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Designer quality fish production technology

Abstract

Fish are highly nutritious widely preferred non vegetarian diet. Its quality is highly governed by living water quality, pollution and availability of feeds quantity and quality. Objective of the present study was to devise production technology for designer quality fish. In the study all ecosystem factors were resolved by creating fish tank and providing innovative feed supplemented with quality improving food ingredients. Study presented detailed description of proteins and vitamins including minerals needed for maintaining good health. Endeavors were made to develop technology for producing desirable quality fish lot so that different species could be produced and reared to provide plentiful quality fish. Bio experiment brought out in the study the indices for quality and understanding and for its validation of the designer quality fish. Experimental setup developed in the present study will unlock many unknown frontiers of biology by application of new theme," Food is medicine", to bring new designer quality world in many respects.

Keywords: aquatic ecology, food and nutrition, livelihood, oxygen, pollution, smell and odors

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Introduction

Fish constitute a major part of animal protein consumption in many parts of the world. Fish are consumed as fresh fish or as frozen, salted, dried, smoked, or canned products. Fish represents a valuable source of proteins and other nutrients in the diet of many countries. As with many animal products, fish and fishery products contain water, proteins and other nitrogenous compounds, lipids, carbohydrates, minerals and vitamins. Fish are highly delicate and liable to get preyed, suffer set back of oxygen and feed constrains. Fish always remain in action for survival and safety of life, therefore, remain under constant stress and the quality of meat does not get flourished to the extent it should be. This implicates that if such constrains are removed by any innovative means, while meeting all necessary condition for its good and feel good living, its quality will get improved. However, the chemical composition of fish varies greatly from one species and one individual fish to another depending on age, sex, environment and season. Proteins and lipids (any fat that are insoluble in water) are the major components whereas carbohydrates are levels (less than 0.5 percent).[1] Different effects of several properties like lipid contents of tissues must be getting affected by water temperature and feeding habits may be built for the bio-accumulation and bio-concentration, free of odorous compounds. Objective of the present study was to develop criteria for designer qualities that fulfill all aspirations of consumers and develop production technology for enemas production. This development is expected to fulfill increasing demand with quality fish and cope up with food situation in developing scarcity of water.

Materials and methods

Pollution as limiting factor

Increasing quantities of organic pollutants are released into the aquatic environment by humans due to industrial production, modern plant protection, more intensive use of medicines, cosmetics, household detergents etc, where the fish survive and live. These compounds are present in the environment as persistent compounds because they might accumulate in the different organisms through bio-accumulation and biomagnifications. Bioaccumulation of certain heavy metals along the food chain is a well recognized process. Essentially toxicity of trace metals in organisms depend on food chain. These factors govern choice of quality of fish and need of designer quality fish.

Ecology

Ecology is situation that develops in any environment (space with L3 dimension) occupied by living and non living entities.[2] Ecologists world over devoted time in establishing ecological balance, which could not get established by virtue of the fact that there are production and consumption and there develop some wastes in the natural process[2] Thus, there is always dominance of dynamic processes; hence such balances do not get established. When time is also added in the environment (L3), the new situation becomes L3.T, the ecology becomes an ecosystem.[2] Fish is a biological promising component of aquatic ecosystems. The interactions among organisms and their abiotic environment, a six main types of ecological interaction are included in Table 1 that operate in ecosystems, with a general framework for their topological connection.[2]

These six types of interaction potentially operate among three abiotic and three biotic basic compartments. The abiotic compartments are (i) abiotic resources (such as light, nitrate, ammonium, phosphate) that are consumed and depleted by autotrophs, (ii) abiotic conditions, that affect both autotrophs and heterotrophs, but are not consumed or depleted by them (such as salinity, soil texture, sediment aeration, soil and water pH, temperature) but that can be modified (e.g. by ecosystem engineers.[3,4] and (iii) detritus (non-living organic material). This interaction-web framework builds on earlier ideas for marine systems by Azam et al.[5] and for terrestrial systems with the importance of the 'dual foundation' of food webs on both autotrophs (plants, photosynthetic or chemoautotrophic microbes) and microbial detrivores, but adding the effect of environmental (non-resource) conditions. by Azam et al. [5]

Table 1 Ecological interactions categorization (Ollif et.al., 2009)[2] and for manoeuvre

S.No	Interactions	Effect on resources	Effect on consumers	Possibility of manoeuvres
(i)	Consumer–resource interactions	Fast depletion ; nedds continuous supplementataion	Consumers grow	Adequate feed with feeding schedule
(ii)	Interactions between organisms and abiotic (non-resource) conditions	No impact	Constrained living	Build ideal habitat
(iii)	Spatial interactions (inputs and outputs of energy, nutrients, organisms),	No immediate visible impact	Quality and quantity buildup	Build ideal habitat
(iv)	Non-trophic direct interactions among organisms,	Create suitable condition	The wree e3xist risk of life	Development of designer quality
(v)	Physical and chemical interactions among factors/compartments	Innovative improvement	Comfortable living and feel good effect	Development of designer quality
(vi)	External forcing of abiotic conditions	Eliminate CO_2 and methane accumulation	Supplementation of fresh air	Innovative conditioning
	Grouping of above six interactions			
A	Abiotic Compartment	Such as light, nitrate, ammonium, phosphate	Consumed and depleted by autotrophs	Adopt ideal condition
B	Bbiotic conditions space, soil and water	That affect both auto-trophs and heterotrophs sediment aeration, soil and water pH, temperature) (modified by ecosystem engineers	But are not consumed or depleted by them (such as salinity and , texture,	But that can be modified by eco engineers
C	Detritus (non-living organic material). for terrestrial systems	This interaction-web framework builds on earlier ideas for marine systems. Importance of the 'dual foundation' of food webs on both autotrophs (plants, photosynthetic or chemoautotrophic microbes) and microbial detrivores.	The autotroph- versus detritus-based consumers viewed as two alternative channels that provide energy to higher trophic levels, while being strongly functionally connected at the bottom through the process of energy fixation	Eliminate detritus food chain buildup and remove CO_2 and methane from water surface

Autotroph- versus detritus- food can be viewed as two different routes that provide energy for higher tropic levels, while being strongly functionally connected at the bottom through the process of energy fixation.

Physical and chemical interactions among factors/compartments, fish experience different interactions, which depend on resource and consumer, abiotic environmental conditions, spatial, induced defense and colonization and behavioral characteristics, physical and chemical interaction and external forcing abiotic condition. Depending on such interactions the quality of fish remains highly variable. Fishery scientists have attempted to explore the situation and remain contented with outcomes of quantity and quality. This implicates that environment and interaction will have significant impact on quality characters, which will affects all bio developed species. Vision of designer quality of fish is new scientific insight. This study focused on developing designer quality fish, in consideration of eco-bio factors.

Parameters of designer quality fish

Fish and fishery products contain water, proteins and other nitrogenous compounds, lipids, carbohydrates, minerals and vitamins. However, the chemical composition of fish varies greatly from one species and one individual fish to another depending on age, sex, environment and season. Proteins and lipids are the major components whereas carbohydrates are detected at very limited levels (less than 0.5 percent).[1] These informations guide to build adequacy of feed to eliminate any stress as brought out under S.No 1. Therefore, development of ideal feed for fish will become need of the coming time. There have been lot of commercial ventures on fish feed. It is not aimed to carry out any review on quality and suitability of those feeds available in market, but to set criteria for quality of feed to produce designer quality fish.

Habitat to meet interactions as listed in items under ii, iii, iv in Table 1

Under natural condition water during the rainy season the pollution get washed or diluted, open system enables fish to move to condition where it gets comfort, whatever, resources can get extracted, the fish develop. Therefore, when provision is made with fresh water resource such habitat can be prismatic habitat, which will provide ideal condition for fish to develop. There can be skepticism that fish quality is genetic based, here the interaction facilitation provide ample opportunity for inducing betterment in quality of any breed, age and sex of fish.

Idealised fish tank

All different abiotic and biotic factors that interact in ecosystems were resolved by creating idealized fish tank. The tank contains stepped bottom so that fish have chice to inhabit in different layers of water pool. The tank has intermittent feedin oxidised fresh water. It has drainage to change the fish tankaged water for irrigation. Additionally, it is equipped with a CO_2 eradicating kit patented by the scientist.[6-14]

The fish tank is provided pyramid powered roof that concentrates geodetic energy,[12] which will provide energy to the fish. Thus all eco systems interactions limiting the fish have been overcome and some additional factors also provided.

Designer quality indicating indices

The fish is nutritious widely accepted non vegetarian diet. Its scenic appearance, smell, texture of tissues, taste and nutrition, color and pH may become quality measuring index. These should be developed by innovative fish feed and feeding schedule. Such quality indicators were developed for designer quality rice production technology.[6]

Appearance

The appearance is the first quality of product that any one uses to get apprised of quality of any product. Rice is expressed as long grain, medium and short grain. The thickness is expressed as fine medium or rough *i.e.* the fat grain. People's preference,[7] rest on long grain thin size of rice kernels. Coming to application of this factor on fish, the sizes is also important indicator. The fish is harvested at catch and use its small to large sizes are harnessed and consumed. The situation of water flow, availability and sustainability compel fish get isolated and preyed. Therefore fish is a helpless biological creature under natural environment and by care and resolving such factors qood quality fish can be produced.

Smell and taste

Smell (in scientific term of factor) is the most important and oldest of human kind five senses**.** The human with small olfactory system rely more on sights, hearing and touch. These scientific facts offer enormous clues towards prediction of human behaviors for acceptance of designer quality any commodity. These facts can be wisely utilized in extension methods, in teaching of class rooms, population control measures and many other such aspects. The extension, teaching and many allied areas can be benefited by innovative applications to save efforts, budgets and enhance efficiency of resources use of water, nutrient and water interaction in fishery as well as paddy culture.

The flower scents and cooking smells are universally linked. The stinks of rotten eggs or other putrefying materials get distinctively disliked. These positive and negative responses provide broad scope and make scientific justifications towards developmental approach of designer quality fish to avoid the poisonous substances and acquire good qualities. The poison is any substance that when taken by anyone it impairs health and causes death.[9] Dose 100g/kg(5-8l) for least toxic substances such as water down to .0001mg/kg (0.005-0.008mg (in consideration of 50-80kg human body weight), for most potent subject such as plutonium 239.[15] These facts implicate need for research and development of designer fish. The genetically improved good species will be grown under varying condition of soil, water, nutrient management and environment that will distinctly display the inheritance of good characters. These facts speak of importance of land, water, pollution and allied management measures (Table 1) in fishery. The interactions of water, nutrient and environment have to be convened in fixed beneficial paths, which becomes a justifiable aspect in development of designer quality fish.

Nutritional quality

Nutrition is concerned with the way organisms take in food and turn in to substances that can be used by the bodies. These substances called as nutrients are essential for building and repairing of body tissues and regulating body processes and acts as food to provide body with energy. Nutrition contains protein vitamins and minerals. The developing countries are striving to provide the nutrition for feeding the country's gentry with sufficient nutrition containing food. Developed countries are concentrating on the reduction of radicals that are formed in the processes taking place in the cells. The outcome of these facts is that there is lot of selectivity in foods and nutrition. The following details are included here to update the readers with the existing knowledge about food and nutrition, known facts, so that they can appreciate the following subsequent innovative developments brought out in this study.

Proteins

Proteins are large molecules that are formed by biological polymerization of amino acids derived from the nitrogen content of foods. The occurrence and circulation of the nitrogen cycle, its good and bad effects on productivity and environment supplementation of green house gases (GHGs) were presented by Yadav.[10] Each protein produce has a specific structure and function. Proteins by their actions enable living cells to grow and perform all activities necessary for its survival. There are 20 common amino acids and proteins are constituted by these building blocks. Plants are able to form all the amino acids they need, but animals must obtain some of them from foods. The proteins constitute one or more chains of amino acids, having different characters acquired at the molecular levels of the amino acids, the chains and their sequences get linked together by peptide bond. These scientific facts further equip design considerations.

As per new estimate normal good quality highly digestible protein requirement is 0.75g/kg body weight/day.[11] The level of lysine and tryptophan in cereal prolamin and *methionine* and *cystine* in legume globulins are beneficial to human (especially vegetarians), dependent on these seeds for essential amino acids. All proteins must be broken down in their constituent amino acids to be used by human cells. Normally only amino acids and (certain small peptides) are absorbed in the small intestines via mucosal cells in to hepatitic portal veins. Studies have shown that absorption and utilization of proteins are optimized when adults evenly distribute their protein intake throughout the day.[11]

In plants storage of proteins can be increased by enhancing use efficiency. The enhancement of harvest index is regarded as an economic prospect trait with improvement potential to more efficient use of resources. Rainy season wheat have higher protein content than winter wheat, the nutritional value of the winter wheat protein is superior.[11] The 20 amino acid found in human tissues come from dietary proteins in food (Table 3). Among them nine (phenylalanine, leucine, isolucine, tryptophan, lysine, theonine, methionine, valine and histidine) are essential to human diet, because they cannot be synthesised in body. In addition, two amino acids, cystine and tyrosine in the diet can spare their parent amino acid of methionine and phenylalanine, respectively. The amino acids with the lowest scores in the listed food (lysine in wheat and barley flour, methionine in soybean, potato and cow's milk and tryptophan in rice and maize)21 are those that should be paid attention to limiting amino acids for the body's nutrition.

It is visible from the values that rice content of protein in six of nine sulphur containing amino acid Table 2 is highest for He, Lysin, Met, Total and Val and at par with two other highest viz Phe and Thr. The low content of Tryptophan that gets converted by the lever in to niacin becomes limiting quality of rice, which caused beriberi disease in the early time. This deficiency of niacin is supplemented by vitamin B_6. Although beriberi is not in existence in the recent time, but their severe or mild effect might be persisting among the sole dependents on rice.

Table 2 Essential amino acid composition of foods a,b

Food	Sulphur amino acid								
	He	**Leu**	**Lys**	**Phe**	**Met**	**Total**	**Thr**	**Try**	**Val**
Ideal protein	370	306	270	180	144	270	180	90	270
Barley	240	430	210	310	90	220	230	90	310
Maize	**293**	**827**	**179**	**284**	**117**	**197**	**249**	**38***	**327**
Rice	**322**	**535**	**236**	**307**	**142**	**222**	**241**	**65***	**415**
	(119)	(175)	(87)	(175)	(99)	(83)	(134)	(72)	(154)
Wheat flour	262	442	126	322	78	192	174	69	262

Table 3 Percapita a consubption of protein

	Supply, mg/d	Remark
France	112.7	Highest
USA	110.7	
Italy	106.9	
USSR	106.7	
Spain	101.4	
Poland	101.4	
Japan	95.2	
China	62.9	
India	54.4	
Ethiopia	51.5	
Nigeria	49.8	
Thiland	49.0	
Phillipines	48.5	
Bangaladesh	43.0	Lowest

The figures expressed amino acid contents as mg/g protein, b. Figures in parenthesis express the ratio (percent) of the food to that in the ideal protein.

*The prime limiting amino acid.

There is contrast difference between protein availability/ consumption across the countries (Table 2). Bottom most three countries are rice eaters. In these countries cropping sequences are rice eaters and have poor utilization of atmospheric nitrogen due to existence of predominant wet condition. The top four countries with high protein availability are rice importing or concentrating as best variety cultivating countries. Limitations, alternatives and prospects are different in different countries. Bottom most four countries having rice and fish as main diet, low protein uptake can get enhanced by producing designer quality fish rich in protein.

Beans and rice are incomplete proteins diets, which can be made up in complete protein by adding meat, fish, egg, cheese and milk products. Thus, the rice growing countries incorporate fish, duck as composite farming practice. This fact becomes justification of popular practice of rice-fish-duck and pigeon pea, papaya and banana growing in their backyards in prominent rice eating states of Eastern India, South East Asia and China. Wherever pulse based proteins are not available fish containing high protein become alternative source.

Vitamins

Vitamins are small molecules that human body need for certain important chemical reactions to take place. Deficiency in the different vitamins causes different diseases.

Vitamins are necessary for protective and regulatory functions. On the basis of their solubility they are classified in two groups, *viz* fat soluble and water soluble. Fat soluble vitamins are A, D, E and K. The fat soluble vitamins can be stored in the body, hence occasional intake of high source may help the body tide over the period of low in take. The requirement of fat soluble vitamins may be met by intake of precursor or the vitamin itself. Not much of fat soluble vitamins are lost in normal cooking procedures.

Vitamins are lost from food during processing, storage and preparation for consumption. Certain vitamins such as thiamine and ascorbic acids are more sensitive to the processing condition than riboflavin. However, riboflavin may be lost exposure to light so, packaging becomes important in determining storage ability. Ascorbic acid is one of the most unstable vitamins. It is oxidized by metal ions such as Fe (III) and Cu (II) in a two sequential one to one electron transfer yield dehydro scorbic acid. Vitamin E also undergoes oxidative degradation.via a free radical pathway, which accounts for its high efficiency as a chain breaking antioxidant. This implicates that for eating rice; especially ladies whose intake of vitamin is more than men during pregnancy and lactation should not eat meal in steel utensils and replace it by the non-metal ceramic plates.

The human body has many natural protective mechanisms to contain oxidative damages, (1). Antioxidant nutrient such as beta-carotene, vitamin C and vitamin E, (2) other small molecules with antioxidant properties. e.g. gluthionine and euric acid., (3) enzyme such as superoxide dismutase and glutathionine peroxidise.

Antioxidant vitamin supplement such as vitamin A, C, D, E are taken in USA for their neutralising effect on free radicals. Foods rich in vitamin E and beta carotene help prevent cancer.

Vitamin A

Vitamin A is necessary for normal growth and developments. Vitamin A deficiency may result in damages of eyes; ulceration and destruction of cornea, then blindness. Lycopene is reported to enhance carotene uptake. The subjects who consumed diets rich in carotenoids developed fewer lung cancers, whether or not they smoked.

Leafy vegetables such as spinach, amaranth, coriander, drumsticks leaves, as well as ripe fruits such as mango, papaya and yellow pumpkins are good source of beta carotene. Generally deep dark vegetables contain more beta carotene than white or light vegetable such as cabbage and lettuce. Large intake of vitamin A in time of plenty are stored in lever and help body tide over period of shortage.

Vitamin E

Vitamin E has antioxidant property and is believed to prevent oxidation of vitamin A and carotene in the digestive tract and to regulate rate of oxidation of food inside the body. Vitamin E is widely distributed in food. The richest ssource of vitamin E (i.e. Tocopherol) are the vegetable oils. Green leafy vegetables are also good source. Vitamin E deficiency symptoms include low birth weight and premature infants.

Vitamin C

Ascorbic acid functions as reducing agent and as effective antioxidant. Nearly 60mg daily will maintain body pool of men and women. Vitamin C requirement are higher for pregnant and lactating women to account for losses to the foetus and to breast milk. Occasional bleeding from soft tissues can be checked by including ascorbic acid rich foods in diet. As brought out earlier, food should not be kept in steel utensils for long so to avoid loss of vitamin C. Juice rich in vitamin C should be taken in glass vessels.

Vitamin B complex

Vitamin B1 (Thiamine)

The thiamine found in rice is necessary for catalyzing the oxidation of carbohydrates in the body. This reaction releases energy in the system. Thiamine helps in the normal functioning of heart and nervous systems. Beriberi, the thiamine deficiency disease is basically neurological condition that sometimes involves the cardiac muscles and paralysis of involuntary muscles. Thiamine absorption occurs in two separate processes. At low concentration (5mg/day) thiamine is actively absorbed, but at higher concentration (8-15mg/day), its absorption becomes passive. Thiamine is transported as a free Vitamin in circulation. Formal elements of blood contain predominantly, thiamine pyrophosphates (TPP) a co enzyme. Plant sources include pulses, nuts, oil seeds and whole grain cereals. Parboiled rice and fresh peas are good source of thiamine. Leafy green vegetables are good source of thiamine. Some symptoms of thiamine deficiency observed are mental depression, moodiness, irritability, forgetfulness, confusion and fear. Severe deficiency of thiamine leads to *beri beri* a disease of nervous systems.

Vitamin B_2 (*Riboflavin*)

Vitamin B_2 deficiency is characterized by variety of clinical signs and symptoms specific to mucous membrane and skins, which in many cases duplicate symptoms seen in deficiency of other B complex vitamins. These details of plants induced vitamin[21] support scientific facts for development of designer rice. Lack of riboflavin affects the eyes, skins and nerves. The eye lids become rough and the eye become sensitive to bright light. This condition is called photophobia. The skin changes are found around the area of mouth, on the lips, tongue and nose. Lips become inflated, cracks are observed in the corners, of mouth and tongue becomes sore, sometimes tongue gets swollen. The deficiency systems can be corrected by administering riboflavin.

Vitamn B_3 Niacin

Niacin is protein which synthesizes muscles and bones, which form framework for body framework. Niacin deficiency defects become non repairable, hence adequacy is important aspect in designer quality new life of any species. Therefore, niacin will become an important outlook from fish. Cereal based amino acid viz tryptophan low in rice and maize can get boosted in fish with necessary inputs so that biomagnifications will add fish rich in B_3.The protein synthesizing ability of fish will enable produce selective animal food supplement for pregnant ladies' carefully selected diet. Such skeletal defects become example of vitamin B3 deficiency. Combination of allopathic and biological measure become highly effective for overcoming B_3 deficiency.

Vitamin B_6 (*Pyridoxine*)

Vitamin B_6 deficiency includes eczema and seborheic dermatosis in the ears, nose, and mouth, cheilosis, glossotis and angular stomatis and hypochromic and microcytic anaemia. Central nervous system changes such as irritability and depressions.

Vitamin B_{12} (Cynocobalamine)

Macrocytic, megaloblastic anaemia and neurological symptoms characterise vitamin B_{12} deficiency. Alterations in hematpoisis occur due to high requirement for vitamin B_{12} for normal DNA replication necessary to sustain the rapid turnover of the erythrocytes. Neurological systems are due to demyelisation of spinal cord and are potentially irreversible.

Minerals

Unlike organic contents, minerals are not synthesized in body therefore these are to be supplemented from external source. The amount needed is small. - micro grams or milligram a day, required for regulatory system in the body for efficient energy metabolism. The other functions are cognition, immune system and reproduction. At times their deficiency takes the proportion of diseases (iron deficiency, cause anemia, iodine efficiency causes goitre). Phosphorus and calcium occur mostly in bones and teeth. But sulphur in aminoacid is present in all living cells.

About 4-6% of human body weight is made of mineral element. The mineral Ca and magnesium are included in nutritional planning. Other major minerals present in the body are P, K, S, Na, Cl, and Mg. Other found in traces are Mn. Cu, I, Co, Zn, and Fl. The body functions regulated by the minerals are maintenance of acid /base, water balance, contraction of muscles and normal response of nerves to physiological stimulation and clotting of blood. The mineral and vitamin deficiency affect the greater number of people in the world than the protein mal nutrition.

Mineral content of some grains

Wheat brawn contains highest percentage of Ca, P, K, Na and Mg than those in flour[10]. Phsphorus in bran and germinated wheat contain high concentration of nutritionally micronutrients viz. Na, Mn, Cu, Ca, Fe, and Se than other milled streams, except that cobalt is distributed in all wheat products. Maximum iron content in wheat (42ppm) was in Philippine, Ca (900 ppm) in Great Britain, and Zinc (17ppm) and magnesium (Mg) (590ppm) in Nigeria[11]. Pearl millet is comparable to wheat in zinc and iron contents. Phosphorus content in millet is almost twice that of wheat. Millet high in phosphorus content may be an important factor in determining the total nutritional value of this grain. The presence of phosphorus as phytin reduces absorption of trace minerals in the gastrointestinal tract. Phytin phosphorus in millet has been reported to constitute from 33-90% of total phosphorus in cereal grain. In the four varieties of analysed content there was significant variability in the content of Ca, Mg, Zn, Fe, K and P, but Na content was relatively stable. These details are necessary in considering building nutrition in designer fish. It is also becoming clear that designer quality fish can be developed for fulfilling different geographical regions of the world by giving innovative fish feed.

Module for designer quality fish

Since fish are an alive entity, they become a parallel ecosystem[2] in the aquatic ecosystem. The two abiotic factor viz ii, and iii are to be resolved by constructing tanks which eliminate the limitations. System of the food web can be resolved by building ample supplementation of innovative food. The chemical and good digestive action should be accomplished by innovative feed supplementation. The problem of disaster of prey of large fish can be overcome by introducing fingerlings of uniform size. External energy need to be supplemented

by providing pyramid powered roof top shelter[12,13] on the fish rearing tanks. Water in tanks should be supplemented by introducing oxygen supplemented water. Proteins and lipids are the major components whereas carbohydrates are detected at very limited levels (less than 0.5 percent).[1] Accumulation of CO_2 and methane can be eradicated by process patented by Yadav (2010).[14] Thus, all limiting factors enumerated vide Table 1 will get fully resolved and fish from idealized rearing should become designer quality.

Acquisition of data on designer fish

The information on protein and vitamins equip knowledge required for development of designer quality fish. How this can be accomplished is becoming clear that make ideal quality fish rearing tank to eliminate all ecosystem constrains. The remaining constraint struggling of fish for food will get overcome by developing innovative feed and adequate feeding. For development of designer fish both ecological factors abiotic and biotic factors resolved by building fishery tank and innovative food. These innovations will enable fishery scientists conduct advanced studies on designer quality fish and produce data on different aspects.

Results

Idealistic fish tank resolving eco-bio factors

The idealized tank is a new innovative design with provision of oxygen, eradication of CO_2 and methane and frequent drainage tor using fish habited enriched with nutrients water for irrigation. Since new idealized tank is new setup it needs to develop all fish tanks with such provision to produce designer quality fish production.

Design considerations for development of feed

It is now sufficiently established that fish are consumed for supplementing proteins and lipids. Therefore, supplementation of food for building proteins of high quality through fish feed will the first item of priority. The major portion of feed has to be derived from commodity viz soya protein chunks. Soy beans are first in category of providing estrogen. Here, earlier researches on agronomy, which is again a parallel bio system, had established that one fourth of this proportion has to be in form of bio green organic protein. In order to meet its stomach need some quantity of carbohydrate of good quality should be supplemented for which rice based supplement would be idea.

In order to eliminate bad smell a small quantity of addition of herbs such as mint is also supplemented. In order to eliminate severe acidity in stomach of fish a small pinch of calcium and to bring strength in tissues by absorption of tryptophan in maize and rice and bone supporting frame work of fish may be sufficient. This supplementation of calcium will enhance uptake of tryptophan low in maize and rice (Table 3-5). This tryptophan will enable build thiamin (B1), necessary for building energy and maintaining nervous system. These ingredients and levels are fixed on fulfilling need of bio systems and also build vitamin B3 (niacin) necessary for tissues and bones for supporting growth. Its impact on development of quality of different species will be different, for which quality indicators are fixed to be evaluated for the products. Inconsideration of aforesaid factors constituents of the feed supplement being developed are drawn in the in the following table.

Table 4 Prevalence of vitamin A deficiency in WHO regions

WHO regions	Children 0-5 years with xerophthalmia (1991)	
	Number, million	Prevalence, %
Africa	1.3	1.4
Eastern mediteranean	1.0	2.8
Latin America	0.1	0.2
S.E.Asia (including India)	10.0*	4.2
W Pacific (Including China)	1.4	1.3
Total	13.8	2.8
*Severe problem		

Table 5 Factors considerations in constituting innovative feed for designer fish

S.No	Content	Devloing feature	General content in fish, %	Designer quality To develop	Remark
1	Nitrogen	Protein	52	Protein	
2	Fats insoluble in water	Lipid	0.09	Lipids	
3	Carbohydrate	C	.5		To Develop THE Maximum extent possible*
4	Tissues	Vit B1 and B3		Wieght	
5	Smell			Peoples progressive opinion	
6	Ditritus products			Minimum	

*The knowledge supplemented in sub section 2.5 will enable any alternate likin to reulate such nutrient conten in the designer quality fish.

Fish is known cleaner of fish aquarium, meaning thereby it will leave least quantity of detritus organic material, which will get decomposed to cause degradation in water quality.

Contents of innovative fish feed

The fish feed commodities are fixed on the basis of protein content per kg. Protein content of soya beans being maximum content providing, was taken as the main constituent. Other ingredients are supplemented as per minimum requirement of biological functions.

Consumption of innovative protein feed for designer quality fish is Rs 13/kg. This feed is to be provided for almost four months ie 120 days. Various considerations are made in Table 7.

The values of quantities shown as sample in Table 6 depict precise values. It gives confidence for management of fish with designer quality innovative feed. Many refinements will come to notice after working on different operations.

Table 6 Constituents and quantity of innovative feed for fish

S.No	Ingradients	Nutrient content, %	Ingradient, g	Ingradient , Kg	Cost, Rs/kg	Compnent cost Rs for 100kg
	Protein	**52**	**100**	**100**		**5000**
1	Through chunk	39	75	75	50	3750
	Through organic sources	13	372	372		
2	Organic N containing seculent green leef	3.5	372	375	5	186
3	Lipid, Mustrd oil kg	1	1	1	175	175
4	Carbohydrate	.5	50	.5	20	10
5	Triptophan	.5	50	.5	37	19
6	Bad smell rmoval	trace	0.05	.05	50	50
7	Fastering digestibility Ca	Trace	0.025	.275	20	20
8	Composite feed		549	452	-	4190
9	Grinding					100
10	Pilleting	flour	100	552	30	300
11	Overall wt			550		
12	Cost of labour					2300
	Overall cost					6890
CostRs/kg	6890/550=12.52 say Rs 13/kg					13

Table 7 Assessment of protein conversion efficiency with 550 fish fingerlings

S.No	Feed consumption, days	Rate/fish, g	Conversion efficiency, g	Progressive accumulation of protein, g
1	1	100	.2	5
2	30x550	16500	.45	145
3	60x550	33000	.5	3000
4	90x550	49500	.55	4950
5	120x550	66000	.70	8400
	Accumulated values, kg			
	Total accumulation	66		8.4
6	Cost of feed , Rs13/kg	858		
7	Price of fish=8400 200x8.4, Rs			1680
8	B:C ratio			1.95:1

Quality characters

Fish quality is classified as variable which can be measured in m, l and t system dimensions (Table 8,9). The other group of factors, which as such cannot be measured and assessment of these attributes are fixed by emerging collective opinion of groups, which assigne scores. These variables and attributes are well accepted practice [6,8] The innovative quality characters and the units of measurements set in development of designer quality fish will be highly useful in evaluating quality of fish.[17] These indicators will be usable in fixing geographical indication registry (GIr), which benefits producers and consumers in getting price and genuine produce.

Table 8 Classes of quality characters of designer rice

S.N,	Variable	Units	S.N.	Attribute	Assigned Score
1	High harvest index	mm	1	Appearanc	100
2	Protein content	Range	2	Fragrance	100
3		Range	3	I No bad smel	100
4	High Protein	percent	4	Good taste	100
5	A,D EK	Range			
6	B1-B12				
	*Delphi Method[7].				

Table 9 Treatments details for perspective study for biological sciences

Replications	Levels of water pH								
	T1	T2	T3	T4	T5	T6	T7	T8	T9
R1	3	5	4	6	7	8	9.	1	2
R2	6	0	5	1	2	3	8	4	7
R3	4	6	9	7	5	2	1	3	8
R4	7	1	2	5	9	6	4	8	3

RBD placements

Upscaling of designer quality fish production

Having established the designer quality growing fish tank which resolved all ecosystem factors, providing innovative high protein containing fish feed and indices for evaluation of quality characters, next aspect is its up scaling so that plentiful fish can be produced.

The fish chambers should contain all essential features of ideal fish tank (Figure 1-3). Such groups of tanks are displayed vide Figure 4. No and size of such facilities should be extended depending on availability of space, budget, need established scope of marketing. These factors will be getting strong after one or two years of successful launch of the venture.

The idealistic tanks sould be constructed in series in N-S diagonal diection (Figure 3). The designer feed may be hangerd in centre of individual fish tank. Different species fed with innovative feed quality will produce different groqth patterens, fish tissues, smells and assemblage as well as quantity of production. Thus this experimental study will produce lessons of immense values on fish production.

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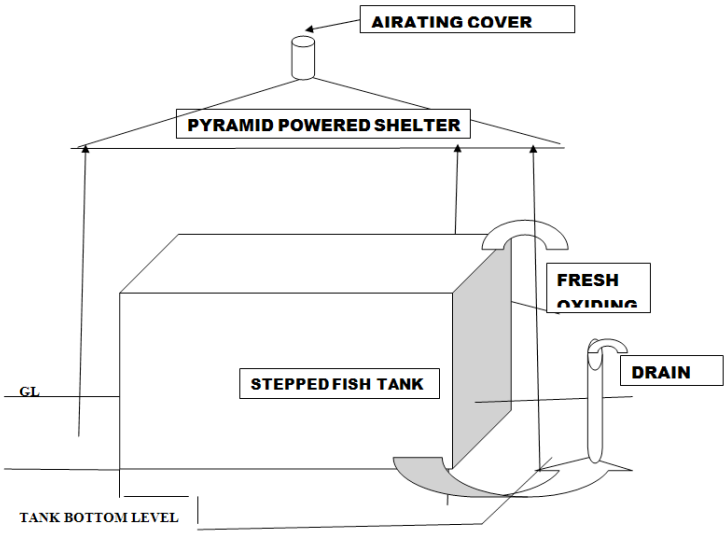

Figure 1 Idealized fish tank for resolving all eco abiotic factors.

Figure 2 Depiction of clean and odor free environment brought by fish and placed revealing clean and decent environment.

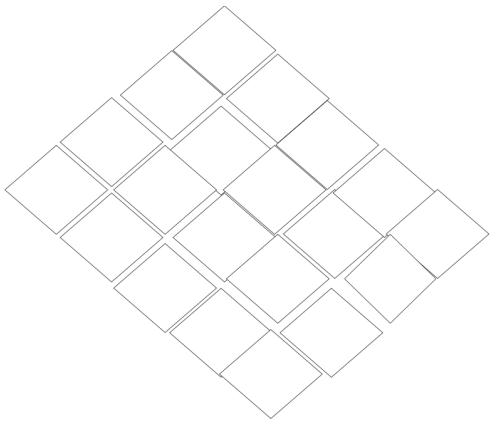

Figure 3 All fish tanks orienting in N-S diagonal axis will enhance geodetic energy boosting energy level in fish in the ideal tanks.

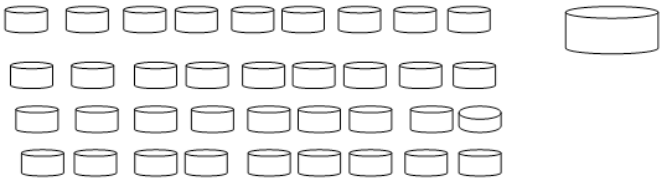

Figure 4 Layout of fish tanks in experimental studies on bio factors.

Setup for perspective research on evaluating impact of environment on development of ffish gentry

This experiment on effect of acidity on survival and growth with the designer quality feed will provide valuable information on bio sciences. In the process randomization of treatments are competed for pH. If mechanism of inducement ovulation and sperm release of fixed quantity is released in each chamber, development of their gentry performance will show impact of water pH quality on biology enabling making many choices in designer quality fish production parameters.

Thus, this study did set the path and further researcher will be able to conduct studies and build data bank on the designer fishery.

Discussion

This study concentrated on development of designer quality fish production technology. Fish is the most promising biological species which is considered as least dispensable water user. Therefore, it is attracting worlds' attention for its expanded production and consumptions. The fish contains large percentage of proteins transformed from nitrogen and least percentage of carbohydrate. Thus, it forms a special food non vegetarian diet. The fish, in general is easily prayed and remain attempting extract water oxygen and its activity makes it highly hungry. Thus, if such constrains are removed the quality of fish will improve with increase in quantity as well.

This study produced an improved design of fish rearing tank, equipped with oxygen supplementing, replacing the use of water for irrigation. The CO_2 emitted and accumulated surface ir eradicated by installing a floating CO_2 eradicating device.[14] The nature inspired orientation of fish tank was kept in N-S orientation and shelter is provided by runoff top pyramid power providing geodetic energy concentration which is a proven ancient art in to a science.

An innovative fish feed was designed and different component[16,17,18] facilitating digestion, removal of bad smell highly rich in nitrogen content was developed and its efficacy enhanced. Economic evaluation confirmed it to be producing benefit cost ratio of over 1.9. Experimental set up is developed for assessing impact of water quality index pH, leading to plentiful bio solutions making a remarkable advancement in biological sciences.[17] Thus, this study on designer quality fish production technology overcomes all ecological limitations and makes innovative fish feed to accomplish a profitable venture. It is already proven fact that fish of delicate quality and plentiful quantity colonies in N E corner of fish tanks.[17,19] This information will support as a guiding factor in fixing price of the designer quality fish.

Conclusion

Fish is bio species in aquatic eco system constrained by ecological factors, usually starved for oxygen and feed supply. In the endeavor to develop designer quality fish and production technology, ecological constraining factors were resolved by developing ideal fish tank and development of innovative fish feed. Designer quality evaluation indices were established. Innovative fish feeding for four month (120 days) reared in the idealistic fish tank showed, on the basis of one quintal of protein rich soya feed based nutritionally supplemented feed and one fourth of it supplemented by seculent high N containing organic nitrogen containing bio materials including green shell of peas after removing grain peas and all vitamin and N containing material produce benefit:cost ratio of 1.95:1. The study included up scaling of extendable group of fishery tanks. This study did set the innovative path that will inspire fishery scientist and research scholars conduct their own experiment and establish the specific information of interest. Thus, the study created new designer quality fish product and production fishery technology.

Conflicts of interest

The author declares that there are no conflicts of interest.

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