

Background Paper on ‘Promotion of Livestock and Dairy, Poultry and Fishery as engines of growth’



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Executive Summary

Animal Husbandry, dairy and fisheries sector is an important component of India's economy in terms of income, employment and foreign exchange earnings. An analysis of the composition of agricultural trade over the last few decades shows a remarkable shift in exports of India from traditional agriculture sector to livestock sector.

The value of output (at constant prices) from livestock sector is 25.7% of the total output from agriculture and allied sector. More than 10% (16 million approximately) populace of India depends on animal, poultry and fishery for their livelihood. As per a study done by Indian Council of Agricultural Research (ICAR) and National Institute of Agricultural Economics and Policy Research (NIAEPR), agriculture and allied sector needs to grow at a rate of 8.6% in order to double the income of farmers by 2022. While disaggregating the growth rate, it is observed that livestock sector would contribute 1.84% of the required growth rate of agriculture sector (8.6%), which is the highest among all sub-sectors¹.

India continues to be the largest producer of milk in the world. The dairy sector of India registered an annual growth of 6.27% and 6.37% during 2015-16 and 2016-17 respectively. Poultry sector has taken a quantum leap producing about 82.93 billion eggs and 3.26 million tonnes meat during 2015-16. Meat production has registered a growth from 2.3 million tonnes in 2006-07 to 5.5 million tonnes in 2011-12. In terms of fisheries, India is the second largest producer of fish in the world with a total fish production of 107.90 lakh tonnes in 2015-16. Despite several achievements, India is unable to reach the optimum level of utilisation of resources due to challenges in these sectors.

The report aims to provide an overview of animal husbandry, dairy and fishery sector, along with providing a detailed analysis of their challenges and opportunities. This report further delves into strategies and action plan required for achieving the noble objective of 'Doubling farmers' income by 2022'.

¹ Background Paper on National Conference on "Agriculture 2022- New initiatives", NDDB.

1. Introduction

1.1. Overview of Animal Husbandry, Dairy and Fisheries Sector

The conducive climatic and topographical conditions of India led to emergence of livestock sector as a key socio-economic driver of rural households. The livestock sector of India is one of the largest in the world and accounts for 11.6% of the global livestock population.

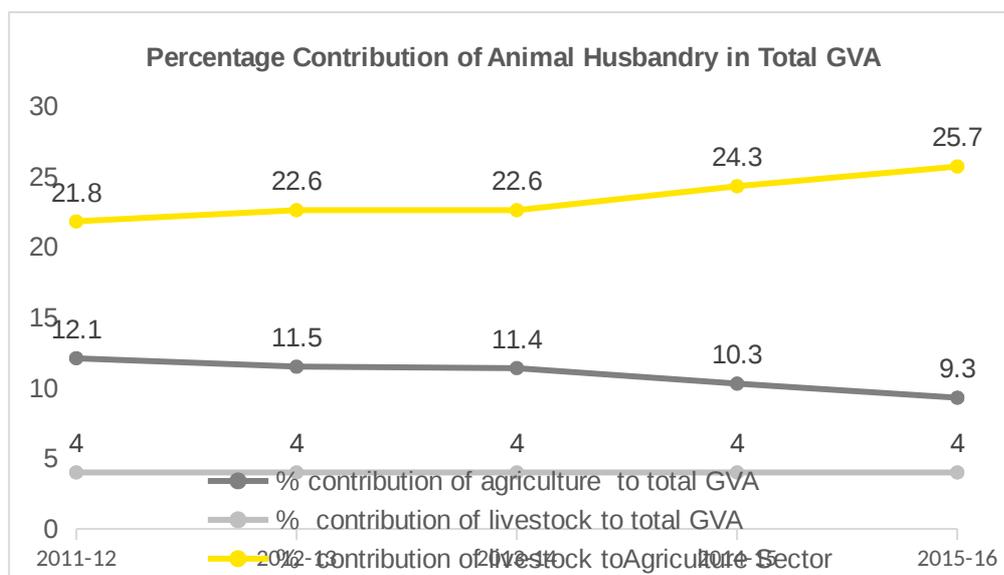
Animal Husbandry, Dairy and Fisheries sector is the key driver of economy in terms of contribution to GDP and employment. Livestock and fisheries contribute 4.1% and 0.8% respectively to the Gross domestic Product (GDP). It contributes to about 25% to the GDP from agriculture and allied sector. According to National Sample Survey Office (NSSO) 68th Round (July 2011- June 2012) survey on employment and unemployment, 16.44 million workers were engaged in farming of animals, fishing and aquaculture².

Over the last two decades, livestock sector has grown at an annual rate of 5.6%, which is higher than the growth rate of agriculture sector (3.3%). This is also suggested by Fig.1.1 which depicts that the contribution of agriculture sector to total GVA at constant prices has seen a declining trend while the contribution of livestock sector to the total GVA has increased. The share of Gross Value Added (GVA) of animal husbandry sector to the agriculture sector (Crops, Forestry, Livestock and Fishing) has increased from 21.8% in 2011-12 to 25.7% in 2015-16 at constant prices.

Table 1.1. Percentage Contribution of Animal Husbandry in Total Agriculture GVA

Year	GVA at Constant (2011-12) Basic Prices					
	GVA – Agriculture			GVA – Livestock		
	(Rs. In Cr.)	% to total GVA	(Rs. In Cr.)	% to total GVA	% to Agriculture Sector	
2011-12	9,82,151	12.1	3,27,334	4.0	21.8	
2012-13	9,83,809	11.5	3,44,375	4.0	22.6	
2013-14	10,37,060	11.4	3,63,558	4.0	22.6	
2014-15	9,97,959	10.3	3,90,436	4.0	24.3	
2015-16	9,75,739	9.3	4,15,949	4.0	25.7	

Fig. 1.1. Percentage Contribution of Animal Husbandry in Total Agriculture Gross Value Added (GVA)



1.2. Department of Animal Husbandry, Dairying & Fisheries (DADF)

Department of Animal Husbandry, Dairying & Fisheries (DADF), under Ministry of Agriculture, came into existence w.e.f. 1st February, 1991 by converting two divisions of the Department of Agriculture and Cooperation namely Animal Husbandry and Dairy Development into a separate Department. The Fisheries Division of the Department of Agriculture and Cooperation and a part of the Ministry of Food Processing Industries were later transferred to this Department on 10th October, 1997³. The major focus areas and functions of the department are:

- ▶ Development of requisite infrastructure in States/Union Territories(UTs) for improving productivity
- ▶ Preservation and protection of livestock through provision of health care
- ▶ Strengthening of central livestock farms (cattle, sheep and poultry) for development of superior germ plasm for distribution to states
- ▶ Expansion of aquaculture in fresh and brackish water as well as welfare of fish farmers.

The past strategies in agriculture sector have not been framed with a view to promote the welfare of farmers; growth in total output did not lead to subsequent increase in the farmers' income. In this background, our Hon'ble Prime Minister (PM) set forth the vision of doubling farmers' income by 2022 (on the 75th anniversary of Indian independence) to promote farmers' welfare, reduce agrarian distress and bring income parity between agriculture and non-agriculture sector⁴. DADF is committed towards realisation of the goal through dedicated policy interventions and strategies.

1.3. Prospects for doubling of farmers' income in livestock and fishery sector

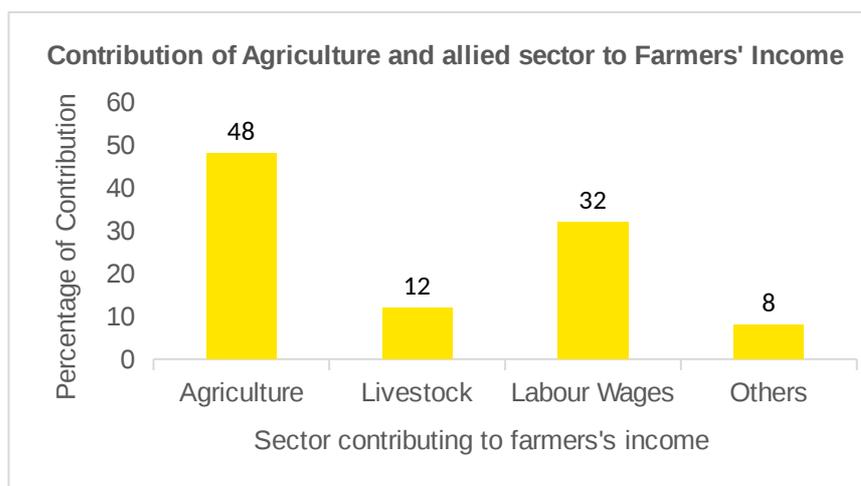
According to NSSO estimates in 2013, agriculture sector contributes to around half of the income of farmers and more than one – tenth is being contributed by livestock sector, thus making contribution of agriculture and allied sector more than 60% in total income of farmer⁵.

Fig.1.2. Contribution of various sectors to Farmers' Income

³ "About the Department", *DADF Website*, <http://dahd.nic.in/about-us/about-department>, accessed 24 January 2018.

⁴ Doubling Farmers' Income: Rationale, strategy, Prospects and Action Plan, NITI Aayog Policy Paper.

⁵ Action Plan for Doubling Farmers' Income by 2022, DADF, GOI.



About 14 crore farmers are dependent on livestock sector for their livelihood and employment opportunities. Globally, India accounts for the highest milk production, second highest fish production and third highest production of dairy products. The share of livestock in agriculture domain of GDP has increased from 14% in 1980-81 to 27% in 2015-16.

The small and marginal farmers have only 44% of the land but contribute to more than 80% of livestock and fishery. During the period 2014-17, the livestock and fisheries sector has grown from 5.5% to 6.2%. According to World Food Organization estimates, every rupee invested in livestock sector of India potentially yields 4 times its value. Therefore it is pertinent to say that there are myriad of opportunities in livestock sector to double the income of farmers by 2022.

2. Dairy Sector

2.1. Brief overview of India's dairy sector

The efforts of DADF in the dairy sector are concentrated on promotion of dairy activities including non-operation flood areas with emphasis on building up cooperative infrastructure, revitalization of sick dairy cooperative milk unions and creation of infrastructure in the states for production of quality milk and milk products. Some of the dairy development schemes implemented by DADF are shown in Fig. 2.1. The National Dairy Development Board (NDDB) continues its activities for overall development of dairy sector in operation flood areas.

Fig.2.1. Dairy Development Schemes in India



As of March 2017, more than 198 dairy cooperative milk unions have covered about 16.30 million farmers under the ambit of 1,77,314 village level dairy corporative societies.

India ranks first among the world's milk producing nations, with a sustained growth in the availability of milk and milk products for growing population. The annual milk production was 165.40 million tonnes during 2016-17 as compared to 155.49 million tonnes during 2015-16, thereby recording a growth rate of 6.37%.

2.2. Opportunities in the dairy sector

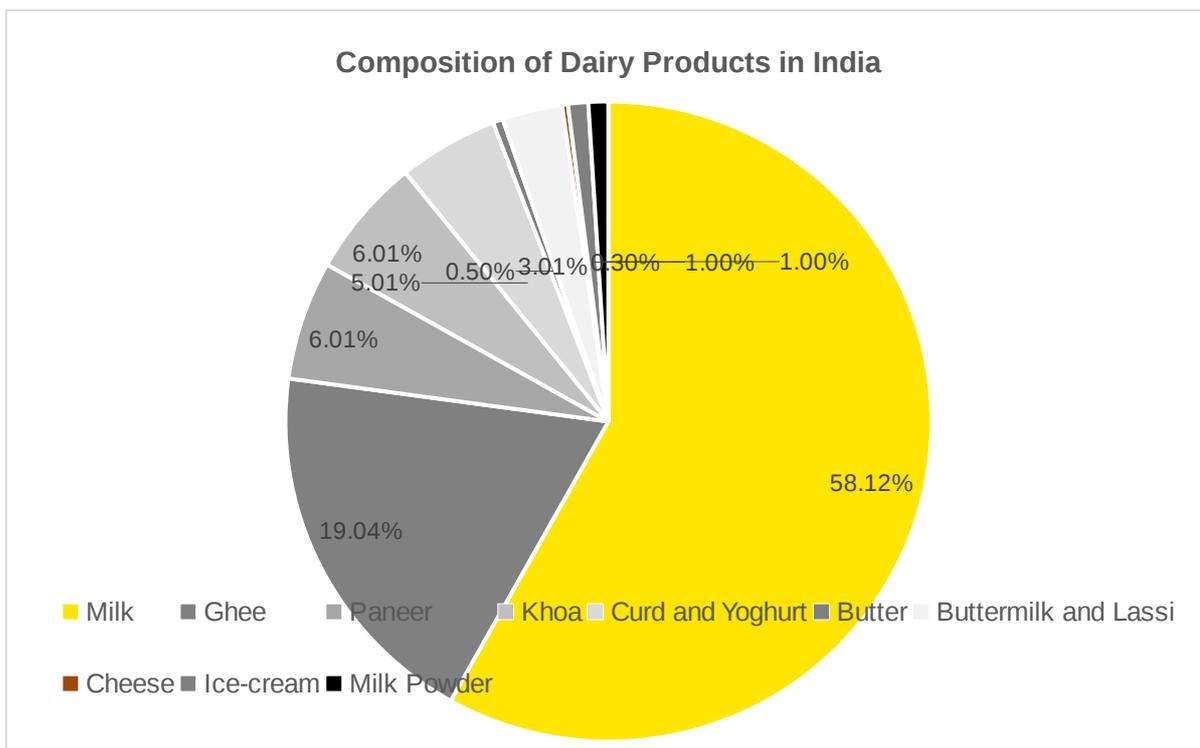
The Indian dairy sector is the largest contributor to the agriculture Gross Domestic Product (GDP). In terms of the output, milk is now the largest agricultural commodity in India. Currently, About 54% of the milk produced in the country is surplus for marketing in the domestic market, of which about 40% is handled by the organised sector (i.e about 20% of total milk production) equally, shared by Cooperatives and Private dairy organizations. Cooperative sector plays a major role in supplying liquid milk in the domestic market.

The Indian dairy industry is estimated at around \$70 Billion in 2014-15, out of which the organised sector is valued at about \$14 Billion. Increase in future demand is expected due to higher consumption of value added products The value-added versions like ghee, butter, yogurt, paneer, cheese, along with flavoured milks, ice creams, UHT processed milk and shredded and liquid cheese is making the sector attractive for growth and investment. The composition of milk and milk products is depicted in Fig.2.2.

The dairy industry in India is currently estimated to be about 130 million tonnes and is expected to grow at 4-5% per annum. The projected value of the industry is about Rs.5,00,000 crore, which includes Rs.1,60,000 crore from liquid milk, Rs.45,000 crore from ghee, Rs.50,000 crore from khoa / chhana / paneer, Rs.10,000 crore from milk powder, Rs.300 crore from table butter, Rs.8,000 crore from cheese / edible casein and the balance from other products⁶.

Fig. 2.2. Composition of Dairy products in India

⁶ Annual Report 2016-17, Department of Animal Husbandry, Dairying & Fisheries, Government of India.



2.3. Trends in Dairy Sector

2.3.1. Demand Trends

India's national dairy plan contains a proposed spend of Rs.173 billion to increase the country's milk production in order to meet the projected demand of 200-210 MT by 2021-22. Fig. 2.3 sets forth the total milk production and per capita availability of milk in India⁷.

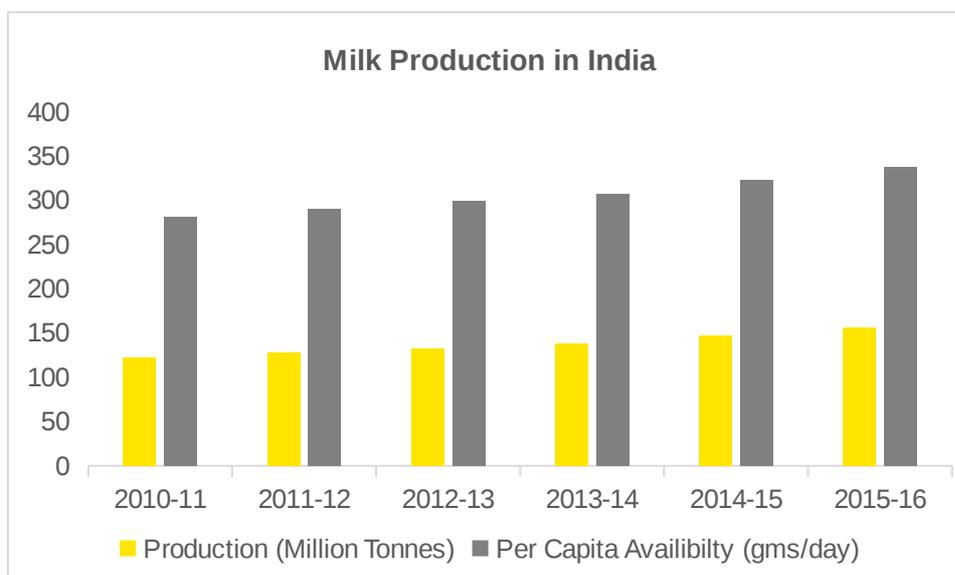
The top ten milk producing states are Uttar Pradesh, Rajasthan, Punjab, Andhra Pradesh, Gujarat, Maharashtra, Madhya Pradesh, Bihar, Tamil Nadu, and Haryana, which account for more than 80 percent of India's milk production. Almost 46% of milk produced in India is consumed as liquid milk and only 15% of milk is processed and packed⁸.

The urban population accounts for major cheese consumption in India. Taken together, the four metropolitan cities viz., Delhi, Mumbai, Chennai and Kolkata consume over 60% of the cheese. India is one of the fastest growing markets for cheese with a total consumption of about 7,000 tons a year. Top players of branded cheese manufacturing in India include Amul, Britannia, Le Bon, Mother Dairy and others. During the last few years, the Indian cheese market has grown steadily at 15 to 20% per annum.

Fig.2.3. Production of Milk in India

⁷ "Milk production in India", NDDDB website, <http://www.nddb.org/information/stats/milkprodindia>, accessed 29th January 2018.

⁸ Ibid.



The Indian ice cream industry is currently estimated to be worth Rs.2,100 crores, growing at a rate of approximately 12%. The per capita consumption of ice cream in India is approximately 300 ml, as against the world average of 2.3 litres per annum. Vanilla, Strawberry and Chocolate together constitute approximately 60% of the market.

The industry is mainly unorganized with 75% of the processing units belonging to the unorganised category; the organised category though small, is growing fast. Some key market players in the organized sector are Amul, Nestle, Patanjali, Anik, Britannia, NDDB, Gowardhan, Kraft, Vadilal, Kwality etc.

2.3.2. Supply and processing trends

The cooperative milk unions recorded a growth of 12% in milk procurement; they procured 42.55 million kgs/day of milk during the year 2015-16 as compared to 38 million kgs/day during 2014-15. The sale of liquid milk by the Cooperative Dairies reached 32 million litres/day during the year 2015-16 as compared to 31.24 million litres/day, registering a growth of 2.7% over the previous year.

During April 2016 – October 2016, the average milk procurement by dairy cooperatives was around 409 lakh kg per day as compared to around 395 lakh kg per day during the same period last year, registering an increase of around 3.5 %. During the same period, the cooperatives marketed an average of around 330 lakh litres of milk per day, registering a rise of around 2.2 % over the corresponding period last year.

There are more than 550 plants in the country. The leading dairies in country are Gujarat Cooperative with Amul brand, Karnataka Milk Federation (KMF) with Nandini brand, Mahanand Dairy (Mahanand), Tamil Nadu Co-operative Milk Producers' Federation Limited with Aavin brand, Heritage, Nilgiri Dairy Farm Pvt Ltd, Hatsun with Arokya brand, Cavinkare Dairy, GRB Dairy, Creamline Dairy, Parag Milk Foods, Tirumala Milk Products, Gokul and Sridevi Milk Products. Mulkanoor, women's mutually aided milk producers cooperative union is the first women's co-operative in the country as well as globally.

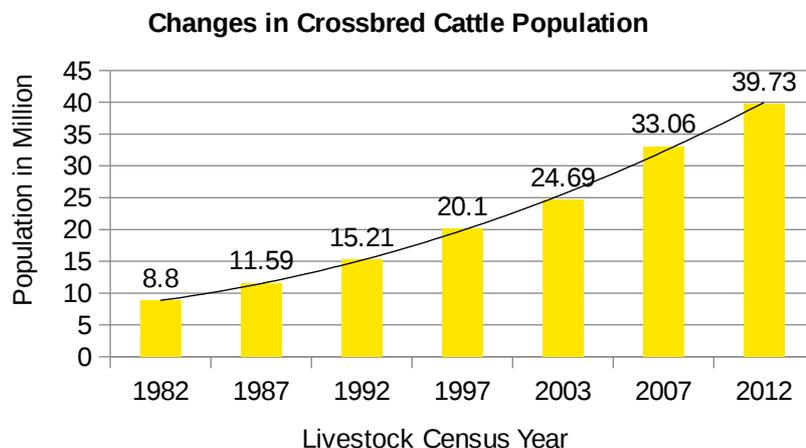
2.3.3. Role of Cattle in Milk Production

Cattle and buffalo rearing has been a traditional livelihood in India and is closely linked to agricultural economy. India with 190.90 million cattle (as per 19th Livestock Census 2007) has 14.42 % of the world cattle population. Out of this, 39.73 million are crossbred, which is 20.81% of the total cattle population. Between 2007 and 2012, crossbred population increased by 20.17%.

The changes within the cattle population over the last two decades indicate a radical shift in the priority of the farming community from production of work animals to milk production. The proportion of the female in the population increased steadily from 1972 onwards. Between 1987 and 2012, the number of working male in cattle population declined sharply by 25.53% (16.65 million) and among females the proportion of adult females increased gradually. Phenomenal growth in the number of crossbred was seen. Total crossbred number grew from 8.80 million in 1982 to 39.73 million in 2012. During

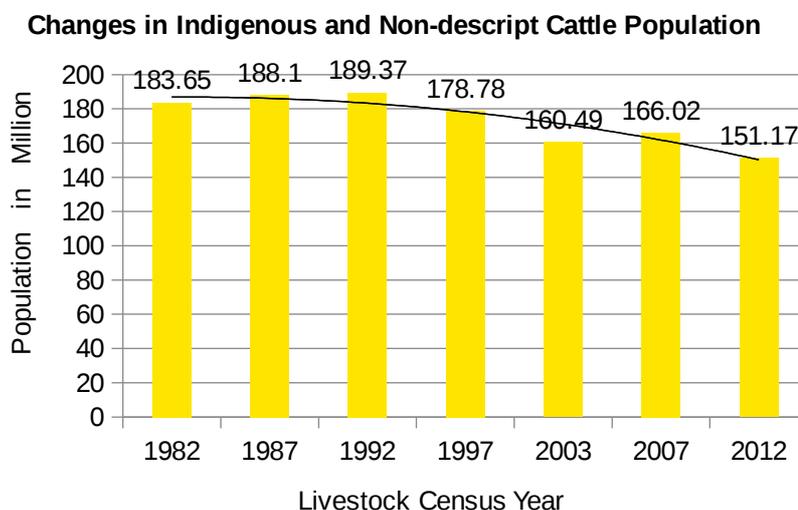
2017, about 48.61 million cattle are in milk and are contributing 77.41 million tonnes of milk, which is about 47.28 % of the total milk production in the country during the same period.

Fig.2.4. Changes in Crossbred cattle population



The indigenous and non-descript cattle population has declined by from 183.65 million to 151.17 million 2012 which is 17.69%. Major decline in the population of indigenous and non-descript was noted between 2007 and 2012 livestock census. As breed wise census was not conducted upto 2003 proportion of indigenous breed cattle population was not available.

Fig.2.5. Changes in indigenous and non-descript cattle population

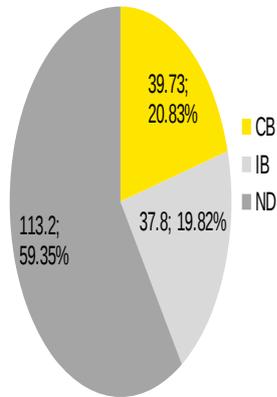


Breed wise census was conducted along with livestock census during 2007 and breed wise survey during 2013. From the breed survey 2013 it was noted that country has only 25% of descript cattle population (37.8 million) out 151 million indigenous cattle population. The descript indigenous cattle which is 20% of the total cattle population contributes 22.12 MMT which is about 26% of the total milk produced from cattle whereas nondescript cattle which are 60% of total cattle (113.2 million) are producing only 13.71 million tonnes of milk which is 18% of total milk produced from cattle.

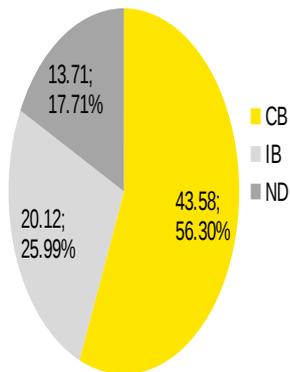
Fig.2.6. Cattle Population as per 2012 Livestock census

Fig.2.7. Cattle milk production

Cattle population in million as per 2012 Livestock Census



Cattle Milk Production in MMT as per ISS 2016-17



*CB-Cross Breed, IB-Indigenous Breed, ND- Non-descript cattle

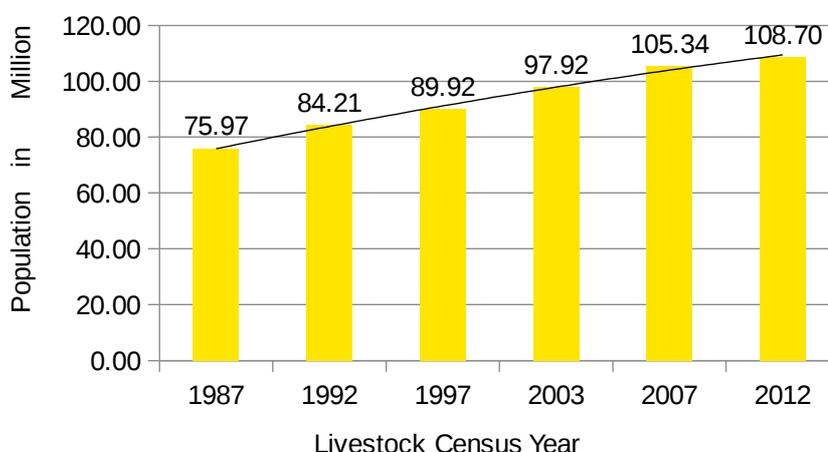
Looking towards huge nondescript cattle population with lower productivity and availability of these low productive with small and marginal farmers, provides immense opportunity to enhance their income and thereby making milk production remunerative to the poor farmers. In this backdrop Rashtriya Gokul Mission was initiated by Government of India in December 2014.

2.3.4. Role of Buffaloes in Milk Production

India has 108.34 million buffalo, which is 56.05 % of the world buffalo population. Buffalo population in the country is increasing at a steady rate with slight increase in the productivity. Out of the total buffalo population in the country more than 50% are breedable females, indicating preference of the farmers for rearing buffaloes for milk production. Among the States, Uttar Pradesh, Andhra Pradesh, Madhya Pradesh, Rajasthan and Punjab have the largest buffalo population and together they accounted for nearly 60% of all the buffalo population of the country in 2012. Eastern region has less than 10 % of the buffalo population with swamp buffalo being included basically for drought purposes. No efforts have been made by these States to develop swamp buffalo population. Thus buffaloes are not playing significant role in milk production in this region.

Fig.2.8. Changes in Buffalo population

Changes in Buffalo Population

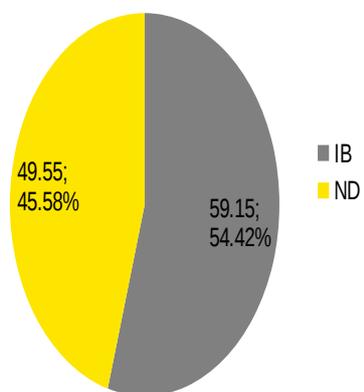


During 2017 about 80.39 million tons of milk was contributed by buffaloes which was about 49.11 % of the total milk produced in the country. This shows the higher significance of the buffaloes in milk production in the country. As per breed survey 2013 country has 59.15 million describe buffalo population which is 54.4% of the total buffalo population and contributes 57.84 MMT which is 71.95% of the total milk produced from buffaloes. Remaining 49.55 million non-descript buffaloes which 45.58% of the total population contributes 22.54 MMT which is only 28.03% of the total milk produced from buffaloes.

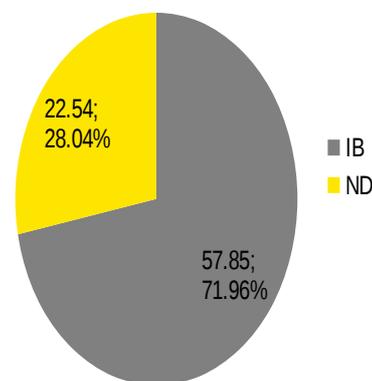
Fig.2.9. Buffalo Population as per 2012 Livestock census

Fig.2.10. Buffalo milk production

Population of Buffaloes in million as per 2012 Livestock Census



Milk production from buffaloes in MMT as per ISS 2017



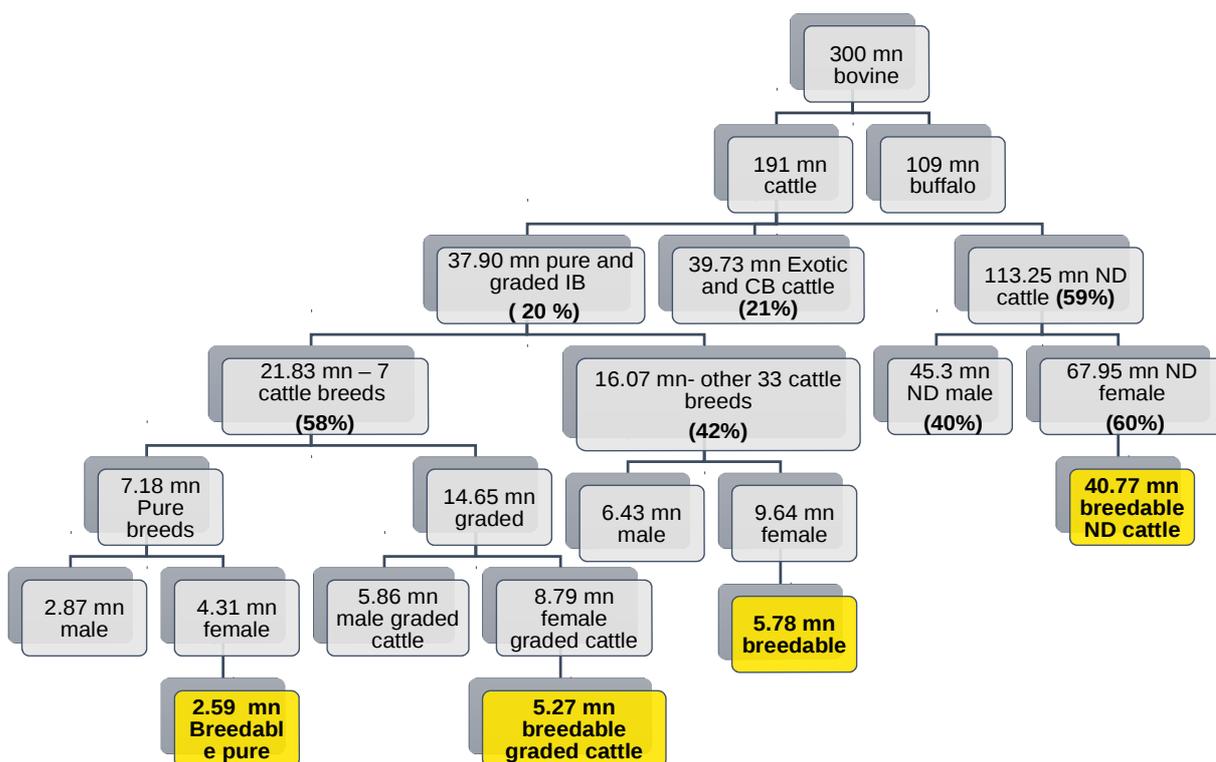
* IB- Indigenous Breed, ND-Non-descript

2.3.5. Cattle Genetic Resources

The cattle genetic resources of India are represented by 42 recognized breeds. Most of the cattle breeds are suited for draught power but produce little milk. Indigenous animals are sturdy, are endowed with quality of heat tolerance, resistance to diseases and ability to thrive under extreme nutritional stress. These breeds are classified into three categories – milch breeds, like Sahiwal, Red Sindhi, Gir and Rathi which calve between 40 to 50 months and produce 1,500 to 2,000 Kg in a lactation and have a calving interval of 15 to 18 months; dual purpose breeds like Tharparkar, Hariana, Kankrej, Ongole, Deoni, Gaolao, Krishna Valley and Mewati which first calve between 45 to 55 months, produce between 600 to 1,500 Kg of milk and have a calving interval between 15 to 20 months; and draft breeds like Kangayam, Hallikar and Khillari. The remaining 80% of the cattle are non-descript which first calve at an age of 60 months, and produce about 500 Kgs in a lactation and

have a calving interval between 20 to 24 months. Details of descript and graded population is depicted in the following diagram.

Fig.2.11. Descript and graded cattle population



2.3.6. Buffalo Genetic Resources

The buffalo genetic resources of India represented by 13 recognised breeds. Murrah is the breed of choice and is used widely in the country grading up nondescript buffalo population. Bhadawari is having its breeding tract in UP (Agra, Mathura) and is well known for milk fat percentage. In this breed milk fat ranges from 6 to 14%. Jaffarabadi well known breed of Gujarat. Mehsana (Gujarat) Nagpuri (Maharashtra), Nili-Ravi(Punjab), Pandharpuri (Maharashtra), Surti (Gujarat), Toda (Tamil Nadu), Marathwada (maharashtra), Chilika (Orissa) and Banni (Gujarat).

2.3.7. Milk production and Productivity of Bovines

India ranks first among the world's milk producing nations. India is the leading producer of milk since 1998. The milk production in India during the period 1950-51 to 2016-17, has increased from 17.0 million tonnes to 163.7 million tonnes. Milk production has been growing at about 4.7 % per year over the five years ending 2016-17, which amounts to an average annual incremental production of about 6.26 million tonnes. Growth in milk production has been higher than that of the population growth resulting in a consistent increase in the per capita availability.

The per capita availability of milk which was 130 gram per day during 1950-51 has increased to 352 grams per day for 2016-17 which is more than the 186 gms estimated for Asia and the world average of 294 grams. However, less than that of developed countries estimated at 831 grams per day. As per FAO, the average annual growth in milk production in the world during last decade was at 2.2%. The estimates of yield rate of milk (in Kg/day) for crossbred cows, non-descript cows and buffalo during 2016-17 are 7.52, 2.83 and 5.25 respectively.

2.4. Gaps and Challenges in Dairy Sector

The biggest challenge in the dairy sector is low milk production of the dairy cattle. This can negatively influence the milk productivity.

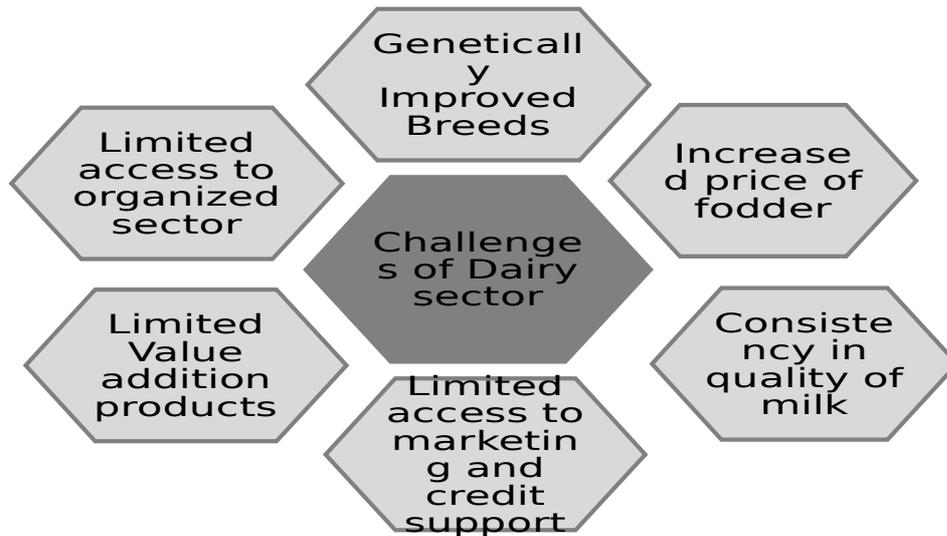
The major gaps identified in the dairy sector and the government intervention to bridge those gaps are described below:

- a) *Availability of inputs* such as feed, medicine, finance, veterinary services
- b) *Cold Chain facilities*: The Prime Minister's Office is monitoring the creation of Cold Chain infrastructure in Agriculture including Dairy Sector on monthly basis. Based on the information obtained from various State Governments/ State Cooperative Milk Federation, the milk chilling capacity is created under dairy development schemes of this Department.
- c) *Artificial insemination*:
 - ▶ NDDDB Dairy Services (NDS)⁹ manages the two largest semen stations in the country- Sabarmati Ashram Gaushala in Bidaj (Gujarat) and Animal Breeding Centre in Salon, Rae Bareli (UP).
 - ▶ Additionally, NDS setup two new state-of-the art semen stations in Alamadhi (Tamil Nadu) and Rahuri (Maharashtra).
 - ▶ The semen doses produced from all the four semen stations are being marketed under a common brand name "Superior Animal Genetics" and it is expected to market about 300 lakh doses during 2016-17. Each of the new semen station has a capacity to produce about 100 lakh semen doses in a year.
 - ▶ The Central Monitoring Unit (CMU) constituted by DADF for the qualitative evaluation of semen stations in the country ranked Animal Breeding Centre, Salon and Alamadhi Semen Station as first and second in the evaluation carried out during 2016.
- d) *Value adding infrastructure*: The Government is actively engaging in creation of Milk chilling facility.
- e) *Cooperatives and Procurement Capital Utilities*: It has been analysed that cooperatives needs to be strengthened in the major milk producing states, followed by procurement capital utilities and farmers.
- f) *Constraints in Cattle Production*: Cattle which is the major constituent of our livestock population is facing newer challenges, which are needed to be addressed promptly and adequately to bring in rapid improvement in cattle population.
 - ▶ Small herd size (ranging from 1-2 animals) and poor productivity
 - ▶ Inadequate availability of quality breeding bulls, both for artificial insemination (AI) and natural service
 - ▶ Dwindling feed and fodder resources and poor resource management
 - ▶ Inadequate number of farmers' organizations and breeders' societies
 - ▶ Technology for proper utilization of cow waste specially cow dung and Urine, which has important medicinal values
 - ▶ Absence of effective extension network

Some of the other major challenges in Indian dairy sector are described in Fig.2.4.

⁹ "NDDDB Dairy Services", NDDDB Website, <http://www.nddb.org/links/inst/nds> , accessed 27th January 2018.

Fig.2.12. Challenges of Dairy sector



2.5. Strategies for growth of dairy sector

The key strategies for growth of dairy sector include:

- ▶ Increase Milk production to meet projected demand of 155 MT (Metric Ton) by 2015-16 and 300 MT by 2023-24
- ▶ Provision of cold chain at district and block level
- ▶ Expansion of Organized Milk Market to provide greater access to dairy farmers for their milk produced
- ▶ Genetic upgradation of cattle, buffaloes and improvement in delivery mechanism of breeding inputs and services to farmers including promotion of clean milk production
- ▶ Extension of dairy development activities in non-operational flood, hilly and backward areas
- ▶ Heifer rearing and management
- ▶ Quality feed and fodder through promotion of good varieties fodder crops and fodder trees
- ▶ Animal Health promotion is vital to Dairy Development. Special emphasis should be laid on enhancing reproductive efficiency, prevention of infertility, preventive veterinary medicine strategies and therapeutics
- ▶ Adequate animal health cover services.
- ▶ Special focus is needed on rendering of dead animals to prevent zoonosis, environmental pollution and to make use of the dead animals
- ▶ An exit policy on dealing with unproductive, unwanted and cold animals
- ▶ Emphasis should be made on two grounds-
 - (a) Dairy export, and
 - (b) Enhancing domestic consumption of dairy products.

2.5.1. Strategy for improving the breed

It is observed that cross breeds have yielded better results in terms of milk production and productivity as compared to other cattle. With improvement of breed, the production of milk also gradually improves. Hence, measures should be put in place for cross breeding of local cows with exotic breeds as well as promotion of indigenous cattle.

Table 2.1. Strategy for breed improvement

S. No	Strategy
1.	100% AI coverage
2.	Super elite population of 7 IB cattle to be developed by Multiple Ovulation Embryo Transfer (MOET)/ IVF ¹⁰ - This requires identification of specific breeds <ul style="list-style-type: none"> ▶ Cattle : Sahiwal, Gir, Tharparkar, Red Sindhi, Rathi, Kankrej ▶ Buffalo: Murrah, Mehsana, Nili Ravi & Pandharpuri
3.	Conservation and Development of other breeds
4.	Upgrading the graded cattle with pure breed for more pure breed
5.	Breed Improvement of non-descriptive cattle: 50% of the ND to be upgraded with 7 dairy breeds and remaining 50% to be upgraded with other 33 breeds in order of their priority ¹¹

Breeding policy

Broad framework of the breeding policy was prepared by Government of India and circulated to all the States as a broad guideline to formulate their own breeding policy. Broad framework of the breeding policy envisages crossbreeding of nondescript cattle population with exotic breeds -Jersey and HF (breed of choice), selective breeding of indigenous stock in their breeding tract and use of indigenous breeds for upgrading proportion of indigenous non-descript stock. Therefore there is a need to insist on:

- ▶ Operationalisation of breeding policy with focus on genetic upgradation of bovine population and improvement of indigenous breeds through programmes in consonance with the policy
- ▶ Production and identification of good quality breeding bulls of exotic, crossbred and indigenous breeds for use in the breeding programmes
- ▶ Promotion of breeders organisations so that major part of development programme for bovine population can be entrusted to them
- ▶ Development of synergies among important players involved in the cattle and buffalo development;

The negative impact of Global Warming/climate change on total milk production for India has been estimated at about 1.60 million tonnes annually in 2020. The decline in milk production and reproductive efficiency will be highest in crossbred cattle followed by buffaloes. Global warming is likely to increase incidences of animal diseases particularly viral and protozoan diseases in crossbred animals. Therefore there is a need to take programmes for development and conservation of indigenous breeds.

2.5.2. Strategy for Artificial Insemination (AI)

Semen production

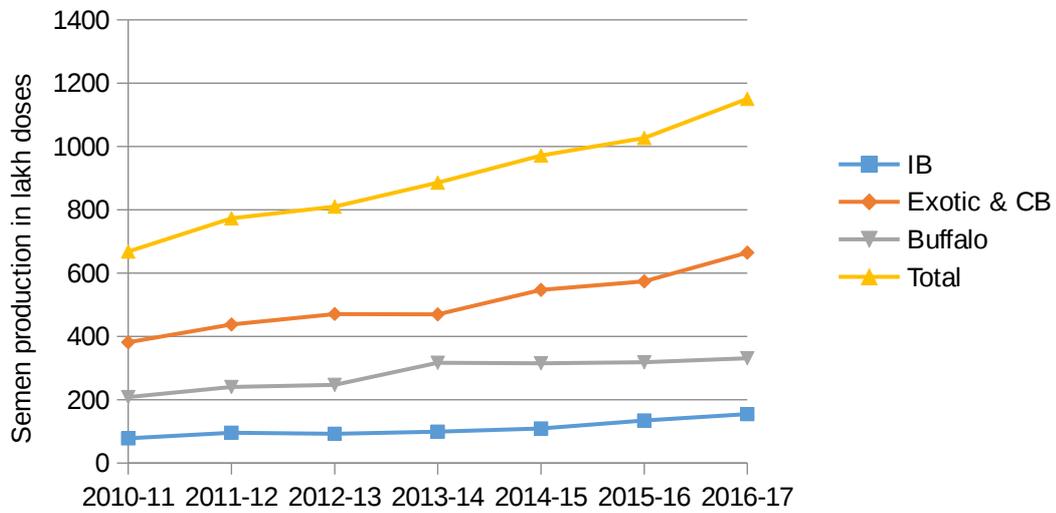
There are 55 semen stations, 40 with the central and State governments, 7 with cooperatives, 5 with National Dairy Development Board (NDDB), and 1 with NGOs and 2 with private. These semen stations together in 2016-17 produced some 115 million doses – 13.41 % of indigenous cattle breeds, 57.78% exotic & crossbred (HF and Jersey), and 28.8% buffaloes. Out of these 55 semen stations 51 have been graded as 'A' and 'B'. 42 semen stations have obtained ISO certification. All the semen stations in the country are following Minimum Standard Protocol formulated by Government of India in semen production.

Fig.2.13. Semen Production of various breeds

¹⁰ Action Plan for Doubling Farmers' Income by 2022, DADF, GOI.

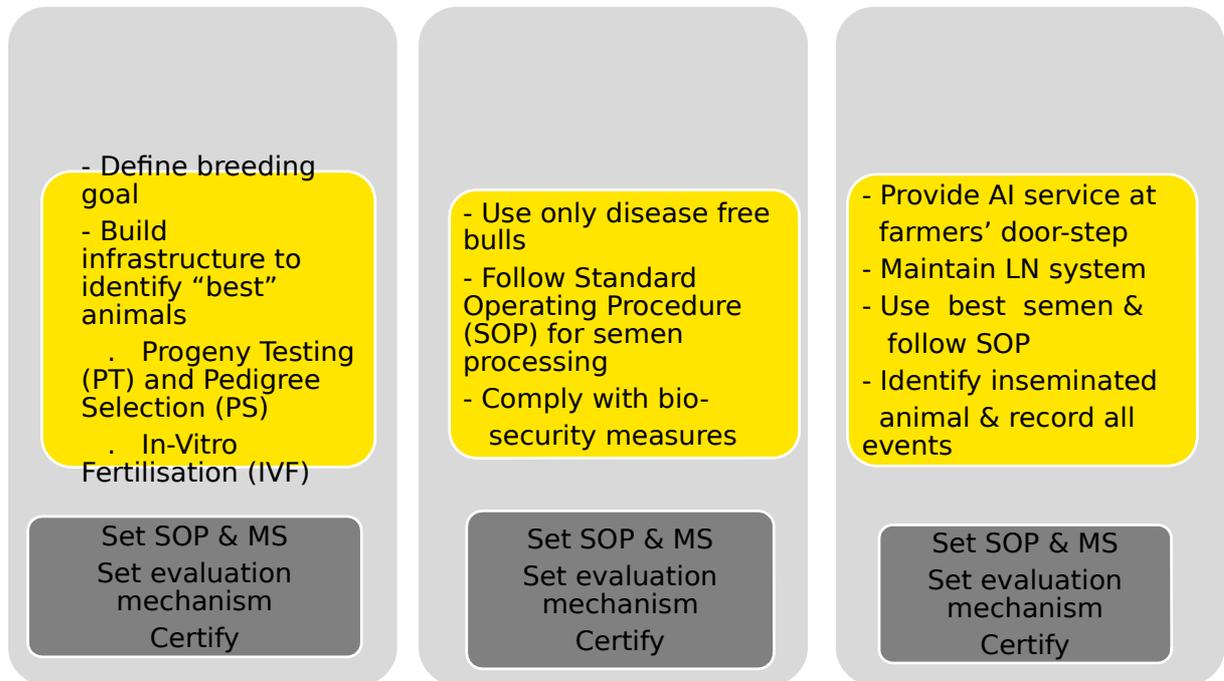
¹¹ Ibid.

Frozen Semen Production Trend



It can be seen in Fig.2.13. that the current semen production in cross bred cattle is almost double that of exotic cattle and buffaloes and more than 5 times that of indigenous cattle. To make-up the requirement of “Cross Breed Cattle Population”, a constant breeding process with exotic breed has to be encouraged. This will not only arrest the inbreeding but will allow the cattle population to have more gene coverage to reduce diseases and adapt to the climate change. The AI delivery strategy to increase productivity of breeds in India is described below in Fig. 2.14.

Fig.2.14. AI Delivery Strategy



AI delivery

There are 105182 AI centres, 55242 with Government, 19848 with cooperatives and 300,92 with NGOs & other private carrying out in all about 73 million inseminations annually.

AI coverage

At present 28% of the breedable bovine females are under AI coverage. Present conception rate ranges between 30 to 35%. Remaining breedable bovine females are covered through scrub bulls of unknown genetic merit. Since the current system of procurement of bulls is unscientific, the need of the hour is development and promotion of bull mother farms¹². Bull mother farms need to employ multiple ovulation and embryo transfer technology to improve the genetic stock. These farms act as a solution for low productivity of milk by producing cows with enhanced milk potential and supplying superior female calves and bulls to farmers.

2.5.3. Strategy for Feed Management

<p>▶ Development of Community Wasteland</p> <ul style="list-style-type: none"> • Involving community through soil water conservation • Introduce improved legumes , grasses and forage trees
<p>▶ Increase in Forage Yields</p> <ul style="list-style-type: none"> ▶ Good varieties of fodder and supply of quality seeds
<p>▶ Improvement of Nutritional Values</p> <ul style="list-style-type: none"> ▶ Improvement in quality of the fodder with new techniques
<p>▶ Complete Feed Rations</p> <ul style="list-style-type: none"> ▶ Decentralized complete feed production units can be established
<p>▶ Fodder Bank</p> <ul style="list-style-type: none"> ▶ Establishment of fodder banks in fodder scarcity regions through Dairy Federations and People's Organisations can help small farmers to feed their livestock during scarcity. Paddy and wheat growing areas where the straw is wasted, facilities for compacting straw should be installed and arrangement should be made to collect and pack them. Fodder banks can play a critical role in timely supply of feed to livestock owners during the drought years.
<p>▶ Introduction of bypass protein feed¹³</p> <ul style="list-style-type: none"> ▶ Avoid wastage of nutrients by feeding by-pass protein. Support should be provided to establish by-pass protein production units particularly in milk sheds where high quality milch animals are maintained.
<p>▶ Reduction of herd size</p> <ul style="list-style-type: none"> ▶ It is also necessary to create awareness among farmers to reduce their herd size and ensure optimum feeding instead of keeping a large number of underfed animals.

2.5.4. Dairy Processing Infrastructure

The following strategies need to be employed to improve the infrastructure requirements of dairy sector:

- ▶ Setting up of modernised and automated dairy plants along with replacement of old plants with modern technology and equipments.
- ▶ Water conservation measures like reutilisation of milk water from powder making plant and reutilisation of treated effluent water along with rain water harvesting mechanisms can be effectively employed at the dairy plants.
- ▶ Implementation of energy conservation measures like use of solar thermal energy for milk processing.
- ▶ Implementation of green building concepts at dairy plants.

2.5.5. New Technology in Dairy Sector

¹² "Bull Mother Farms", *The Hindu Website*, <http://www.thehindu.com/news/national/kerala/hitech-bull-mother-farm-breeding-centre-at-mattupetty/article3866404.ece> , accessed 3rd February 2018.

¹³ NDDB has standardized and commercialized bypass protein technology, using locally available protein meals such as rapeseed meal, sunflower meal, groundnut meal, guar meal and soybean meal. These protein meals are treated suitably to reduce their degradability in the rumen from 60-70 per cent to 25-30 per cent, in a specially designed airtight plant.

New technologies are being developed in dairy industry which has resulted in product and process improvement along with value addition in the dairy market chain. Some of the technologies that have the potential to revolutionise dairy processing include:

- ▶ Reverse Osmosis process can be used for milk concentration for double milk packs as well as milk transportation.
- ▶ Dairy plants can be effectively managed with latest improvements in automation industry. Advanced process control system can result in quality and efficiency of the operations.
- ▶ Implementation of vertical Automatic Storage and Retrieval Storage System (ASRS) for dairy products; this will manage shortage of land during plant expansion.

2.5.6. Dairy Processing and Infrastructure Development Fund (DIDF) Scheme

The Government of India announced created of DIDF scheme under NABARD with a total corpus of Rs.8000 Crores from 2017-18 to 2019-20. The aim of the scheme is to maintain competitiveness of the producer owned institutions in interest of the farmers. The broad objectives of the scheme include:

- ▶ To modernize the milk processing plants and machinery and to create additional infrastructure for processing more milk.
- ▶ To create additional milk processing capacity for increased value addition by producing more dairy products.
- ▶ To bring efficiency in dairy processing plants/producer owned and controlled dairy institutions, thereby enabling optimum value of milk to milk producer farmers and supply of quality milk to consumers.
- ▶ To help the producer owned and controlled institutions to increase their share of milk, thereby providing greater opportunities of ownership, management and market access to rural milk producers in the organized milk market.
- ▶ To help the producer owned and controlled institutions to consolidate their position as dominant player in the organised liquid milk market and to make increased price realisation to milk producers.

The key components of the scheme include:

- ▶ Modernisation and creation of milk processing facilities and manufacturing facilities for value added products
- ▶ Creation of village level cold chain infrastructure
- ▶ Setting up of electronic milk adulteration testing equipment

2.5.7. Schemes of Cattle Division

(a) *Rashtriya Gokul Mission (RGM)*:

- ▶ Increasing the productivity of the indigenous cow breeds had never been taken up in the country. However a project "Rashtriya Gokul Mission" has been launched in December 2014 for development and conservation of indigenous breeds through selective breeding specially for genetic upgradation of 11.3 crore low milk yield nondescript bovine population.
- ▶ It is time for the states to put all their energy in taking up development of more disease and climate resistant productive indigenous cow for the farmer than a foreign breed cow. It is an established scientific fact that the disease resistance and heat tolerant is much better in indigenous breeds like Kankrej, Gir, Sahiwal etc than the exotic breeds.
- ▶ The Rashtriya Gokul Mission is very timely in that sense and the cow as an income asset will become more productive and useful to the small and marginal farmer who largely own more than 90% of the poor productive cows.

The key components of the scheme include:

- ▶ Field Performance Recording (FPR) for propagation of elite animals
- ▶ Induction of High genetic merit bulls for AI & Natural Service
- ▶ Strengthening of bull mother farms
- ▶ Assistance to institutions maintaining elite animals of indigenous breeds
- ▶ Award to Farmers ("Gopal Ratna") and Breeders' Societies ("Kamdhenu"), AI Technicians, Veterinarians and states

- ▶ Establishment of “Gokul Gram”
- ▶ Extension of AI coverage through establishment of MAITRIs and strengthening of existing AI network
- ▶ Strengthening LN storage and transport system
- ▶ Skill development

Major Achievements made under the scheme:

- ▶ 31 bull mother farms strengthened for production of high genetic merit bull calves 1290 Bulls inducted at semen stations.
- ▶ Amount of Rs 173 crores sanctioned for establishment of Gokul Grams and 3 gokul grams are under completion.
- ▶ Funds sanctioned for establishment of 16000 MAITRIs and 4802 MAITRIs have been established
- ▶ 15581 existing stationary AI centres converted into mobile

Innovation related major achievements:

- ▶ 381 mass embryo transfers have been carried out during the the period 2-20 Oct. 2017
- ▶ 1,10,000 lakh mass AI using estrus synchronization has been conducted in the period 2-20 Oct. 2016.
- ▶ 50% increase in AI semen of indigenous breeds from 10 million to 15 million
- ▶ Global tender for sexed semen floated. Uttrakhand LDB and BAIF, Pune under finalisation
- ▶ 100 ETT/IVF experts trained during 2017-18

Also, the central breed improvement institute will also be strengthened for this, which was established in the 1960s. These institutions are as follows:

- ▶ Central Cattle Breeding Bull Mother Farms’ (CCBF) - at 7 locations
- ▶ Central Herd Registration Scheme centres at 4 locations for FPR
- ▶ Central Frozen Semen Production & Training Institute - Hessarghatta

(b) Gokul Gram:

The Rashtriya Gokul Mission also envisages establishment of integrated cattle development centres ‘Gokul Grams to develop indigenous breeds including upto 40% nondescript breeds:

- ▶ To promote indigenous cattle rearing and conservation in a scientific manner
- ▶ To propagate high genetic merit bulls of indigenous breeds
- ▶ To optimize modern Farm Management practices and promote Common Resource Management.

Establishment of 18 Gokul grams have been sanctioned under the scheme with an outlay of Rs 173 crores.

(c) National Kamdhenu Centre:

Further one more scheme has been initiated - Establishment of National Kamdhenu Breeding Centre scheme. Under the scheme, Two “National Kamdhenu Breeding Centres” are being established as a repository of indigenous germplasm to develop and conserve Indigenous Breeds in a holistic and scientific manner. The National Kamdhenu Breeding Centre (NKBC), besides being a repository of indigenous germplasm, will also be a source of Certified Genetics in the Country. An amount of Rs 25 crore each has been released to Madhya Pradesh and Andhra Pradesh for establishment of National Kamdhenu Breeding Centre. In the AP NKBC is established in 700 acres and 150 different breeds of cows and 50 different species of buffaloes have been preserved. Modern shed has also been constructed in 56,000 sq ft. The work is progressing rapidly in the wake of other facilities and almost all the work will be completed in March 2018. In the Madhya Pradesh 400 acres of land has been secured for the center, Tenders for work related to construction of shade etc. are being invited and Construction work will be started in February 2018 and is aimed to be completed in next 6 months.

(d) National Mission on Bovine Productivity:

The National Mission on Bovine Productivity has been initiated with an allocation of Rs 825 crore to enhance productivity of the bovines. The scheme has following components:

- (i) Animal health card and unique identification component
- ▶ Every year some Rs 40,000 crores are lost due to various diseases in the cow and the buffalo. This needs to be controlled and there should be a viable economic model to ensure 100% vaccination and disease control of such diseases like foot and mouth disease which will ultimately help in helping India increase its meager share of 0.4% world dairy trade share as the western world is extremely sensitive to disease control and management in food products.
 - ▶ In order to address this problem, Pashu Sanjivani an animal Wellness Programme - comprising provision of Animal Health cards ('Nakul Swasthya Patra') along with identification of 90 million animals In-Milk using UID and uploading data on National Data Base has been launched.
 - ▶ The Pashu Sanjivni program will help in the drive to increase productivity of the pashudhan with less disease.
 - ▶ An amount of Rs 74 crores as Gol share has been released to the States for identification of 88 million animals in milk.
 - ▶ As on date 10 million animals have been tagged and 20 lakh health cards have been printed.

(ii) Advanced Breeding Technology component

Under this initiative, Advanced Reproductive Techniques will be adopted to improve availability of disease free female bovines through of sex sorted semen technology & IVF (in-vitro-fertilisation) and ETT (embryo transfer technique).

- ▶ 8 million doses of sex sorted semen will be produced annually. Global tenders have already been floated.
- ▶ Further, 50 IVF/ETT labs will be set up under this initiative for production of 5880 bulls of high genetic merit (high milk yielding potential). Proposals for strengthening of 15 ETT lab has already been approved for production of 3000 bulls of indigenous breeds.
- ▶ Further a Rs 81 crores National Bovine Genomic Centre for Indigenous Breeds (NBGC-IB) is proposed to be established to increase production and productivity of indigenous breeds through genomic selection. These efforts will help in production of vastly improved breed of progeny and make the cow more and more productive with every passing year through use of genomic based identification technology which will reduce the selective breed upgradation program from seven years to just 2 years.

(iii) e-Pashuhaat portal market place

- ▶ Presently there was no national market place for identification and purchase of high quality semen doses, embryo, calves and adult animals of high yield.
- ▶ Under the e-pashuhaat initiative a web based portal has been launched in November, 2016 which is now providing a unified portal for online real time trading of bovine germplasm such as high yielding cows, heifers etc.
- ▶ This single web platform will provide valuable real time certified information on high quality animals and semen doses in real time for the benefit of the farmers both from the seller side and the buyer side. All such initiatives will help make the Indian cow more productive and therefore a better income generating asset in the possession of the poor farmer and realize the goal of doubling the farmers' income in the near future.
- ▶ Already information on 6.57 crores of high quality semen doses from 55 semen stations across the country, 372 embryos and 79000 live animals of high pedigree milk

2.5.8. Attracting investments in dairy sector

The dairy sector in India promises to have immense investment potential, offering high returns to the investors. The basic raw material for the dairy industry, i.e., milk is available in abundance in India. Along with availability of raw material, India has a plentiful supply of technically skilled labourers. There is an easy availability of technological infrastructure.

The different sectors within the dairy industry that provides business investment opportunities:

- a) *Biotechnology*: There is a huge potential available for foreign investors to invest in-
 - ▶ Dairy cattle breeding of high-quality buffaloes
 - ▶ Dairy cultures, including dairy biologics, enzymes, probiotics, and other coloring materials for food processing
 - ▶ Producing bio preservative ingredients based on dairy fermentation, such as pediococin, aciophilin, bulgarican, and Nisin contained in dairy powder
- b) *Dairy/Food Processing Equipment*: There are huge business opportunities for manufacturing and marketing of cost-effective, top-quality food processing machinery.
- c) *Food Packaging Instruments*: There is a tremendous investment opportunity for foreign investors in the manufacturing of both machinery and packaging materials of dairy products.
- d) *Retailing*: Retailing of dairy products also helps in standardization and upgrading dairy products in the main metropolitan cities.
- e) *Manufacture of Ingredients*: Manufacturing of ingredients involved in preparation of dairy products like ghee, condensed milk, and cheese offers a great potential for foreign investment.
- f) *Finished Products*: There is a great scope for investment in the manufacturing of finished dairy products such as cheese sauce and cheese powders.
- g) *Technically Advanced Manufacturing Units*: The investors can build world-class manufacturing units to support specialized dairy-related activities, such as cheese slicing, cheese packaging, butter printing, and dicing lines, which hold greater potential over other activities.

2.5.9. Export potential of the Indian in dairy sector

The dairy sector in India promises to have immense export potential, offering high returns to the investors. The basic final material for the dairy industry, i.e., Skimmed Milk powder, condensed sweetened milk, butter and ghee have the export potential to SAARC countries, middle east and some major countries in the Africa continent. Rejuvenation of the export scheme of APEDA for identification of such potential market is the immediate requirement.

2.5.10. Exit policy of dairy animal

Globally the dairy sector is profitable as there is a fall-out/exit market of the un-productive, unwanted or cold dairy animals. Till 2013 APEDA had registered an export of buffalo meat in far-east countries like Vietnam, Cambodia and North Korea. Now this export has come down. Revamping the pink revolution will boost the dairy farmers to generate profits otherwise stray animal will be a nuisance in the country. This will also help in preventing zoonosis, environmental pollution and protein security in our food.

2.5.11. Utilisation of unproductive animals

Unproductive animals should be bred in controlled environments under expert supervision. Their urine and dung can be used in the production of manure, fertiliser and vermi-compost which in turn increases the fertility of soil. Their meat can be used for consumption in domestic market as well as for exports. Their bones can be used in feed and fodder which will act as nutritional supplement for animals.

2.5.12. Enhancing productivity of indigenous breeds

The following would be the area of focus going ahead for dairy development in the country through the dairy development schemes being implemented by the Department:

- ▶ Extension of AI coverage from the present level of 20% to 35% of the breedable bovine females through establishment of 30,000 MAITRIs (Multi-Purpose AI Technicians in Rural India).
- ▶ Conservation and development of indigenous breeds
- ▶ Promotion of entrepreneurship in the dairy sector
- ▶ Skill up gradation of farmers and technical manpower
- ▶ Formulation of uniform training module and duration of training
- ▶ Accreditation of Artificial Insemination Training Centres
- ▶ Training and retraining of AI technicians at accredited AI training institutes
- ▶ Refresher training of professionals at reputed training centres
- ▶ Synergized Implementation of RGM, NDP-I and Dairy Entrepreneurship Development Scheme (DEDS) for inclusive dairy development with schemes of other Departments
- ▶ Quality control and certification of bulls and services at semen stations

- ▶ Creation of national data base on breeding programmes, milk procurement, milk processing and value addition.

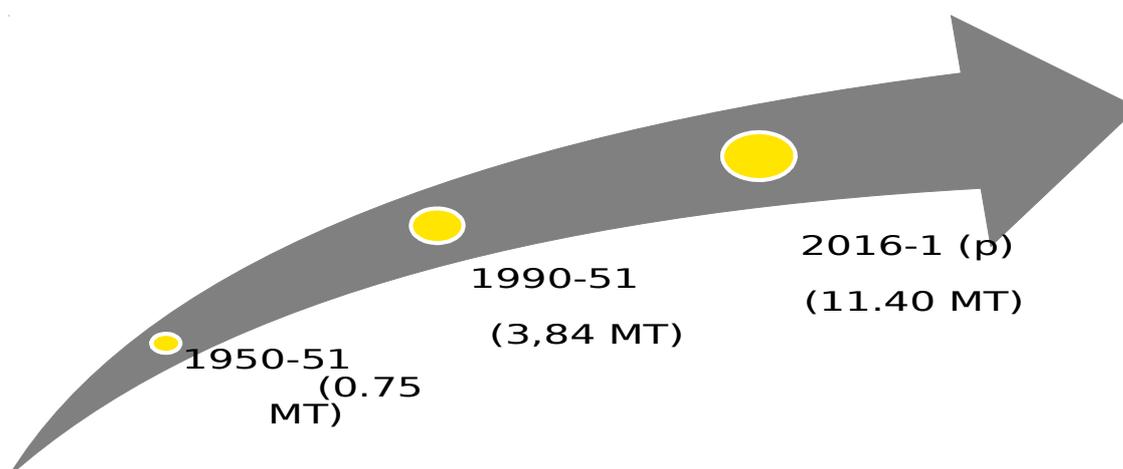
3. Fisheries

3.1. Brief overview of India's fishery system

The fisheries sector in India has undergone change by leaps and bounds- transforming itself from a purely traditional activity in the first Five Year Plan to a viable commercial enterprise.

Fisheries is a sunrise sector with varied resources and potential, engaging over 14.50 million people at the primary level and many more along the value chain. The growth in fish production has shown a cyclical pattern with an increasing long term trend. The sector has experienced a 14-fold increase in the last six decades, from 0.75 MMT (Million Metric Tons) in 1950-51 to 11.40 MMT in 2016-17 (p) (as shown in Fig. 3.1).

Fig.3.1. Fish Production over years



Presently India is the second largest fish producing and second largest aquaculture nation in the world after China. The total fish production during 2016-17 is at 11.40 MMT with a contribution of 7.76 MMT from inland sector and 3.64 MMT from marine sector. The fish production during first three quarters of 2017- 18 has also shown an increasing trend and is estimated at 9.24 Million Tonnes.

The fisheries sub-sector has recorded an average growth of about 6% over the Five Year Plan periods. The sector contributed about 0.92% to National GVA and 5.23% to the agricultural GVA in 2015-16. It contributes Rs.1, 22,775 Cr. to the GVA (at current prices).

During the financial Year 2015-16, India has exported Rs.37,870.90 Cr. which is about 0.92% of the National GDP and 5.23% to the agriculture GDP (2015-16). The Marine Products Export Development Authority (MPEDA) of India envisages an export earnings target of Rs.1,00,000 crore by the year 2022.

Some of achievements of policy and government interventions in fisheries sector during 2014-15 to November, 2017-18 include:

1. Central assistance of Rs. 133459.09 lakhs released for development of Fisheries Sector to various State/UTs.
2. Assistance provided for bringing 27982.65 ha area under aquaculture, benefited 65760 fish farmers

3. Sanctioned construction of 84 Nos of fish landing centers in inland sector
4. Approved the installation of 5,861 Nos cages/pens in reservoirs and other open water bodies
5. Approved establishment of 294 Nos of fish/prawn hatcheries
6. 5711 Traditional Crafts Motorised which benefited 28555 fish farmers.
7. Sanctioned 12,142 Nos of safety kits for Fishermen at Sea
8. Assistance provided to 288 Nos Traditional/Artisanal fishermen
9. 311 units of post Harvest Infrastructure facilities viz., ice plants & cold storage have been sanctioned
10. Approved construction of 11,480 fishermen houses
11. Insurance cover provided to total 18,720,343 fishers
12. Financial assistance provided to 9,09,294 fishers under Saving-cum-Relief component during fishing lean/ban period
13. To promote ornamental fisheries central assistance was provided for a total of 481 hatcheries in the country.
14. Rs. 200 crore assistance provided for procurement of 500 deep sea fishing vessels to promote deep sea fishing
15. Total 49361 fishers have been trained.

3.2. Brief overview of the fishery market in India

3.2.1. Mariculture

Mariculture is the farming and husbandry of plants and animals in marine or brackish water environments. Apart from the open sea, there are many brackish water areas and low lying tidal areas, spread over the country, having huge scope for this activity. Mariculture in the country over the years was confined largely to bivalve mollusc viz., mussels, edible oysters and pearl oysters, and to some extent seaweeds. With a thrust on development of technologies pertaining to sea cage farming during last decade, developmental plans with both forward and back ward linkages are envisaged to allow these activities to become significant contributors for production of seafood in the country.

3.2.2. Reservoir Resources

The manmade reservoir resources cover more than 3 million ha water spread area and are mostly distributed in varied climatic conditions congenial for fish growth. The average fish production potential was estimated at 250 kg/ha for reservoirs and about 350 kg/ha for wetlands. While reservoirs and freshwater aquaculture would be the two main pillars of growth, other resources such as upland water bodies, floodplain lakes and wetlands, irrigation canals, saline and waterlogged areas also need to be gradually mainstreamed to start contributing to the production. Another major activity in aquaculture sector is the cage/ pen culture in open waters, which has picked up very well in recent years. It offers vast potential for inland aquaculture in the country. The production potential from sustainable cage culture for table fish production is about 50 kg/m³ with enormous possibility for further expansion and intensification.

3.2.3. Freshwater fish farming

The freshwater fish farming lacks in quality inputs in terms of seed, feed, health management and marketing support. Programs aimed at production and distribution of quality seed and feed for aquaculture and also culture-based-capture fisheries, husbandry of farmed species and availability of quality water are essential to optimize production and productivity from inland fisheries and aquaculture in the country.

3.2.4. Cold water resources

The cold water resources are distributed mainly in the form of upland streams, rivers, lakes and reservoirs that are located at medium to high altitudes of Himalayan corridor such as Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, West Bengal and all North-Eastern States. The Himalayan region has around 8,243 km long streams and rivers, 20, 500 ha of natural lakes, 50,000 ha of reservoirs and 2,500 ha of brackish water lakes. These water bodies inhabit diverse kind of fish fauna, i.e., nearly 258 cold water fish species. At present, the total fish production from upland areas constitute about 3% of inland fish production of India which is a very small share of the overall production. Commercial farming of high value cold water species like exotic rainbow trout has been

taken up successfully and estimable progress has been made. Jammu & Kashmir, Himachal Pradesh and Sikkim are the leading states in trout farming.

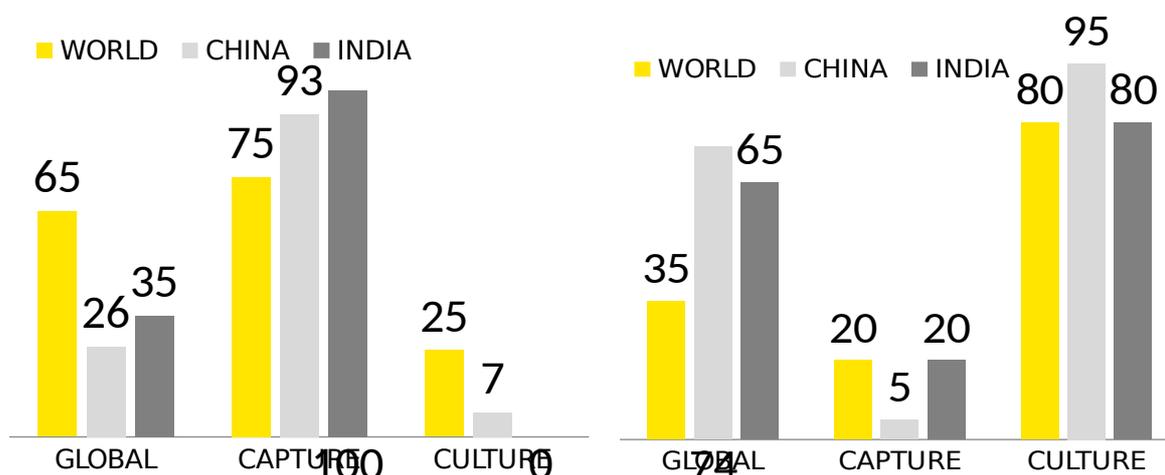
3.2.5. Brackish water estuaries

Brackish water estuaries or river mouth is another set of water bodies having the peculiarity of fluctuating salinity due to tidal effects and have huge potential for both fish and shell fish culture. Valuable fish like sea bass, pearl spot and shrimp could be cultured in large quantities. India has 1.24 million ha of brackish water area spread over all maritime States / UTs, but hardly 15% of brackish water areas are developed for commercial farming. Shrimps, oysters, mussels, crabs, lobsters, sea bass, groupers, mullets, milk fish, cobia, silver pompano, pearl spot, ornamental fishes and sea weeds are being farmed to some extent. The Coastal Aquaculture Authority (CAA) is regulating these activities in saline and brackish water systems within 2 kms from the High Tide Line (HTL) for sustainable development of coastal aquaculture sector.

3.3. Gaps and Challenges in Fisheries Sector

Though India ranks second in fish production after China, India ranks fairly low in several parameters of fish production as depicted in Fig.3.2.

Fig.3.2. Global Comparison of Fish Production



As per 2014 data, the fish production in China is almost 5 times that of India. The coast length of China is about 2 times that of India. China has twice the area of total inland water resources and 6 times the area of reservoirs than that of India¹⁴.

Table 3.1. Comparison of Fish production in India and China

S#	Parameters	India	China
1	Total Inland water resources	75,000 sq. km	1.76 lac sq. km
2	Reservoirs	31,000 sq.km	1.96 lac sq. km
3	Coast length	8,118 km	14,500 km
4	Exclusive Economic Zone (EEZ)	2.02 Million sq. km	0.88 Million sq. km
5	Production	11.40 Million	55.2 Million Ton

¹⁴ Action Plan for Doubling Farmers' Income by 2022, DADF, GOI.

		Tons	
6	Productivity (Pond)	About 2-3 ton / ha	About 5-8 ton / ha

3.3.1. Low production and Low productivity

Though ponds contribute to 80% of the total production of inland fisheries, only 65% of the ponds are used in the yield. Those existing 65% of the ponds use traditional and unscientific methods of production.

Table.3.2. Production Frontier of fish production

Source	Area (lac Ha)	YIELD / ha	PRODUCTIO N (Lakh Tons) 2014-15	POTENTIAL YIELD realised %	POTENTIAL YIELD based on Col 5	TOTAL POSSIBLE PRODUCTI ON (LT) @60% area based on Col 6	GLO BAL % YIEL D realized	GLOBAL YIELD LEVEL POSSIBL E / ha as per Col 8	GLOBAL LEVEL POSSIB LE (LT) @60% area as per Col 9
1	2	3	4	5	6	7	8	9	10
Reservoirs	31.5	100 kg	3.5	20	500 Kg	9.45	2.5	4 tons	75.6
Wetlands	7.4	0.22 tons	1.63	30	0.73 tons	3.24	8	2.75	12.21
Brackish water	14.1	3.5 tons	5.46	54	6.48 tons	54.82	11.7	29.9	252.92
Ponds	22.1	2.2 tons	51.78	64	3.9 tons	86.25	18.6	11.8	156.46
Total	75.1		62.37			153.76			497.19

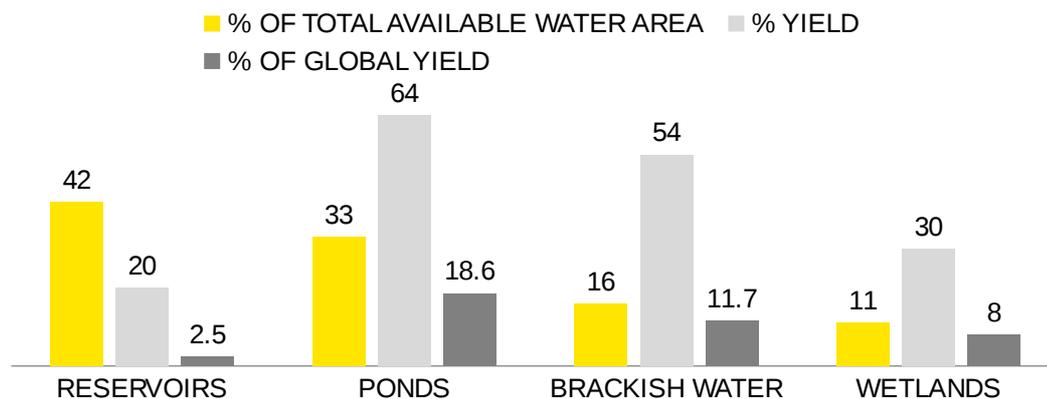
Thus the present inland fisheries production can be raised from 62.37 Lac Tons, valued at Rs.62,370 Crores (Rs.100/kg) to 109.02 Lac Tons (74.8% more) valued at 1.09 Lac Crores. If the production is at global level, then the production can be raised to 497.19 Lac Tons (8 times more) valued at over 5 Lac Crores¹⁵.

3.3.2. Untapped Potential of Inland Fisheries and Aquaculture

In terms of marine capture, India has utilised about 81% of the total marine production of 3.5 million tonnes. However, there are myriad of opportunities in capture and aquaculture of inland fisheries.

Fig. 3.3. Aquaculture Scenario in India

¹⁵ Ibid.



Freshwater aquaculture with a share of 34 percent in inland fisheries in mid-1980s has increased to about 80 percent in recent years.

3.3.3. Lack of Processing and Storage facilities

Due to lack of organized business arrangements and preservation infrastructure (Cold chain Storage) for perishable items like fish, organised sector accounts for less than 10% of the total market share of fish production. The potential of water resources have not been tapped to the optimum level due to lack of cluster based approach and policy formulation at the regional level. More than 90% of the fishes produced are sold without any processing and hence there is value addition in less than 10% of the cases.

About 75% of the fishes produced become non-saleable in the market due to lack of storage and preservation facilities which in turn affects the income of farmers negatively. Due to lack of storage facilities near reservoirs, there is a loss in fish production¹⁶.

3.3.4. Distribution infrastructure

The current mission of The National Institute of Fisheries Post Harvest Technology and Training (NIFPHATT) is to take up the new challenges and opportunities in the fisheries sector such as post-harvest technology upgradation and dissemination, human resource development, gender development, relief and rehabilitation programmes for the fishermen communities and consultancies in fisheries infrastructure and post-harvest technology.

An amount of Rs.601.47 lakh was released under Infrastructure Post Harvest Processing towards modernization of fishing harbours and fish landing centers in Gujarat, Tamil Nadu and Kerala. Nearly 32 ice plant and other post-harvest infrastructure projects were assisted benefiting about 480 fishers.

3.3.5. Value adding infrastructure

Fisheries infrastructure and technology were practically nil or rudimentary in the past few years. The fish production in India during 1940's & 50's could in no way be comparable to that of the present day production. The introduction of mechanized fishing, initiated in India by the Indo-Norwegian Project (the forerunner of NIFPHATT) has opened a new chapter in the marine fish production of India. Now marine products have risen to the level of earning a major portion of foreign exchange for India.

India is the second highest exporter of shrimps in the world. Out of the total exports of fishes of Rs.37,870.90 Cr. during 2016-17, the share of export of shrimps was 66% Shrimps but global share in exports was merely 3%. It is important to note that in the last 6 years, the price compound annual growth rate (CAGR) was 18.5% for domestic fish and 13.8 % for exports¹⁷, which provides a good case for future business opportunities in fisheries sector. Fish production is also an important factor for improving food and nutritional security of the nation, especially in terms of protein content.

3.4. Blue Revolution

¹⁶ Action Plan for Doubling Farmers' Income by 2022, DADF, GOI.

¹⁷ Action Plan for Doubling Farmers' Income by 2022, DADF, GOI.

In an attempt to realise the unlimited potential and opportunities of fisheries sector, our Hon'ble PM launched 'Blue Revolution' or the Neel Kranti Mission in December 2015¹⁸.

Vision: Creating an enabling environment integrated development of the full potential of fisheries of the country, along with substantially improvement in the income status of fishers and fish farmers keeping in view the sustainability, bio-security and environmental concerns.

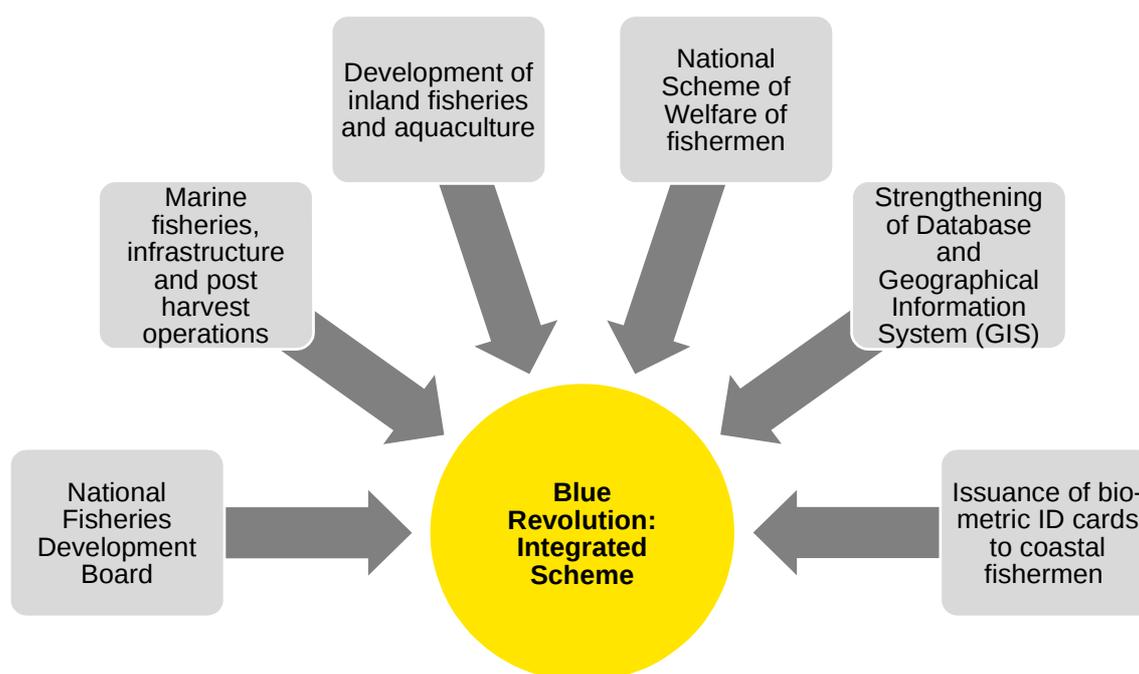
Mission:

- ▶ Achieving growth rate of about 8% annually on a sustainable basis over a period of 5 years
- ▶ To achieve fish production from 10.16 MMT in 2014-15 to 15 MMT by 2019-20

Objectives:

- ▶ To fully tap the total fish potential of the country both in the inland and the marine sector and triple the production by 2020
- ▶ To transform the fisheries sector as a modern industry with special focus on new technologies and processes
- ▶ To double the income of the fishers and fish farmers with special focus on increasing productivity and better marketing postharvest infrastructure including e-commerce and other technologies and global best innovations
- ▶ To ensure inclusive participation of the fishers and fish farmers in the income enhancement
- ▶ To triple the export earnings by 2020 with focus on benefits flow to the fishers and fish farmers including through institutional mechanisms in the cooperative, producer companies and other structures
- ▶ To enhance food and nutritional security of the country

Fig.3.4. Components of Blue Revolution



18 "Blue Revolution", PIB Press Release, <http://pib.nic.in/newsite/PrintRelease.aspx?relid=160888> , accessed 25th January 2018.

3.4.1. Increasing productivity through Blue Revolution

1. *Increasing Fish production at Ponds, Reservoirs, Wetlands, Brackish water, Cold water:*
 - ▶ 20 States, 200 Hatcheries - 15Bn fingerlings/year
 - ▶ 2,000 Cage culture & 100 Re-circulatory Aqua-culture / year
 - ▶ Increase production from 10MT to 15 MT by 2019-20
2. *Tap new areas through ornamental Fish culture:*
 - ▶ Setting up 100 high market value species based Hatcheries across 7 states
 - ▶ Increase in exports from 15 Crores to Rs.100 Crores
 - ▶ Increase in domestic market share from Rs.300 Crores to Rs.1,000 Crores
3. *Exploit Deep sea Fishing (DSF) & Mariculture:*
 - ▶ Rs.1,700 Crores DSF Scheme for interest subvention
 - ▶ 500 ocean cage culture, 10 Sea Ranches
4. *Establishment of Cold Chain Infrastructure, Fish / Shrimp Processing Parks:*
 - ▶ Set up Cold Chain facilities in 25 existing Fish harbours
 - ▶ Set up 10 Disease Diagnostic Labs for Shrimps, etc
5. *Reduction in cost of feed and increase in provision of Nutritive Feed:*
 - ▶ Green Water Technology, AIT
 - ▶ Fish waste in harbours, Pelletised feed
6. *Outreach and Capacity Building of farmers:*
 - ▶ Quality for higher value of fish production
 - ▶ 100 Women and Farmer Producer Organisations
7. *Creation of Fisheries Development fund:*
 - ▶ Funded by National Bank For Agriculture And Rural Development (NABARD), Asian Infrastructure Investment Bank, Asian Development Bank (ADB)
 - ▶ The EFC meeting has been completed on 11th January, 2018 and the minutes of the said meeting is awaited.

3.5. Strategies for growth of fisheries sector

3.5.1. Effective Implementation of schemes and policies

- ▶ State Action Plan should be formulated on the basis of fund-based allocation and availability of water resources
- ▶ Time-bound Monitoring and Evaluation of schemes and policies at national, state and district level by monitoring committees
- ▶ My Fishery App- This will act as a one-stop portal for all the queries related to fisheries sector, used for data analysis, Geographic information science (GIS)-based tagging and transfer of funds through direct benefit transfer (DBT).
- ▶ Establishment of call centers and grievance redressal mechanism for fish farmers on a periodic basis

3.5.2. Capacity Building of fish breeders and farmers

- ▶ Village level schemes in coordination with Panchayati Raj institutions
- ▶ Establishment of fish cooperative organisations
- ▶ Establishment of union or association of fish breeders and farmers

- ▶ Knowledge sharing arrangement and sharing of best practices among breeders
- ▶ Training and Skill development of fish farmers with respect to scientific breeding practices to increase productivity

3.5.3. Convergence of Schemes and Policies

- ▶ Integration of Blue Revolution with other schemes including Ministry of Food Processing Industries (MOFPI), Rashtriya Krishi Vikas Yojana (RKVY), Mahatma Gandhi National Rural Employment Guarantee Act (MILLIONREGA), National Rural Livelihood Mission (NRLM). For example, the ponds established under MILLIONREGA are not used effectively for aquaculture or development of fisheries. These ponds can be used effectively for fish hatcheries and organised cluster development.
- ▶ Matsya Mitra for collection and distribution and Bank Mitra for providing loans
- ▶ Establishment of fish parks for quality benchmarking
- ▶ Setting up markets inside towns and cities
- ▶ Signing of relevant MoUs with related ministries
- ▶ Strategies related to allocation among states and setting up alignment centers

3.5.4. Providing a balanced view of development of fisheries sector through research

This requires synergy between fish R&D centers of ICAR and institutions including Central Institute of Brackish water Aquaculture (CIBA), Central Inland Fisheries Research Institute (CIFRI), Central Institute of Freshwater Aquaculture (CIFA), Directorate of Coldwater Fisheries Research (DCFR), and National Bureau of Fish Genetic Resources (NBFGFR). Also it will require establishing support and coordination at multi-national level through inking of MoUs

3.5.5. Development of Fisheries technologies

Various fisheries research institutes and universities have conducted extensive scientific research have resulted in development of new technologies like fish stock assessment, captive breeding and hatchery technology for marine, freshwater and ornamental fishes, genetic up-gradation, disease diagnostics, cage culture of high-value fish and shellfish species, seaweed cultivation and pearl culture.

3.5.6. Start-ups in Fishery sector

Various research institutes of fisheries sector have established Agri-Business Incubation (ABI) Centres to nurture the development of technology-based and knowledge-driven agri-business ventures. These research centres also provide an entry point for the start-ups in the initial period of 2-3 years by providing the following requirements-

- ▶ Technical and management assistance
- ▶ Value added services like market research, business planning and access to seed capital
- ▶ Access to workspace and specialised equipment
- ▶ Training, accreditation and networking support

3.5.7. Attracting investments in fisheries sector

During 2017-18 an amount of Rs.1,108.52 lakh was released to States towards taking up cage culture activities, and training on cage culture management in reservoirs. During 2016-17 an amount of Rs.206.54 lakh was released under ornamental fisheries other activity to 2 States towards establishment of 12 medium/backyard ornamental fish hatcheries, one integrated ornamental unit, project on National Disease Surveillance Programme and awareness programme during Swachta Pakhwada celebration.

During 2017-18 an amount of Rs.617.94 lakh was released to Kerala for different mariculture activities. As a new technology in Recirculatory Aquaculture System Rs. 779.00 lakh has been released to States.

During 2017-18 Rs 888.11 lakh has been sanctioned to Central Marine Fisheries Research Institute against two research projects namely: "Enhancing Production of Farmed Cobia (*Rachycentron Canadum*) Through The Establishment of Brood Bank And Supply of Larvae To States For Seed Production" and "Enhanced Production of Farmed Pompano Through The Establishment of Broodbank and Supply of Larvae To States For Seed Production".

Export Promotion

An interactive business portal called 'Fish Exchange Portal' was launched by MPEDA. The portal is a 'one stop shop' for trade needs in fisheries sector and aims at enhancing the export trade between registered seafood exporters of India and buyers abroad¹⁹. It contains the entire gamut of information regarding Indian seafood exporters, country profiles, regulatory, and tariff information, standards, notifications and information on upcoming business events/ fairs.

4. Poultry, Small Ruminants and Ensuring Feed and Fodder

4.1. Poultry Sector

4.1.1. Overview of Poultry Sector

The poultry population of India is around 729 million out of which 5 States, i.e., Andhra Pradesh, Tamil Nadu, Maharashtra, Karnataka and West Bengal have 65% of the total population. India produced 88 billion eggs in 2016-17; the per capita egg production being 66. The sector has grown at a rate of 5% over the years. Poultry exports was around Rs.531.65 crore in 2016-17. India is currently ranked 3rd in egg production and 6th in chicken meat production in the world²⁰.

Some of the existing government and policy level interventions in the sector include:

1. *Productivity Enhancement:*
 - a) Rural backyard Poultry Development
 - b) Innovative Poultry Productivity Project
 - i. Broiler rearing
 - ii. Low Input Technology Birds
2. *Entrepreneurship Development and Employment Generation-Poultry Venture Capital Fund (EDEG-PVCF)* : Budgetary allocation was Rs.273 Crores for FY 2014-17
3. *Modernization and Development of Breeding Infrastructure:*
 - a) Central Government farms
 - b) State / University farms

4.1.2. Challenges in Poultry Sector

The major areas of concern in the poultry sector include:

¹⁹ "Fish Exchange Portal of MPEDA launched, MPEDA Website, http://mpeda.gov.in/MPEDA/news_details.php?pg=fish-exchange-portal-of-mpeda-launched# , accessed 30th January 2018.

²⁰ Action Plan for Doubling Farmers' Income by 2022, DADF, GOI.

- ▶ Low Farm Size
- ▶ Lower feeding stuffs prices and improved availability consequent to higher domestic production, falling exports and imports of raw materials
- ▶ Lower bad debts and write-offs will offset higher energy and labour costs
- ▶ Positive and negative impact of fewer but bigger operators at breeder and commercial levels
- ▶ Lack of state of art processing plants and post-harvest technology are available

4.1.3. Opportunities in Poultry Sector

- ▶ Government policies relating to investments in poultry and ancillary industries, taxation, import duties, excise levies are positive
- ▶ Increase in income generation vis-à-vis purchasing power in the rural poor and marginal farmers
- ▶ Value added poultry products will have high demand and also increase consumer acceptance

4.1.4. Strategy for growth of poultry sector

The strategies for different subsectors of poultry are different and major ones are as follows:

Strategy for Unorganized Sector: Transform Backyard Poultry to commercial economic model

Already Private Industry and NABARD encourage economically viable / bankable projects, wherein the scale is much higher and so, beyond the reach of small and marginal/ BPL farmers. The goal is to bring these landless, small and marginal farmers into mainstream of economic activity.

Presently, we have a component under National Livestock Mission (NLM), namely, Rural Backyard Poultry Development (RBPD) which covers beneficiaries from BPL families to enable them to gain supplementary income and nutritional support. Under RBPD, the chicks/ birds suitable for rearing in the backyard are reared in the mother units upto 4 weeks and are further distributed to the BPL beneficiaries in atleast two batches.

It is proposed to move incrementally from this subsistence model of backyard poultry farming to a scaled-up entrepreneur model, upscaling incrementally. A pilot Innovative Poultry Productivity Project is launched in limited States in this regard.

Strategy for Transitional Sector- Small/ Marginal/ Entrepreneurial segment

Boost Entrepreneurship Development and Employment Generation component. This will also be ensured in clustered manner with unorganized sector where the IPPP, RKVY and State Programs will all be focused in clustered manner to enable shared services and attain economies of scale.

Strategy for Organized Sector

- i. An interest Subvention scheme may be proposed with a corpus fund for small and medium scale entrepreneurs / FPOs, Women SHGs etc.
- ii. Processing would be encouraged as presently only 6% of the poultry products is processed. This needs to be given adequate attention in collaboration with Ministry of Food Processing Industries.
- iii. Intensify skill development in the poultry sector and fulfill the required skilled manpower
- iv. Encouraging exports dovetailing of efforts with APEDA.

4.2. Small Livestock

4.2.1. Brief overview of the sector

The small ruminant sector, comprising of sheep and goats, constitute an important role in the agrarian economy, especially in areas where crop and dairy farming are not economical. It plays an important role in employment generation of a large proportion of landless as well as small and marginal farmers. Piggery on the other hand is still at its infancy and is being given due attention for its development.

The Mission also supports initiatives relating to development of poultry, piggery, small ruminants and other minor livestock species as per the agro-climatic conditions of different regions/states. An amount

of Rs.2,800 crore had been allocated for carrying out above activities under National Livestock Mission for the 12th Five Year Plan.

India has 10.71% of world's livestock population and stands second in cattle & goat population and third in sheep world over. The below table depicts the sheep & goat population and the number of farmers involved.

Animal	Population (2012 census)	Number of farmers
Sheep	65 million	4.55 million
Goat	135 million	33.01 million

Goat provides 3.54 % of the total milk production in the country. The total quantity of wool is 43.6 million Kg. Goats contribute Rs.1,06,335 million annually to the national economy and are a source of nutritional security to small and marginal farmers.

4.2.2. National Livestock Mission

Components under this to develop the Small Ruminants and Pig are,

1. *Central Farm-Central Sheep Breeding Farm, Hisar (Haryana)* : The farm was established in 1969-70 in collaboration with the Government of Australia during the Fourth Five Year Plan with the objective of producing acclimatized exotic rams for distribution to various State Sheep farms and training of personnel in sheep management and mechanical sheep rearing. Presently the farm is keeping Nali X Ramboulett and Sonadi X Corriedale crosses, as well as Beetal goats.

During 2016-17, the farm supplied 303 rams and 11 bucks to different State agencies and farmers. In addition, a total of 25 farmers were trained in sheep management and production, while another 90 farmers were trained in machine shearing techniques and 666 nos of farmers have been trained under one day training programme till 15th December, 2016²¹.

2. *Strengthening of breeding infrastructure of State / University farms*: During 2016-17, three state goat farms were assisted to strengthen and modernize their set-up and infrastructure. These farms are located at Odisha, Telangana and West Bengal and funds to the tune of Rs.37.53 lakhs, Rs.29.04 lakhs, Rs. 36.30 lakhs respectively, have been released to these farms.

During 2016-17, an amount of 290.40 lakh has been released to the State of Punjab for strengthening of 2 government pig farms and for setting up of 1 swine semen processing lab at Nabha.

3. *Sub-Mission on Pig Development in North-Eastern Region* : There has been persistent demand from the North-Eastern States seeking support for the all- round development of pigs. Therefore, in the North Eastern Region, pig development is being implemented as a Sub- mission of the NLM.

During 2016-17, a total of 7 pig farms were assisted for strengthening i.e. 2 in Manipur, 1 in Meghalaya, 2 in Mizoram and 2 in Nagaland and funds to the tune of Rs.133.398 lakh, Rs.45.0 lakh, Rs.117.99 lakh and Rs.90.0 lakh respectively, have been released. Under health cover, during 2016-17, amounts of Rs.85.5 lakh to cover 1.4 lakh nos of animals in Meghalaya, Rs.54.0 lakh to cover 3 lakh nos of animal in Mizoram and Rs.81.0 lakh to cover 5 lakh nos of animal in Nagaland, have been released.

In addition, during 2016-17, for importing 225 nos of germplasm, funds amounting to 40.5 lakh were released to Nagaland.

4. *Entrepreneurship Development and Employment Generation (EDEG)* : Under the Sub-mission of Livestock Development of NLM, the Component- Entrepreneurship Development and Employment Generation (EDEG), an amount of Rs. 6600 lakh has been released to NABARD to channelize the funds for establishment of poultry, pig and sheep/ goat rearing & breeding units in various states to encourage entrepreneurship development.

²¹ Annual Report 2016-17, Department of Animal Husbandry, Dairying & Fisheries, Government of India.

Till November, 2016, a total number of 4,964 beneficiaries have been assisted for establishment of poultry (1,482), sheep/ goat (3,468) and piggery (14) units for Entrepreneurship Development and Employment Generation among women, poor and marginal farmers.

4.2.3. Challenges faced by this sector

In the 2012 Livestock Census, the population of Sheep was 65 million and Goat is 135 million; there is a decrease in population of Sheep by 9% and Goat by nearly 4% from the 2007 Livestock Census. This has been attributed to more culling/death than the male goats/ sheep produced due to increasing demand of meat in the country as compared to the available progeny from the natural reproduction rate. The long term consequence of this would be shortage of goat and sheep meat which in turn has impact on the nutritional requirement fulfilment of the country's population. Some of the other major challenges include:

- ▶ Low Yield: Natural vegetation, degraded common grazing lands and tree lopping are amount the causes of low productivity of goats.
- ▶ Low Farm Size: The current number goat and sheep (per farmer) are 4 and 20 respectively while the required numbers are 20 and 100.
- ▶ No cross-breeding: The productivity is minimal because of no or low cross breeding.
- ▶ Small farm size
- ▶ Lack of proper food and nutrition
- ▶ Poor technology
- ▶ Pre and post-harvest losses
- ▶ Availability of inputs
- ▶ Value adding services
- ▶ Deficit of facilities including cold storage, advertisement and packaging.

Thus, to increase the meat, milk and wool production, breed improvement in case of indigenous breeds and upgrading through imported germplasm in case of non-descript small ruminants through breed Improvement of goats and sheeps with focus on separate identified breeds, importing germplasm of suitable genetic traits need to be practiced.

4.2.4 Opportunities in Small Ruminant Sector

- (1) The growing demand of products
- (2) Low start-up cost or Low production costs compared to other breeds and animal species
- (3) Integrated Systems Farming/ Mixed Species Farming
- (4) Untapped potential for the export & value added products.
- (5) Paradigm shift in Government policies.
- (6) Modern production technologies and tremendous growth potential.
- (7) Industry with tremendous growth potential.

4.2.5 Strategies for growth of small ruminants

Currently, Department of Animal Husbandry, Dairying & Fisheries is implementing the following schemes under the National Livestock Mission,

- A. Under the Submission Livestock Development, a Component – Interventions towards Productivity Enhancement. Under this Component, there is a Sub-component – Innovative Projects and under this,
 1. **Innovative Pig Development Project for North East (IPDPNE)**,with the objective to increase the income of the Pig rearing farmer / entrepreneur/ NGO / Cooperative Society, etc so as to achieve the Honourable Prime Minister’s plan for doubling the farmer’s income. This is envisaged to be done by incorporation of superior germplasm of high genetic merit through import and eventually, to fetch an increase in the income of the pig rearer.
 2. **Innovative Project for “Genetic Improvement of Goat and Sheep” (GISG)**, with the objective to increase the meat, milk and wool production per se and per animal, breed improvement is the key which would at the same time help in increasing the farmers income as part of the achievement of the vision of the Hon PM for doubling farmers income. Currently focused to 8 states Andhra Pradesh, Karnataka, Tamil Nadu, Himachal Pradesh, Gujarat, Rajasthan, Uttar Pradesh and Punjab
- B. Under the Sub-Mission of Livestock Development of NLM, the Component- Entrepreneurship Development and Employment Generation (EDEG), funds are released to NABARD to channelize the funds for establishment of sheep, goat and pig Commercial as well as Breeding units in various States to encourage entrepreneurship development.
 1. Integrated Development of Small Ruminants & Rabbits (IDSRR),where department is giving support for the establishment of breeding and commerce units.
 2. Pig Development schemes, where department is giving support for the establishment of breeding ,commerce units and retail pork outlets with chilling facility.
- C. Increase in yield or Productivity of animals is the single most important factor that can increase farmers’ income and strengthening of the sector. Also, the untapped export oriented production potential of the sector will contribute the National Income. On the other hand, realizing the need to pay special attention to the vision and goal set, for

doubling of farmers income by 2022 by the Honourable Prime Minister, the small livestock sector need to evolve very specific and concrete strategies to achieve the targets. Hence, the division formulated the National Action Plans separately for Sheep, Goat and Pigs.

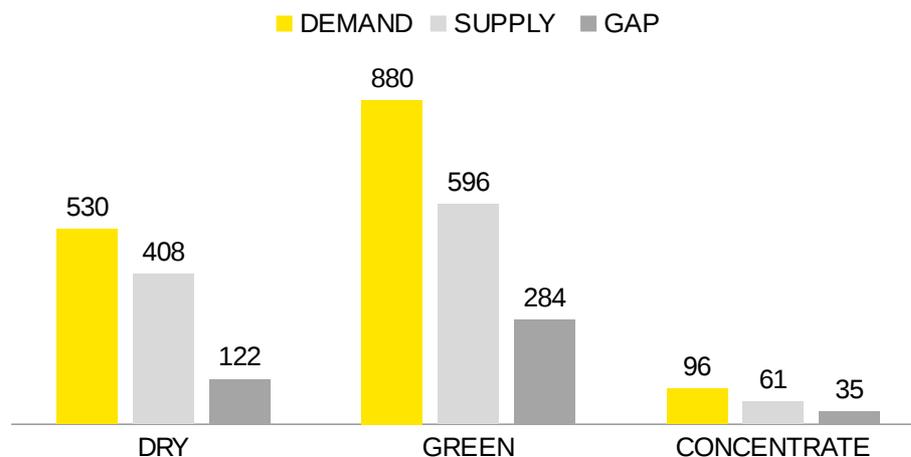
1. The National Action Plan for Sheep envisages, increasing the Mutton production to 7.5 Lac Tonnes and 46.5 Thousands Metric Tons of Wool from the 40% non-descript and 60 % population comprised with pure/graded/crossbred/exotic animals, anticipated to be achieved through genetic improvement. At present the sheep population is 66 million and to achieve the physical targets, an increase of approx.30 million more animals per year needed over the plan period.
 2. The National Action Plan for Goat envisages, increasing the Chevon production to 12.6 Lac Tonnes and 8.2 Million MT of Goat Milk from the non-descript population anticipated to be achieved through genetic improvement. At present the Goat population is 135 Million and to achieve the physical targets, an increase of approx.114 million more animals needed.
- i. The National Action Plan for Pigs, envisages, increasing the pork production to 7.8 Lac Tonnes from the non-descript population anticipated to be achieved through cross breeding, and there by double the pork production from non- descript animals and a total contribution of increase of 50% from the present total pork production.

4.2. Fodder and Feed Development

4.3.1 Challenges for feed and fodder development in India

India constitutes about 10.86% of world's livestock resource; the livestock population being 512.05 Million and poultry of 729.2 Million. However, only 4.9% of the gross cropped area (6.9 Million Ha) is under fodder. There is requirement of approximately 3.55 lac tons of seed / annum to produce 880 Million Tons of green fodder from 9.1 Million Ha. Moreover, India has no policy for fodder and feed security.

Fig.4.1. Fodder Status in India



To overcome the shortage of feed and fodder and to improve the nutritive value, the department is implementing the sub-mission on Feed and Fodder Development. It is to mention that India with only 2.29% of the land area of the world, is maintaining about 10.71% of the livestock population of the world. Some of the fodder schemes are:

1. Fodder Production from CPRs outside Forests
2. Fodder Production from Forest Land
3. Cultivation of Coarse Grains and Dual Purpose Crops
4. Fodder Seed Production / Procurement and Distribution
5. Conservation of Fodder through Post-Harvest Technologies:
 - i. Chaffing of fodder
 - ii. Densification of dry fodder
 - iii. Ensiling green fodder
 - iv. Feed enrichment
 - v. Feed testing
6. Regional Fodder Stations

4.3.2. Strategies for Feed and Fodder Development

- ▶ Focuses on assured irrigated areas with high milk production - supply of fodder seed – maize, sorghum and berseem, lucerne (3 crops of maize – summer crop in areas of assured irrigation)
- ▶ Cover pasture land (10.2 Million Ha) and waste land (19.26 Million Ha) with scientific fodder cultivation
- ▶ Rehabilitation of degraded land and forest fringe areas with perennial fodder grasses including moringa (sahajan) & hedge lucerne etc for small ruminants
- ▶ Crop residues collection, storage & management to ensure dry fodder security for livestock rearers in normal as well in deficit areas
- ▶ Fodder depots for dry fodder, forages & concentrates in high density milch animal locality
- ▶ Facilitate procurement of Soya and Maize for Feed industry by Price Deficiency Payment as per MSP by GOI – Rs. 60 crs for 3 Million Tons – payment to farmers through DBT – assured feed of 1.8 Million Tons
- ▶ Use of innovative techniques including – silviculture, horticulture, hydroponics

5. Meat Production

5.1. Current Meat Industry Status in India

It has been found that the meat production in the July-October in FY 2016-2017 has increased by 8.48%, which is 33% of the targeted meat production of 7.37 million tonnes. About 48.68% of meat is contributed by poultry and 20% from buffaloes. Uttar Pradesh, Maharashtra, West Bengal, Andhra Pradesh, and Telangana are key meat producers.

Buffaloes in India contribute 31% of total meat production. The contribution by cattle, sheep, goat, pig and poultry is 31% (5%, 10%, 10%, 11%, respectively). The share of bovine meat is 52% and small ruminants 15% and red meat 77%. In spite of big potential and large livestock population, meat industry has not grown up to its expectations. Meat industry had not been acknowledged seriously by the policy makers, entrepreneurs, scientists, and government bodies, though it is linked with economic condition of the backward communities. At the same time the meat production is intimately linked with leather production in which India acquires second position in the world after Italy. One of the major huddles which come in meat production is unhygienic meat produced in the domestic slaughter house, with minimum care about the quality of the meat.

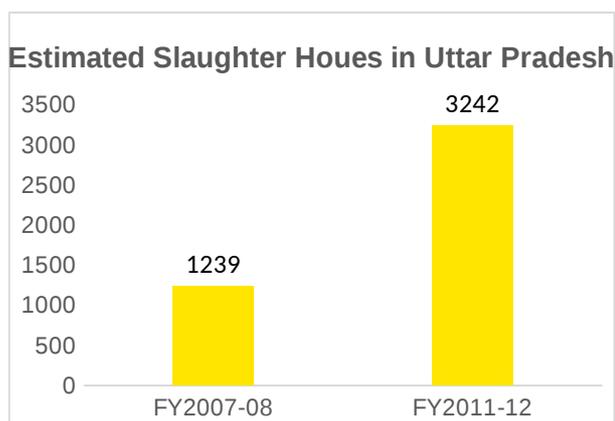
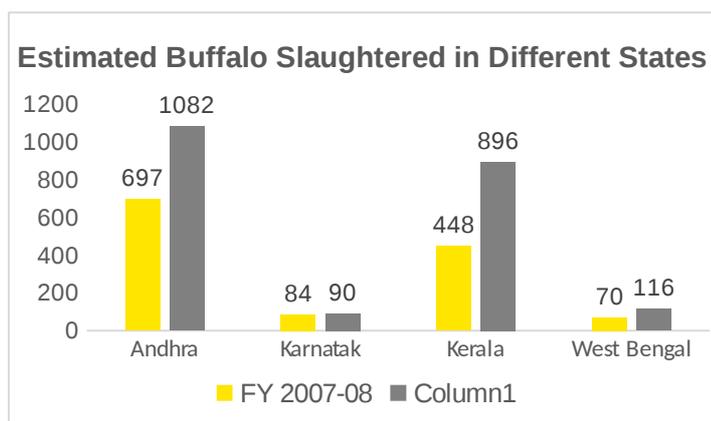


Fig.5.1. Trend in Increasing Consumption of buffalo milk in domestic market



5.2. Opportunities and Challenges for Meat Industry

The opportunities and challenges faced by the industry are summarized in the table below.

Opportunities	Challenges
<ul style="list-style-type: none"> ▶ Impetus in male buffalo calf rearing ▶ Disease free zone – Foot & Mouth disease control programme ▶ Export to new countries to fetch better returns from Indian meat ▶ Establishment of livestock trading Mandis in districts with 80% livestock population ▶ Promotion of fast growing buffalo breed exclusively for meat ▶ Value addition to meat and meat 	<ul style="list-style-type: none"> ▶ Establishment of meat processing plant ▶ Buffalo rearing under contract farming for meat production ▶ Organized slaughter houses and new technologies ▶ Proper facility for short to medium period storage and transport with cold chain ▶ Promoting animal health certificate

products	
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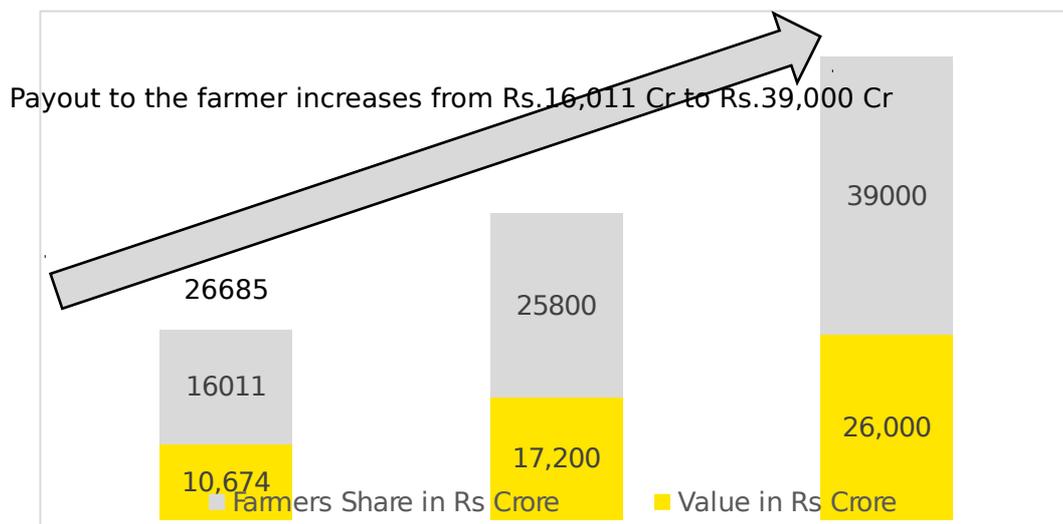
5.3. Strategies for growth of Meat Industry

To double the income of small and marginal farmers, certain policy interventions are required. These are:

- ▶ Impetus on Male Buffalo Calf Rearing
- ▶ Disease Free Zones - Foot & Mouth Disease Control Programme
- ▶ Export promotion to new countries so as to get better price for meat
- ▶ Establishment of Livestock trading mandis in each district or at least districts with 80% livestock population

These interventions and strategies will result in maintaining the health and nutritional balance in the livestock sector, which in turn will result in better production of meat. Healthier breeds will also result in better quality of meat which will open up new market avenues for export. The output value of meat export will lead to higher proportion of income for farmers. The strategies and the estimated increase in exports and farmers' income are given in Fig. 5.2.

Fig.5.2. Projection of meat export and farmers' income as a result of policy interventions



5.3.1. Impetus on male buffalo calf rearing

Annually, approximately 14 million male buffalo calves die in India. The farmers in small ruminant sector should be encouraged to rear them for meat industry. If farmers can save half of the 14 million male buffalo calves and rear them for the meat industry, then they have a potential worth Rs.22,000 Crores of export of meat.

With this objective, the Government of India started a central sector scheme called Salvaging of Male Buffalo Calves (SMBC) under National Livestock Mission (NLM)²². However, the scheme hasn't witnessed an increase in rearing of male buffalo calves. This is due to the fact that the buffalo farmer is usually landless or marginal farmer and he can't give any collateral. Hence, the role of Non-Banking Financial Company (NBFC) becomes important; they can provide credit to farmers without collateral. National Bank for Agriculture and Rural Development (NABARD) should route subsidy to farmers by refinancing the loan for them.

5.3.2. Disease Free Zones - Foot & Mouth Disease Control Programme (FMD-CP)

²² Operational Guidelines, National Livestock Mission, DADF.

States like Jammu & Kashmir, Himachal Pradesh, West Bengal, Bihar, Jharkhand, Odisha and North Eastern states have frequent FMD cases. In case India is FMD free then we can get market access to developed markets like USA and EU.

The Government of India launched FMD-CP programme²³ under which India applied for declaration of Maharashtra, Telangana, Andhra Pradesh and Punjab as FMD Free Zones to World Organisation for Animal Health (OIE) in 2016.

5.3.3. Export Promotion to New Countries

Direct trade to China will help India improve balance of trade of US \$1.8 Billion with China and increase Export Value.

S#	Country	Additional Export potential	
		MTs	\$million
1	Philippines	1,70,000	500
2	Iran	1,50,000	500
3	China*	4,50,000	1,800
4	Indonesia	2,50,000	800
5	Turkey	1,60,000	600
6	Thailand	85,000	300
7	Others	1,35,000	500
TOTAL		14,00,000	5,000

5.3.4. Establishment of Livestock trading mandis at district level

Farmers get 60% of the value from export of meat. This can be increased to 65% by eliminating the middle men in supply chain.

Hence, setting up of livestock trading markets is very essential in each district of India. These could be multi-purpose markets which can allow trade of dairy animals, spent buffaloes for Meat, sheep and goat for Meat.

e-Pashuhaat Portal: The Government has launched e-Pashuhaat portal under National Mission on Bovine Productivity. This portal aims to connect breeders and farmers regarding availability of bovine germplasm. The broad objectives of the portal include²⁴:

- ▶ E-Trading Market portal for livestock germplasm and related services
- ▶ Connect farmers with breeders - Central, State, Co-operative and private agencies.
- ▶ Provide real time, authentic certified information on availability of germplasm.
- ▶ Centralized repository of information for Central and State Governments

6. Livestock Health

6.1. Scenario of Livestock Health in India

Livestock in India is free from the following diseases:

- ▶ Contagious Bovine Pleuro-pneumonia

²³ Technical Guidelines to states for implementation of various components of Livestock Health & Disease Control (LH & DC), DADF.

²⁴ "e-Pashuhaat Portal", Vikaspedia website, <http://vikaspedia.in/agriculture/livestock/e-pashuhaat-portal> , accessed 6th February 2018.

- ▶ Rinderpest
- ▶ Bovine Spongiform Encephalopathy (Mad cow disease) *negligible risk status*
- ▶ African Horse Sickness
- ▶ Vesicular Stomatitis (VSV), African Swine Fever (ASF), Lumpy skin disease, FMD serotype (SAT 1, 2, 3 & C) Swine Vesicular Disease (SVD) has not been reported.

Certain Innovations made in the domain of livestock health for prevention of diseases include²⁵:

- ▶ Up-gradation of state biological production (BP) units to GMP compliance, for quality vaccines
- ▶ Control of endo-parasites in cattle and buffaloes, to improve the productivity and health of animals.
- ▶ Vaccination of dogs against rabies vaccine, to reduce threat of Rabies in animals / humans.
- ▶ Three FMD free zones (Zone 1 – Telangana & Andhra Pradesh; Zone 2 – Maharashtra and Zone 3 – Punjab) have been established in the country.

6.2. Livestock Health Challenges

Despite the above mentioned eradication of some diseases, the following continue to persist in:

- ▶ Large ruminants: FMD, Haemorrhagic Septicemia (HS), Brucellosis, BQ and Anthrax
- ▶ Small Ruminants: PPR, Sheep & Goat Pox
- ▶ Pigs: Classical Swine Fever
- ▶ Canines: Rabies / other susceptible animals
- ▶ Poultry: Avian Influenza (AI), Newcastle Disease (ND)

Following are the continuing issues:

- ▶ Zoonotic: emerging and re-emerging diseases – Glanders (horses), CCHF (Congo Fever) in large ruminants and Avian influenza etc.
- ▶ Direct: Mortality, Morbidity, reduced fertility, reduced milk production, meat quality etc
- ▶ Indirect: Reduced work capacity; abortions. Losses due to denied access for better export markets

6.3. Strategies to ensure Livestock Health

The following steps/measures are essential for maintaining healthy livestock:

- ▶ Glanders (horses): This disease is under reported in India because of lack of awareness and limited veterinary services. The government should enhance investment in Information Education and Communication (IEC) for glanders disease which will result into enhanced awareness and potentially timely treatment as well.
- ▶ Developing disease resistant poultry may be a potential solution.
- ▶ Prevention of foreign animal diseases by the regulation of import
- ▶ Referral services for existing diseases for diagnosis of animal diseases
- ▶ Quality control and assured drug standards
- ▶ Strengthening of Animal quarantine and certification services
- ▶ Strengthening of 5 regional disease clinical laboratories - referral services in the state
- ▶ Quality control and testing of regulated vaccines in the country
- ▶ More surveillance of economically important animal disease

7. Budget 2018: Fillip for Animal Husbandry and Fisheries sector

7.1. Blue Revolution Infrastructure Development Fund (BRIDF)

The Union Government in its Budget 2018-19 has set aside Rs.8000 crore for setting up of a dedicated Blue Revolution Infrastructure Development Fund (BRIDF). BRIDF will provide concessional

²⁵ Action Plan for Doubling Farmers' Income by 2022, DADF, GOI.

finance to the State Governments/UTs, State entities, cooperatives and individual entrepreneurs for development of infrastructure facilities in fisheries sector (both in marine and inland fisheries sector).

BRIDF has the potential to benefit over 4 million marine and inland fishers especially women, SHGs, weaker sections, due to availability of modern infrastructure and added value of produce. The Fund would be created in collaboration with NABARD, National Centre for Disease Control (NCDC) and specified commercial banks. National Fisheries Development Board (NFDB) will be the Nodal Implementing Agency for overall coordination of the BRIDF activities. The broad objectives of the fund include:

- ▶ fill the large infrastructure gaps in fisheries sector
- ▶ create employment opportunity to the rural population in fishing and allied activities
- ▶ contributes towards enhancement of fish production and productivity
- ▶ tapping the potential of fisheries sector in order to double farmers' income

The infrastructure facilities to be funded under the BRIDF will broadly cover the following:

- ▶ development of fishing harbours and fish landing centres
- ▶ creation of cold chain infrastructure facilities
- ▶ establishment of fish transport facilities, fish processing units and fish markets
- ▶ development of fish seed farms, fish feed mills/plants, cage culture in reservoirs and mariculture activities,
- ▶ introduction of deep sea fishing vessels
- ▶ setting up of disease diagnostic and aquatic quarantine facilities

7.2. Animal Husbandry Infrastructure Development Fund (AHIDF)

As per the provisions of Union Budget 2018-19, the Union Government has allocated Rs.2000 crore for setting up of a dedicated Animal Husbandry Infrastructure Development Fund (AHIDF).

AHIDF will provide concessional finance to the State Governments/UTs, State entities, cooperatives, Self-Help Groups and individual entrepreneurs for encouraging entrepreneurship and development of infrastructure facilities in small ruminant and poultry sector. The Fund would be created in collaboration with NABARD (which is also the nodal implementing agency) and commercial banks. The broad objectives of the fund include:

- ▶ fill the large infrastructure gaps in small ruminants, piggery and poultry sector
- ▶ create employment opportunity to the rural population in small ruminant rearing and poultry
- ▶ contribute towards enhancement of production and productivity of small ruminants and piggery
- ▶ fulfil the requirement of tapping the potential of the sector, with a vision to double farmers' income

The activities entailed under the fund for fulfilment of the aforementioned objectives include:

- ▶ encourage entrepreneurship through rearing of small ruminants and poultry activities
- ▶ setting up, expansion as well as modernization of farms and hatcheries
- ▶ establishment and/or strengthening of District level semen stations for Goat, Sheep and Pig
- ▶ induction of High Genetic Merit (HGM) Porcine Germplasm for multiplication

7.3. Extension of Kisan Credit Card (KCC) linked loans to Milk, Fisheries, Poultry and Small livestock farmers

The benefit of crop loan and interest subvention available for agriculture sector under KCC has been extended to small and marginal farmers in animal husbandry, dairy and fisheries sector.

8. Conclusion

Livestock sector is likely to emerge as an engine of agricultural growth and doubling farmers' income by 2022. This is substantiated by the fact that there is a strong political will to develop and implement schemes and policies which are in the farmers' interest. The following reasons also add to the prospects:

- ▶ It contributes to about 4% of GDP and 25% to the GDP from agriculture and allied sector.

- ▶ Livestock sector has grown at an annual rate of 5.6%, which is higher than that of agricultural sector, i.e., 3.3%.
- ▶ According to World Food Organization estimates, investment in livestock sector potentially yields Rs.4 per every Rs.1.

A recent study of ICAR-NIAEPR also indicates that the total output value from agriculture and allied sector should grow by 8.6% per annum between 2015-16 and 2021-22. Out of the total growth rate of 8.6%, livestock sector is touted to contribute the highest growth rate out of all sub-sectors, i.e, about 1.84%.

Livestock sector is a crucial driver of employment generation and livelihood providing opportunities; the population dependent on livestock sector is growing faster in comparison to agriculture sector. The exponential growth of the livestock sector also has far reaching implications for poverty reduction. States like Punjab, Haryana, Himachal Pradesh etc., where livestock contributes more to farm income, has less rural poverty. Small and marginal famers are joining the livestock business in huge numbers. About 67% of the small and marginal farmers as well as landless farmers constitute about 70% of the livestock market.

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