake ¹	Grayling ¹	Cooks Run	Oden
Horse liver	27.2	45.2	41.5	90.5	34.7	18.2	8.7
Horse heart	...	22.8	17.5	...	30.8	...	...
Canned, cooked horse meat	...	...	6.7	9.5	...	...	4.4
Horse meat	...	...	2.7	...	...	...	...
Pork melts	34.6	25.9	...	...	30.0	39.7	36.6
Pork liver	24.5	...	...	...	...	30.0	...
Beef melts	13.3	...	...	...	...	4.4	...
Beef liver	...	...	...	...	2.0	...	...
Telang liver	...	...	6.4	...	...	...	...
Cereal	2.3	6.0	24.7	...	...	7.1	33.6
Ocean herring	...	...	0.4	...	2.5	...	...
Inedible liver	...	...	...	...	...	...	16.5
Total percent horse meat	27.2	68.0	68.4	100.0	65.5	18.2	13.1
Total percent pork	59.1	25.9	...	...	30.0	69.7	36.6
Total percent horse and pork	86.3	93.9	...	...	95.5	87.9	49.7

¹ Blindness present.

In comparing diets for stations where blindness was present with those not having blindness, the combined total percentage of both horse and pig products is not significant because the figure is high where no blindness was reported. The same is true in considering only pig products. Nor can any correlation be found between blindness and any of the horse or pig products considered individually, with the exception of Wolf Lake where 90.5 percent of horse products fed was horse liver.

If, however, the total percent of all horse products (liver, heart, canned meat, and raw meat) is considered, it will be noted that the two stations feeding not over 18.2 percent (Cooks Run and Oden) did not have blindness, while all other stations fed from 27.2 percent to 100 percent horse products and were affected with blindness in brook trout. If the cause of blindness is horse products--and the above data indicate this to be a strong possibility--the critical percentage appears to be somewhere between 18.2 percent and 27.2 percent. Accordingly, it is suggested that, in an effort to prevent blindness in brook trout, the diet should not contain more than 18 percent of horse products.

Experiments are now in progress to determine whether any single horse product (hearts, liver, raw meat, or cooked meat) may be responsible for the disease.

Although the percentage of blindness is not high (estimated 10-30 percent), this type of blindness in brook trout is important. Tests have shown that affected trout cannot be cured and blind trout are difficult to catch with hook and line. Therefore stocking of such fish is largely wasted effort.

Literature Cited

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Report typed by M. J. Lambert