Arkansas CTE

Aquaculture: Grades 10, 11, 12

Adopted 2006

Introduction to and History of the Aquaculture Industry

1.1 Define terms

1.2 List and explain the uses of aquacrops

1. Identify local producers of aquacrops for various uses 1.2.1

1.3 Identify species of aquacrop produced locally and explain habitat requirements

1. List general descriptive characteristics of each species, including the required water environment 1.3.1
2. Observe production systems used with identified species 1.3.2

1.4 Identify production levels of selected aquaculture species

1. Select an aquaculture species for a particular production situation 1.4.1
2. Distinguish between tank, pond, and raceway systems of production 1.4.2

1.5 Identify and describe facilities needed for aquaculture production by species

1. Plan facility needs for a selected aquaculture species 1.5.1
2. Consider available facilities in choosing aquaculture production systems 1.5.2

1.6 Outline aquaculture systems

1. Distinguish between closed and open systems 1.6.1
2. Select the appropriate system for producing a particular species 1.6.2

1.7 Discuss the history of early fish farming

1. Prepare a short paper on aquaculture and its history in the local area 1.7.1

1.8 Discuss opportunities in FFA for students interested in aquaculture

1. Research a career in the aquaculture industry to determine education requirements, working conditions, and salaries of those working in aquaculture 1.8.1

1.9 Plan supervised agricultural experiences for students interested in aquaculture

1. Consider all types of SAE programs 1.9.1
2. Keep records on aquaculture SAE 1.9.2

Aquaculture Biology

2.1 Define terms

2.2 Name and distinguish aquaculture species between the taxonomic kingdoms

1. Match important aquatic species with kingdom 2.2.1
2. List the common and scientific names of important aquaculture species 2.2.2

2.3 List and discuss the life processes of aquatic organisms

1. Discuss life processes as related to a selected aquatic species 2.3.1
2. Match life process requirements of cultured aquatic species to facility needs for production 2.3.2

2.4 Name and describe body systems of aquatic species

1. Research one aquatic species to determine its habitat, nutrition requirements, and marketability 2.4.1
2. Identify body systems that allow an aquatic species to be adapted to its environment 2.4.2

2.5 Name the major parts and discuss the functions of the nervous and sensory systems

1. Contrast nervous and sensory systems of finfish, crustaceans, and mollusks 2.5.1

2.6 Discuss the circulatory and respiratory systems of aquatic species

1. Contrast circulatory and respiratory systems of finfish, crustaceans, and mollusks 2.6.1

2.7 Discuss the digestive systems and mouth positions of selected aquatic species

1. Dissect a fish to identify the parts of a digestive system 2.7.1
2. Relate digestive system and mouth position to food acquisition 2.7.2

2.8 Describe the reproduction processes of important aquatic species

1. Observe the operation of a fish hatchery and prepare a report on your findings 2.8.1
2. Hatch fertile eggs in the school lab hatchery 2.8.2

2.9 List the nutritional requirements of fish

1. Discuss the functions of nutrients with finfish 2.9.1
2. Relate nutrition requirements to commercially available fish feed 2.9.2

Safety with Aquaculture

3.1 Define terms

3.2 Discuss the meaning and importance of safety and safe work environment in aquaculture

1. Relate examples of safety hazards in aquaculture 3.2.1
2. Have students name examples of accidents that have occurred locally in aquaculture 3.2.2

3.3 Identify safety hazards in aquaculture

1. Survey hazardous situations in local aquaculture facilities and prescribe the appropriate safety measures to be taken and propose ways of eliminating or reducing the risk of these hazards 3.3.1
2. Develop a list of practices to reduce hazards in aquaculture facilities, particularly including electrical and water hazards 3.3.2

3.4 Describe the importance of personal safety

1. Identify and properly use appropriate PPE with aquaculture 3.4.1
2. Calculate the cost of PPE for an individual involved in aquaculture 3.4.2
3. Work together with others to promote safety in aquaculture, including locating safety devices such as float rings and life jackets 3.4.3

Water Facilities and Environments

4.1 Define terms

4.2 Discuss the importance of water in aquaculture

1. Compare water from various sources as related to its quality for the culture of aquatic species 4.2.1

4.3 Describe the water (hydrologic) cycle

1. Explain the processes in the water cycle, including evaporation, precipitation, and percolation 4.3.1

4.4 Describe the quality of water based on salinity

1. Distinguish between freshwater, saltwater, and brackish water 4.4.1
2. Match aquaculture species with water based on salinity 4.4.2

4.5 Identify and describe water facilities used in aquaculture

1. Compare the environmental features of various water facilities 4.5.1
2. Match aquaculture species with appropriate water facilities 4.5.2

4.6 Discuss types and components of tank systems used in aquaculture

1. Compare various types of tanks and tank systems 4.6.1
2. Distinguish between open, recirculation, and closed systems 4.6.2
3. Label the major parts on a drawing of a recirculation system 4.6.3

4.7 List and explain factors in selecting a water facility

1. Observe an aquaculture facility and prepare a report on its operation 4.7.1
2. Prepare a poster that lists factors associated with land availability and past use, available water, labor supply, market availability, and personal preferences 4.7.2

4.8 Describe the sources of water for aquaculture

1. Identify and assess the potential of water sources in the local area, including wells, ponds, streams, municipal systems, and surface runoff 4.8.1

4.9 Explain how water well production is measured as gallons per minute (GPM)

1. Calculate time requirements for supplying water needs based on well production 4.9.1

4.10 List water quality factors related to suitability of water for aquaculture

1. Assess samples of water from various sources to determine quality 4.10.1
2. Use water test kits and meters in determining water quality 4.10.2

4.11 Describe the impacts that dissolved oxygen, temperature, pH, and hardness have on water quality

1. Use a dissolved oxygen meter to determine the DO level of water 4.11.1
2. Determine if fish and other aquatic species could live and grow in water with the DO reading that was measured 4.11.2
3. Demonstrate methods of correcting dissolved oxygen deficiency 4.11.3

4.12 Discuss factors that affect dissolved oxygen

1. Determine the temperature of a water sample 4.12.1
2. Determine DO levels in water samples of various temperatures 4.12.2
3. Determine the pH of a water sample with a pH meter 4.12.3

Water Quality Management

5.1 Define terms

5.2 List water quality characteristics

1. Sample water from a pond to determine quality , including DO, ammonia, alkalinity, and salinity 5.2.1
2. Determine common measures used with aquaculture water, including ppm 5.2.2

5.3 Explain the physical and biological characteristics of water

1. Assess the physical and biological characteristics of water from selected sources 5.3.1

5.4 List the common signs of oxygen depletion

1. Observe aquaculture facilities for signs of oxygen depletion 5.4.1
2. Determine conditions that contribute to current oxygen level in a water sample 5.4.2

5.5 List and explain the causes of oxygen depletion

1. Observe aquaculture facilities for the presence of conditions that may lead to oxygen depletion 5.5.1

5.6 Explain how oxygen can be added to water with low DO

1. Experiment with aeration by testing water before and after oxygenation practices 5.6.1

5.7 List methods of getting dissolved oxygen into water

1. Apply methods of aeration with aquaculture water 5.7.1

5.8 Determine the causes of turbidity

1. Assess sources of turbidity in aquaculture water 5.8.1
2. Assess aquaculture water for turbidity 5.8.2
3. Use a secchi disk to measure turbidity 5.8.3

5.9 Describe the methods used to control turbidity

1. Apply a method of turbidity control to a water environment 5.9.1

5.10 Calculate water volumes in various facilities

1. Determine number of gallons in a cubic foot 5.10.1
2. Determine the number of gallons of water in an acre foot of water 5.10.2
3. Calculate the volumes of rectangular and round tanks 5.10.3
4. Calculate the weight of a haul tank when filled with water 5.10.4

5.11 Explain the methods of weed and algae control in aquaculture facilities

1. Identify weeds and algae in aquaculture facilities 5.11.1
2. Select appropriate management methods of weeds and algae in aquaculture facilities 5.11.2
3. Relate the role of personal and environmental safety in aquatic weed control by preparing and giving an oral report 5.11.3

5.12 Determine the ppm of nitrogen and oxygen in water

1. Use a DO meter 5.12.1
2. Use a nitrogen test kit 5.12.2

5.13 List the most common nitrogen compounds in water and explain why these compounds cause problems in aquaculture

1. Indicate management practices that will reduce problems with nitrogen compounds 5.13.1
2. Relate overfeeding to the presence of nitrogen compounds 5.13.2

Disease and Pest Management

6.1 Define terms

6.2 Explain how an aquaculture environment may be a good place for harboring diseases and pests

1. Interview a fish producer to determine the health management practices that are followed 6.2.1

6.3 Explain and distinguish between direct and indirect losses in aquaculture

1. Identify common sources of loss in local aquaculture production 6.3.1
2. Investigate practices that can be implemented to reduce loss to diseases and pests 6.3.2

6.4 List the common signs (symptoms) of disease in aqua crops and explain how these relate to normal body functions

1. Observe a sample of fish or other species for signs of disease 6.4.1
2. Observe a sample of diseased fish or other aquacrop to determine the kind of disease or loss 6.4.2

6.5 Discuss good aquacultural practices that aid in disease prevention

1. Observe sites where poor water quality has affected aquatic life 6.5.1

6.6 Discuss aquatic predators

1. Identify predators found in local aquaculture facilities 6.6.1
2. Select appropriate methods of controlling predators in local aquaculture facilities 6.6.2

Marketing

7.1 Define terms

7.2 Discuss the meaning and importance of marketing in the success of an aquaculture enterprise

1. Identify local markets for aquaculture products 7.2.1
2. Relate market outlets to the species produced and volume of production 7.2.2

7.3 Explain aquaculture marketing and the marketing channels that are used

1. Identify the functions involved in marketing local aquacrops 7.3.1
2. Use the Internet to assess the content and usefulness of the Regulatory Fish Encyclopedia 7.3.2
3. Identify the marketing channels used locally 7.3.3

7.4 Describe live aquaculture product forms

1. Develop a marketing plan for a locally-produced species 7.4.1

7.5 Explain the "dressing" process in the aquaculture industry

1. Calculate yield percentages of live aquaculture products 7.5.1

7.6 Evaluate the types of processed forms and cuts of fish

1. Identify common fabricated fish forms 7.6.1

7.7 Develop an advertising campaign for a type of aquaculture product

1. Interview someone in the aquaculture business to learn more about management practices 7.7.1