Recirculation System Guidelines Checklist for High School Teachers

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Recirculation systems have two crops

1. bacteria
2. fish

A recirculation system must have the following:

1. culture unit
2. solids removal unit
3. nitrification unit
   -2 and 3 may be combined, as in a bead filter, but this is not recommended
4. temperature control
5. aeration
6. an emergency system/plan

System preparation

1. Fill system and drain after 1 week
2. Never clean with soap, clean water and a brush is the best.
3. Make sure alkalinity is 100 – 200 ppm
4. Chloride level at 100-2000ppm (0.138 –2.75 lbs/100 gal water)
5. Temperature set at 78 – 84 degrees F
6. Stock with either few adult fish or all small fish so the systems can grow together.
7. Measure all water quality parameters to determine your baseline
8. Check parameters every M, W, F after fish are stocked
   -Greater frequency gives more data points and better graphs

Water quality parameters:

1. alkalinity 100-200ppm (carbonates add alkalinity)
2. hardness 100ppm or more (calcium adds hardness)
3. chlorides 200-2000ppm (0.275 – 2.75lbs/100gallons)
4. temperature 78-84 F (25-29C)
   a. less T gives more DO or CO_2 (liquid holds gas better)
   b. less T gives less ammonia (NH_3) in the TAN
   c. more T gives more biological growth
   d. T outside the fish's range causes stress
5. oxygen 5ppm or more (never less than 3ppm)
6. TAN: tilapia can tolerate less than 20ppm
   a. composed of two parts that can be calculated using a chart
   b. ionized ammonia $NH4^+$ is non-toxic
   c. unionized ammonia NH_3 is toxic
   d. keep NH_3 levels less than 0.2ppm
   e. when the system is stable, TAN should be 3ppm or less
7. Nitrite must be less than 0.91ppm with no salt (chlorides) added
   a. if salt is used, max nitrite is 15ppm
   b. make sure there are 10ppm of chlorides for every 1ppm of nitrite
8. Nitrate less than 300ppm is not toxic
9. pH 7.0 – 7.2
   a. less than 7.0 hurts bacteria
   b. more than 7.2 hurts fish if TAN is high (up to 7.8 is fine if TAN is low)
   c. lower pH prevents NH_3 and promotes NH_4^+
   d. respiration increases CO2 which decreases pH

Management

1. Feed at least 5 days per week using satiation feeding
2. For every 1000g of feed (2.2lbs) given to the system, add 142g (0.3lb) of sodium bicarbonate (baking soda)
3. Test each day for T and DO
4. Test 3 days per week for TAN, nitrite, nitrate until they stabilize; one day per week thereafter
5. Test pH and alkalinity at least once per week
6. Keep records of all tests and feeding, stocking, harvesting, and mortalities
7. Use Tilapia Quick Fact Sheet
8. Grow tilapia for the first two years before using a different species
9. Feel free to call Bauer Duke for assistance
    a. 870 575-8143