TECHNICAL NOTES

U.S. DEPARTMENT OF AGRICULTURE WYOMING SOIL CONSERVATION SERVICE

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FISH FACTS*

The following is a listing of basic fish culture facts and rules of thumb at that are used in the fish culture business. They should be useful when assisting land owners interested in recreational or commercial fish production.

1. The carrying capacity of a commercial fish pond is limited by oxygen consumption and accumulation of metabolic products.

2. The amount of oxygen consumed and the quantity of metabolic products are proportional to the amount of food fed in a commercial operation.

3. Trout water temperature for good growth should be between 50° -- 65° F., dissolved oxygen should be > 6 ppm.

4. Optimum temperature for trout growth is 56° F.

5. Trout death point is 82° F.

6. Maximum temperature for trout egg production is 55° F.

7. For every 1° F. decrease from optimum temperature, there is a 5% decline in trout growth.

8. When temperature increases, respiration rate increases.

9. Because of water density (viscosity), temperatures should be kept at the warm end of the range so fish expend less energy.

10. Catfish require water temperatures above 70° F. for 180-210 days for good production growth.

11. With constant 80° F. water, catfish can reach market or cacheable size (2-3 lbs.) in 10-24 months.

12. Water temperature in a pond can be increased by taking out overflow water from the bottom in the summer.

13. For every 18° F. increase in temperature, fish will consume twice the amount of dissolved oxygen.

14. Oxygen uptake rates for trout is proportional to temperature and inversely proportional to fish size.

* Taken in part from Idaho Technical Note No. 12, 5/82.

15. A one-pound fish uses less dissolved oxygen than then 0.1 pound fish.

16. Less atmospheric pressure at higher elevations means less dissolved oxygen in water.

17. For catfish, dissolved oxygen of > 3 ppm is needed.

18. Dissolved oxygen concentration is always lowest at daybreak or after many days of calm cloudy weather.

19. Dissolved oxygen is reduced is a storm turns over a pond. Oxygen-short water on the bottom comes to the top.

20. Suspended solids should be kept below 80 ppm. Greater amounts adversely affect gill tissue.

21. The buildup of unionized ammonia (NH_3) is a limiting factor in fish production.

22. The amount of unionized ammonia is dependent upon pH and temperature.

23. Catfish are stocked by placing all sizes in the same raceway. The market-sized fish are removed every 60 days and smaller fish added. The system is always maintained within 80-110% of carrying capacity.

24. Trout ponds or raceways are stocked at about 30% capacity with fingerlings and the entire population is harvested when they reach 100% capacity (market size).

25. Adult fish are fed 1-3% of their body weight daily. Fingerlings fed 4-5% and Fry fed 7-9% daily.

26. An average production figure is 2 pounds of feed to produce 1 pound of fish (2:1 conversion ratio). This also produces 2/3 pound of fish waste.

27. An increase in feeding level results in a proportional decrease in carrying capacity.

28. To determine the maximum amount of food to feed and maintain good water quality use:

    lbs. of food = Dissolved oxygen at inlet – dissolved oxygen at outlet X .0545 x g.p.m.

29. Fish feed should be about 32% protein with 2500 calories per pound.

30. With good management, trout can be produced at a rate of 10-20 thousand lbs/cfs of water flow of good quality. Catfish can be produced at a rate of 25-35 thousand lbs/cfs under good conditions.

31. A farm pond (recreation) in Wyoming can produce 100-200 pounds of trout per acre per year on natural foods.

32. An increase in the rate of water exchange increases the carrying capacity, but this is not proportional to the rate of increase.

33. The velocity of water in a trout raceway should be about .05 ft/sec.

34. A rule of thumb for a raceway with good flow: Trout can be stocked at a density of one-half their length in pounds/cubic foot of water.

35. If 100 pounds of 2-inch trout were the maximum load that could be held in a tank, then 200 pounds of 4-inch fish, 300 pound of 6-inch fish, and 400 pounds of 8-inch fish would also be maximum loads.

36. Loading factor example problems:

F = loading factor
W = weight of fish
L = length of fish
I = water flow (gpm)

$W = F \times L \times I$ or $F = W/LxI$ or $I = W/FxL$

If 900 pounds of 4-inch fish is maximum in a 150 gpm raceway then:

$F = 900/4 \times 150 = 1.5$

Then 1800 pounds of 8-inch fish is the same load.

$1800/8 \times 150 = 1.5$

What must the flow be with an additional 450 pounds of 8-inch trout?

$I = 1800 \times 450/1.5 \times 8 = 188$ gpm

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