Health Management

Biofloc

Biofloc technology (BT) is a fish farming system that recycles waste nutrients as fish food. Biofloc, specifically cultured microorganisms, are introduced into the water to form microbial protein from toxic fish waste and other organic matter. This maintains water quality as well as lowering costs. Candidate species must be resistant to environmental changes, tolerate high stocking density, adapt to changes in dissolved oxygen, and take microbial protein as food. BT is used in large-scale shrimp and finfish farms, mainly in Asia.

The first BFT was developed in the 1970s at Ifremer-COP (French Research Institute for Exploitation of the Sea, Oceanic Center of Pacific) with Penaeus monodon, Fenneropenaeus merguiensis, Litopenaeus vannamei, and L. stylirostris. Israel and USA (Waddell Mariculture Center) also started Research and Development with Tilapia and L. vannamei in the late 1980s and 1990s.

Commercial application started at a farm in Tahiti (French Polynesia) in 1988 using 1000m2 concrete tanks with limited water exchange achieving a record of 20–25 tons/ha/year in 2 crops. A farm located in Belize, Central America also produced around 11-26 tons/ha/cycle using 1.6 ha poly-lined ponds. Another farm located in Maryland, USA also produced 45-ton shrimp per year using ~570 m3 indoor greenhouse BFT race-ways. BFT has been successfully practiced in large-scale shrimp and finfish farms in Asia, Latin, and Central America, the USA, South Korea, Brazil, Italy, China, India, and others. However, research on BFT by Universities and Research Centers are refining BFT for farm application in grow-out culture, feeding technology, reproduction, microbiology, biotechnology, and economics.

Disease surveillance:

Disease surveillance is an epidemiological practice by which the spread of disease is monitored in order to establish patterns of progression. The main role of disease surveillance is to predict, observe, and minimize the harm caused by outbreak, epidemic, and pandemic situations, as well as increase knowledge about which factors contribute to such circumstances. A key part of modern disease surveillance is the practice of disease case reporting.

In modern times, reporting incidences of disease outbreaks has been transformed from manual record keeping, to instant worldwide internet communication.

The number of cases could be gathered from hospitals – which would be expected to see most of the occurrences – collated, and eventually made public. With the advent of modern communication technology, this has changed dramatically. Organizations like the World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC) now can report cases and deaths from significant diseases within

days – sometimes within hours – of the occurrence. Further, there is considerable public pressure to make this information available quickly and accurately.

Sanitary and Phytosanitary Agreement:

The Agreement on the Application of Sanitary and Phytosanitary Measures, also known as the SPS Agreement or just SPS, is an international treaty of the World Trade Organization (WTO). It was negotiated during the Uruguay Round of the General Agreement on Tariffs and Trade (GATT), and entered into force with the establishment of the WTO at the beginning of 1995. Broadly, the sanitary and phytosanitary ("SPS") measures covered by the agreement are those aimed at the protection of human, animal or plant life or health from certain risks.

Under the SPS agreement, the WTO sets constraints on member-states' policies relating to food safety (bacterial contaminants, pesticides, inspection and labelling) as well as animal and plant health (phytosanitation) with respect to imported pests and diseases. There are 3 standards organizations who set standards that WTO members should base their SPS methodologies on. As provided for in Article 3, they are the Codex Alimentarius Commission (Codex), World Organization for Animal Health (OIE) and the Secretariat of the International Plant Protection Convention (IPPC). The SPS agreement is closely linked to the Agreement on Technical Barriers to Trade, which was signed in the same year and has similar goals. The TBT Emerged from the Tokyo Round of WTO negotiations and was negotiated with the aim of ensuring non-discrimination in the adoption and implementation of technical regulations and standards.

Periphyton:

Periphyton is a complex mixture of algae, cyanobacteria, heterotrophic microbes, and detritus that is attached to submerged surfaces in most aquatic ecosystems. The related term Aufwuchs (German "surface growth" or "overgrowth") refers to the collection of small animals and plants that adhere to open surfaces in aquatic environments, such as parts of rooted plants.

Periphyton communities are used in aquaculture food production systems for the removal of solid and dissolved pollutants. Their performance in filtration is established and their application as aquacultural feed is being researched.

Biofilm:

A biofilm comprises any syntrophic consortium of microorganisms in which cells stick to each other and often also to a surface. These adherent cells become embedded within a slimy extracellular matrix that is composed of extracellular polymeric substances (EPSs).The cells within the biofilm produce the EPS components, which are typically a polymeric conglomeration of extracellular polysaccharides, proteins, lipids and DNA. Because they have three-dimensional structure and represent a community lifestyle for microorganisms, they have been metaphorically described as "cities for microbes".

Biofilms may form on living or non-living surfaces and can be prevalent in natural, industrial, and hospital settings. They may constitute a microbiome or be a portion of it. The microbial cells growing in a biofilm are physiologically distinct from planktonic cells of the same organism, which, by contrast, are single cells that may float or swim in a liquid medium. Biofilms can form on the teeth of most animals as dental plaque, where they may cause tooth decay and gum disease.

Microbes form a biofilm in response to a number of different factors, which may include cellular recognition of specific or non-specific attachment sites on a surface, nutritional cues, or in some cases, by exposure of planktonic cells to sub-inhibitory concentrations of antibiotics. A cell that switches to the biofilm mode of growth undergoes a phenotypic shift in behavior in which large suites of genes are differentially regulated.

Biosecurity:

Biosecurity is the implementation of measures that reduce the risk of the introduction and spread of disease agents; it requires the adoption of a set of attitudes and behaviors by people to reduce risk in all activities involving domestic, captive/exotic, and wild animals and their products (FAO/OIE/World Bank, 2008). Bioexclusion centers on the prevention of disease introduction and relies on external biosecurity practices. In contrast, biocontainment centers on preventing the spread of disease within a farm or group of animals, or to other farms or groups of animals, and relies on implementation of internal biosecurity practices.

Thus, disease control and prevention relies on the interrelated processes of bioexclusion, surveillance, and biocontainment. Prevention of disease is costly, difficult, and time consuming and is primarily directed at preventing epidemic or exotic diseases. It invariably involves eradication of disease-causing agents from a population of animals or geographic area. In contrast, control programs are less demanding and primarily focus on limiting endemic diseases to tolerable levels within a population of animals or geographic area. Although preventing exposure to disease-causing agents remains an objective of control strategies, strategies are primarily focused on limiting the consequence of disease.

PAPER:DSE-3

Fisheries Economics

Economics:

Economics is a social science that focuses on the production, distribution, and consumption of goods and services, and analyzes the choices that individuals, businesses, governments, and nations make to allocate resources.

Microeconomics:

Microeconomics studies how individual consumers and firms make decisions to allocate resources. Whether a single person, a household, or a business,

economists may analyze how these entities respond to changes in price and why they demand what they do at particular price levels.

Microeconomics analyzes how and why goods are valued differently, how individuals make financial decisions, and how they trade, coordinate, and cooperate.

Within the dynamics of supply and demand, the costs of producing goods and services, and how labor is divided and allocated, microeconomics studies how businesses are organized and how individuals approach uncertainty and risk in their decision-making.

Macroeconomics:

Macroeconomics is the branch of economics that studies the behavior and performance of an economy as a whole. Its primary focus is the recurrent economic cycles and broad economic growth and development.

It focuses on foreign trade, government fiscal and monetary policy, unemployment rates, the level of inflation, interest rates, the growth of total production output, and business cycles that result in expansions, booms, recessions, and depressions.

Using aggregate indicators, economists use macroeconomic models to help formulate economic policies and strategies.

Demand:

In economics, demand is the quantity of a good that consumers are willing and able to purchase at various prices during a given time. The relationship between price and quantity demand is also called the demand curve. Demand for a specific item is a function of an item's perceived necessity, price,

perceived quality, convenience, available alternatives, purchasers' disposable income and tastes, and many other options.

Factors influencing demand:

Innumerable factors and circumstances affect a consumer's willingness or to buy a good. Some of the common factors are:

The price of the commodity: The basic demand relationship is between potential prices of a good and the quantities that would be purchased at those prices. Generally, the relationship is negative, meaning that an increase in price will induce a decrease in the quantity demanded. This negative relationship is embodied in the downward slope of the consumer demand curve. The assumption of a negative relationship is reasonable and intuitive. For example, if the price of a gallon of milk were to rise from $5 to a price of $15, that would be a big price increase. Such a significant price increase causes the consumer to demand less of that product at the price of $15 because not only is it more expensive, but the new price is very unreasonable for a gallon of milk.

Price of related goods: The principal related goods are complements and substitutes. A complement is a good that is used with the primary good. Examples include hotdogs and mustard, beer and pretzels, automobiles and gasoline. (Perfect complements behave as a single good.) If the price of the complement goes up, the quantity demanded of the other good goes down.

Mathematically, the variable representing the price of the complementary good would have a negative coefficient in the demand function. For example, $Qd = a - P - Pg$ where Q is the quantity of automobiles demanded, P is the price of automobiles and Pg is the price of gasoline. The other main category of related goods are substitutes. Substitutes are goods that can be used in place of the primary good. The mathematical relationship between the price of the

substitute and the demand for the good in question is positive. If the price of the substitute goes down the demand for the good in question goes down.

Personal Disposable Income: In most cases, the more disposable income (income after tax and receipt of benefits) a person has, the more likely that person is to buy.

Tastes or preferences: The greater the desire to own a good the more likely one is to buy the good. There is a basic distinction between desire and demand. Desire is a measure of the willingness to buy a good based on its intrinsic qualities. Demand is the willingness and ability to put one's desires into effect. It is assumed that tastes and preferences are relatively constant.

Demand curve:

In economics the demand curve is the graphical representation of the relationship between the price and the quantity that consumers are willing to purchase. The curve shows how the price of a commodity or service changes as the quantity demanded increases. Every point on the curve is an amount of consumer demand and the corresponding market price. The graph shows the law of demand, which states that people will buy less of something if the price goes up and vice versa. According to Kotler, eight demand states are possible:

Negative demand — Consumers dislike the product and may even pay to avoid it.

Nonexistent demand — Consumers may be unaware of or uninterested in the product.

Latent demand — Consumers may share a strong need that cannot be satisfied by an existing product.

Declining demand — Consumers begin to buy the product less frequently or

not at all.

Irregular demand — Consumer purchases vary on a seasonal, monthly, weekly, daily, or even hourly basis.

Full demand — Consumers are adequately buying all products put into the marketplace.

Overfull demand — More consumers would like to buy the product than can be satisfied.

Unwholesome demand — Consumers may be attracted to products that have undesirable social consequences.

Price elasticity of demand:

The price elasticity of demand is a measure of the sensitivity of the quantity variable, Q, to changes in the price variable, P. It shows the percent by which the quantity demanded will change as a result of a given percentage change in the price. Thus, a demand elasticity of -2 says that the quantity demanded will fall 2% if the price rises 1%. For infinitesimal changes, the elasticity is $(\partial Q/\partial P) \times (P/Q)$.

Elasticity along linear demand curve

The slope of a linear demand curve is constant. The elasticity of demand changes continuously as one moves down the demand curve because the ratio of price to quantity continuously falls. At the point the demand curve intersects the y-axis, demand becomes infinitely elastic, because the variable Q appearing in the denominator of the elasticity formula is zero. At the point the demand curve intersects the x-axis, the elasticity is zero, because the variable P appearing in the numerator of the elasticity formula is zero. At one point on a linear demand curve, demand is unitary elastic: an elasticity of one. For higher prices, the elasticity is greater than 1 in magnitude: demand is said to be elastic because percentage quantity changes are bigger than price changes. For prices below the point of unit elasticity, the elasticity is less than 1 and

demand is said to be inelastic.

Supply:

In economics, supply is the amount of a resource that firms, producers, labourers, providers of financial assets, or other economic agents are willing and able to provide to the marketplace or to an individual. Supply can be in produced goods, labour time, raw materials, or any other scarce or valuable object. Supply is often plotted graphically as a supply curve, with the price per unit on the vertical axis and quantity supplied as a function of price on the horizontal axis. This reversal of the usual position of the dependent variable and the independent variable is an unfortunate but standard convention.

An example of a nonlinear supply curve

The supply curve can be either for an individual seller or for the market as a whole, adding up the quantity supplied by all sellers. The quantity supplied is for a particular time period (e.g., the tons of steel a firm would supply in a year), but the units and time are often omitted in theoretical presentations.

In the goods market, supply is the amount of a product per unit of time that producers are willing to sell at various given prices when all other factors are held constant. In the labor market, the supply of labor is the amount of time per week, month, or year that individuals are willing to spend working, as a function of the wage rate.

In financial markets, the money supply is the amount of highly liquid assets available in the money market, which is either determined or influenced by a country's monetary authority. This can vary based on which type of money supply one is discussing. M1 for example is commonly used to refer to narrow money, coins, cash, and other money equivalents that can be converted to currency nearly instantly. M2 by contrast includes all of M1 but also includes short-term deposits and certain types of market funds.

Utility:

In economics, utility is a term used to determine the worth or value of a good or service. More specifically, utility is the total satisfaction or benefit derived from consuming a good or service. Economic theories based on rational choice usually assume that consumers will strive to maximize their utility.

The economic utility of a good or service is important to understand because it directly influences the demand, and therefore price, of that good or service. In practice, a consumer's utility is usually impossible to measure or quantify. However, some economists believe that they can indirectly estimate what is the utility of an economic good or service by employing various models.

Consumer surplus:

Consumer surplus is defined as the difference between the consumers' willingness to pay for a commodity and the actual price paid by them, or the equilibrium price.

Description: Total social surplus is composed of consumer surplus and producer surplus. It is a measure of consumer satisfaction in terms of utility.

Graphically, it can be determined as the area below the demand curve (which represents the consumer's willingness to pay for a good at different prices) and above the price line. It reflects the benefit gained from the transaction based on the value the consumer places on the good. It is positive when what the consumer is willing to pay for the commodity is greater than the actual price.

Consumer surplus is infinite when the demand curve is inelastic and zero in case of a perfectly elastic demand curve.

Profit maximisation:

Profit maximisation is a process business firms undergo to ensure the best output and price levels are achieved in order to maximise its returns.

Influential factors such as sale price, production cost and output levels are adjusted by the firm as a way of realising its profit goals.

In business, profit maximisation is a good thing, but it can be a bad thing for the client if, for example, lower-quality materials and labour are used or if the business decides to raise the prices for executing projects, all in pursuit of profit maximisation.

Break-even analysis:

A break-even analysis is an economic tool that is used to determine the cost structure of a company or the number of units that need to be sold to cover the cost. Break-even is a circumstance where a company neither makes a profit nor loss but recovers all the money spent.

The break-even analysis is used to examine the relation between the fixed cost, variable cost, and revenue. Usually, an organisation with a low fixed cost will have a low break-even point of sale.

Importance of Break-Even Analysis

Manages the size of units to be sold: With the help of break-even analysis, the company or the owner comes to know how many units need to be sold to cover the cost. The variable cost and the selling price of an individual product and the total cost are required to evaluate the break-even analysis.

Budgeting and setting targets: Since the company or the owner knows at which point a company can break-even, it is easy for them to fix a goal and set a budget for the firm accordingly. This analysis can also be practised in establishing a realistic target for a company.

Manage the margin of safety: In a financial breakdown, the sales of a company tend to decrease. The break-even analysis helps the company to decide the least number of sales required to make profits. With the margin of safety reports, the management can execute a high business decision.

Laws of Demand and Supply:

The law of demand states that all conditions being equal, as the price of a product increases, the demand for that product will decrease. Consequently, as the price of a product decreases, the demand for that product will increase. Therefore, the law of demand defines an inverse relationship between the price and quantity factors of a product.

The law of supply, on the other hand, states that all factors being constant, an increase in price will cause an increase in the quantity supplied. That is the quantity being supplied will move in the same direction as the price. Production units will invest more in production and supply more products for sale at an increased price. Therefore, the law of supply defines a direct relationship between the price and quantity.

Price Elasticity of Demand:

Price elasticity of demand is a measurement of the change in the consumption of a product in relation to a change in its price. Expressed mathematically, it is:

Price Elasticity of Demand = Percentage Change in Quantity Demanded ÷ Percentage Change in Price

Economists use price elasticity to understand how supply and demand for a product change when its price changes.

Like demand, supply also has an elasticity, known as price elasticity of supply.

Price elasticity of supply refers to the relationship between change in supply and change in price. It's calculated by dividing the percentage change in quantity supplied by the percentage change in price. Together, the two elasticities combine to determine what goods are produced at what prices.

Income Elasticity :

Income elasticity of demand measures the relationship between the consumer's income and the demand for a certain good. It may be positive or negative, or even non-responsive for a certain product. The consumer's income and a product's demand are directly linked to each other, dissimilar to the price-demand equation.

Demand for a normal good grows with an increase in customer wages and vice versa, assuming other factors of demand are constant. Income elasticity of demand is the level of response in demand to the adjustment in customer income. The larger the income elasticity of demand for a certain product, the greater the shift in demand there is from a change in consumer income.

Cross elasticity:

The cross elasticity of demand is an economic concept that measures the responsiveness in the quantity demanded of one good when the price for another good changes. Also called cross-price elasticity of demand, this measurement is calculated by taking the percentage change in the quantity demanded of one good and dividing it by the percentage change in the price of the other good.