ZOO510 – ECONOMIC ZOOLOGY

MID TERM MOST IMPORTANT QUESTIONS

PREPARED BY: SIR MUGHAL (ADMIN, BS BIOLOGICAL SCIENCES)

GROUP LINK: https://chat.whatsapp.com/BjC6W0jZx8o9yaC2ISh1Gu

1. Define Ari Lac and Phunki Lac.

Ari Lac refers to the crop of lac that is harvested during the winter season, typically around January to March. It is one of the seasonal varieties of lac produced by the lac insect (*Kerria lacca*), which secretes a resinous substance on the branches of host trees. Ari Lac is usually cultivated on host plants such as palas (Butea monosperma), kusum (Schleichera oleosa), or ber (Ziziphus mauritiana). The quality and yield of Ari Lac depend on the climatic conditions and the health of the host tree. This crop is important in lac cultivation as it helps maintain the production cycle and provides raw material for various industries.

Phunki Lac is the lac crop that is harvested in the summer season, usually around June to July. Like Ari Lac, it is produced by lac insects that colonize suitable host trees and secrete a resin that hardens into lac. Phunki Lac often follows the Ari Lac crop in the lac cultivation cycle and plays a critical role in sustaining lac production throughout the year. The quality of Phunki Lac can vary depending on the host tree and environmental conditions, and it is used in the manufacture of products such as shellac, varnish, and dyes. Together, Ari and Phunki Lac represent key seasonal harvests in the lac industry, supporting livelihoods and traditional agroforestry systems in several parts of India and Southeast Asia.

2. Write uses of Lac.

- ***Wood and Furniture Polish:*** Lac is used to make shellac, a natural varnish used for polishing wood, furniture, and musical instruments.
- ***Pharmaceutical Industry:*** Lac is used for coating tablets and pills to protect them and improve shelf life.
- ***Cosmetics:*** It is used in making natural cosmetics such as lipsticks, nail polish, and other beauty products.
- ***Textile and Dye Industry:*** Lac dye, extracted from lac, is used as a natural coloring agent for fabrics & food.
- ***Traditional Crafts:*** Lac is used in making decorative items, bangles, and ornaments in traditional handicrafts.
- ***Livelihood Support:*** Lac cultivation provides income and employment to rural and tribal communities.

3. Differentiate Natural Infection and Artificial Infection.

Natural Infection

Natural infection occurs when lac insects from a previous crop or surrounding areas infest a new host plant on their own. This process happens without any human intervention. The insects naturally settle on fresh twigs and begin secreting lac resin. While it is simple and cost-effective, natural infection is less reliable and may result in uneven distribution or low yield, as the number of insects settling on the plants cannot be controlled.

Artificial Infection

Artificial infection is a controlled method where humans deliberately introduce lac insects to fresh host plants using broodlac (sticks containing mature lac insects ready to emerge). These broodlac sticks are tied onto the branches of the host tree, ensuring uniform and timely settlement of the insects. This method leads to better distribution, higher yield, and more predictable results, making it widely preferred in scientific and commercial lac cultivation.

4. Write factors which effect the ammonia nitrogen concentration in aquaculture.

- ***Stocking Density:*** Higher stocking densities lead to more waste production, which increases ammonia concentration in the water.
- ***Feeding Rate and Feed Quality:*** Excessive feeding and poor-quality feed result in more uneaten feed and excreta, contributing to higher ammonia levels.
- ***Water Temperature:*** Warm water increases the metabolic rate of aquatic animals and bacterial activity, both of which raise ammonia production.
- ***pH of Water:*** Higher pH levels favor the more toxic form of ammonia (NH_3), increasing the overall toxicity in the system.
- ***Dissolved Oxygen:*** Low dissolved oxygen slows down the activity of nitrifying bacteria that convert ammonia to less harmful compounds.
- ***Water Exchange Rate:*** Infrequent water exchange allows ammonia to accumulate, while regular exchange helps maintain lower concentrations.
- ***Presence of Nitrifying Bacteria:*** A healthy population of nitrifying bacteria helps control ammonia levels by converting it to nitrite and then nitrate.
- ***Organic Matter Accumulation:*** Decomposition of organic materials like dead algae, waste, and uneaten feed releases ammonia into the water.

5. Write tips for the safety of beekeepers.

- ***Protective Clothing:*** Always wear proper bee suits, gloves, and veils to prevent bee stings.
- ***Calm Movements:*** Move slowly and calmly around bees to avoid provoking them.
- ***Smoke Usage:*** Use a bee smoker gently to calm the bees before opening the hive.
- ***Avoid Strong Scents:*** Do not wear strong perfumes, soaps, or deodorants as these can attract or agitate bees.

- ***Work During Optimal Times*:** Inspect hives during warm, sunny days when bees are less aggressive and more active outside.
- ***Stay Alert:*** Be aware of bee behavior and stop work if bees become aggressive.
- ***First Aid Preparedness:*** Keep a first aid kit handy, including treatments for stings and allergies.
- ***Training and Knowledge:*** Get proper training and understand bee behavior before starting beekeeping.
- ***Avoid Swatting:*** Do not swat at bees, as this can provoke attacks.
- ***Maintain Hive Health:*** Keep hives healthy to reduce aggressive behavior in bees.

6. Write advantages and disadvantages of hand feeding method.

Advantages of Hand Feeding Method

- Allows precise control over the amount and type of feed given to each animal.
- Enables close observation of the health and behavior of individual animals.
- Reduces feed wastage compared to some other feeding methods.
- Suitable for small-scale farming and when feeding high-value or special diets.
- Helps in administering medicines or supplements along with feed.

Disadvantages of Hand Feeding Method

- Time-consuming and labor-intensive, especially for large herds or flocks.
- Not practical for large-scale or commercial operations.
- Requires skilled labor to ensure proper feeding and avoid underfeeding or overfeeding.
- Can cause stress to animals if not done gently and correctly.
- May increase the risk of disease transmission if hygiene is not maintained.

7. Differentiate between Queen and Drone bee.

Queen Bee

The queen bee is the only fertile female in the hive responsible for laying eggs. She is larger in size compared to other bees and has a longer abdomen. The queen produces pheromones that regulate the behavior and development of the colony. She typically lives for several years and mates once during her lifetime. Her main role is reproduction and maintaining colony cohesion.

Drone Bee

Drone bees are the male bees in the colony whose primary function is to mate with a queen during the mating flight. They are larger than worker bees but smaller than the queen and have no stinger. Drones do not participate in hive work such as foraging or nursing. They live only during the mating season and are often expelled from the hive before winter.

8. Explain Artificial and Biological method of Lac crop.

Artificial Method of Lac Crop

The artificial method involves the deliberate inoculation of lac insects onto host trees by humans. This is done by attaching broodlac sticks, which contain mature lac insects, to healthy branches of suitable host plants. This controlled process ensures uniform distribution and timely infestation of the lac insects, leading to better yields and quality of lac. The artificial method allows farmers to manage the crop cycle effectively and is widely used in commercial lac cultivation.

Biological Method of Lac Crop

The biological method relies on the natural infestation of lac insects from existing colonies or nearby host trees without human intervention. Lac insects naturally migrate and settle on fresh twigs during their life cycle. This method depends on environmental conditions and the presence of natural lac insect populations. While it requires less labor and cost, the infestation is often uneven and less predictable, resulting in lower and inconsistent lac yields.

9. Differentiate between Male and Female Lac insect.

Male Lac Insect

Male lac insects are smaller and have wings, allowing them to fly. They have a short lifespan and do not produce lac resin. Their main role is to mate with the female. After mating, males die quickly. They lack a functional mouth and do not feed during adulthood.

Female Lac Insect

Female lac insects are wingless and larger than males. They produce the lac resin by secreting it over the branches of host plants, forming the lac crop. Females have a longer lifespan and are responsible for laying eggs. They feed on the sap of the host plant throughout their life.

10. How abdominal capacity of Hen is measured and expressed?

The abdominal capacity of a hen is measured by determining the volume of the abdominal cavity, which reflects the space available for digestive organs and egg development. This is typically done by gently inserting a specially designed measuring instrument, such as a graduated syringe or an inflatable balloon, into the hen's abdominal cavity to estimate the volume. The measurement is expressed in cubic centimeters (cm^3) or milliliters (ml), indicating the total capacity of the abdomen. This measurement helps assess the hen's reproductive potential and overall health.

11. Write importance of fats.

- Fats provide a concentrated source of energy for the body.
- They help in the absorption of fat-soluble vitamins A, D, E, and K.
- Fats are essential for building and maintaining healthy cell membranes.
- They play a role in the production of important hormones.
- Fats provide insulation and protect vital organs from injury.
- They serve as an energy reserve during fasting or increased energy needs.

12. How to recognize if fish is ill?

You can recognize if a fish is ill by observing several signs. An ill fish often shows changes in behavior, such as sluggishness, hiding more than usual, or swimming abnormally—like swimming upside down or in circles. Loss of appetite or refusal to eat is another common indicator. Physical symptoms may include visible spots, sores, ulcers, or discoloration on the skin and fins. The fins might appear clamped or held close to the body. Rapid or labored breathing can also suggest health issues. Additionally, excessive mucus production, bloating, or swelling of the abdomen are signs that the fish might be unwell. Isolation from other fish and overall lethargy are further clues to watch for.

13. Differentiate between Kusumi Lac and Rangeeni Lac.

Kusumi Lac

Kusumi Lac is produced when the lac insect infests the Kusum tree (Schleichera oleosa). It is known for its good quality resin and is commonly harvested during the summer season. Kusumi Lac generally has a darker color and is preferred for making natural dyes and shellac products. It tends to have a higher resin content and is considered commercially valuable.

Rangeeni Lac

Rangeeni Lac is obtained from the lac insect infesting the Palas tree (Butea monosperma). This type of lac is usually harvested during the winter season. Rangeeni Lac has a lighter color and is often softer compared to Kusumi Lac. It is mainly used in the production of varnishes, polishes, and other industrial products. Rangeeni Lac has slightly lower resin content but is easier to process.

14. Define factors which effect fish protein requirements.

Factors that affect fish protein requirements include:

- ***Species of Fish:*** Different fish species have varying protein needs based on their metabolism and growth patterns.
- ***Age and Growth Stage:*** Younger, growing fish require higher protein levels compared to mature or adult fish.
- ***Water Temperature:*** Higher temperatures increase metabolic rates, often raising protein requirements.
- ***Water Quality:*** Poor water quality can stress fish, affecting their ability to utilize protein efficiently.
- ***Feeding Frequency and Method:*** How often and how well fish are fed influences their protein intake and utilization.
- ***Health Status:*** Diseased or stressed fish may require different protein levels for recovery.
- ***Activity Level:*** More active fish or species with higher energy demands typically need more protein.
- ***Protein Source and Quality:*** The digestibility and amino acid profile of the protein affect how much is needed in the diet.

15. Name parts of chicken.

Here are the main parts of a chicken: Head, Neck, Comb, Wattle, Back, Breast, Wing, Thigh, Drumstick, Tail, Beak, Feet (including claws), Eyes, Crop, Sternum (keel bone).

16. Explain Aeration and Oxygenation.

Aeration is the process of increasing the oxygen content in water by exposing it to the air. This is usually done by physically agitating the water surface or introducing air bubbles, which helps dissolve atmospheric oxygen into the water. Aeration improves water quality by enhancing oxygen availability for aquatic organisms and promoting the breakdown of organic matter.

Oxygenation, on the other hand, refers specifically to the increase of dissolved oxygen in water, regardless of the method used. It can occur naturally through photosynthesis by aquatic plants or artificially by adding pure oxygen or oxygen-rich air. Oxygenation is essential for maintaining the health of aquatic life, supporting respiration, and preventing the buildup of harmful gases like ammonia.

17. Write benefits of Aquaculture.

- Increases production of fish and other aquatic organisms to meet food demand
- Creates employment opportunities and supports livelihoods in rural and coastal areas
- Reduces pressure on wild fish populations, promoting sustainability
- Contributes to the economy through trade and exports
- Allows controlled production environments for better quality and safety of seafood
- Provides opportunities for research in breeding, nutrition, and disease management

18. Write characteristics of Bombyx mori.

- ***Scientific Name and Common Name:*** *Bombyx mori*, commonly known as the domestic silkworm.
- ***Role:*** It is the primary species used for commercial silk production worldwide.
- ***Diet:*** The larvae feed exclusively on the leaves of the mulberry tree (*Morus* species).
- ***Life Cycle:*** Undergoes complete metamorphosis with four distinct stages—egg, larva (caterpillar), pupa (cocoon), and adult moth.
- ***Silk Production:*** The larva spins a cocoon made of continuous silk fibers, which are harvested to produce raw silk.
- ***Domestication:*** *Bombyx mori* is fully domesticated and dependent on humans for survival; it cannot survive in the wild.
- ***Adult Moth:*** The adult moth has reduced or non-functional mouthparts and does not feed; its primary function is reproduction.
- ***Life Span:*** The entire life cycle lasts about 6 to 8 weeks, with the larval stage lasting approximately 3 to 4 weeks.
- ***Environmental Sensitivity:*** It requires specific temperature and humidity conditions for optimal growth and cocoon formation.
- ***Economic Importance:*** Plays a crucial role in the sericulture industry, providing raw material for silk textiles.

19. Name developmental stages of bee and describe their lobes.

The developmental stages of a bee are:

1. **Egg**
2. **Larva**
3. **Pupa**
4. **Adult**

Description of Lobes (in the larval and pupal stages):

- ***Head Lobes:*** These form the head region and develop into the brain, eyes, and mouthparts of the adult bee.
- ***Thoracic Lobes:*** Located in the middle part of the body, these lobes develop into the three segments of the thorax, each bearing a pair of legs, and the wings.
- ***Abdominal Lobes:*** These lobes develop into the segmented abdomen of the bee, housing vital organs such as the digestive and reproductive systems.

20. Write characteristics of Culture tanks effluent.

Characteristics of culture tanks effluent include:

- It contains high levels of organic matter due to uneaten feed, feces, and decaying plants.
- The effluent is rich in nutrients like nitrogen and phosphorus, which can cause water pollution if discharged untreated.
- It often has elevated levels of ammonia, nitrites, and nitrates from fish or shrimp waste.
- The turbidity or suspended solids in the effluent is usually high because of particulate matter.
- Oxygen levels in the effluent can be low due to microbial decomposition of organic waste.
- The pH of the effluent may vary but often tends to be alkaline.
- Effluent temperature is typically similar to the culture tank water but can vary depending on environmental conditions.
- It may contain pathogens or harmful microorganisms if the culture stock is diseased.

21. Define apiculture.

Apiculture is the science, art, and practice of keeping and managing honeybee colonies for the purpose of producing honey, beeswax, royal jelly, propolis, and other valuable products. It also involves the care and maintenance of bees to ensure their health and productivity. Apiculture plays an important role in agriculture by aiding in the pollination of many crops, which increases crop yields and biodiversity. This field includes the study of bee biology, behavior, hive management techniques, and methods to protect bees from diseases and pests.

22. Define water soluble and fat soluble vitamins.

Water Soluble Vitamins are vitamins that dissolve in water and are easily absorbed into the bloodstream. They are not stored in large amounts in the body and need to be consumed regularly through the diet. Examples include vitamin C and the B-complex vitamins. Because they dissolve in water, excess amounts are usually excreted through urine, reducing the risk of toxicity.

Fat Soluble Vitamins are vitamins that dissolve in fats and oils and are absorbed along with dietary fat. These vitamins are stored in the body's fatty tissues and liver, so they do not need to be consumed as frequently as water soluble vitamins. Examples include vitamins A, D, E, and K. Since they can accumulate in the body, excessive intake can sometimes lead to toxicity.

23. How we can prevent from bee sting?

To prevent bee stings, it's important to wear protective clothing such as bee suits, gloves, and veils when working around bees. Avoid sudden movements or loud noises that may agitate the bees, and always move calmly and slowly near the hive. Using a smoker gently helps calm the bees before opening the hive. Avoid wearing strong perfumes, scented soaps, or bright-colored clothing, as these can attract or provoke bees. Work with bees during calm weather, preferably on warm, sunny days when bees are less aggressive. Finally, avoid swatting at bees, as this can trigger defensive behavior.

24. What are different types of fish feed?

Different types of fish feed include:

Natural Feed: Consists of naturally occurring organisms in the water like plankton, insects, and aquatic plants.

Artificial Feed: Manufactured feeds made from various ingredients formulated to meet the nutritional needs of fish. These include pellets, flakes, and granules.

Supplementary Feed: Feeds provided in addition to natural food to enhance growth and health, such as grains, kitchen waste, or agricultural by-products.

Compound Feed: Commercially prepared balanced feeds containing a mix of proteins, carbohydrates, fats, vitamins, and minerals.

Live Feed: Live organisms like worms, brine shrimp, or larvae used mainly for feeding young or ornamental fish.

Farm-made Feed: Feeds prepared on the farm using locally available ingredients, often mixed and processed manually.

25. Define term Catchers.

Catchers are individuals or workers involved in the process of capturing or harvesting fish or other aquatic organisms from natural water bodies or aquaculture systems. They play a crucial role in the fishing industry by using various methods and tools to catch fish for commercial, subsistence, or recreational purposes.

26. What is cause of Ulcer and hemorrhage disease in fish?

Ulcer and hemorrhage disease in fish is mainly caused by bacterial infections, particularly by bacteria from the genus *Aeromonas*, such as *Aeromonas hydrophila* and *Aeromonas sobria*. These bacteria are opportunistic pathogens that invade the fish's body when the immune system is weakened or when the skin is damaged. The disease is characterized by the development of painful ulcers on the skin, hemorrhages (bleeding) on the body surface and fins, and internal organ damage.

Several factors contribute to the outbreak of this disease, including poor water quality, overcrowding, sudden changes in temperature, and physical injuries to the fish. Stress caused by environmental or handling factors weakens the fish's resistance, making them more vulnerable to infection. If not treated promptly, ulcer and hemorrhage disease can lead to high mortality rates and significant economic losses in aquaculture.

27. Write names of five Aquaculture Journals.

Here are five well-known aquaculture journals:

1. Aquaculture
2. Aquaculture Research
3. Journal of the World Aquaculture Society
4. Aquaculture International
5. Reviews in Aquaculture

Disclaimer:

For best results, it is advised NOT to rely on this file only. Go through video lectures, handouts and other sources as well.

Regards,

Sir Mughal,

BS Zoology, Virtual University of Pakistan

B.Sc (Honors), University of Karachi.