Reading Material

Advances in Livestock Husbandry approaches for popularizing Agricultural Technology

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CONTENT

ROLE OF LIVESTOCK & POULTRY IN INDIAN AGRICULTURE

- As a primary source of draft animal, power, production of milk, wool, egg & meat:

India is a predominantly Agrian country with more than 70% of its population living in villages, 80% of which depending on agriculture and its allied activities for their livelihood. The average land holding size of cultivators is 1.68 ha. and 75% of them have it below 2.0 ha. Hence for majority of farmers, land is the limiting source in improving their family income and employment through crop production alone

- The economic importance of cattle in India is based upon their production of both milk and work. In India, most of the cultivated land is in small and fragmented holdings of less than 2 hectres. The cultivator depends largely on bullock labour for tillage, irrigation and carting. Recently, mechanization of agriculture has attracted the attention of many farmers, because of its quicker and more efficient output, yet due to number of limitations, Indian farming especially in the case of a common farmer, is largely dependent on bullock power.
- Their importance for India increases for the reason that a majority of people in the country are vegetarian, and milk and milk products constitute the only source of animal protein in their diet.
- Thus assumes paramount importance for efficient bullock for cultivation and cows for milk production.
- Cow dung important source of manure for soil fertility and superior to chemical fertilizers.
- Carcasses is an important source of national wealth as India is an important supplier of hides skins to the international market.
- Horns, hoofs and bones used in industries.
- Bone meal used as mineral supplements in animal feed & also as fertilizer.

GOAT

- Poor man's cow: provides milk, meat, wool, hides, manure,& sacrificial purposes at ceremonies.
- Adapts readily to almost any climate.
- Eats a class of fodder over which other animals would starve.
- Rearing an occupation among landless labourers in rural areas.
- Principal meat producing animal in India, as its meat preferred over other animals.
- Skins are exported and earn foreign exchange.
- Mohair wool from Angora & pashmina from kashmiri goats superior dress fabrics.
- Intestines of goats are used to make cat-gut.

PIG

- Pig raising is in a primitive state
- Rural families maintains on domestic waste
- Can be reared economically on low cost building & equipments
- Requires minimum labours & quick return over investment
- Efficient converters of feeds into edible
- Fits well with mixed farming
- Has an important role to serve as an effective instrument of social change in majority weaker section of rural community
- Considering high demand of animal protein, it is evident, improvement of pig production has greater promises

POULTRY AND ITS BENEFITS

- It has influenced man's civilization in many ways. Egg & meat are being consumed since prehistoric times. Poultry industry in India has transformed itself under impact of modernization. It is today one of the commercially viable Agro-based industry in the country.
- Source of high quality human food (egg & meat).
- Highly adoptable under various conditions.
- Can be adopted by under-employed persons, working in offices, schools & other business establishments.
- Provides employment avenues to unemployed persons.

- There are many diversified types of business allied to poultry farming like: egg production, broiler production, chick production, production of hatching eggs, feed manufacture, equipment manufacture etc.
- Poultry waste is an excellent source of organic manure
- Eggs have many industrial uses- in preparation of vaccines, varnishes, adhesive, soap, shampoos etc.
- Egg shells are used as minerals in animal feed

Endocrine glands used for preparation of hormones

NATIONAL POLICY IN DAIRY DEVELOPMENT

- Key Village Scheme (KVS): Initiated during first five year plan(1951) to deal with the problem of cattle improvement from all aspects (AI, Fodder &feed, Health care & marketing).
- Intensive Cattle Development Project (ICDP): it is an extension of KVS & milk plant (4rth plan)
- All India co-ordinated Project for Cattle Dev.: for a rapid increase in milk prodn., an aggressive cross-breeding programme was undertaken in 5th plan (NDRI- Karnal, Bangalore, Mumbai, Kalyani)

DAIRY DEVELOPMENT IN ASSAM

- Milk Village- initiated by Dairy Dev. Dept.
- Aim- distribution of crossbred milch cows through Bank Loan to ST/SC/EB farmers
- Operation Flood (OF)- intensive milk prod. Initiated by National Dairy Development Board (NDDB) & Indian Dairy Corporation(IDC)
- West Assam Milk Producers Cooperative union Ltd. Was established in 1980 at Guwahati (OF-ii)
- Cattle Feed Plant at Changchari – eg. Purabi dana
- Liquid Milk Plant at Panjabari. Eg: Purabi milk, cream, ghee, casein, flavoured milk.
- Aim: production, procurement, processing & marketing

Role of National Dairy development Board (NDDB): 1970-1995

- NDDB established at Anand in 1966 by founder chairman Dr. V. Kurien
- Kaira District Co-operative Milk Producer's Union Ltd. In 1948, later known as Anand Milk Union Ltd.(AMUL)
- Operation Flood (OF) project (WFP-aided)- launched by NDDB-1970(i-phase), 1981(ii-phase), 1985(iii-phase)

Major objectives of Operation Flood

- To replicate the "Anand Pattern" milk co-operatives in the rural milk sheds and link them with the urban milk markets to ensure progressive elimination of middleman and increase net – returns to rural milk producers
- White Revolution being advanced by Operation Flood

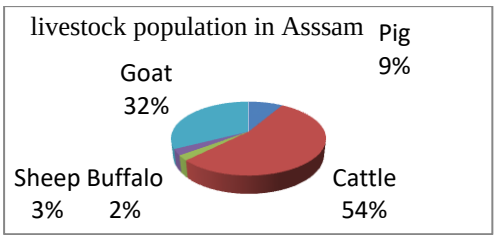
Livestock Population

Salient features of 19th Livestock census.

Particulars	India in 2012(in million numbers)	Assam in 2012(in million numbers)
Cattle	199.90 (1st position)	10.30
Buffaloes	108.70	0.43
Sheep	65.10	0.51
Goat	135.20 (2nd position)	6.16
Pig	10.30	1.63
Total Livestock population	512.10	19.08
Poultry	729.20	27.21

We can express in diagram- The total livestock population in Assam is 19.08 million

Pig	8.57
Cattle	54.02



Buffalo	2.28
Sheep	2. 71
Goat	32.33

Sl.no	India	Assam
1. Milk	Largest producer of milk in world (1st position accounting for 18.5% of world) and total milk production 140 million tonnes in 2012.	Total milk production is 873.00 million litres in 2012
2. Egg	Total egg production by the end of 2011-12 is 70 million numbers(3rd position)	Total egg production by the in 2012 is 473 million numbers
3. Meat	Total meat production(5th position) in 2012-13 is 59 lakh tonnes	Total meat production by the in 2012 is 42.54 thousand tonnes
4. Wool	Total wool production in 2012-13 is 46 million kgs	-

Per capita availability of milk, egg, poultry meat in 2013-14

Commudity	India	Assam
Milk	307gm/head/day in 2013-14	69gm/head/day in 2013-14
Egg	51/head/year	17/head/year
Poultry	1.76kg/head/year	980gm/head/year
Meat	8kg/head/day	

N.B.- p.c.a of milk 294 gm/head/day during 2013 in world

ICMR recommendation

1. Milk – 208 gm/head/day
2. Egg -180/head/year
3. Meat – 10.8kg/head/year

RECENT TECHNOLOGIES IN INCREASING LIVESTOCK PRODUCTION

Introduction

The increased world population is demanding more reliable quality livestock products. In recent time the number of farms is decreasing but the number of animals per farm and animal production are increasing. In addition to this trend problems associated with livestock production has also increasing. The solution of these problems comes from multidisciplinary studies from very different fields such as technology. In large enterprises (Livestock production) it is not possible to obtain the expected performance without using technology and automation systems. Data monitoring in the modern dairy farm enables the ongoing control of production, animal health, and welfare. However, as the number of animals increases, error burden and work load increase. Successful livestock farmers will be capable of rapidly adapting their infrastructures to exploit changes in technology for better production. Mechanism and automation systems offer options in front of the user in intense competition for convenience. Currently, most data is extracted manually, yet manual observation is gradually being replaced by many milking systems by automated recording (milk yield,

milk conductivity, activity recording and body weight measurements) leading to better data, both in quantity and quality. The number of farms automation systems has increased rapidly since 1980.

Current Technology Application

The benefits of new technology are plentiful and include increased cost efficiency, improved animal welfare, improved working conditions, better production monitoring (e.g. remote monitoring, access to real-time data) and improved provision of important production data. The new technology means producers can work easier and improve livestock welfare, production efficiency, and profitability. Technologic developments provide more efficient, profitable and fast solutions for farmers to get on time process using management and direct manipulation possibilities. Continuous monitoring of disease and its careful management is essential for the well-being of an animal .This can be achieved through the detection of early stages and, subsequently, the detection and treatment of the infection. Automation today is super-sophisticated technology and software as well as complicated machinery. A number of computer-assisted image analysis applications are being developed for more convenient animal husbandry. The latest computer programs can identify and classify sounds of animal for specific situations. Many research concluded that these applications could be used to monitor the welfare of animals and provide early identification of disease, physiologic status, and abnormality. The main technology that livestock farmer's requirements met is electronic records, milking, heat detection walk-over-weighing, auto-drafting, genetic improvement, feeding, barn environment optimization, and health recording etc. Some sensors are currently available for this purpose, but they do not fulfill all demands. Also, with advances in proteomics and genomics, new biomarkers are being discovered, allowing the disease to be detected at earlier stages. This will lead to assays with higher sensitivity, which can provide additional quantitative information on the level of inflammation 'on-site' and 'on-line' and which is also faster and less expensive.

Breeding and Genetics:

In dairy farms with very high genetic value of breeding animals cannot get the expected performance without the use of latest technology. Dairy cattle herd management programs if can be used as effectively, dairy farming will have many advantages for consumer, farmer and also animals. Genetic information and type evaluation of herd members and bulls are particularly suitable for expanded electronic updating. However, to obtain these advantages from this system required to have knowledge of the functions and effective use of the functions. Breeds in animal husbandry have changed a lot with the use of breeding and gene technology. Till 1980s livestock products demands have been met by breed substitution, cross-breeding, and within-breed selection. But this demand in future is to be met using new techniques such as artificial insemination and more specific selection techniques.

Use of Computers:

New technology in computers, biotechnology and scientific discoveries regarding ruminant nutrition and genetics provide the basis for accelerated progress in milk production for those dairy farmers that adopt these technologies. 10 years ago most dairy farmers focused their attention solely on animal husbandry practices. The use of computers for farm management in dairy sector started in as early in 1990s in many developing countries. As personal computer was developed and the price has dramatically declined, more and more farmers began to use computers by themselves in the last decade. But generally, computers have been used by producers with larger farms. Small-scale farmers bypassed the technology because of its cost and their lack of knowledge about computer use in farming. Many computer programs were described, by which data on data in dairy herds may be processed. The some computer software is designed for timely and direct convenience to farmers. Thus, the breeder can evaluate lots of data on monthly basis using many formulas with high accuracy

using software's. It can also be programmed for annual report for detail herd evaluation. In addition to all these, daily milk yields, feed consumption, pregnancy check, inseminated cow list can be programmed for daily work routine. In recent years there is a form of high interest to cattle breeding and this is leading to the establishment of intensive farms.

Electronic Identification System:

The Electronic identification system is started 1970s. However, current laws deal with the visual, readable markings that are placed on the animal. There are numerous animal ID technologies available to livestock producers. Radio frequency identification (RFID) will likely be used to identify cattle. These devices have an electronic number that will be unique for an individual animal and link that animal to the database. Electronic ear tags, injectable transponders and boluses with a transponder place in the reticulum of animal are the latest technology for animal identification technology.

Milking Automation:

Milking automation system is also involving the dairy sector at 1990s. An automatic milking system requires a completely different management system for milking, feeding, cow traffic, cow behavior and grazing, but also for safeguarding milk quality and animal health. Electronic devices or sensors are the tools that need to take over the human visual inspection for abnormality. The milking robots equipped with sensors to detect signs of mastitis which measures many characters of abnormal milk pH, Somatic cell count, milk acidity, milk conductivity etc.

Feeding Automation:

Computer programmer designed many software for make best option to farmer for ration preparation. Optimal feeding programs can be done for advanced options such as live weight, recording, lactation period and animal feed stock information. These programs use data from the National Research Council in animal feed and feed content. Various systems for automated animal feeding will be used in many big dairy farms to get better production. They will comprise complete systems include each stage of feeding, feed preparation, mixing equipment and the installations for distributing feed. Feed components such as grass and maize/corn silage as well as mineral feed and feed concentrate will be loaded, mixed and delivered to the feed table built up there by the systems. The Automation systems as simple consists of a control panel, a programmable command manager, a scale, a communication interface and finally all the needed equipment to organize the feeding process and feed provision to the animal of each age groups. Computer-controlled calf feeders have many advantages over traditional calf feeding methods.

Health Coverage:

The big hazard for animal production is to disease outbreak. An animal disease has serious economic implications on farm productivity. The right time detects disease three to 5 days' sooner, reduce treatment costs, reduce mortality rates and improve production efficiency. The production, product quality, product composition, body condition, and behavior provide a good indication for the health status of animals. By closely monitoring normal pattern changes, the farmers ensure animal health status. Many firms provided programs developed and provided by data collection and analysis products for monitoring animal behavior for the best early detection system. To monitor the health conditions of each animal the sensors are mounted on the animal.

Reproductive Performance:

Estrus detection technology; is the key point for successful running of a dairy farm. Average calving interval in cattle farm is the best criteria for comparisons for reproductive performances of the farms which is varying between 13 and 18 months. Improper heat detection in a farm leads to severe

economic loss to the farmer. By using recent technologies of proper heat detection, actual time of insemination, early pregnancy detection increases farmer's income and provides them a successful farming environment. Although costs associated with computerized estrous detection are higher than other methods, the benefits may pay off with increased estrous detection accuracy.

GOAT REARING AS A SMALL-SCALE ENTERPRISE

Goat farming has become a profitable business idea. It requires a very low investment due to its multi-functional utility. But, it is very necessary to make a proper goat plan before starting this business.

Why Goat Farming:

- Goat products are healthy & easily digestible:
- Easy maintenance & less capital:
- Don't require a huge area:
- Good breeders:
- Less risk:
- Equal price in market:
- Good adaptability & less prone to diseases:
- Natural fertilizer:

Things to know to start your own farm.

- Right Location:
- Land Requirement:
- Goat Breed:
- Veterinarian:
- Proper Food & Housing:
- Proper Planning:
- Good Transportation:
- Care & Management:
- Vaccination
- Total Expenditure & Profit:

Some difficulties in goat farming.

Lack of sufficient knowledge about goat farming ,not using modern farming methods in goat rearing business.

Beginners without any practical goat rearing training face high mortality rate in goats due to some fatal goat diseases like PPR, pneumonia, diarrhea, tetanus etc. As they lose money during first time, they don't want to start rearing goats again.

Not choosing the right breed for production due to lack of knowledge. As a result, they can't produce their desired production and lose their interest in goat farming. Choosing right breed can increase the production of a farm greatly. Non-availability of all vaccines (especially PPR) and veterinary doctor throughout the country.

Lack of capital. Most of the people don't have the ability to buy sufficient number. (50-100) of goats for starting the business. A farm of 50-100 goats can certainly generate a handsome income.

Absence of specially-designed vehicles which are very useful for transporting live goats from one place to another.

Although, there are some risk in every business, taking proper care and good management can ensure better production and high profit. Goat farming can be concluded as a traditional, profitable, risk-less and very easy business because of its multi-utility and fast growing rate. They can also be used as a tool for poverty reduction and play a crucial role in the economic growth of a country

COMMUNITY BASED APPROACH FOR LIVESTOCK DEVELOPMENT

A community-based approach insists that people targeted for humanitarian assistance have "the right to participate in making decisions that affect their lives" as well as "a right to information and transparency" from those responsible for providing assistance.

Farmer Interest Group (FIG) is a self managed, independent group of farmers with a shared goal and interest. The members work together to achieve this goal by pooling their existing resources, gaining better access to other resources and to share in the resulting benefits

Benefits of Farmers Interest Group

Access to technical and market information

• Improved buying and selling power
• Likely to maintain useful and relevant activities
• High motivation for sustainability
• Builds social cohesion

Objectives of the group

- To address production and marketing issues
- To develop 'self-help' approaches
- To provide pooled resources
- To allow members to exploit an economy of scale
- To provide a forum for training and information sharing
- To provide a focal point for technical and training activities

Activities of a group

- Engage in information sharing (including networking with other groups)
- Organise bulk selling and purchasing
- Develop market networks and make market assessments
- Support individual members on a needs basis
- Manage a 'revolving' fund for group activities

Commodity Interest Group

A Commodity Interest Group is a self managed, independent group of farmers based on specific commodity with a shared goal and interest.

- CIGs should be promoted / mobilized for all major commodities (Size 20-25 farmers).
- CIG members should meet at least once in a month to discuss activities and future course of action.
- Block Technology Team (BTT) and Block Farmer's Advisory Committee (BFAC) shall monitor functioning of all CIGs on a regular basis,
- CIGs at village level should be federated at block level and subsequently at district level.

- CIGs should maintain proper register & records (commodity / proceedings / savings / accounts)

Farmers Producer Organisation

- A Producer Organisation (PO) is a legal entity formed by primary producers, viz. farmers, milk producers, fishermen, weavers, rural artisans, craftsmen.
- A PO can be a producer company, a cooperative society or any other legal form which provides for sharing of profits/benefits among the members.
- In some forms like producer companies, institutions of primary producers can also become member of PO.

Can there be a PO for non-farmers?

- ✓ The PO is an organization of the primary producers.
- ✓ If the produce in question is a nonfarm item (for example, handloom or handicraft), then the PO will be that of non-farmers.
- ✓ The objective of the PO is to ensure better income realization to its members (who are producers) through aggregation and, if feasible, value addition.

What are the essential features of a PO?

a. It is formed by a group of producers for either farm or non-farm activities.
b. It is a registered body and a legal entity.
c. Producers are shareholders in the organization.
d. It deals with business activities related to the primary produce/product.
e. It works for the benefit of the member producers.
f. A part of the profit is shared amongst the producers.
g. Rest of the surplus is added to its owned funds for business expansion.

Who owns the PO?

- The ownership of the PO is with its members.
- It is an organization of the producers, by the producers and for the producers.
- One or more institutions and/or individuals may have promoted the PO by way of assisting in mobilization, registration, business planning and operations.
- However, ownership control is always with members and management is through the representatives of the members.
- Any individual or institution can promote a PO. Individual persons or institutions may promote PO using their own resources out of goodwill or with the noble objective of socioeconomic development of producers.
- If, however, the facilitating agency wishes to seek financial and other support, then they have to meet the requirements of the donor/financing agency.

Weather impact on livestock and poultry and preparation of weather-based advisories

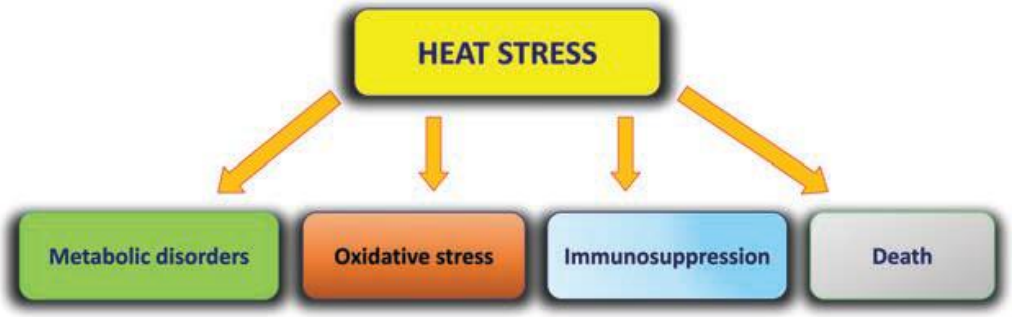
Introduction

Climate is one of many factors with the potential to alter disease states and is expected to exert an overwhelming negative effect on the health of humans and animals. In addition, several studies suggested that the increase of temperature might reduce mortality and/or improve health and welfare related aspects in humans and livestock living in geographic areas with cold winters.

The effect of climate change on animal health may be either direct or indirect (Figure 1) and may be due primarily to changes in environmental conditions, which include air temperature, relative humidity, precipitation, and frequency and magnitude of extreme events (i.e., heat waves, severe droughts, extreme precipitation events, and coastal floods). Although this article focuses on the effects of environmental factors, it should be noted that factors leading to the effects of climate change on health are extremely complex, involving not only environmental forces, but also ecological and social aspects, economical interests, and individual and community behaviors .

The direct effects of climate change on health may be due primarily to increased temperatures and frequency and intensity of heat waves .These effects are mediated by induction of heat stress conditions. Depending on its intensity and duration, heat stress may negatively affect livestock health by causing metabolic alterations, oxidative stress, immune suppression, and death (Figure 2).

Figure 2.

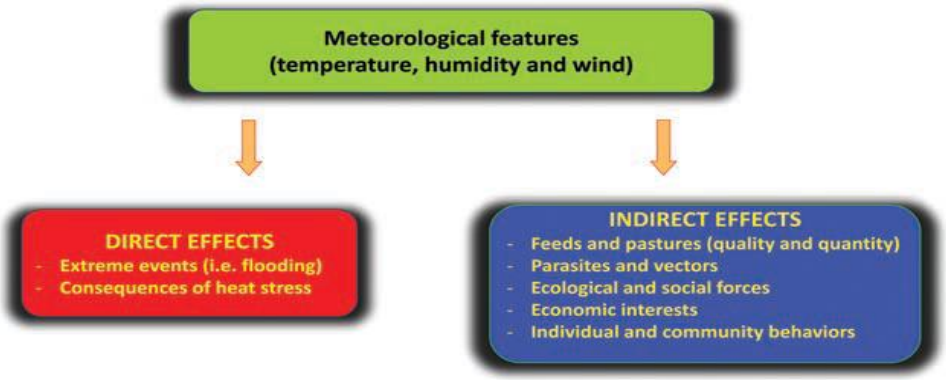


Schematic representation of the most frequent consequences of heat stress on animal health.

Metabolic Disorders

Homeothermic animals respond to high temperatures by increasing heat loss and reducing heat production in their attempt to avoid increased body temperature (hyperthermia). Such responses include an increase in respiratory and sweating rates and a decrease in feed intake. These physiological events may provide a significant contribution to explain the occurrence of metabolic disorders in heat-stressed animals (Figure 3).

Figure 3.



Schematic representation of some mechanisms through which heat stress may cause metabolic disorders in farm animals.

Heat stress can contribute to the occurrence of lameness in dairy and beef cows . Lameness in cattle may be defined as any foot abnormality that causes an animal to change the way that it walks. Lameness can be caused by a range of foot and leg conditions, themselves caused by disease, management, or environmental factors and is one of the most significant health, welfare, and productivity issues. The contribution of heat stress to lameness is perhaps due to ruminal acidosis or increased output of bicarbonate . Heat-stressed cattle eat less frequently during cooler times of the day, but they eat more at each feeding. Reduced feed intake during the hotter part of the day, followed by increased feeding when the ambient temperature cools down, can cause acidosis which is considered a major cause of laminitis . As ambient temperatures rise, the respiratory rate increases with panting progressing to open-mouth breathing. A consequence is respiratory alkalosis resulting from a rapid loss of carbon dioxide. Cattle compensate by increasing urinary output of bicarbonate. Rumen

buffering is affected by a decreased salivary bicarbonate pool. Lameness, with sole ulcers and white line disease, will appear in a few weeks to a few months after heat stress.

Oxidative Stress

In farm animals, oxidative stress may be involved in several pathological conditions, including conditions that are relevant for animal production and the general welfare of individuals .Oxidative stress results from an imbalance between oxidant and antioxidant molecules and may depend on the excess of oxidant and/or lack of antioxidant substances (Figure 4). In the last 10 to 15 yr, the involvement of heat stress in inducing oxidative stress in farm animals has received increasing interest .The total antioxidant status concentrations in serum of heifers were lower in the summer than in the winter in peri- and postpartum periods. In mid-lactating cows, plasma values of reactive oxygen metabolite substances were increased during summer. Total carotenes and vitamin E were decreased during summer. Increased oxidant and decreased antioxidant molecules in blood during the hot summer season have been reported both in dairy and buffalo cows. Finally, heat stress has been associated with an increase of antioxidant enzyme activities (e.g., superoxide dismutase, catalase, and glutathione peroxidase), which has been interpreted as an adaptation response to increased levels of reactive oxygen species.

Immune Suppression

The immune system has evolved as a complex of mechanisms to protect the host from invasion by pathogenic organisms. A number of factors may affect the proper functioning of the immune system. Several studies reported that heat stress may impair the function of the immune system in food-producing animals. Effects of heat stress on immune function are not always straightforward and may depend on the species, breed, genotype, age, social status, acclimation level, and intensity and duration of the exposure to the unfavorable conditions.

Immune suppression facilitates the occurrence of infections, which impairs reproductive efficiency, overall production efficiency, and may compromise animal welfare and increase the use of antimicrobials. Increased use of antimicrobials may lead to development of antimicrobial resistance in microorganisms.

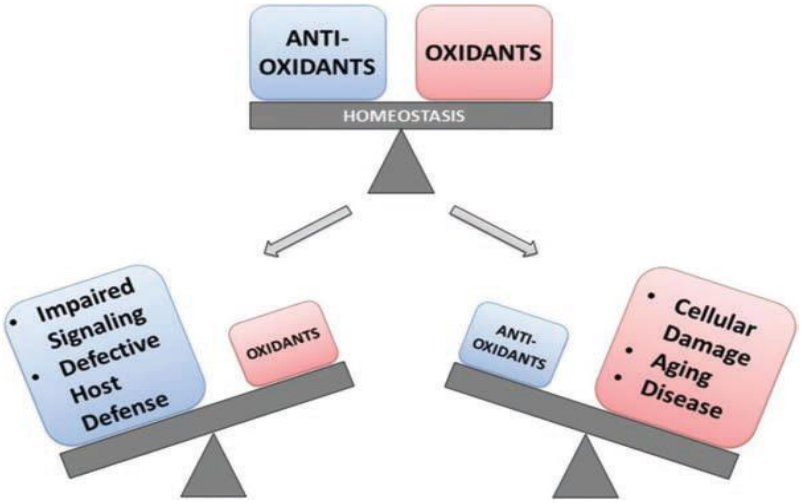


Figure 4.

Balance between oxidants and antioxidants molecules in animal health and disease.

Death

A series of studies have described a greater risk of mortality during the hottest months and an increased death rate during extreme weather events. High temperatures may cause heat stroke, heat exhaustion, heat syncope, heat cramps, and ultimately organ dysfunction. These heat-induced complications occur when the body temperature rises 3 to 4 °C above normal.

In an Indian study, reported an increase of mortality in Mecheri sheep during summer season. Another series of studies on the effects of temperatures on mortality in farm animals described an

increase of deaths during extreme weather events. The impact on livestock from a weeklong heat wave in the mid-central United States during July 1995. A heat wave is generally defined as a prolonged period of excessively hot weather. It was also reported that during the severe and prolonged heat waves which occurred in Europe during summer 2003, over 35,000 people and thousands of pigs, poultry, and rabbits died in the French regions of Brittany and Pays-de-la-Loire (http://lists.envirolink.org/pipermail/ar-news/Week-of-Mon-20030804/004707.html). Ssummer mortality in dairy cows was greater during days in a heat wave compared with days not in a heat wave. Furthermore, the risk of mortality continued to be higher during the three days after the end of the heat wave. Mortality also increased with the length of the heat wave. Considering deaths stratified by age, cows up to 28 mo old were not affected by heat waves, whereas all the other age categories of cows (29 to 60, 61 to 96, and >96 mo) showed a greater mortality when exposed to a heat wave. The risk of death during a heat wave was higher in the early summer months. In particular, the highest risk of mortality was observed during a heat wave in June.

The temperature–humidity index combines temperature and humidity into a single value and is widely considered a useful tool to predict the effects of the environment on farm animals.

An epidemiological study with dairy cows indicated that 80 and 70 are the daily maximum and minimum temperature–humidity index values, respectively, above which heat-induced death rate increases. In addition, the same study indicated that 87 and 77 are the daily upper critical maximum and minimum temperature–humidity index, respectively, above which the risk of heat-induced death becomes maximum.

A recent study with swine in Italy reported the effects of month, length of the journey, and temperature–humidity index on mortality of heavy slaughter pigs (approximately 160 kg live weight) during transport and lairage . The aggregated data of the summer vs. nonsummer months showed a greater risk of pigs dying during the hot season when considering both transport and lairage. The month with the greatest frequency of deaths was July, whereas the lower mortality risk ratios were recorded for January and March. The mortality risk ratio during transport increased significantly for journeys longer than 2 h. Finally, 78.5 and 73.6 temperature–humidity index were the thresholds above which the mortality rate increased significantly during transport and at lairage, respectively. In a long-term study on scenarios of temperature-related mortality in Europe, change in the seasonality of mortality, with maximum monthly incidence progressively shifting from winter to summer from 1950 to 2100.

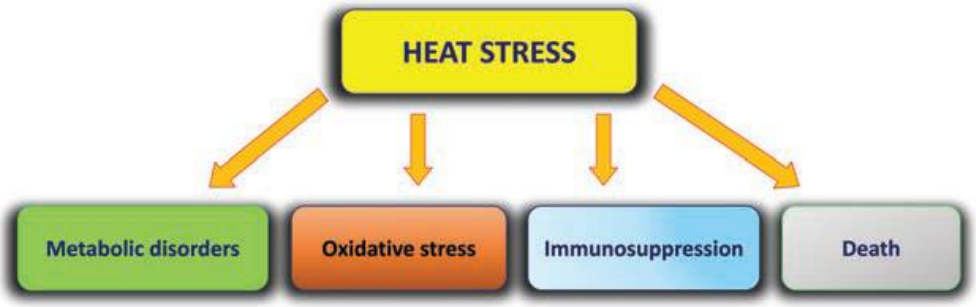
Indirect Effects

As already described earlier, weather and climate change are likely to affect the biology and distribution of vector-borne infections. For example, temperature changes, global wind and precipitation patterns, and changes in relative humidity in temperate climates will affect positively the reproduction of insects and, consequently, their population density. Thus, some tropical diseases, especially those transmitted by insects, may probably move from their natural basin of endemic to other countries.

Simulating an increase of temperature values by 2 °C, a model tested by Wittmann et al. (2001) indicated the possibility of an extensive spread of *Culicoides imicola*, which represents the major vector of the bluetongue virus. This virus is responsible for an infectious arthropod-borne disease primarily of domestic and wild ruminants. Infection with bluetongue virus is common in a broad band across the world. Since 1990, this virus has spread considerably due to changing climatic and environmental conditions necessary to support the *Culicoides* vectors.

Another mechanism through which climate change may alter livestock and human health is represented by the favorable effects that high temperatures and moisture may exert on growth of mycotoxin-producing fungi. Growth of these fungi and the associated toxin production are closely related to the temperature and degree of moisture, which are dependent on weather conditions at harvest and techniques for drying and storage of grains. Mycotoxins can cause acute disease episodes when animals consume critical quantities of contaminated feeds. These mycotoxins may have a negative effect on specific tissues and organs such as liver, kidney, oral and gastric mucosa, brain, or reproductive tract. Most frequently, however, concentrations of mycotoxin in feeds are below those that can cause acute disease. At low concentrations, mycotoxins may reduce the growth rate of young animals. Some mycotoxins may interfere with the native mechanisms of disease resistance and may impair immunologic responsiveness, making the animals more susceptible to infection.

Finally, other examples of how climate change may affect animal health are provided from parasitic diseases. In this context, gastrointestinal nematodes are important parasites of livestock, causing mortality and morbidity. Because a significant part of the life cycle of these parasites is completed outside of the host, their survival and development are susceptible to climate change. In this regard, a recent simulation study predicted that future climatic data for a temperate region will have an opposite effect on annual infection pressure (increase or decrease) depending on the species of parasites.



PREPARATION OF BUSINESS PLAN

- The business plan is a written document prepared by the entrepreneur that describes all the relevant internal and external elements and strategies for starting a new venture.
- It is a integration of functional plans such as marketing, finance, manufacturing, sales and human resources.

Purpose of a Business Plan

- Alignment of team(s)
- Operating plan
- Communication across company, division, department, business partners
- Investment capital
- Expansion capital (banks, leases)
- Merger/acquisition process

Outline of a Business Plan

Introductory Page

- Name and address of business
- Name(s) and address(es) of principal(s)
- Nature of business
- Statement of financing needed
- Statement of confidentially of report

Executive Summary

Three to four pages summarizing the complete business plan

- What is the business concept or model?
- How is this business concept or model unique?
- Who are the individuals starting this business?
- How will they make money and how much?

Environmental and Industry Analysis

- Future outlook and trends
- Analysis of competitors
- Market segmentation
- Industry and market forecasts

Description of Venture

- Product(s)

- Service(s)
- Size of business
- Office equipment and personnel

Production Plan

- Manufacturing process (amount subcontracted)
- Physical plant
- Machinery and equipment
- Names of suppliers of raw materials

Operational Plan

- Description of company's operations
- Flow of orders for goods and/or services
- Technology utilization

Marketing Plan

- Pricing
- Distribution
- Promotion
- Product forecasts
- Controls

Organizational Plan

- Form of ownership
- Identification of partners or principal shareholders
- Authority of principals
- Management-team background
- Roles and responsibilities of members of organization

Assessment of Risk

- Evaluate weakness of business
- New technologies
- Contingency Plans

Financial Plan

- Pro forma income statement
- Cash flow projections
- Pro forma balance sheet
- Break-even analysis
- Sources and applications of funds

Appraisal of business plan:

- **Economic viability:**
  Impact on production, employment, revenue, living standard, national income, etc, is evaluated.
- **Ecological viability:**
  Effect on the environment - ground water and air pollution – is examined**.**
- **Technical viability:**
  Factors related to infrastructure, technology, availability of machine, equipment, and raw materials, skilled manpower are need to be evaluated.
- **Marketing viability:**
  Market potential, demand forecast, position of competitors, distribution channels, etc are examined.
- **Managerial viability:**
  The background of the business project developer, qualification, experience and potential of key management personnel are examined.
- **Financial viability:**
  Financial position of business enterprise is examined for sound implementation of the project. The surplus generation capacity of the project is assessed for timely repayment of credits, meeting the project cost in the pre-defined time line, sources of various type of finance. Projected income statement, balance sheets and various financial ratios are also critically examined.

SUCCESS STORY WRITING TECHNIQUES

Success Story

Success story is a simple description of a program's Progress, Achievements and Lessons learned. Success stories can be as short as a few paragraphs or as long as 10 pages.

The 4 "Knows" of Success Stories

1. Know what information you want to tell
2. Know your audience
3. Know to tailor your message to your audience
4. Know your story

Tips for writing success story

- Find out achiever (s)
- Know about success broadly
- Set your purpose of writing the story :
  - Why to write
  - For whom to write
  - What for to write
- Decide where to publish or use
- Gather information with researcher's spirit
- Decide on headings and sub-headings
- Now-Before – After is a popular sequence to follow in writing
- Follow journalistic writing principles and practices

Writing success story on Extension/Development Programme

- Describes positive changes brought by the programme and shows how that change benefits the people
- The story may be about an entire program or part of a program

What goes into such a success story?

Situation

- Tell what started the program
- What problem, issue or concern needed addressing?

Response: we have taken into consideration of the followings

Inputs: staff, funding, volunteers, research, expertise
Outputs: activities like teaching, facilitation and products and material outputs
People reached: number of people and demographics
Partnerships and funding sources
Extension's contribution

Results

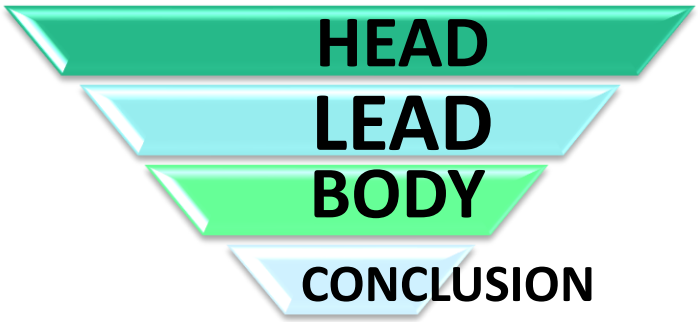
- Use quantitative and qualitative data
- Describe outcomes in terms of both value or meaning
- Who benefited and how?
- What resulted?

Evidence

- What's the evidence?
- Briefly describe how you evaluated the program to attain the reported evidence.
- Include the data collection methods

- Create an emotional hook whether success story or feature article
- Good stories/article cuts through cutters and connects to people's heart opening their mind to writer's point of view

COMPONENTS OF SUCCESS STORY



Lead

- The lead is the beginning, the most important structural element of a story
- It is ideally 20-25 words in length
- must be accurate, short and crisp
- should reflect the mood of the story

Body

- Mere description of the fact with figures and photographs
- Generally consist not less than 2/3rd of the success story
- must be descriptive, elaborate and informative
- should reflect the reality with data , figures and photographs

Conclusion

- Last part of the story
- Describe outcomes in terms of both value or meaning
- Must reflect the relevancy of the story in other's situation
- Should motivate for implications with necessary suggestions

Success story formatting features:

- Times New Roman, 12 point
- Single space within paragraphs, double space between paragraphs
- Left justify headers and text
- Bold headers
- 1.5-inch margins
- Short paragraphs and active tense
- Names, not like "this agent"
- Avoid bullets, special fonts or features since they may not transfer to the

DUCKERY & POULTRY AS A SMALL SCALE ENTERPRISE

Poultry sector in India is valued at about Rs. 80,000 crore (2015-16) broadly divided into two sub-sectors – one with a highly organized commercial sector with about 80% of the total market share (say, Rs. 64,000 crore) and the other being unorganized with about 20% of the total market share of Rs. 16,000 crore. The unorganized sector also referred to as backyard poultry plays a key role in

supplementary income generation and family nutrition to the poorest of the poor. It is estimated that with a poultry population of 729 million [30% layers at around 215 million and 40% broilers at around 480 million] small and medium farmers are mostly engaged in contract farming system under larger integrators and there are around 30 million farmers engaged in backyard poultry as per 19th Livestock Census. The needs of organized and unorganized sectors are very different. Discussions with various stakeholders reveal that poultry sector- especially commercial poultry sector- is flourishing in certain pockets, where amenable environment exists, alongwith backward and forward linkages while the unorganized sector is very dispersed and micro-fragmented.

The egg production in the country has increased from around 83 billion nos. in 2015-16 to around 88 billion in 2016-17 registering a growth of about 6%. The per capita availability of egg has increased from 61 in 2013-14 to 66 in 2015-16. In 2016-17 it is 69.

Distribution of Poultry population
Duck 0.68%
Broiler 38.7%
Layer 29.4%
Backyard Poultry 29.8%
Others 1.43%
Around 214 Million Layers are present
Share of layer Population: Improved Fowl 72%, Desi Fowl 28%

Contribution to egg production: from common farms 79%, from backyard farm 21%

Top 5 States in terms of poultry population:

S.No	. State	Poultry Population (in million)
1.	Andhra Pradesh	161.33
2.	Tamil Nadu	117.35
3.	Maharashtra	77.79
4.	Karnataka	53.44
5.	West Bengal	52.84
6.	All others	266.45
	Total	729.21

Family poultry is defined as small-scale poultry keeping by households using family labour and, wherever possible, locally available feed resources. The poultry may range freely in the household compound and find much of their own food, getting supplementary amounts from the householder. Family poultry is rarely the sole means of livelihood for the family but is one of a number of integrated and complementary farming activities contributing to the overall well-being of the household. Poultry provide a major income-generating activity from the sale of birds and eggs. Occasional consumption provides a valuable source of protein in the diet. Poultry also play an important socio-cultural role in many societies. Poultry keeping uses family labour, and women (who often own as well as look after the family flock) are major beneficiaries. Women often have an important role in the development of family poultry production as extension workers and in vaccination programmes.

Income generation is the primary goal of family poultry keeping. Eggs can provide a regular, albeit small, income while the sale of live birds provides a more flexible source of cash as required.

PRODUCTION SYSTEMS
Family poultry are kept under a wide range of conditions, which can be classified into one of four broad production systems (Bessei, 1987):

- free-range extensive;
- backyard extensive;
- semi-intensive; and
- Intensive.

Free-Range Extensive Systems

Under free-range conditions, the birds are not confined and can scavenge for food over a wide area. Rudimentary shelters may be provided, and these may or may not be used. The birds may roost outside, usually in trees, and nest in the bush. The flock contains birds of different species and varying ages.

Backyard Extensive Systems

Poultry are housed at night but allowed free-range during the day. They are usually fed a handful of grain in the morning and evening to supplement scavenging.

Semi-Intensive Systems

These are a combination of the extensive and intensive systems where birds are confined to a certain area with access to shelter. They are commonly found in urban and peri-urban as well as rural situations. In the "**run**" system, the birds are confined in an enclosed area outside during the day and housed at night. Feed and water are available in the house to avoid wastage by rain, wind and wild animals.

Intensive Systems

These systems are used by medium to large-scale commercial enterprises, and are also used at the household level. Birds are fully confined either in houses or cages. Capital outlay is higher and the birds are totally dependent on their owners for all their requirements; production however is higher. There are three types of intensive systems:

- **Deep litter system**: birds are fully confined (with floor space allowance of 3 to 4 birds/m^2 within a house, but can move around freely. The floor is covered with a **deep litter** (a 5 to 10 cm deep layer) of grain husks (maize or rice), straw, wood shavings or a similarly absorbent (but non-toxic) material. The fully enclosed system protects the birds from thieves and predators and is suitable for specially selected commercial breeds of egg or meat-producing poultry (layers, breeder flocks and broilers).
- **Slatted floor system**: wire or wooden slatted floors are used instead of deep litter, which allow stocking rates to be increased to five birds/m^2 of floor space. Birds have reduced contact with faeces and are allowed some freedom of movement.
- **Battery cage system**: this is usually used for laying birds, which are kept throughout their productive life in cages. There is a high initial capital investment, and the system is mostly confined to large-scale commercial egg layer operations.

Intensive systems of rearing indigenous chickens commercially is uncommon.Though India has shown a tremendous growth in poultry production over decades but rural poultry farming is still lagging behind and always found neglected. As it is the best alternative for the small scale farmers to subsidise the income with negligible input, this farming system needs an upliftment with recent advancement of research in the field of rearing of chicks, balanced feeding, disease control and efficient marketing system for the egg and meat. Now-a-days, the backyard poultry can easily start with good egg laying birds of RIR (Rhode Island Red), Chabro, Punjab Red and Partapdhan breeds.

Newly developed chicken breeds suitable for Backyard poultry:

Although relatively low poultry prices have resulted from improvements in commercial poultry operation management, raising backyard chickens remains popular. Chickens Breeds suitable for Backyard farming:

- Vanraja
- Giriraja
- Srinidhi
- Kamrupa
- Rainbow rooster etc.

Kadaknath Chicken:

Kadaknath or Kali Masi(fowl with black flesh) is unique breed of chicken that is completely black in colour. Apart from its meat, it's bones and most organs are also black. It's egg are also in black. Its black colour stems from deposition of melanin pigment.

This breed of chicken is popular for its adaptability and flavourful good tasting black meat, which is believed to have medicinal properties.

Nutrition Value:

- **Protein Content:** Kadaknath contains more than 25% of protein than ordinary bird, protein content varies between 18 to 20%
- **Low cholesterol:** Researches have revealed that black meat has very low (0.73 – 1.5%) cholesterol compared to white chicken (13-25%).
- **Medicinal Value:** Kadaknath chicken has unique effectiveness of improving women's discuss, menoxenic (abnormal menstruation), habitual abortion and sterility. It is very suitable for cardiac patients as it increases blood supply to the heart.
- **Essential vitamins:** Along with 18 essential amino acids, kadaknath meat contains B1, B2, B6 & B12.

Advantages of backyard poultry farming

There are many advantages of rural poultry farming system which are given follows:

- Gives employment to the rural small scale and marginal farmers.
- Provides additional income to the rural communities.
- Aids in enhancing the soil fertility in backyards (15 chickens produce 1-1.2 kg of manure/day).
- Products from rural poultry farming fetches high price compared to those from intensive poultry farming. Almost double the rates of brown shelled eggs in the local market.
- Provides egg and meat with almost no or very less investment through backyard poultry farming in free range system.
- Birds reared under free range conditions give eggs and meat of low cholesterol concentration compared to those produced under intensive poultry farming.
- Lessens protein malnutrition in susceptible groups like pregnant women, feeding mothers and children.

Management of backyard poultry birds

Feeding: In backyard poultry farming, the feed cost is considered to be minimum. The birds collect the required protein, energy, minerals and vitamins etc. From snails, termites, leftover grains, crop residues and household wastes. Feed ingredients like broken groundnut straw and wheat grains can also be given to the chicks. The chicks may be supplied with extra concentrate ration@30-60 gm/day/chick for better performance. The chicks need balanced feed during the initial 6 weeks of age under brooder by providing balanced chick feed during the early period of growth. The average body weight of 1.5 to 2.0 kg will be attained up to 5 weeks and if required should be provided with supplemental calcium sources likelime stonepowder, dicalcium phosphate (DCP), stone grit, shell grit at 4 to 5 grams/bird/day.

Floor space: The chick should be provided sufficient feed and floor space. Overcrowding results in stress and mortality chick requires 8 square inches of feeding space. During the 6th week, 1 sq. ft. floor space per chick must be provided to avoid overcrowding.

Ventilation: Supply of fresh air to the chicks is highly essential. Brooding will cause depletion of oxygen and build up of carbon dioxide, ammonia etc., the airtight curtains should be avoided. It is recommended to keep a gap of 3.5 inches between the ceiling and side curtains to facilitate gas exchange between the house and environment. In extreme weather conditions, windows, doors and fans need to be effectively used to maintain optimum ventilation.

Beak trimming: Trimming of beak is an important managemental practice. This is done to prevent cannibalism and wastage of feed. Beak trimming is a sensitive operation and it should be done by trained people. The beak trimming is done at 3rd week and one third of upper beak should be trimmed.

Litter management: Litter management place a vital role in controlling the disease in the flock. When birds are housed on deep litter, placing of waters and their maintenance should receive due attention to keep the litter dry. The litter should be stirred at regular intervals depending on the environmental temperature, humidity, ventilation fecal moisture content, quality of water system.

Health issues: Rural chicks need brooding care during the initial 6 weeks of age. After 6 weeks, they can be let free for scavenging in the backyard. The excess males can be reared separately and marketed for meat purpose. The night shelter should have good ventilation and protection from predators and plenty of clean water should be made available. The birds must be vaccinated against Marek's and Ranikhet diseases. There should be periodic de worming at 3-4 months intervals.

- **Vaccination schedule:** Follow the vaccination schedule given below:

ge of birds	**Name of vaccine**	**Name of disease**	**Doses**	**Route of vaccination**
Day old chicks	HVT MD Vaccine	Marek's disease	0.2 ml	s/c or i/m
4-7 days	F-1/Lasota	Ranikhet disease	One drop	Eye or nostril
14 to 18 days	IBD vaccine	Gumboro disease	-	Drinking water
35 days	F-1/Lasota	Ranikhet disease	One drop	Eye and nostril
6 to 7 weeks	Fowl pox vaccine	Fowl Pox	0.5 ml	Wing stab method
8 to weeks	Mukteshwar R2B	Ranikhet disease	0.5 ml	s/c or i/m

Duck Rearing:

Duck rearing is prevalent among weaker sections of rural population which provides them supplementary and steady income on daily basis besides providing them nutrition duck eggs for family consumption and engaging family labour in their leisure hours to look after Duck unit thus, generates rural employment.

Duck farming has following advantages:-

1. Ducks lay more egg per bird per year than chicken.
2. The size of the duck egg is larger than hen egg by about 15 to 20 gms.
3. Ducks require lesser attention and thrive well in scavenging conditions.
4. Ducks supplements their feed by foraging. They eat fallen grains in paddy fields, insects, snails, earthworms, small fishes and other aquatic materials.
5. From commercial point of view, ducks have a longer profitable life. They lay well even in second year. 6. Ducks do not require any elaborate houses like chicken
7. Ducks are quite hardy, more easily brooded and more resistant to common avian diseases.
8. Marshy river side, wet land and barren moors upon which chicken or no other type of stock will flourish, are excellent quarters for duck farming.
9. Ducks lay 95 – 98% of their eggs in the morning before 9.00 AM. Thus saving lot of time and labour.
10. Ducks are suitable for integrated farming systems such as duck-cum-fish farming, duck farming with rice cultivation. . In duck-cum-fish farming the droppings of ducks serve as feed for the fishes and no other feed or manuring of the pond is necessary for fishes (200-300 ducks per hectare of waste area). Under integrated duck farming with rice cultivation, the ducks perform four essential functions viz., intertillage as they search for food, their bills loosen up the soil around the rice plants-weeding, insect control and manuring.

BREEDS

Among the egg laying breeds, Khaki Campbell is the best producer. Individual egg production of almost an egg a day in this breed for well over twelve months has been recorded and flock averages in excess of 300 eggs per duck per year are not uncommon. Khaki Campbell ducks weigh about 2 to 2.2 Kgs, and drakes 2.2 to 2.4 Kgs. Egg size varies from 65 to 75 gms. White Pekin is the most popular duck in the world known for table purpose. It is fast growing and has low feed consumption

with fine quality of meat. It attains about 2.2 to 2.5 Kgs of body weight in 42 days of age, with a feed conversion ratio of 1:2.3 to 2.7 Kgs.

REARING (15-16 Weeks):

Ducklings may be reared in intensive, semi-intensive or range system. Under intensive system, allow a floor space of 0.279m2 (3 sq.ft.) up to 16 weeks of age. Under semi-intensive system, a floor space of 0.186 to 0.279m2 (21/2 to 3 sq.ft) per bird is allowed in night shelter and 0.929 to 1.394 m2 (10 to 15 sq.ft.) as outside run per bird upto the age of 16 weeks. Usually ducklings are allowed to move to runs at the end of 3 to 4 weeks of age depending upon weather. Water in the drinkers should be 12.5 to 15 cm (5" to 6") deep to allow minimum immersion of their heads. Partitions upto the height of 60-90cm (2 -3") inside the pens and the outside runs are adequate for control. Under range system a flock of 1000 can be reared per 0.405 hectare (one acre).

ADULT STOCK (above 17 weeks of age) :

Under intensive system, a floor space of 0.371 to 0.465* (4 to 5 sq.ft.) per duck is essential, whereas in semi-intensive system, a floor space of 0.279m2 (3 sq.ft.) in the night shelter and 0.929 to 1.394m2 (10 to 15 sq.ft.) as outside run bird would be adequate. For wet mash feeding in a 'V' shaped feeder, allow 10 to 12.5 cm. (4 to 5") feeding space per duck but for dry mash or pellet feeding adlib in hoppers, a feeding space of 5 to 7.5 cm.(2 to 3") per duck would be sufficient. High egg laying strains of ducks come into production at 16 to 18 weeks of age. About 95 to 98% of eggs are laid by 9.00AM. One nest box of size 30x 30 x 45 cms.(12 x12 x18") to every three ducks be provided. In case of laying breeds a mating ratio of 1 drake to 6-7 ducks and in table breeds 1 drake to 4-5 ducks is allowed. Photo period of 14 to 16 hours per day is essentia for optimum production. In free range, 1000 ducks are kept per 0.405 hectare (1 acre) depending upon greens.

HOUSING

Ducks do not require elaborate houses. The house should be well ventilated, dry and rat proof. The roof may be of shed type, gable or half round. It may have solid or wire floors. The wire floors are not popular with breeders. Under semi-intensive system the house should have easy access to outside run as the ducks prefer to be outdoors during the day time and even during winter or rains. Generally the proportion of night shelter to outside run is 1/4:3/4. The run should gently slope away from the houses to provide drainage. Normally a continuous water channel of size 50cm. (20") wide and 15-20cms. (6-8") deep is constructed at the far end, on both sides, parallel to the night shelter, in the rearing or layer house.

WATER:

Though duck is a water fowl and very fond of water, WATER FOR SWIMMING IS NOT ESSENTIAL AT ANY STAGE OF DUCK REARING. However, water in drinkers should be sufficiently deep to allow the immersion of their heads and not themselves. If they cannot do this, their eyes seem to get scaly and crusty and in extreme cases, blindness may follow. In addition, they also like to clean their bills periodically and wash them to clear off the feed. While in meat strains a slight increase in body weight of ducks at seven weeks of age has been noticed (weight advantage of swimming ducks to non-swimming ducks is 0.3%), but for egg laying strains, swimming is a disadvantage

FEEDING

Ducks may be grown on dry mash, a combination of dry and wet mash or pellets. Ducks prefer wet mash due to difficulties in swallowing dry mash. The pellet feeding, though slightly costly, has distinct advantages such as saving in amount of feed, minimum wastages, saving in lobour, convenience and improvement in sanitary conditions. Ducks are good foragers. The use of range, pond or supplementary green feed, reduces the feed cost. DUCKS SHOULD NEVER HAVE ACCESS TO FEED WITHOUT WATER. During the first eight weeks, birds should always have access to feed, but later on they may be fed twice a day i.e. first in the morning and then late afternoon. Khaki Campbell duck consumes about 12.5 Kgs. of feed upto 20 weeks of age. Afterwards the consumption varies from 120 gms and above per bird per day and depending upon the rate of production and availability of greens.

CATCHNING AND HANDLING

While handling ducks, they should be caught by neck and not on the side of the body as this might lead to sudden death

HEALTH COVER

A. **Means of disease spread through**: 1. Wet litter. 2. Feed and water. 3. Close contact. 4. Contaminated equipment. 5. Attendants and visitors. 6. Air. 7. External parasites. 8. Free moving birds. 9. Rodents and flies.

B. **General Principles for Prevention of Diseases.** 1. Procure day old ducklings from disease free flock. 2. Maintain proper hygienic conditions. 3. Provide adequate feed, water and floor space etc. 4. Rodents and wild birds etc should be prevented to enter the houses. 5. Follow regular vaccination schedule. 6. Proper disposal of dead birds. 7. Footbaths should be provided at the entrance of each shed. 8. Reduce stress effect. 9. Ensure clean and adequate water supply. 10. Use of suitable litter material and periodical turning is essential to keep it dry. C. What to be done at the time of an out break 1. Restrict the movement of ducks (selling and buying) 2. Follow strict hygienic measures. 3. Take help of Veterinarians.

Vaccination Schedule for Duck:

Name of the vaccine	Route	Dose	Age of duck
Duck Cholera	Subcutaneous		
	Ducklings	1ml	3-4 weeks
	Adults	2 ml.	After 1 month of last Vaccination
Duck Plague	Subcutaneous		
	Adults	1 ml.	8-12 weeks.

PIGGERY AS A POTENTIAL ENTERPRISE AND ITS SCIENTIFIC REARING

Piggery farming has been recognized as one of the profitable business among the rural farmers. This business has proved to be one of the most important livelihood options. Generally the pigs are reared for pork, considering the increasing trend of pork consumers. Piggery farming will certainly take a industrial for the following-

Advantages of pig rearing

- Pigs convert inedible feeds, forages, certain grain byproducts obtained from mills, meat by products, damaged feeds and garbage into valuable nutritious meat. Most of these feeds are either not edible or not very palatable to human beings
- Pig grows fast and is a prolific breeder, farrowing 10 to 12 piglets at a time.
- The carcass return is quite high i.e. 60-80 percent of live body weight
- With a small investment on building, equipment, proper feeding and sound disease control programme the farmer can profitably utilize his time and labour in this subsidiary occupation
- The faeces of pigs is used as a manure to maintain soil fertility

Pig farming- for whom?

- Small and landless farmers
- Part time earning for educated youth having agriculture as occupation
- Un educated youth
- Farm women

COMMONLY FOUND BREEDS OF PIGS

1. Hampshire
2. Large WhiteYorkshire
3. Large Black
4. Saddle Back
5. Ghungroo

Breeding Management

Age to breed gilts	8 months

Weight of breed gilts	100-120 kg
Length of heat period	2-3 days
Best time to breed in heat period	Gilts – first day, Sows- Second day
Number of services per sow	2 services at an interval of 12-14 hours
Period of oestrous cycle	18-24 days (Average 21 days)
Occurrence of heat after weaning	2-10 days
Gestation period	114 days

Feeding of Pig:
Generally pig has no definite time for feeding. Piglets are habitual nibblers and eats in small quantity throughout the day. However, pigs are fed twice or thrice a day with the following computed feed:

Age	Quantity of feed
1-2 months	0.5 kg / day
2-3 months	1.0 kg / day
3-4 months	1.25 kgs / day
4-5 months	1.5 kgs / day
5-6 months	2.0 kgs / day
Boar and Pregnant Gilt	2.5 kgs / day

Besides above, kitchen waste, waste vegetable, fruit, Chang waste and others not fit for human consumption can also be fed to pigs mixing with computed feed which may curtail 30-40% of feed cost.

BREEDING CYCLE
If sow/gilt does not conceive after first mating, it usually comes in heat in another 18-25 days again, the estrus (heat period) in a sow persists for 40-60 hrs.

SYMPTOMS OF HEAT:

1. Excitement.
2. Swollen and reddening of vulva.
3. Mounting on other pigs.
4. Restlessness and low intake of feed.
5. White discharge from the genetalia.

TIME OF INSEMINATION/ MATING:
A gilt or sow should be inseminated or mated with boar within 13-20 hrs of manifestation of the symptoms of heat. Segregate the gilt or sow from boar immediately after mating.

CARE AND MANAGEMENT OF PREGNANT SOW

1. Gestation period of a sow ranges between 114 to 117 days.
2. After mating if the sow does not come to heat in 21- 42 days, it confirms conception.
3. Pregnant sow should be segregated from others.
4. Sow should be fed with quality green fodder along with balanced diet.
5. Feed should be decreased before 8-10 days of farrowing to reduce abdominal pressure on foetus.

PREPARATION FOR FARROWING PROCESS

1. Segregate sow a week before farrowing.
2. Sow should be provided with bedding of straw, hay and husk.
3. Scalpel, blade, scissors, potash, iodine, suture (thread), gunny bags, towel, cotton, emergency medicines etc.
4. Make environment conducive and peaceful during farrowing.

FARROWING SYMPTOMS:

1. Sow looks anxious and restless before 10-15 hrs of farrowing.
2. Nesting around by dozing on the bedding material with snout.
3. Vulvular swelling and enlargement.
4. Sometimes dripping of milk from teats.

CARE AND MANAGEMENT AFTER FARROWING

1. Farrowing completes within 2 to 6 hrs.
2. Segregate new born piglets immediately after farrowing.
3. After 2-3 hrs of farrowing, sow should be provided with 4-5 kilos of semi-liquid feed.
4. Keep away the piglets from the mother after birth and feed them with mother's milk only when it is required to avoid constant irritation the sow.
5. Remove the placenta completely from sow.
6. Uterine flushing with antibiotic solution in sow should be done for 2-3 days.
7. After flushing the uterus, administer U -bolus or any other suitable antibiotic intrauterine bolus.

CARE AND MANAGEMENT OF GILTS

1. Gilts can attain maturity at the age of 6 months under good care and management.
2. Gilt should be mated at the age of 8 months only.
3. Gilt should be segregated from Boar at the age of 6 months.
4. Early mating or mating before maturity reduces the reproductive capacity of gilts.
5. After weaning the piglets, a sow comes in heat within 3-10 days.
6. The sow which has already given birth once should be fed with 3-4 kg of feed one week before it is mated and 3-4 kg after it is conceived. This way proper feeding will increase the potential of a sow give maximum litter size.

CARE AND MANAGEMENT OF PIGLETS

Removal of needle teeth

Piglets are born with four pairs of sharp teeth, with two pairs on each jaw. They are of no practical value to the piglets and they may irritate the sow's udder during nursing or cause injury to other piglets. Clipping of these teeth shortly after birth will prevent the injury of the udder caused by the needle teeth.

Anaemia in piglets

Anaemia is a common nutritional disease in piglets. This condition can be prevented and cured by supplying iron either orally or by injection.

Castration

The male piglets not selected for breeding may be castrated when they are three to four weeks old.

Separation of piglets from mother (Weaning)

Normal weaning age of piglets is at 8 weeks age. The sow should be separated from the piglets for a few hours each day to prevent stress of weaning and feed is reduced gradually. The piglets should be dewormed after 2 weeks of weaning. The piglets should be gradually shifted from 18 percent protein creep feed to 16 percent grower ration over a period of two weeks. Group of 20 piglets of more or less the same age should be housed in each pen.

Feeding Management of pigs

Points to be considered while formulating feeding ration

- Most economical ingredients should be selected
- Grains- maize, sorghum, oat, other millets, wheat and rice should form the basic ingredients
- Protein supplements - oil cakes and fishmeal and meat meal
- No vitamin supplements are necessary if the pigs are allowed to pasture or are fed fresh green legumes. Vitamin B 12 supplement would be necessary if little or no animal protein is fed
- Antibiotic supplements at the rate of 11 mg of antibiotic per kilogram of ration
- Mineral supplements should be provided

The following table gives specifically the various requirements in the formation of creep, grower and finisher rations for pigs.

Nutrients	Creep feed (Up to weaning)	Grower ration (20-40 kg)	Finisher ration (40-90 kg)
Protein supplement (%) **Oilcakes**	16-18	14-16	13-14
Animal protein	8-10	4	2
Grains (Maize, sorghum, millets or combination of grains) (%)	60-65	50-55	40-50
Wheat bran or rice bran (%)	5	10	20
Lucerne meal (%) if available	--	5-8	--
Mineral mixture(%)	0.5	0.5	0.5
Antibiotic supplement (mg)	40	20	10

The composition of the concentrate feed for various age groups pigs

Ingredients	Creep feed (14th to 56th day	Grower ration (up to 40 kg)	Finisher ration(40-90 k.g)	Pregnant and nursing sows
Maize or sorghum or broken wheat, broken rice and barley in convenient combinations	65	50	50	50
Oil cakes (groundnut oil cake, soya bean oil-cake, sesame oil cake, linseed oilcake	14	18	20	20
Molasses	5	5	5	5
Wheat bran or rice bran	10	1.5	25	18
Fishmeal or meat meal or cooked offal, skim milk powder dairy wastes	5	5	3	5
Mineral mixture	1	1.5	1.5	1.5

All grains in mixed feeds should be ground. Generally feeding in the form of wet mash is not superior than (Slop feeding) dry feeding. Slop feeding requires more time and excessive labour. If a ration is fairly high in fibre, pelleting the feed may increase the rate and efficiency of gain in weight. Pelleting may also decrease the amount of feed that is wasted. It is important not to overfeed sows which have been bred. Over fat sows are apt to produce weak pigs and crush more piglets at farrowing. Sows should gain about 35 kg and gilts about 55 kg from breeding to farrowing.

Housing management of pigs

Adequate housing and equipment for raising pigs are necessary to provide shelter against inclement weather, prevent diseases, control parasites and save labour.
The normal requirement of floor area, water and air space in pens for various classes of pigs is given below

Class of animals	Covered floor area per animal (m^2)	Open-yard area per animal (m^2)	Water required (litres)

Boar	6.25-7.5	8.8-12.0	45.5
Farrowing	7.5-9.0	8.8-12	18-22
Weaner	0.96-1.8	8.8-12	3.5-4
Dry sow	1.8-2.7	1.4-1.8	4.5-5

Creep space

The flooring should have a rough finish and should be be of a regular masonary type made up of water proof cement mortar. Proper drains should be provided so that the effluents are disposed off. Generally under village conditions the housing can be made up of pens measuring 3 m X 2.4 m or 3 m X 3 m with an open yard of nearly the same dimension or in some cases slightly longer. Walls should be 1.2-1.5 m high from the floor. For the purposes of farrowing some of the pens could be converted into farrowing pens by providing guard rails made up of G.I pipes of 5 cm diameter, along the walls, 20-25 cm from the ground and the wall. In addtion to guard rails, creep space can be provided for the piglets along the wall by making a partition or in one of the corners with separate entrances for the piglets. This space usually of 0.75m X 2.4 m area. In many of the farms the yard is provided with regular flooring.

Prolonged exposure of exotic breeds of pigs to bright sunshine may cause pigs to become overheated even during moderate weather. Shade helps in preventing deaths and increasing production efficiency during hot weather. While it is desirable to plant trees in the neighborhood of pens for reducing the intensity of heat. But it is not desirable to plant trees for giving regular shade because they permit rapid buildup of parasite levels.

Farrowing Pen

Wallows

Pigs have very few sweat glands. In areas having warm weather mature breeding animals and fattening animals need a wallow during summer months. Instead of permitting unsanitary wallows a masonry wallow with proper drainage would be desirable. The size of the wallow will depend upon the number and size of the animals.

QUAIL AND TURKEY REARING- ITS POTENTIAL IN NE REGION

The term 'quail farming' means, raising quails commercially (like other poultry birds) for the purpose of profitable eggs and meat production. Quail farming business is very easy, lucrative and entertaining. It's very easy to maintain a quail farm, because quails are among the smallest species of poultry birds. The Japanese scientists first tamed the wild quails and revealed the ways to raise them as domestic birds. Commercial quail farming in Japan has spread tremendously. Now, people throughout the world performing quail farming business commercially for the purpose of meat and egg production.

Advantages of quail farming

- Requires minimum floor space
- Needs low investment
- Quails are comparatively sturdy birds
- Can be marketed at an early age ie. five weeks
- Early sexual maturity - starts laying eggs in about six to seven weeks of age
- High rate of egg laying -280 eggs per year
- Quail meat is tastier than chicken and has less fat content. It promotes body and brain development in children.
- Nutritionally, the quail eggs are on par with that of chicken eggs. Moreover, they contain less cholesterol.
- Quail meat and eggs are a nutritious diet for pregnant and nursing mothers.

Quail Breeds

At present there are 18 species of quails are available, which are very suitable for profitable quail farming business. Some of these breeds are famous for egg production and some are popular for meat production. According to their production, quail breeds are of two types such as broilers and layers.

Layer Quail Breeds

- Tuxedo
- Pharaoh
- British Range
- English White
- Manchurian Golden

Broiler Quail Breeds

- Bobwhite (American)
- White Breasted (Indian)

Housing management of quails

1. **Deep litter system**

- 6 quails can be reared in a sq.ft. of floor space.
- After 2 weeks, Quails can be reared in cages. This will help to gain good body weight, as unnecessary wandering of animals is avoided.

2. **Cage System**

Age	Cage Size	No.of birds
First 2 weeks	3 x 2.5 x 1.5 ft.	100
3- 6 weeks	4 x 2 .5 x 1.5 ft.	50

Quails in cage system of rearing

- Each unit is about 6 feet in length and 1 foot in width, and subdivided into 6 subunits.
- To save space, the cages can be arranged upto 6 tiers high. There can be 4 to 5 cages in a row.
- The bottom of the cage is fixed with removable wooden plates to clean the bird droppings.

- Long narrow feed troughs are placed in front of the cages. Water troughs are placed at the back of the cages.
- Commercial egg layers are usually housed in colonies of 10-12 birds per cage. For breeding purposes, male quails are introduced in the cages in the ratio of 1 to 3 females.

Feeding management of quails

Feed can be formulated as follows.

Feed Ingredients	**Chick mash**	**Grower mash**
	0-3 weeks	**4-6 weeks**
Maize	27	31
Sorghum	15	14
Deoiled RiceBran	8	8
Groundnut Cake	17	17
Sunflower Cake	12.5	12.5
Soya meal	8	-
Fishmeal	10	10
Mineral Mixture	2.5	2.5
Shell grit	-	5

- Feed material should be made of small particles
- A 5 weeks old quail consumes about 500 gms of feed
- Quails of 6 month old, consumes about 30-35 gms of feed per day.
- Quails require about 400 gms feed for the production of 12 eggs.
- Broiler starter mash can be used by adding 5 kg of oil cakes to 75 feed. The particle size is reduced by grinding the feed for one more time.

General management of quails

- At the age of six weeks, female quails usually weigh 175-200 g and the males weigh about 125-150 g
- Female quails start laying eggs at 7 weeks of age and continue utpo 22 weeks of age
- Usually egg laying happens during the evening time of the day
- The quail egg usually weighs about 9-10 g
- The breast of the male quail is usually narrow and covered with equally distributed brown and white feathers. But the female quail has a broad breast covered with brown feathers with black dots.
- The female and male quails should be separated at the age of four weeks
- Sixteen hours of light per day should be available to the egg laying quails

Management of quail chicks

The day old quail chicks usually weigh 8-10 g. Hence, the quail chicks need more temperature. Absence of adequate temperature and exposure to high speed cool wind leads to clustering of young ones, which results in high mortality.

Breeding management of quails

Quail eggs

- Quails start laying their eggs at the age of 7th week. They attain 50% egg production at 8th week of age
- In order to produce fertile eggs, the male quails should be reared along with the females at 8-10 weeks of age
- The male, female ratio is 1:5
- Incubation period in quails is 18 days
- With 500 female quails we can produce 1500 quail chicks per week

Diseases of quails

- When there is deficiency of vitamins and minerals in the female quail breeders, the chicks obtained from their fertile eggs are usually lean with weak legs. To prevent this the breeder females should be provided with optimum minerals and vitamins in their feed
- Generally quails are resistant to infectious diseases than chicken. So there is no vaccination required for quails
- Proper management of quail chicks, disinfecting farm premises, providing clean drinking water to quails and feeding of quality concentrate feed will prevent disease outbreaks in quail farms

TURKEY FARMING

Turkey farming in India can be a great alternative of chicken farming. Commercial turkey farming in India is gaining popularity day by day. Turkeys are suitable for commercial egg, meat production and can be raised as pets. They are very beautiful and help to increase the beauty of your home. For business purpose, turkeys are highly meat productive. But not suitable for commercial egg production. They grow faster and become suitable for slaughter purpose earlier like broiler chickens and pigs.

Weather and other circumstances of India are very suitable for turkey farming. Turkey farming is very easy like chickens. By proper care and management, we can produce more and generate high profit from commercial turkey farming business in India.

Breeds of turkeys in India

1. Broad breasted bronze
2. Broad breasted white
3. Beltsville small white
4. Nandanam Turkey-1

Nandanam Turkey – 1 variety is a cross between the black desi variety and exotic Beltsville small white variety. It is suited for Tamil Nadu climatic conditions

Economic Parameters in Turkey Farming

Male – Female ratio	1:5
Average egg weight	65 gms
Average day old young one weight	50 gms
Age at sexual maturity	30 weeks
Average egg number	80 -100
Incubation Period	28 days
Average body weight at 20 weeks	4.5 – 5 (Female), 7-8 (Male)
Egg production period	24 weeks
Marketable age Male Female	 14 -15 weeks 17 – 18 weeks
Marketable weight Male Female	 7.5 kg 5.5 kg
Food efficiency	2.7 -2.8
Average feed consumption upto marketable age Male Female	 24 -26 kg 17 – 19 kg

Mortality during brooding period	3-4%

Turkey rearing systems

Turkeys can be reared under free range or intensive system.

A. Free range system of rearing:

Advantages:

- It reduces the feed cost by fifty percent.
- Low investment.
- Cost benefit ratio is high.

In the free range system, in one acre of fenced land we can rear 200-250 adult turkeys. Shelter should be provided during night at the rate of 3-4 sq.ft. per bird. They should be protected from predators during scavenging. Planting of trees is desirable for providing shade and cooler environment. The range should be rotated which will help to reduce incidence of parasite infestation.

Free range feeding

Since turkeys are very good scavengers, it can consume earthworms, small insects, snails, kitchen waste and termites, which are rich in protein and that will reduce the feed cost by fifty percent. Apart from this leguminous fodder likes Lucerne.To avoid leg weakness and lameness in free ranging birds, calcium should be supplemented at the rate of 250gm per week per bird in the form of oyster shell. Ten percent of feed can be substituted with vegetable waste to reduce the cost of feed.

Health cover

Turkeys in the free range system are highly susceptible for internal (round worms) and external parasites (fowl mite). Hence once in a month deworming and dipping is essential to improve the growth of the birds.

B. Intensive system of rearing

Advantages

- Improved production efficiency.
- Better management and disease control.

Housing

- Housing protects turkeys form sun, rain, wind, predators and provides comfort.
- In hotter parts of the country the long axis of the house should run from East to West.
- The distance between two houses should be at least 20 meters and the young stock house should be at least 50 to 100 meters away from the adult house.
- The width of the open house should not exceed 9 meters.
- The height of the house may vary from 2.6 to 3.3 meters from the floor to roof.
- An overhang of one meter should be provided to avoid the rainwater splash.
- The floor of the houses should be cheap, durable and safe preferably concrete with moisture proof.

When turkeys are reared under deep litter system, the general managemental conditions are similar to that of chicken but care should be taken to provide adequate floor, waterer and feeder space to accommodate the large bird.

Care to be taken while rearing Turkeys

The temperament of turkeys is usually nervous; hence they get panicky at all stages. Hence entry of visitors in to the turkey's house should be restricted.

Debeaking

Young ones should be debeaked to control feather picking and cannibalism. Debeaking can be done at day old or 3-5 weeks of age. Remove the beak at about one half the distance from nostril to the tip of the beak.

Desnooding

Removal of the snood or dewbill (the fleshy protuberance near the base of the beak) is to prevent the head injuries from picking and fighting. At the day old the snood can be removed by finger pressure. At 3 weeks of age it can be cut off close to the head with sharp scissors.

Detoeing or toe clipping

Clipping is done at day old by removing the tip of the toe just to the inside of the outer most toe pad including the entire toenail.

Feeding management of turkeys

Feeding healthy and nutritious food ensures proper growth and maximize production. So, it is very important to feed the turkey well balanced and nutritious food. Generally, the turkeys need about 3.25 kg of feed to gain 1 kg of body weight. We can easily feed your turkeys poultry/chicken feeds that are available in the market. But we have to add some extra amount of protein with the poultry feed. Along with providing well balanced and nutritious feed, always try to serve them sufficient amount of fresh and clean water according to their demand.

The methods of feeding are mash feeding and pellet feeding.

- The energy, protein, vitamin and mineral requirements for turkeys are high when compared to chicken.
- Since the energy and protein requirements for the both sexes vary they must be reared separately for better results.
- Feed should be given in feeders and not on the ground.
- Whenever change is made from one diet to another it should be carried out gradually.
- Turkeys require a constant and clean water supply at all times.
- Provide more number of waterers during summer.
- Feed turkeys during the cooler parts of the day during summer.
- Provide shell grit at the rate of 30-40 gm per day per bird to avoid the leg weakness.

Green feeding

In intensive system, greens can be fed upto 50% of the total diet on dry mash basis. Fresh Lucerne is first class green feed for turkeys of all ages.

Body weight and feed consumption

Age in weeks	Average Body Weight (Kg)		Total feed consumption (Kg)		Cumulative feed efficiency	
	Male	Female	Male	Female	Male	Female
Upto 4th week	0.72	0.63	0.95	0.81	1.3	1.3
Upto 8th week	2.36	1.90	3.99	3.49	1.8	1.7
Upto 12th week	4.72	3.85	11.34	9.25	2.4	2.4
Upto 16th week	7.26	5.53	19.86	15.69	2.8	2.7
Upto 20th week	9.62	6.75	28.26	23.13	3.4	2.9

Vaccination Schedule

Day Old	ND – B1 Strain
4th & 5th Week	Fowl Pox
6th Week	ND – (R2B)
8 – 10 Week	Cholera Vaccine

Turkey meat and egg

Turkey egg

- The turkey will start lay from the 30th week of age and its production period is 24 weeks from the point of lay.
- Under proper feeding and artificial lightening management turkey hens lay as much as 60-100 eggs annually.
- Nearly 70 percent of the eggs will be laid in the afternoon.
- The turkey eggs are tinted and weigh about 85 gms.
- Egg is noticeably pointed at one end with strong shell.

- The protein, lipid carbohydrate and mineral content of turkey egg are 13.1%, 11.8%, 1.7% and 0.8% respectively. The cholesterol is 15.67-23.97 mg/gm of yolk.

Turkey meat

People prefer turkey meat because of its leanest nature. The protein, fat, energy values of turkey meat are 24%, 6.6%, 162 Calories per 100 gm of meat. Mineral like potassium, calcium, magnesium, iron, selenium, zinc and sodium are present. It is also rich in essential amino acids and vitamins like niacin, vitamin B6 and B12. It is rich in unsaturated fatty acids and essential fatty acids and low in cholesterol.
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Source: 1. *Handbook on Animal Husbandry, ICAR and Text books on poultry production*
2. Technologies developed by TANUVAS,Tamil Nadu (1.6MB)
3. Turkey farming Guide (219KB)

DAIRY ENTERPRISE – IT'S SCOPE AND CHALLENGES

India has been the leading producer and consumer of dairy products worldwide since 1998.

Dairy activities form an essential part of the rural Indian economy

India also has the largest bovine population in the world with a total bovine population of **299.6 million numbers**

However, the milk production per animal is significantly low as compared to the other major dairy producers

Nearly all of the dairy produce in India is consumed domestically the majority being sold as fluid milk.

MILK PRODUCTION AND PER CAPITA AVAILABILITY OF MILK IN INDIA		
Year	**Production (Million Tonnes)**	**Per Capita Availability (gms/day)**
2010-11	121.8	281
2011-12	127.9	290
2012-13	132.4	299
2013-14	137.7	307
2014-15	146.3	322
2015-16	155.5	337
2016-17	165.4	355
2017-18	176.3	375
Source: Basic Animal Husbandry Statistics, DAHD&F, GoI		

N.B.: As per ICMR guidelines the daily requirement of milk for an adult is 200 Gms per day
The Indian dairy industry holds tremendous potential for value-addition and overall development

INDIAN DAIRY INDUSTRY AT A GLANCE	
Sector	**Volume (Rs)**
Indian Dairy Industry	5,67,000 Cr
Organized Dairy Industry	1,00,000 Cr
Value Added Dairy Products	25,000 Cr
Paneer	10,000 Cr
Cheese	3,500 Cr
Flavoured milk	2,000 Cr
Milkshake	500 Cr
Source: Business Today	

INITIATIVES BY GOVERNMENT OF INDIA AIMED AT DEVELOPMENT OF THE DAIRY SECTOR IN THE COUNTRY

Owing to its vast potential the Govt. of India has undertaken some flagship programmes for development of dairy in India

1. National Programme for Dairy Development (NPDD)
2. National Dairy Programme (Phase-I)
3. Dairy Entrepreneurship Development Scheme (DEDS
4. Support to Dairy Cooperatives
5. Dairy Processing and Infrastructure Development Fund (DIDF)

Out of these above programmes the" Dairy Entrepreneurship Development Scheme" (DEDS) is within our access

DAIRY ENTREPREUNERSHIP DEVELOPMENT SCHEME (DEDS)

It is a bank linked subsidy endorsed scheme specifically meant for aspirant dairy farmers initiated by NABARD.

* **ELIGIBLE BENEFICIARIES** include farmers, individual entrepreneurs, NGOs, Companies, Cooperatives, Groups of organised sector which may be SHGs and JLGs

It includes schemes like

a. Establishment of small dairy units with crossbreed cows up to 10 heads- Rs.7.00 Lakhs
b. Rearing of heifer cows and graded buffaloes – Rs. 9.70 Lakhs
c. Vermicompost unit with dairies – Rs.25,200.00
d. Purchase of milking machines and bulk Milk Cooling Units – Rs. 20 Lakhs
e. Purchase of Dairy processing equipments – Rs. 13.20 Lakhs
f. Establishment of dairy product transportation facilities – Rs. 26.50 Lakhs
g. Establishment of Cold storage – Rs.33.00 Lakhs
h. Establishment of Private Veterinary Clinic – 2.60 Lakhs
i. Establishment of marketing outlets – Rs. 3.00 Lakhs

SUBSIDY RATES ARE AS FOLLOWS

@ 25 % for General categories
@ 33.33 % for SC/ST categories

On the other hand, the private participation in the Indian dairy sector has also increased over the past few years.

Both national and international players are entering the dairy industry, attracted by the size and potential of the Indian market.

GLOBAL DAIRY GIANTS MAKING THEIR WAY INTO OUR DAIRY INDUSTRY

1. Fontera Future Dairy from New Zealand,
2. Danone Dairy from France,

3. The Bel Group from France makers of the famous "The Laughing Cow Cheese",
4. Denmark's Arla Dairy,
5. Mexico's group Lala,
6. Germany's Holchland,

   Their focus is to produce value-added products such as cheese, Yogurt, Probiotic drinks, Flavoured Milk, **UHT Milk,** Curd, Probiotic Products, Flavoured & Frozen Yoghurts, Buttermilk, Lassi, Ghee, Butter, Cheese, Paneer, Cream, Khoya, Dairy Whiteners, Skimmed Milk Powder, Ice Cream, Sweet Condensed Milk, Dairy Sweets and Whey.

These players are also improving their milk procurement network which is further facilitating the development of the dairy industry in India.

INDIAN DAIRIES

1. Amul Industries Pvt. Limited
2. Karnataka Cooperative Milk Federation
3. Kwality Ltd.
4. Dudhsagar Dairy
5. Mother Dairy
6. Schreiber Dynamix Dairies
7. Gujarat Coperative Milk Marketing Federation (Amul India)
8. TheTamil Nadu Cooperative Milk Producers Federation
9. The Kerela Cooperative milk Marketing Federation Ltd.
10. The Orissa State Cooperative milk Marketing Federation Ltd.

DAIRIES OF ASSAM

1. Purabi Dairy,
2. Prithvi Dairy,
3. Sitajakhala

The dairy market in India reached a value of INR 9,168 Billion in 2018.

Looking forward, the market is expected to reach a value of INR 21,971 Billion by 2024, exhibiting a CAGR (Compound Annual Growth Rate) of around 16% during 2019-2024.

SWOT ANALYSIS OF INDIAN DAIRY INDUSTRY

STRENGTH

• Flexibility of product mix is tremendous.
• Technical manpower is abundant – trained and built over last 30 years.
• The basic raw material needed for the dairy industry; that is, milk is available in abundance.
• India has a plentiful supply of technically skilled labourers.
• There is an easy availability of technological infrastructure.
• India has all the key elements required for a free market system.
• The vast livestock population of the country could prove to be a vital asset for the country and unlike many other natural resources which will deplete over the years, a sustainable livestock production system will continue to propel Indian economy.
• As the milk productivity of our animals is low, there is a vast scope for improvement of the milk production and consequently increased marketable surplus of milk for processing.
• Purchasing power of the consumers is on the upswing with growing economy and continually increasing population of middle class.
• Milk consumption in India is regular part of the dietary programme irrespective of the region and hence demand is likely to rise continuously.
• Large number of small and marginal farmers is involved in dairying (around 11 million farmers)

• Very large number of animals and huge scope to enhance productivity.

WEAKNESSES

• Salient cross breeding programmes have significantly improved animal productivity but not being put into objective implementation at the field level.

•The milk production system in many parts of the country is still largely dominated by low yielding animals.

• Poor condition of roads and erratic power supply remain a major challenge for procurement and supply of good quality raw milk. Furthermore, raw milk collection systems in certain parts of the country remain fairly underdeveloped.

• Majority of producers is unaware about scientific dairy farming, clean milk production and value chain.

• Absence of comprehensive and reliable milk production data, impact assessment studies are almost non-existent.

• Large share of milk (70–85%) of marketable surplus goes through informal channel of marketing where quality is a big concern

• Very little competition to cooperatives because private sector was not allowed to participate in until recently

• Milk production is scattered over a large number of farmers producing miniscule quantities.

• Lack of ad hoc export policies and a ban on exports.

• Milk and milk products are barred to make entry into the export market, especially the EU and the USA.

• Lack of policy focusing on strengthening indigenous breeds.

• Farmers' prices are not based on fat measurement, which affects their profitability.

•There is a gross lack of awareness among farmers about the quality parameters, including microbiological and chemical contaminants as well as residual antibiotics.

• Middlemen still control a very large proportion of the milk procurement.

• Lack of awareness on milk hygiene and clean milk production

•Poor feeding practice.

•Poor access to institutional credit

•Lack of cold storage facilities

OPPORTUNITIES

•Retailing of dairy products promises great investment opportunities for standardization and upgrading dairy products in the main metropolitan cities.

• There is a great scope for investment in the manufacturing of finished dairy products

• Organized dairy industry handles only 15% of the milk produced. Cost effective technologies, mechanization, and quality control measures are seldom exercised in unorganized sector and remain key issues to be addressed.

• Potential for exports to nearby countries due low cost of production.

• Overall positive growth environment, which is triggering the Government to enhance infrastructure.

• Expanding market will see creation of enormous job and self employment opportunities.

• Economy has started to grow and consequently the investment opportunities in dairy are also increasing continually.

• Demand for dairy products is income elastic. Continued rise in middle class population will see shift in the consumption pattern in favour of value added products besides the growth in demand for liquid milk.

THREATS

• Entry of multinationals could result in a large portion of milk being diverted towards value added products which, though it augers well for the producers, is likely to affect the availability of liquid milk supply for mass consumption especially for the poor urban class.

• Today milk vendors and middlemen are occupying the pride of place in the industry. Serious efforts need to be taken to eliminate them from the supply chain Organized dissemination of information about the harm that they are doing to producers and consumers should be amplified.

• A parallel economy is thriving on adulterated liquid milk including synthetic milk in certain pockets which needs to nip in the bud.
• Low productivity and scattered production leading to high cost of transportation
• Large portion of the population does not care about quality issues in milk.
• Because of high price sensitivity for dairy products, people are not willing to pay for quality.
• Significant increase in maize prices can increase feed prices

ADVANCES IN FISHERY AND LIVESTOCK BASED INTEGRATED FARMING SYSTEM.

INTRODUCTION:

Best farm management practices are those practices that ensure harnessing maximum productivity from unit area with minimum extraneous input, investment of time, money and energy and without any negative impact on the environment. In aquaculture sector a good number of technologies have been developed for maximizing production from unit area with minimum input, out of which the fishery and livestock based integrated farming system is one of the best options for NE Region of India with a viewpoint of viability in enhancing production and profitability in consideration of socioeconomic and agro climatic condition of the Region.

1. INTEGRATION OF AQUACULTURE WITH OTHER ENTERPRISES:

The goals of integrated farming system are to sustain agricultural production, maintain farm incomes, safeguard the environment and respond to consumers' concerns about food security. The International Organization for Biological Control (IOBC) describes integrated farming as a farming system where high quality food, feed, fibre and renewable energy are produced by using available bio resources and by using as little extraneous inputs as possible. In such systems, selected components are incorporated in such a way, that each component contributes to the production of the other components either directly or indirectly and brings about an ecosystem harmony, thereby reducing the external input cost, increasing production, reducing risk factor, minimizing pollution and drudgery. The integrated components share the available bio resources (land, air, water), utilize the wastes from one component as input or nutrient for the other, thus minimizing the probable exploitation of nature for deriving inputs. As such a sustainable eco-friendly system is created through judicious recycling of wastes that results in higher production with minimum input cost and impact on the environment while addressing the social, economic and nutritional issues of farm families.

Integrated aquaculture system is defined broadly as the concurrent or sequential linkage between two or more farming activities of which at least one is aquaculture. The integrations may occur directly (on site) or indirectly (off site) as per needs and opportunities, or both. In this system, the aquaculture component is integrated with crop cultivation or livestock husbandry or allied activities in an eco- friendly and sustainable way. Aquaculture is recognized as an ecologically competent and economically viable component for integration with agricultural and allied components like livestock husbandry paddy cultivation, horticulture, plantation crop cultivation, aquatic plant production, forage crop cultivation

beekeeping, vermin compost production etc. Integration of fish farming is also feasible with activities like eco tourism, recreation (angling, boating, swimming etc) and commercial ventures like 'farm to food', 'farm & fun' etc. Different combination for aquaculture based integrated farming system may be fabricated as per resource availability, local market demand, economic condition & choice of the farmers as well as prevalent agro-climatic and socio-economic condition. However following criteria should be followed while selecting components for an integrated aquaculture system-

- Compatibility to each other.
- Beneficial to each other either directly or indirectly.

- Should have economical, biological & ecological importance.
- Should be farmers' friendly and eco friendly.
- Should contribute to enhancement of overall farm income/profitability.
- Can be maintained through available bio-resources and
- Can be produced with minimum extraneous input and drudgery.

INTEGRATED FISH-LIVESTOCK FARMING:

Livestock are domesticated animals raised in domestic setting to produce commodities such as food, fiber, fuel and labor. Livestock production serves as a major source of income, nutritional and livelihood security for a large section of population around the globe. Livestock also serves as insurance against risk and as economic buffer under adverse climatic condition and as a means of diversification of income source.

Livestock husbandry practices have been varied widely depending on agro climatic conditions, traditions, cultures and have been transformed from traditional open farming to closed intensive farming. Intensification of livestock raising have led to increased concerns about animal welfare and environmental impact. Although a decreasing trend to the tune of 3.33% was observed in overall livestock population of the country over the18th livestock Census (Table-1), there is substantial increase in some states like Gujarat (15.36%), Uttar Pradesh (14.01%), Assam (10.77%), Punjab (9.57%), Bihar (8.56%), Sikkim (7.96%), Meghalaya (7.41%) and Chhattisgarh (4.34%). This indicates the increasing importance of livestock husbandry as a source of livelihood among a large section of the population of the country. However increase in number of non-descriptive low yielding livestock population is beset with several inherent problems.

Table-1: Changes in livestock and poultry population in Rural and Urban areas (In thousand)

Categories/ Species	Total number of animals in Rural			Total number of Animals in Urban		
	2007	2012	% change	2007	2012	% change
Cattle	1,90,297	1,83,736	-3.45	8,778	7,168	-18.34
Goat	1,33,314	1,29,081	-3.18	7,224	6,092	-15.66
Pigs	9,960	9,226	-7.37	1,174	1,068	-9.06
Poultry	6,06,738	6,97,895	15.02	42,092	31,314	-25.60

Besides being not economically viable, raising higher number of low yielding livestock has serious negative impact on environment through emission of Green House Gases (GHG). Recent findings indicate that aquaculture ponds can serve as a carbon sink, even contributing more efficiently to carbon sequestration than the world's oceans(Boyd et al,2010).On the other hand different livestock wastes having essential nutritional elements can act as efficient enhancer of productivity of aquaculture pond (Table -2)

Integrated fish livestock farming is an age old practice defined broadly as the system where a fish crop is integrated with raising of livestock and bird, so that there are synergistic benefits to both the components in varying degrees. This is an efficient example of environment friendly economically sustainable integrated food production system that is based on the principle of productive recycling of farm wastes and efficient utilization of available resources (Fig-2).

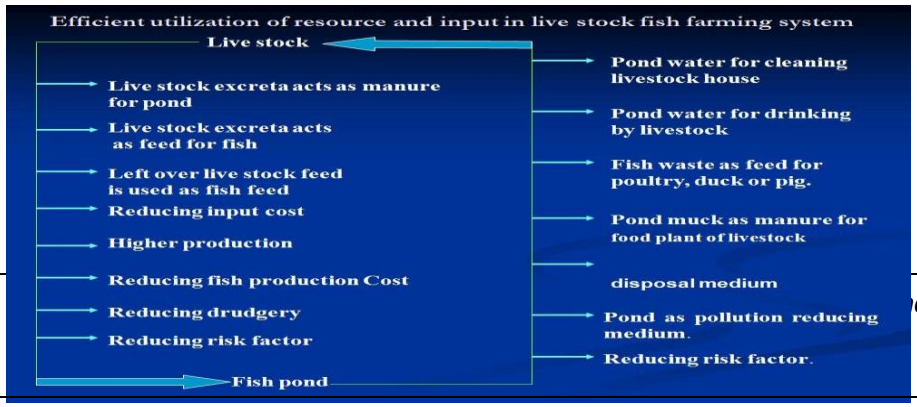

Fig-2: Resource Utilization in fish- livestock farming

In this system, livestock or birds are raised in pond area (either over pond water or in pond embankment) and predetermined quantum of livestock or bird wastes (excreta and left over feed) is recycled in pond for fish production. Additional supply of nutrients viz. application of manure or fertilizer in pond and supplementary feeding for production of fish is exempted in this system.

Table2: Nutritional elements in different livestock manure

Livestock	Item	Moistur e (%)	Organic matter (%)	Nitrogen (%)	Phosphorus (%)	Potassium (%)
Cattle	Dung	80-85	14.0	0.3	0.2	0.1
	Urine	92-95	2.3	1.0	.01	0.14
Pig	Dung	85	15.0	0.6	0.5	0.4
	Urine	97	2.5	0.4	0.1	0.7
Poultry	Excreta	78	25.5	1.4	0.2	0.6
Duck	Excreta	81	26.2	0.9	0.4	0.6
Goat	Dung	10	-	2.7	1.7	2.9
Rabbit	Dung	10	37.0	2.0	1.3	1.2

Merits of integrated livestock fish farming system:

- Production of multiple commodities from unit area.
- Assured production of fish with minimum input.
- Drastic reduction in fish production cost.
- Efficient recycling of farm waste.
- Increase in overall farm productivity
- Better and easier farm management
- Efficient utilization of available resources and manpower.
- Minimizing environmental pollution
- Minimizing risk factor.
- Coping up strategy against climate change related impacts
- Enhancing aesthetic beauty of farm.

Recommended technologies:

On the basis of agro-climatic condition, socio-economic situation and other factors different combinations for fish-livestock integration have been advocated. Some of them are integration of two commodities out of which one is fish culture. Eg.

- Integrated fish pig farming
- Integrated fish poultry farming.
- Integrated three tier fish-pig-poultry farming.
- Integrated fish duck farming.
- Integrated fish cattle farming
- Integrated goat–fish farming

Additional components may be incorporated with fish and livestock integration as the major crops on the basis of compatibility, adaptability, availability, market demand, management facility and ecological factors. Incorporation of minor components, planned judiciously, help in maximum utilization of available resources and maximum farm income Different integration can be planned like Fish- livestock- horticultural crop- honey bee, Fish – livestock- plantation crop- horticultural crop, Fish livestock- vermicompost-aquatic plant like azolla, foxnut, lotus etc, Fish- livestock- flower- bird-ecotourism etc.

Stocking densities in different livestock fish farming systems

Sl. No.	Technology	No. of animals/birds per ha	No. of fish/ha
1.	Pig-fish farming	30-40	8,000
2.	Duck-fish farming	250-300	5,500
3.	Poultry-fish farming	500-600	7,000
4.	Three tier system	30-40 pigs, 300-400 poultry	8,000
5.	Cattle-fish farming	7 cow with calf (1 cow with calf for 1000 sqm)	5,500

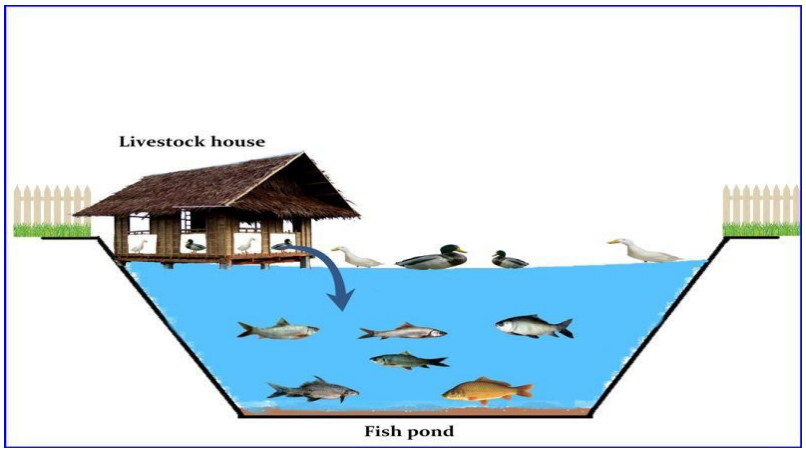

Fig.1. Integration of duck farming with fish farming

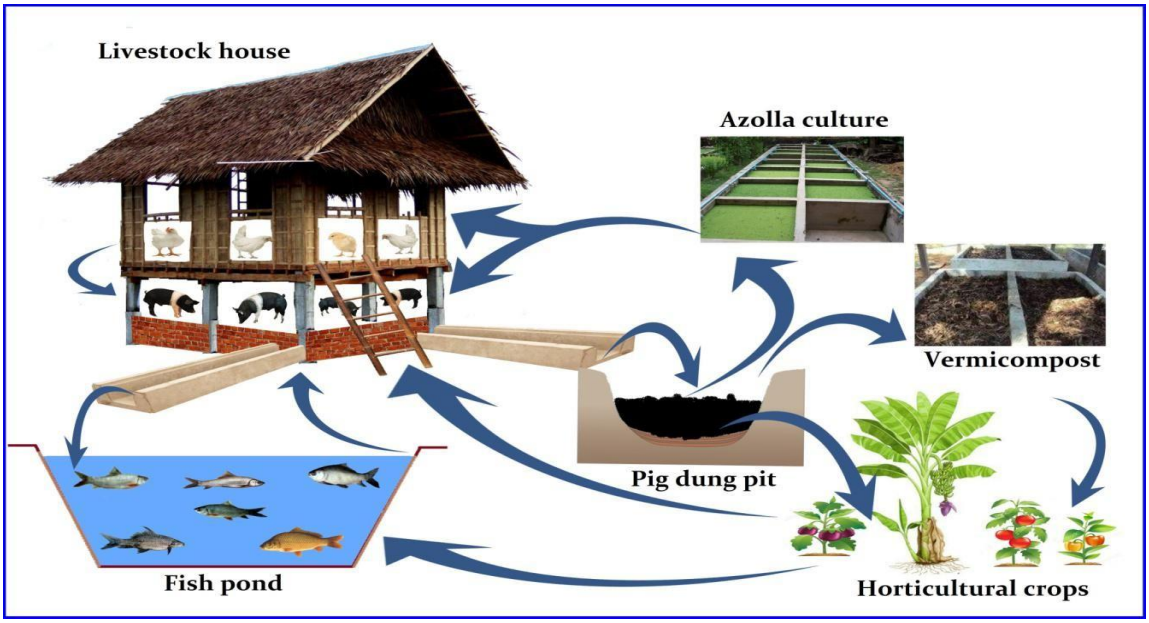

Fig 2, Integration of Fish farming with multiple commodities

Incorporation of AQUAPONICS in integrated farming system:

Aquaponics, the combination of Recirculatory Aquaculture System (RAS) with Hydroponics (horticulture without soil), is one of such systems that facilitate judicious use of water and other available bio-resources for higher and safer production of food with minimum extraneous input. In a closed aquaculture system, lots of bio wastes accumulate in the form of excreta of cultured stock, decomposition of weeds and other dead organism, leftover food etc., which degrade the water quality and make it unsuitable for culture of fish and other aquatic organism. In aquaponics, the bio waste loaded water from aquaculture tank is recycled through a suitable filter system and sent back to the tank after filtration and the separated bio waste is used as medium/manure for in situ growing of horticultural crop. This system has already made waves in

the developed countries as an incredibly simple,

Fig3.Low cost aquaponics system developed by Fisheries Research Centre, A