

Nutrition of Aquatic Species - Student Notes

Directions:

Fill in the blanks.

1. Nutrition

- Is the process by which organisms receive and utilize food products
- Involves many different chemical reactions and _____ changes which convert food into usable energy
- Among aquatic species is a _____ researched subject

2. Nutrients

- May be broken into two categories:
 - _____: an element required in large proportions for the proper growth and development of an organism; includes carbon and oxygen
 - _____: substance necessary in very small amounts for the proper growth and metabolism of a living animal; includes vitamins and minerals

3. Aquatic Plant Nutrition

- Requirements include the following:
 - carbon _____
 - oxygen
 - macronutrients
 - _____

4. Macronutrients

- Are needed for _____ aquatic plant nutrition
- Include the following:
 - nitrogen
 - _____
 - potassium
 - hydrogen
 - calcium

5. Micronutrients

- Needed for healthy aquatic plant _____ include the following:
 - chlorine
 - copper
 - zinc
 - _____

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6. Fish Diets

- Are very high in protein
 - fry and _____ diets are often 50 percent or higher crude protein
- Require high amounts of amino and fatty acids
- Include minerals _____ from the water
- Involve adding vitamins A, B, C, D and E to food

7. Bioenergetics

- Studies the balance between energy intake from _____ and energy used by animals
- Explains why growth occurs when more _____ is taken in than used
- In aquaculture, shows fish generally use low amounts of energy in daily functions, therefore growing at faster rates

8. Proper Feeding

- Includes considering the following issues:
 - _____ rate
 - feed rate
 - pellet size
 - _____

9. Aquatic Feeding Guidelines

- Include the following:
 - the smaller the fish, the higher percentage of body _____ fed every day
 - the feed to body weight ratio decreases as the fish gets larger
 - as the _____ of fish increases, so should the feeding rate

10. Prepared Diets

- Account for 40 to 50 percent of production costs
- Must consider color, _____ and form as different species have different preferences
- Are commonly prepared as pellets or _____
- May be either of the following:
 - complete: offers all necessary elements for fish nutrition
 - supplemental: intended to support natural diet

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11. Pellets

- Provide the most nutritionally complete diet
- Are cooked and provide _____ nutrition between pellets
- May be either dry, moist or semi-moist
- Sink _____ and may be too small for large fish and too large for small fish

12. Flakes

- Are used largely in the _____ fish industry
- Sink very slowly
- Require a large volume in order to meet the _____ needs of fish

13. Common Fish Feed Ingredients

- Include some form of the following:
 - proteins
 - _____
 - lipids
 - vitamins

14. Proteins

- Are the main component in organs and various soft _____ in animals
- Are required continuously throughout life to ensure growth and _____ repair
- Are unique in every animal

15. Carbohydrates

- Constitute major sources of energy for animals
- Are produced by photosynthetic plants
- Contain only _____, hydrogen and oxygen, usually found in a 1:2:1 ratio
- Include sugars and _____

16. Lipids

- Are insoluble in water but *soluble* in an organic solvent
- Are synonymous with “fats” but include other _____ as well
- Act as concentrated sources of energy, providing approximately twice the amount of energy as _____ and proteins

Soluble – the ability to be dissolved or liquefied

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17. Lipids

- May be either of the following:
 - _____: possess no double bonds between carbon atoms; tightly packed
 - unsaturated: possess double bonded _____ atoms; loosely packed

18. Vitamins

- Are found in _____ quantities among natural foods
- Are essential for the health and growth of animals
- Are classified as either of the following:
 - fat soluble: dissolve in fat; includes vitamins A, D, E and K
 - _____: dissolve in water; include vitamins B1, B2, B6 and B12

19. Feeding Rate

- Depends on the size of the fish
 - _____ fish and fry should be fed a high protein diet frequently and excessively
 - small fish possess a high energy demand and therefore must be fed continuously, often even _____
 - larger fish do not require as much feed and are easier to over-feed than small fish

20. Feed Conversion

- Is the ratio between amount of feed and weight gain, allowing producers to assess success of feed
- Is calculated by dividing the _____ of feed given to the fish by the weight of fish growth
 - Example: If fish are fed ten pounds of feed and exhibit a five pound weight gain, then the feed _____ ratio is two
 - Practice: If fish are fed twelve pounds of feed and exhibit an eight pound increase in weight, what is the feed conversion ratio?

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21. Feed Efficiency

- Shows the percentage of feed being utilized for growth by the fish
- Is calculated by dividing the amount of weight gain by the weight of feed provided and _____ by 100
 - Example: If fish gain five pounds and are provided with 10 pounds of feed, the feed efficiency is 50 percent
 - Practice: If fish gain four pounds and are provided with twelve pounds of feed, what is the feed _____?