Final Report

"Impact Assessment and Evaluation of Fodder Seed Production and Sale activities under National Dairy Plan I- Maharashtra State"

Funded by PMU NDDB

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Foreword

India is the highest milk producer country in the World but milk production per animal per year is very low. Deficiency in quantity and quality of fodder is one of the major cause of this low productivity. The animals need proper feeding to meet their nutrient requirement to express their full genetic production potential. Deficiency of green forage is mainly due to non-availability of land for fodder cultivation. India has vast tracts of grazing land, most of which has fragmented or become degraded due to lack of appropriate policy interventions and management inputs. Fodder are cultivated or grown naturally on degraded and marginal lands with minimum inputs, in terms of fertilizers water and operational energy. Moreover, in case of forages, regional and seasonal deficiencies are more important than the national deficiencies, as it is not economical to transport the forage over long distances.

The small marginal farmers own only 44 per cent of the agricultural land while they own 80 per cent livestock assets. Quite logically, if the income of the farmer is to be doubled by 2022 as per the vision given by the Hon Prime Minister in 2016, then livestock is perhaps the best and most available assets to enhance farmers income due to higher availability of the livestock as compared to land as an asset for income generation. While overall productivity of livestock has been low in past, because of inadequate nutrition from green fodder, along with dry residue and protein concentrate. As per NIANP ICAR estimate, there is shortage of up to 36 per cent of green fodder and protein concentrates besides up to 23 per cent shortage of dry fodder.

With an aim to increase productivity of milch animals and thereby increase milk production to meet the rapidly growing demand for milk as well as to provide rural milk producers with greater access to the organised milk-processing sector, Government of India approved the scientifically planned multi-state initiative, i.e. National Dairy Plan Phase I (NDP I) as a Central Sector Scheme for a period of six years from 2011-12 to 2016-17. This plan was launched to cover 15 major milk producing States viz. Andhra Pradesh, Telangana (after separation), Bihar, Gujarat, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal which account for over 90 per cent of the country's milk production, having 87 per cent of breedable cattle and buffalo population and 98 per cent of the fodder resources. In June/August 2015, the Union Government included three more states viz. Uttarakhand, Jharkhand and Chhattisgarh and it was extended up to 2018-19. This plan was implemented wholly by National Dairy Development Board, Anand (Gujarat) through milk co-operatives and state agencies. The project includes a number of programs, of which Fodder Development Programme (FDP) was designed with an aim to enhance green fodder yield of cultivated fodder crops from the land already under fodder production as well as to increase seed production of fodder crops and enhance use of quality fodder seeds.To strengthen fodder seed multiplication and distribution chain, an important component of sub-project plan on Fodder Development, NDP I was to create required infrastructure of fodder seed production, processing, storage and marketing of fodder seeds at dairy cooperative level, encourage production and usage of fodder seeds by farmers for enhancing yield and availability of green fodder. About 3.18 per cent of total project cost (Rs. 2060 Crore) was earmarked for this component. Fodder Development

Programme under NDP I had entered into its 5th year of operations in April, 2017. It was planned to undertake an impact assessment and evaluation for strengthening fodder seed multiplication and distribution chain at dairy cooperative level under sub project of FDP. Therefore, present study was undertaken in eight states covered under NDPI fodder development programme (Andhra Pradesh, Bihar, Gujarat, Karnataka, Maharashtra, Punjab, Rajasthan and Uttar Pradesh) for a comprehensive assessment of the present status of fodder development programme under NDP I thereby enhancing dairy development. The study came out with important and relevant policy implications which would help to enhance efficiency of implementation benefitting the milk producers.

I am thankful to authors and their research team for putting in a lot of efforts to complete this excellent piece of work. I also thank the National Dairy Development Board, Anand for giving us an opportunity to undertake this study. I hope this report will be useful for policy makers and researchers.

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The study would not have reached to this stage without the active co-operation of the respondent fodder seed and green growers from selected villages who provided all the

required data for the study without any hesitation and expectation. We thank each one of them for their invaluable support.

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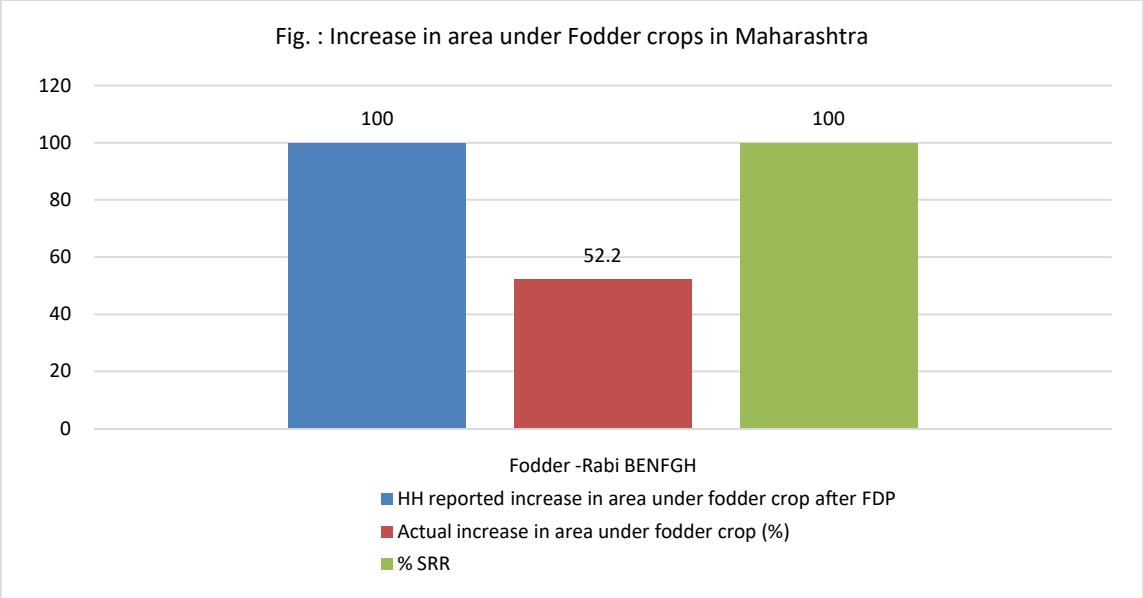
List of Abbreviations

A.H.	-	*Animal Husbandry*
A.I	-	Artificial Insemination
ADP	-	Annual Development Plan
AN	-	Animal Nutrition
ASMM	-	Area Specific Mineral Mixture
Av.	-	Average
BENFGH)	-	Beneficiary Fodder Grower Households
BENSEED	-	Beneficiary Fodder Seed Growers
CB	-	Cross Breed
CSS	-	Centrally Sponsored Scheme
DADF	-	Department of Animal Husbandry, Dairying and Fisheries
DCS	-	Dairy Cooperative Society
DES	-	Directorate of Economics and Statistics
DM	-	Dry Matter
EIA	-	End Implementing Agency
FGD	-	Focus Group Discussion
ICDP	-	Intensive Cattle Development Programme
GCA	-	Gross Cropped Area
GDP	-	Gross Domestic Product
GIA	-	Gross Irrigated Area
GNP	-	Gross National Product
GOM	-	Government of Maharashtra
GOI	-	Government of India
GVA	-	Gross Value Added
GVO	-	Gross Value of Output
ha	-	Hectare
HH/hh	-	Household
IDA	-	International Development Association
IGFRI	-	Indian Grassland and Fodder Research Institute
INAPH	-	Information Network for Animal Productivity and Health
ISP	-	International Organization for Standardization
kg	-	kilograms
Km	-	Kilometer
KVK	-	Krishi Vigyan Kendra
LRP	-	Local Resource person
LTPD	-	Litres per day
M.T./mt	-	Metric Tone
mha	-	Million hectares
MOA	-	Ministry of Agriculture
MU	-	Milk Union (district level)
NA	-	Not Available/ Not Applicable
NCDFI	-	National Cooperative Dairy Federation of India

NDDB	-	National Dairy Development Board
NDP	-	National Dairy Plan
NITI Ayog	-	National Institution for Transforming India
NLM	-	National Livestock Mission
No./Nos	-	Number
NONBFGH	-	Non-Beneficiary Fodder Grower Households
NSSO	-	National Sample Survey Office's
OF	-	Operation Flood
OFP	-	Operation Flood Programme
PCs	-	Producers Company
PDCS	-	Primary Dairy Cooperative Society (village level)
PDO	-	Project Development Objective
PMC	-	Project Management Cell
PMU	-	Project Management Unit
Prodvty.	-	Productivity
RBP	-	Ration Balancing Programme
Rs.	-	Rupees
SAUs	-	State Agricultural University
SC	-	Scheduled Caste
SF/MF/AL	-	Small Farmer, Marginal Farmer, Agricultural Laborer
SMR	-	Seed Multiplication Ratio
SNF	-	Solid Not Fat
ST	-	Scheduled Tribe
SUMUL	-	Surat Milk Union Limited
TE	-	Triennium Ending
TL	-	Truthful Seed
VAP	-	Village Awareness Programme
Y	-	Yield

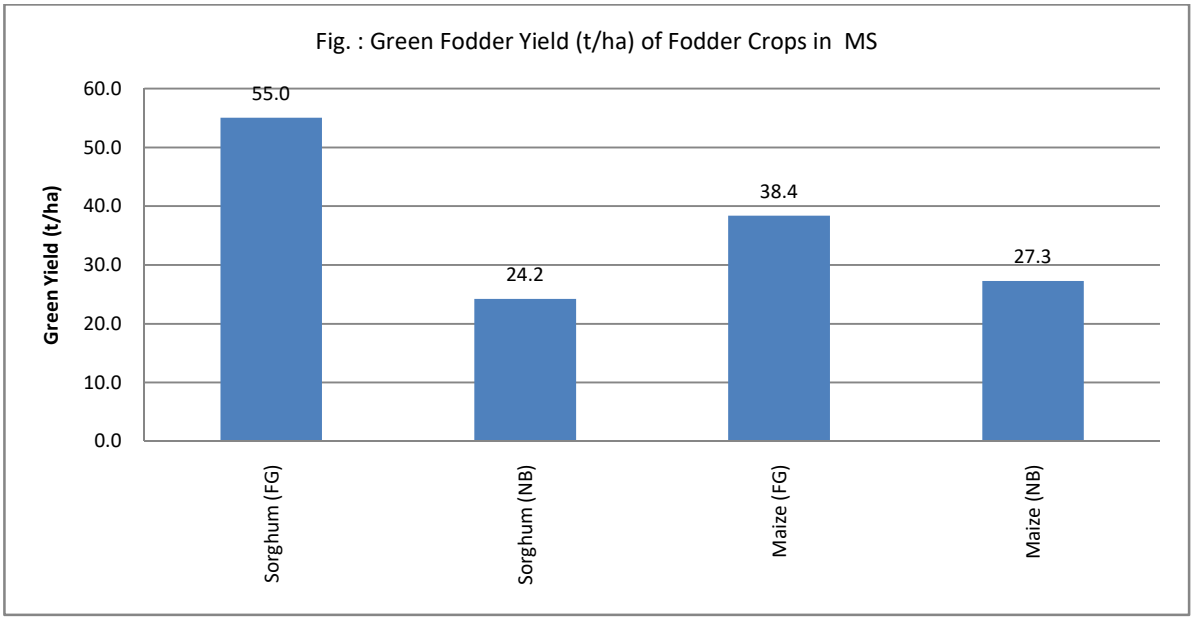
(i) Increase in area

- The effect of green fodder production programme under NDP I indicates significant increase in area under green fodder crop production as compared to the before FDP year 2011-12.
- No seed production activity was undertaken in Solapur milk union during Rabi season due to less rainfall and thus low moisture availability in soil.
- All the households opined that area under fodder production had increased by around 52 per cent.
- The SRR was reported to be 100 percent during rabi season under study.

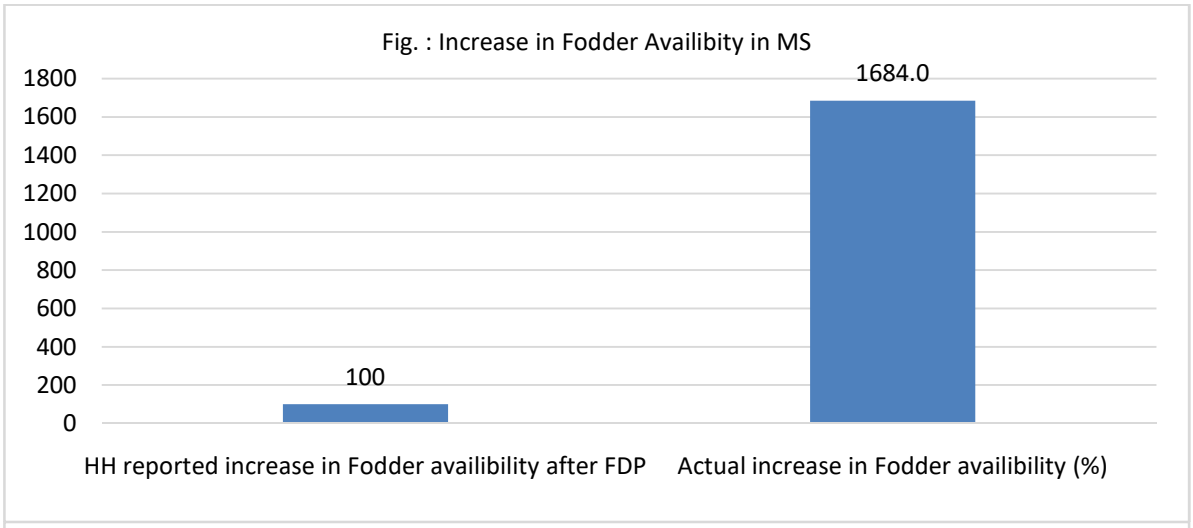


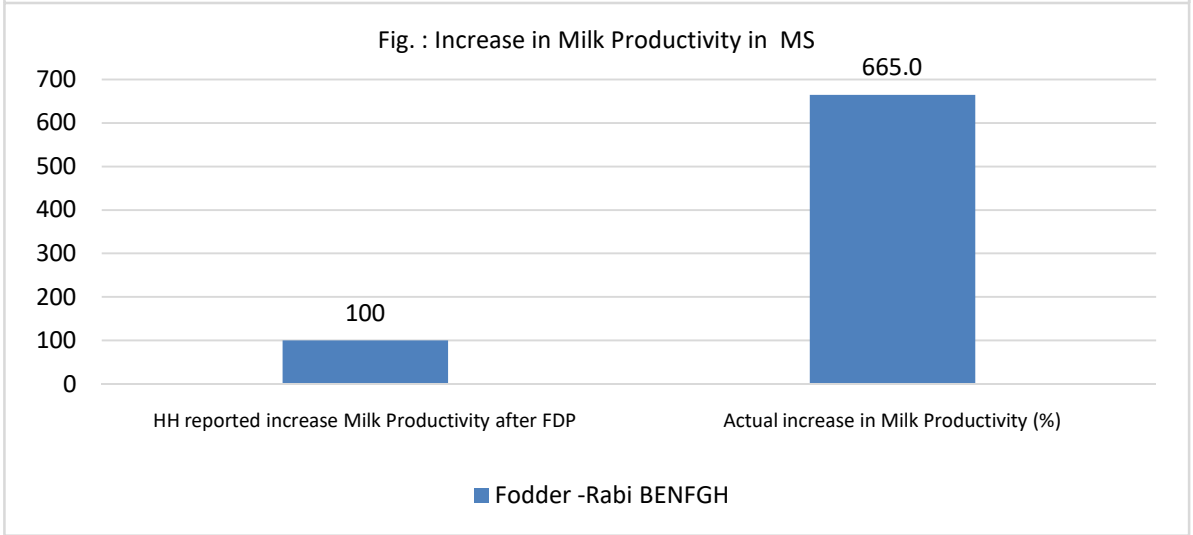
(ii) Increase in Yield level of Green Fodder

- The yield level of fodder crops grown by beneficiary households (FG) was reported to be higher than the fodder crops grown by the non-beneficiary households (NB), this may be due to quality and timely seed provided by the PDCS.
- Besides, dry fodder yield was also observed higher with beneficiary fodder growers than non-beneficiary growers.



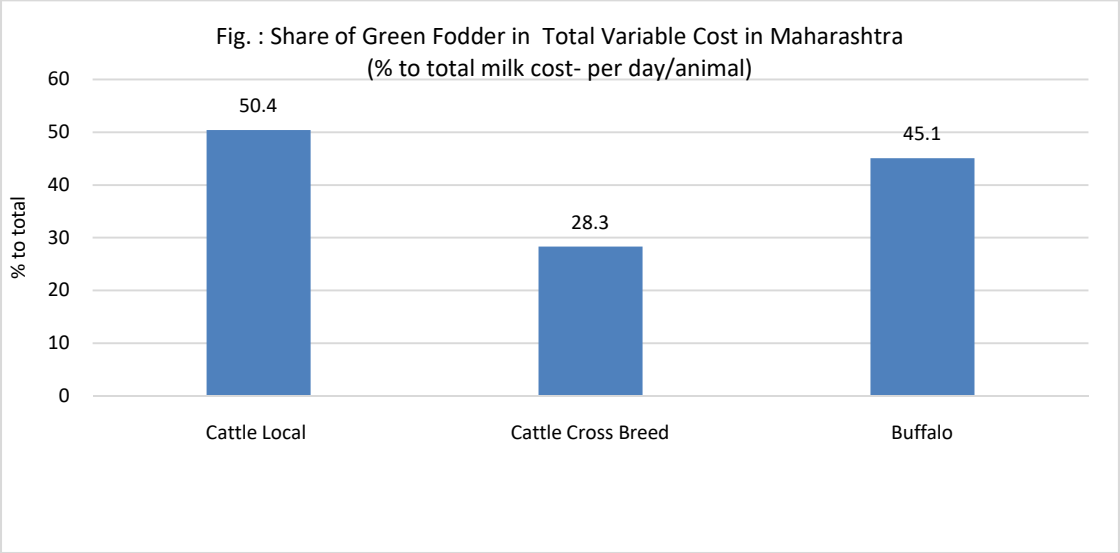
- All the selected households have opined that after FDP, availability of fodder for animal had increased by 1684 per cent over base year which has resulted in increase of milk productivity of animals.

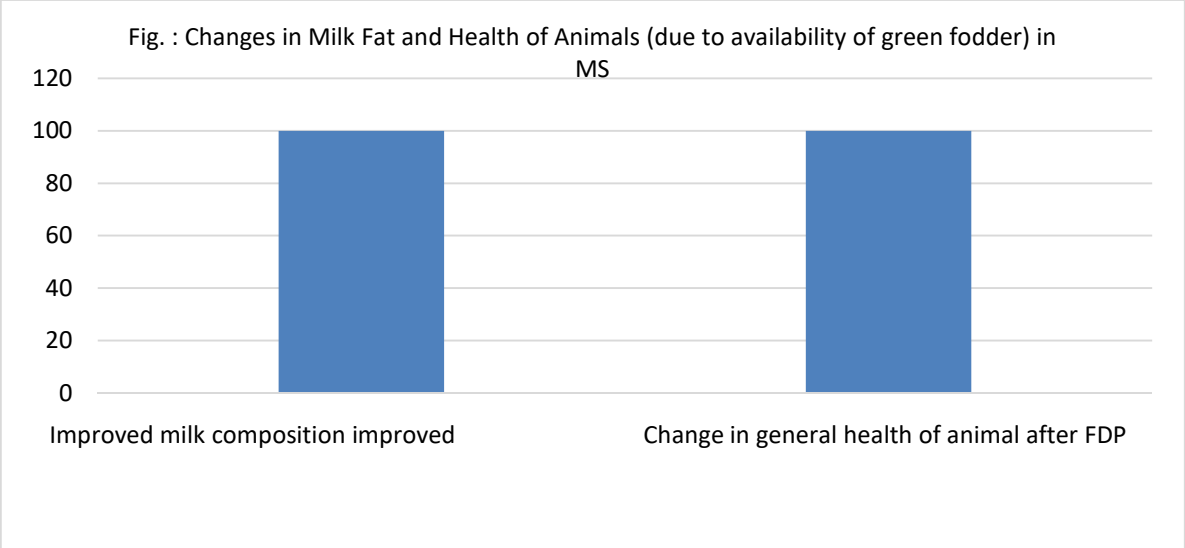




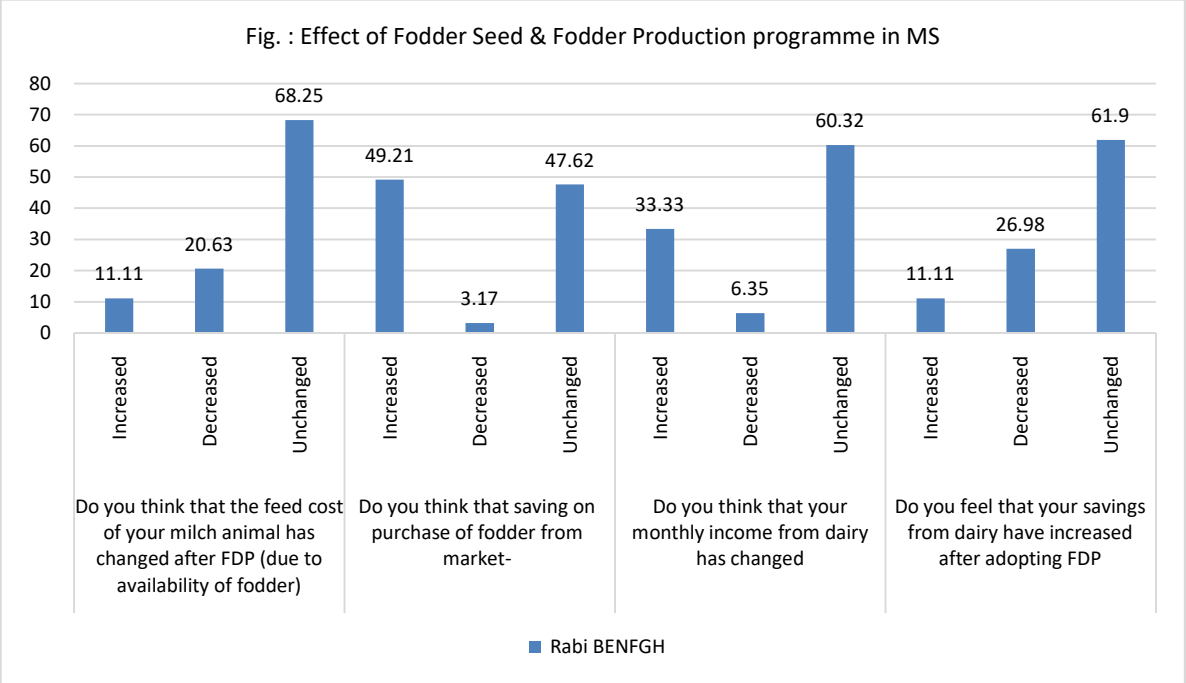
(iii) Reduction in Cost of Milk Production:

- As expected the beneficiary fodder growers had provided more green fodder to dairy animals during rabi season as compared to fodder given in kharif seasons. The reduction in milk cost was noticed by the selected dairy farmers after FDP.
- It was very strange to note that reduction in feeding cost of green fodder was relatively better in local cows, followed by buffalo.
- Besides, health of animals had also improved due to adequate availability of green and dry fodder.



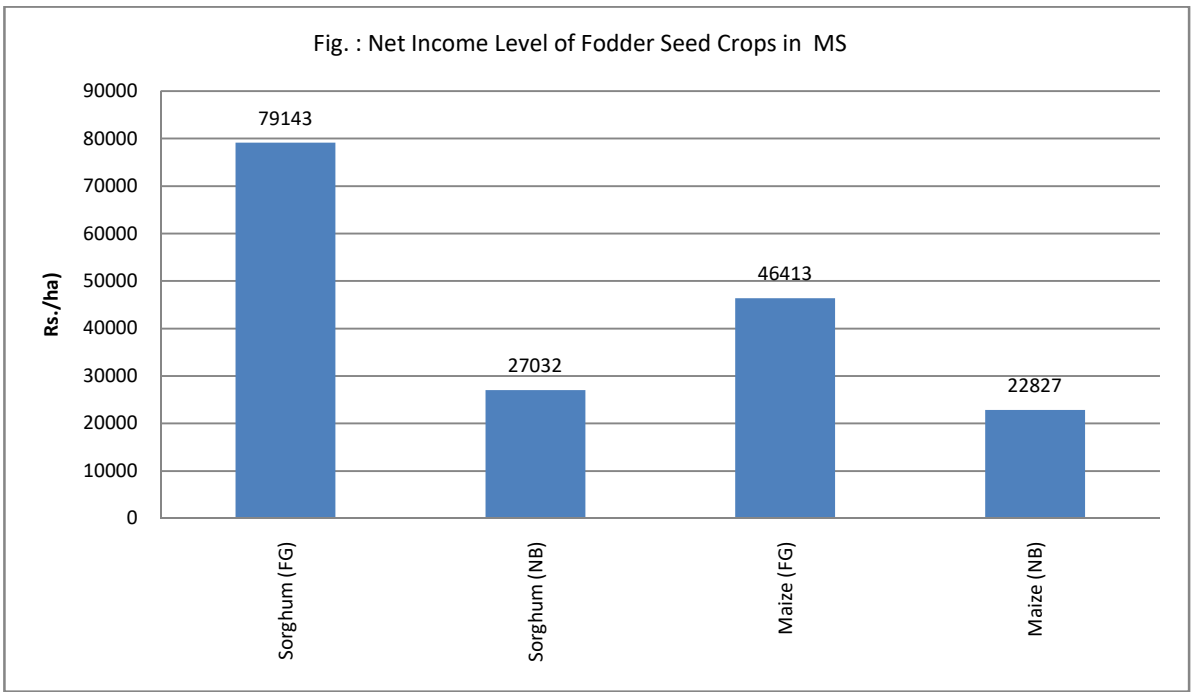


- About one fifth of respondents had opined that feed cost of milch animal decreased due to increase in availability of fodder in their own field; majority of respondents opined that there was no change in the situation; while rest have reported an increase in cost.
- Almost half of the respondents had reported savings on purchase of fodder from market. One third of respondents felt that their monthly income had increased.



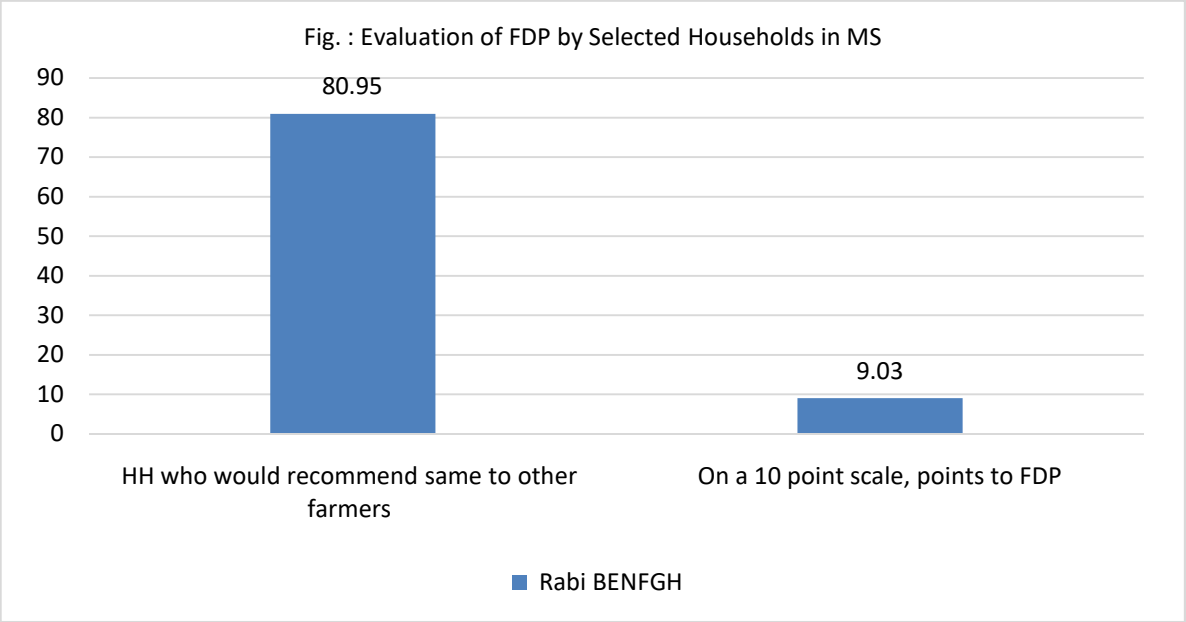
(iv) Cost of Fodder Seed and Green Fodder Production:

- The comparative economics of cost of cultivation of fodder crops and its competitive crops during the same season shows that fodder crop cultivation undertaken by the selected farmers during rabi 2017-18 season was comparatively profitable than its counterpart and thus should be provided necessary support as it could reduce fodder deficit and yield additional income for the farmer households.
- As mentioned earlier, the area under study was rainfed and drought prone, no competitive crop is as such available. Exceptionally those who have adequate irrigation had grown Sugarcane, which has different economics.



(v) Evaluation and Recommendation of FDP by Selected HH:

- In view of availability of green fodder, respondents were asked about their future plan of extension of herd size strength. Very few respondents expressed the willingness of extension of herd strength, while some of them had purchased livestock after joining the FDP.
- Almost all felt that they were somewhat or totally involved in the programme. More than 80 percent of the households opined that they would recommend this programmeto other dairy farmers.
- They have rated the fodder development programme with 9.03 points (out of 10) along with a suggestion that there is a need to ensure the quality of fodder seed with supply on subsidized rate.



- The non-beneficiary households were asked about their perception regarding FDP and their interest in the same. The responses received indicated willingness of the farmers to be a part of this programme in future.
- While majority of them had opined that the programme was beneficial to the dairy owners and they could notice change in feeding pattern after implementation of FDP in the village.

(vi) Responses of PDCS and MU:

- While implementing the programme, PDCS faced major constraints in terms of unavailability of required quantity of seed for fodder production (from dairy union), less availability of irrigation in the area and thus low demand for fodder seed, inability to provide fodder seed on credit, and lack of training facilities.

- While among infrastructure related constraints, lack of training facilities was a major constraint. PDCS had recorded the shortage of trained manpower, shortage

of finance, issues related to governance and political interference in the functioning of society was reported.

- PDCS suggested that water resources need to be developed, milk union should supply quality seeds in required quantity, and further steps need to be taken to increase production of required fodder crops.

- The milk unions were asked about constraints faced by them in implementation of fodder development programme and their suggestion to improve the same. While Solapur milk union responded that they had faced the problem of seed availability. They opined that the seed availability with other dairy cooperative society was costlier than market where cheaper seeds were available.

- Kolphaur Union reported that they faced problem of less demand for fodder seed from PDCS (Table 7.6).It was very strange to note that Maharashtra was deficit in fodder production and yet demand for fodder seed was not growing.

- During field visit, it was observed that Solapur milk union had only one officer who looked after fodder development and he too was given other additional work. Thus, a need was felt for concrete action by Milk Union for fodder development.

(vii) Policy Suggestions:

- The selected area is suffering from deficit of fodder which has ultimately affected the milk yield of animals. Therefore, there is a need create awareness among the farmers and dairy owners about the same through continuous efforts rather than taking up same on piecemeal basis.
- Fodder seed should be made available to villagers well in advance of seasons and information of same should be displayed as well as communicated in villages through traditional method of munari/public announcement through rikshaw.
- There is a need to increase protective irrigation coverage to the crops grown through various water saving techniques and technology in order secure crop from failure due to erratic and unseasonal rainfall.
- Most of the villages are having more than primary dairy cooperative societies and thus, hinder the prospectus of the each diary society by having rivery among them and milk pourer due to political interference. The Milk Union should play a decisive role in making consensus among them rather keeping itself away from this aspect. Ultimately, Union is based on the dairy societies in villages and thus growth of these village societies is must for growth of union.
- Solapur Union found to be going through the manpower constraints which has hinder the implementation of the beneficial programmes like seed production, fodder production and many other. There should be specific fodder development cell in each dairy union to take care the needed of seed and supply of same with stipulated time period.
- Milk Union should come out with the supportive strategies and policies for enhancement of coverage under fodder production through quality and in time

supply of seed to farmers in each season and every years, then only changes would notices.

- There is a lack of adequate and genuine data on production and availability of various types of fodder and feed grains. Therefore, competent agencies should be encouraged to generate real time and time-period data on fodder production, feed grain production, land availability for grassland and other pasture grounds along the lines of Cost of Cultivation scheme.
- It was observed during field survey that proper record or systematic entry of distribution of seeds to farmers under Fodder Development Programme was not maintained by the PDCS. Also the milk unions' approach towards fodder development activities was found to be less enthusiastic. Thus, there is an urgent need to revamp fodder development mechanism by making them accountable for success or failure of the scheme.
- As there is a demand for fodder seed by the farmers and farmers are ready to allot land for fodder cultivation, quality seed in adequate quantity and in time needs to be provided by the PDCS.
- Quality seed production is an important area that needs to be strengthened for vertical growth in cultivated fodder. Multi-pronged strategic policy and research interventions are required to take care of all aspects of fodder seed production technology, quality, seed standards, certification, distribution and marketing.
- Fodder based cheaper feeding strategies are required to reduce the cost of production of quality livestock since feed alone constitutes 70 percent of milk production costs. To meet the current level of demand by livestock and its annual growth in population, the deficit in all components of fodder, dry crop residues and feed need to be met by either increasing productivity, utilising untapped feed resources, and increasing land under fodder cultivation.
- Efforts need to be made to increase production of quality fodder seeds through necessary incentives, arranging foundation seeds of different high yielding fodder varieties and modern scientific farming procedures. Appropriate resources and technologies need to be made available to ensure quality fodder seed production.
- Round the year availability of quality fodder through promotion of hay, silage and fodder banks need to be emphasised. Non conventional sources of feeds such as azolla, processed vegetables and fruits waste, need to be promoted.
- While fertile lands with assured irrigation are diverted for growing high value crops, large stretches of marginal and wastelands are lying under utilised across the country. Fodder cultivtation can be undertaken in such wastelands. There are also opportunities to introduce fodder as an intercrop or as a soil binder under the watershed development programme.
- Shortage of quality fodder and feed is another major constraint for dairy development. The gap between the requirement and availability of feed and fodder is increasing due to decreasing area under fodder cultivation and reduced availability of crop residues as fodder. Besides common property resources are continuously shrinking leading to over-grazing of the existing grass land. Therefore, there is a need to frame strategies for sufficient availability of good quality feed and fodder for efficient utilisation of genetic potential of the various livestock species and thereby sustainable improvement in productivity.

- The role of institutions in fodder development especially district dairy cooperatives needs to be strengthened and there should be dedicated fodder officer to take up fodder development activity on a large scale.
- The fodder seed growers had also noted constrains like no compensation by DCS/Union in case of failure of fodder seed crops due to crop failure, thus attempt should be made to provide support to such fodder grower by providing either new seed or some compensation.
- There is a need to establishment of fodder banks in the drought prone areas to tackle with fodder scarcity.

Maharashtra being a fodder deficit state that to agriculture depends on vagaries of monsoon, concrete efforts is needed to enhancement in area under fodder and its management throughout the years, particularly during summer season. Development of waste lands / Gairans into community pasture lands through systematic efforts of green cover augmentation under soil and water conservation schemes with involvement of village panchayats and NGOs need to be undertaken. Implementation of such policy imperatives in Maharashtra would prove helpful in assuring that fodder and fodder seed production is given its due importance. The fact that fodder accounts for the single largest share of expenditure in dairy, any strategies associated with making dairy business profitable cannot afford to ignore incentivizing fodder development through various strategies. Besides as discussed, farmers are motivated to indulge in fodder production, and they also find it to be comparatively profitable. Therefore, policy directives that motivate the farmers further towards developing efficient fodder and fodder seed production may hold answers to issues related to the scarcity of fodder, given the ever-increasing demands for fodder from the ever expanding dairy business.

Chapter I

Introduction

1.1 Introduction

Animal husbandry in India is closely interwoven with agriculture. It plays an important role in the socio-economic development of millions of rural households thereby contributing importantly in the national economy (Vaidyanathan, 1989; Mishra, 1995; Chawla, *et al,* 2004; Sharma, 2004; Birthal, 2016). Livestock rearing is one of the most important economic activities in the rural areas providing supplementary as well as stable income round the year. This sector has also emerged as a vital sector for ensuring a more inclusive and sustainable agriculture system. Evidence from the National Sample Survey Office's (NSSO) 70thround survey (2014a) showed[1] that more than one-fifth (23 per cent) of agricultural households with very small holdings of land (less than 0.01 hectare) reported livestock as their principal source of income. More than 70 million of the reported 147 million rural households depend on dairy, in varying degrees, for their livelihoods. Marginal, small and semi-medium farmers with average operational holdings of area less than 4 ha own about 87.7 per cent of the livestock of India. By controlling 64 per cent of the bovine, 70 per cent of ovine, 73 per cent of caprine and 70 per cent of the poultry population, the small holders contribute substantially to livestock production (NSSO, 2014). Dairying has become an important secondary source of income for millions of poor and rural households and has assumed an important role in providing employment and income generating opportunities particularly for marginal and women farmers (Patel, 2003). This sector has created a significant impact on equity in terms of employment and poverty alleviation as well. It cannot be merely a co-incidence that the level of rural poverty is significantly higher in states where livestock sector is underdeveloped (Singh and Meena, 2012). This is the sector where the poor contribute to growth directly instead of deriving benefits from growth generated in other sectors of the economy.

In many cases, livestock is also a central component of risk management strategies for small holders(Randolph et al., 2007). It serves as a substitute of insurance. It has been witnessed over the years that the stability in dairy income is far stronger than the income

[1]http://dadf.gov.in/about-us/divisions/cattle-and-dairy-development

realised from agricultural activities (Kumar and Shah, 2016). Livestockis anatural asset for poor that can be liquidated when required or during times of crisis (Singh and Meena, 2012). It also helps in controlling migration as well as suicides. It is estimated that this sectorgenerates 5-6 per cent of total rural employment (Shah, 2019), provides regular employment to 9.8 million people as a principal occupation and 8.6 million people as a subsidiary occupation. More importantly, women constitute 71 percent of the labour force in livestock farming (GOI, 2002). Apart from providing subsidiary income (about 12 per cent of rural household income,while 26 per cent in case of the poorest household), rearing of livestock is a source of nutrition for rural households in the form of milk, eggs and meat. Milk has always played a critical role in addressing hunger and malnutrition (Kumar, 2016).

Livestock sector is the second most important contributor to the agricultural economy of India, next only to staple crops.Animal husbandry and dairying sector contribute about 25.8 percent to the Gross Value Added (GVA) from total agriculture, forestry and fishing sectors. Its overall contribution to the total GVA of India was about 4.6 per cent in 2016-17, at current prices. The share of GVA of livestock sector to total agriculture (crops & livestock) has increased from 23.8 per cent in 2011-12 to 26.2 per cent in 2016-17 at constant prices. At current prices, same share has increased from 22.0 per cent in 2012-13 to 25.8 per cent in 2016-17 as depicted inTable 1.1.

Table 1.1: Percentage contribution of Livestock in Total Agriculture GVA

Year	GVA at Constant(2011-12) Basic Prices					GVA at Current Basic Prices				
	GVA-Agri		GVA-livestock			GVA-Agri		GVA-livestock		
	Rs. In Cr	% to total GVA	Rs. In Cr	% to total GVA	% to Ag.	Rs. In Cr	% to total GVA	Rs. In Cr	% to total GVA	% to Ag.
2011-12	1501947	18.53	327334	4.04	21.79	1501947	18.5	327334	4.04	21.79
2012-13	1524288	17.84	344375	4.03	22.59	1675107	18.2	368823	4.01	22.02
2013-14	1609198	17.75	363558	4.01	22.59	1926372	18.6	422733	4.08	21.94
2014-15	1605715	16.53	390449	4.02	24.32	2093612	18.2	510411	4.44	24.38
2015-16	1615216	15.38	421369	4.01	26.09	2225368	17.7	584070	4.65	26.25
2016-17	1716746	15.26	448964	3.99	26.15	2484005	17.9	639912	4.62	25.76

Source: GOI (2018), www.dahd.nic.in.

The dairy subsector occupies an important place in the livestock sector and in the agricultural economy of India since milk is the second largest agricultural commodity contributing to Gross National Product (GNP), next only to Rice. While about two third of total value of output from livestock sector during 2016-17 was accounted by milk group followed by about one fifth share by meat group, the use of dung as fuel with a

contribution of 5.54 per cent also significantly contributed in total value derived from livestock sector at current prices as shown in Table 1.2.

Table 1.2: Value of Output from Livestock Sector (at current prices)

Sr. No.	Item	Value of Output from Livestock sector (at current prices)					
		2014-15		2015-16		2016-17	
		Rs. Crore	% to total	Rs. Crore	% to total	Rs. Crore	% to total
1	Milk Group	495835	66.75	560777	67.15	614387	66.93
2	Meat Group	154152	20.75	173840	20.82	194454	21.18
3	Eggs	24382	3.28	26274	3.15	29557	3.22
4	Dung	45455	6.12	48451	5.80	50883	5.54
5	Increment in stock	15474	2.08	17854	2.14	20249	2.21
	Value of Output (Livestock Sector)	742807	100	835157	100	917910	100

Source: www.nddb.coop

India is endowed with a significant proportion of the world's livestock population (Prabaharan, 2002; Sharma and Sharma, 2002). Indiaranks first in terms of cattle and buffalo population in the world. The population of cattle and buffalo in India was 218 million and 115 million in 2012 respectively, which accounted for 14.7 per cent and 58 per cent share respectively of world cattle and buffalo population. Most of these are milch cows and milch buffaloes. However, milk productivity of these animals is very low that might be due to malnutrition. Shortage of quality of fodder and the scarcity of feed are impending constraints in improving livestock productivity (Birthal and Jha, 2005).

India inhabits about 17.79 percent of world human population with 15 per cent of world livestock population on 2.4 percent of geographical area. Withonly 4.2 per cent of the world’s water resourcesthe natural resources of India are under considerable strain. Due to ever increasing pressure of human population, arable land is mainly used for food and cash crops, leaving lesser proportion of good quality arable land for fodder production. Despite of the fact that there is a scarcity of total feed and fodder, land available for fodder production has been decreasing. Land allocation to cultivation of free fodder crops is limited and has hardly ever exceeded 5 per cent of the gross cropped area resulting in a severe deficit of green fodder, dry fodder and concentrates. Availability of adequate quantity of feed and fodder for livestock is essential for improving the livestock productivity. NITI Ayog in their ‘Three Year Action Agenda 2017-2020’ emphasised on shift into high value commodities, have indicated that an important challenge in development of animal husbandry is concerned with fodder availability (GOI, 2017). Thus, feed

availability needs to be ensured if livestock is to be sustained at farm level (Biradar and Kumar, 2013).

1.2 Dairy Development:

Dairy development in India has been acclaimed as one of the most successful development programmes under the world's largest integrated dairy development programme 'Operation Flood' (Shiyani, 1996; NAAS, 2003). India ranks first in the world[2] in milk production (19.6 % of world's milk production). Milk production has increased to 176.4 million tonnes in 2017-18 (from 17 million tonnes in 1950-51) and it is targeted to produce 300 million tonnes by 2023-24 (GOI, 2017). Nearly 49 per cent of milk production was contributed by buffalo followed by cow (47%) and goats (4%) in 2017-18 (GOI, 2018).

While more than 75 million households in India are engaged in dairy farming, about 16.6 million farmers have been brought under the ambit of 1,85,903 village level dairy corporative societies up to March 2017 (http://dahd.nic.in). The dairy co-operatives have created a positive impact on the social and economic life of the people in the respective region/state. The impact of the 'White Revolution' can be seen in the villages in the form of generation of funds for community development and social welfare, creation of self-employment opportunities, ensuring distributive justice and removal of the evil of untouchability. This silent social revolution has been relatively smooth and hence even unnoticed by the conservative community. The dairy cooperative movement has been central to the development of dairying in India. The inspiration for this movement was the success of the *Khaira* District Cooperative Milk Producers Union (KDCMPU) known as 'Amul'. The 'while revolution' was driven by demand (Delgado et al., 2001); starting with the cooperative milk producers union, Amul (mainly women) in Anand (Khaira district of Gujarat). Founded in 1946, in response to the exploitation of districts dairy farmers, Amul grew rapidly from its initial base of two societies and two hundred litres of milk. The Amul model has helped India to emerge as the largest milk producer in the world. More than 16.57 million milk producers poured milk in 1.86 lakh dairy cooperative societies across the country in 2017-18. The milk was processed in 184 District Co-operative Unions and marketed by 22 State Marketing Federations, ensuring a better life for millions.

[2] Forecast by FAO indicate that the world's milk production in 2016 would be 817 million tonnes, while that of India would be 160.4 million tonnes (NCAER, 2017).

The Amul Model of dairy development is a three-tiered structure with the dairy cooperative societies at the village level federated under a milk union at the district level and a federation of member unions at the state level. Dairy cooperatives account for the major share of processed liquid milk marketed in the country. Milk is processed and marketed by milk producer's cooperative unions, which federate into state cooperative milk marketing federations.That growth, however, posed a challenge that threatened its existence as flush season production of milk exceeded the demand. Yet the cooperatives success depended on accepting the farmer milk year round. An institution of national Importance i.e. National Dairy Development Board **(**NDDB) was established in Anand, Gujarat by the Act of Parliament in 1965 for the dairy development in India. Also a Federation of Cooperative Societies (National Cooperative Dairy Federation of India - NCDFI) was formed which is located at Anand, Gujarat. NDDB Dairy Services (NDS) was incorporated in 2009 as a not-for-profit company under Section 8 of the Companies Act to function as a delivery arm of NDDB for field operations related to promoting producer companies and productivity enhancement services.

1.3 Cooperative Dairy Sector in India

Dairy cooperatives have played an important role in improving farmers' access to markets (Birthal and Negi, 2012; Birthal, 2016). During last more than two and half decades, the number of dairy milk cooperatives in India has increased significantly. Between 1980-81 to 2017-18, the number of village dairy cooperatives has increased from 13,284 to 1,85,903 with an associated increase in dairy members from 1.75 million to 16.574 million. During the same period milk procured increased from less than 1.0 million tonne to 17.36 million tonnes, equivalent to about 10 per cent of the total milk produced in the country (Table 1.3). During 2015-16, there were about 5.01 million women members in dairy cooperatives, while numbers of all women dairy cooperatives increased to 32,092 across the country (18.77 % of the total). Out of the total milk procured, about 75.42 per cent milk was sold as liquid and the rest was converted into value added products.

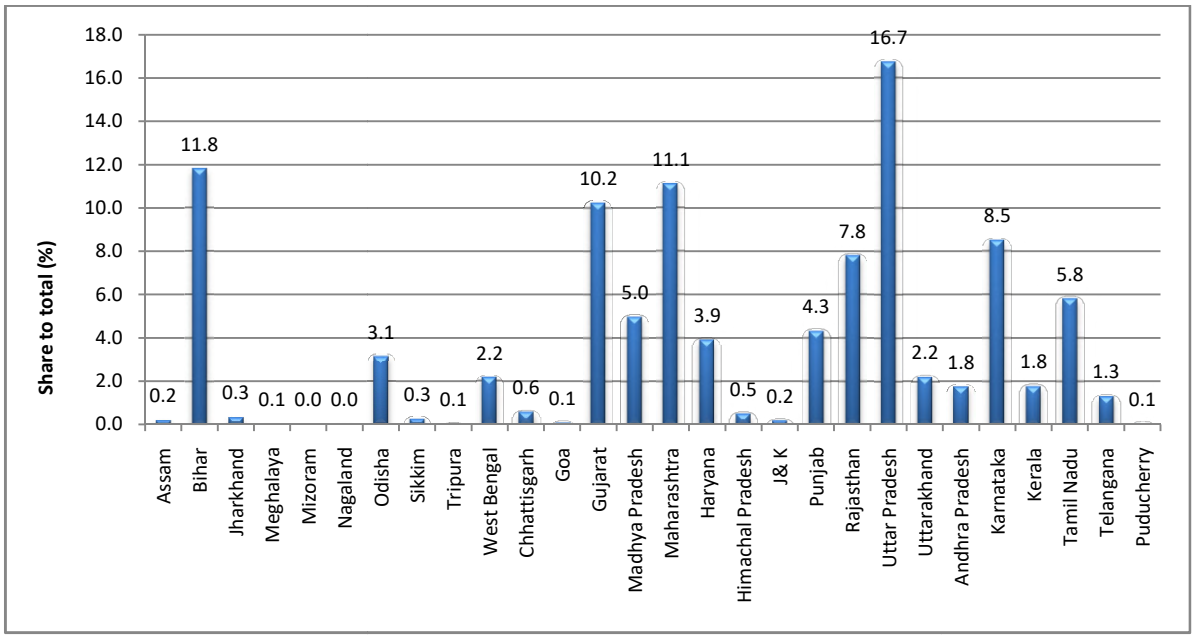
Table 1.3: Growth of Dairy Cooperatives Societies in India

Particulars	1980-81	1990-91	2000-01	2013-14	2015-16	2017-18
Dairy cooperatives (Nos.)	13284	63415	92206	165835	170992	185903
Members (in thousands)	1747	7482	10738	15399	15835	16574
Milk Procurement (000 kg/day)	2562	9702	16504	37953	42557	47563
Milk procured (million tonnes)	0.94	3.54	6.02	13.85	15.53	17.36
% of milk output procured	3.0	6.6	7.5	9.5	10.0	9.84

Source: NDDB (2016, 2018, various issues & Authors Calculations)

Cooperative sector in dairy production have played an important role in the development of the Indian dairy sector by linking village cooperative dairy producers with the markets and providing fair cost and quality inputs and services to the farmers. Inter-state comparison indicates that despite of significant growth at national level, cooperatives have remained concentrated in a few states. Thus, distribution of benefits from dairy cooperative has been unequal between states as suggested in figure 1.1.

Fig. 1.1: State-wise share in total Dairy Cooperative Societies in India (2017-18)



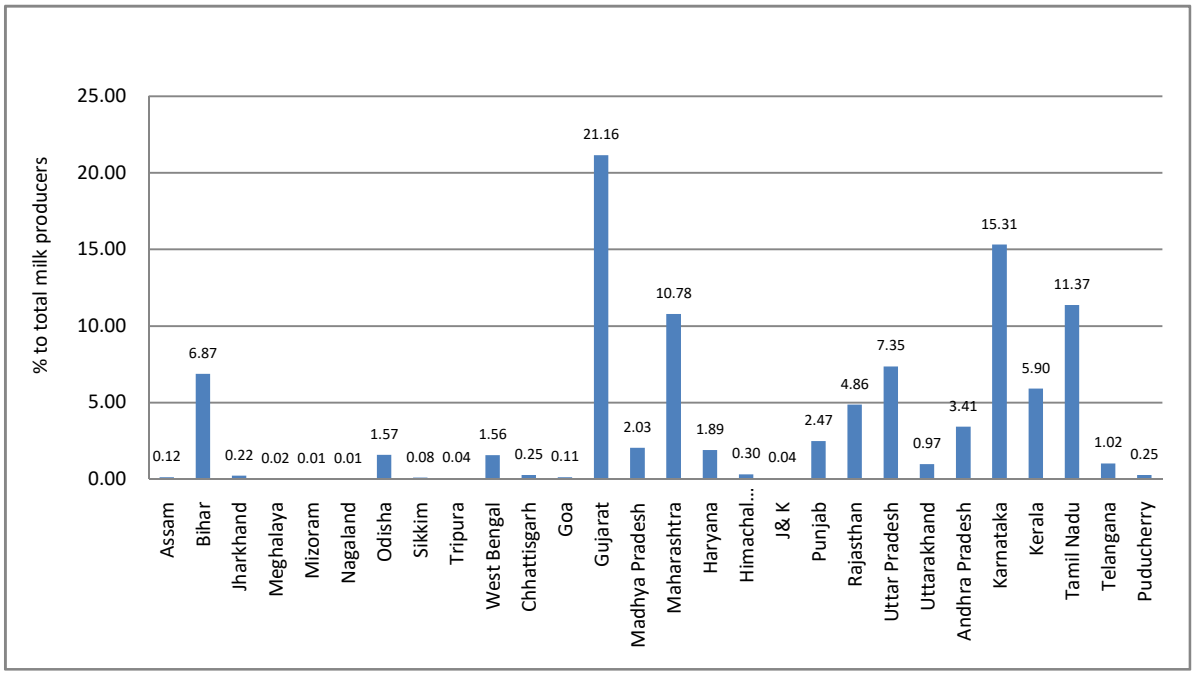
Source: NDDB (2016, 2018, various issues & Authors Calculations)

In terms of Dairy cooperative societies, Uttar Pradesh had the highest number of dairy co-operatives in India (16.7 per cent) followed by 11.8 per cent in Bihar and 11.1 percent in Maharashtra (Fig 1.1).

Dairy cooperatives are very strong in Gujarat and adjoining regions. Gujarat with a share of 7.7 per cent in the country's milk production, accounts for about 10.25 per cent in the total village level cooperatives, 21.16 per cent of the total membersand 44.44 per cent of the total milk procurement in India (2017-18). Gujarat recorded the highest share of number of producer members (21.16%) in country followed by Karnataka and Tamilnadu (Fig. 1.2). However, as compared to share of producer members to total in country, share of Gujarat and Tamilnadu had declined, while that of Rajasthan and Karnataka has improved in 2017-18 as compared to the year 2000-01 (Table 1.4). While in case of milk procurement by cooperative societies, share of Gujarat has increased from 16.8 per cent

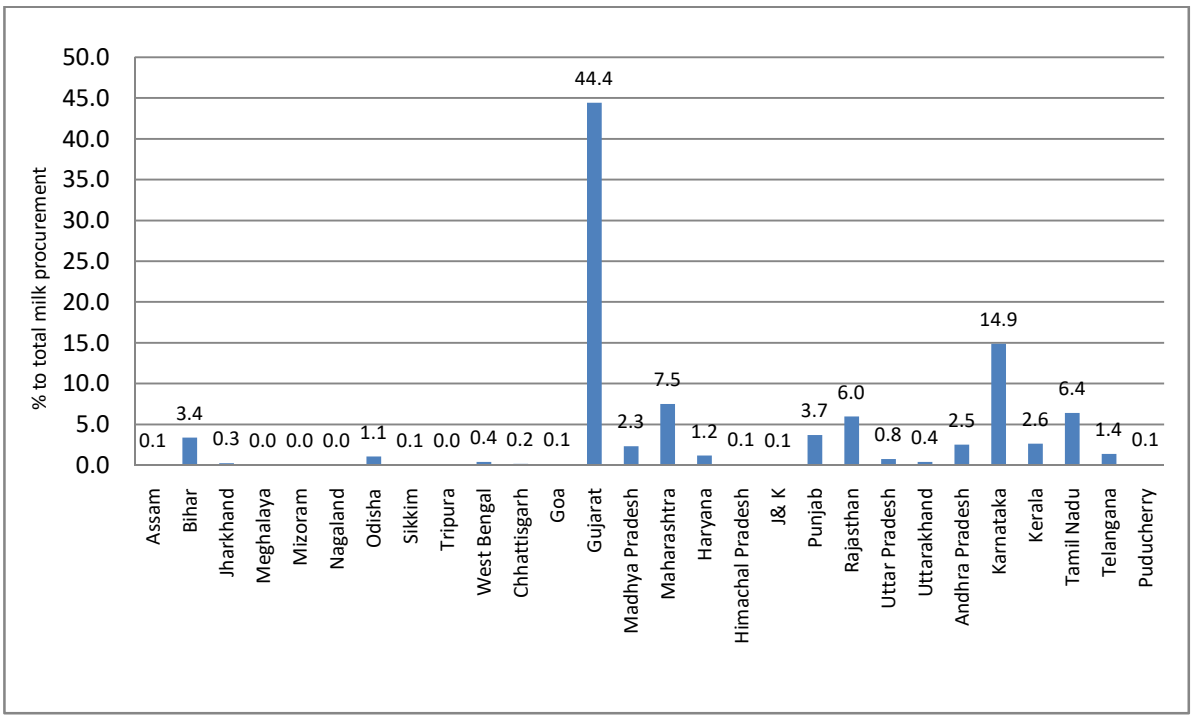
between 2000-01 and 2017-18 followed by Karnataka and Bihar while Maharashtra has lost its share by 10.5 per cent points during corresponding period.

Fig. 1.2: Statewise Share in total milk producer members of Cooperative Societies (2017-18)



Source: NDDB (2016, 2018, various issues & Authors Calculations)

Fig. 1.3: Statewise Share in total milk procurement by Cooperative Societies (2017-18)



Source: NDDB (2016, 2018, various issues & Authors Calculations)

Table1.4: Share of Major States in Total Milk Procurement by Cooperative sector

States/ Regions	Share of Major States in Total Milk Procurement by Cooperative sector in India						
	1980-81	1990-91	2000-01	2010-11	2015-16	2016-17	2017-18
Haryana	1.29	0.97	1.67	1.95	1.06	1.05	1.18
Himachal Pradesh	0.00	0.14	0.15	0.23	0.13	0.15	0.13
J & K	0.00	0.11	0.00	0.00	0.03	0.04	0.07
Punjab	2.93	4.06	5.53	3.96	3.27	3.46	3.70
Rajasthan	5.39	3.75	5.37	6.22	6.12	6.00	5.98
Uttar Pradesh	2.50	3.94	4.79	1.92	0.76	0.82	0.76
Uttarakhand	0.00	0.00	0.00	0.00	0.41	0.37	0.41
North	12.10	12.98	17.51	14.29	11.77	11.89	12.23
Assam	0.00	0.04	0.02	0.02	0.05	0.06	0.06
Bihar	0.12	0.98	2.00	4.16	4.06	3.65	3.37
Jharkhand	0.00	0.00	0.00	0.02	0.14	0.20	0.25
Meghalaya	0.00	0.00	0.00	0.00	0.03	0.03	0.03
Mizoram	0.00	0.00	0.00	0.00	0.02	0.01	0.01
Nagaland	0.00	0.01	0.02	0.01	0.01	0.01	0.01
Odisha	0.00	0.42	0.57	1.05	1.23	1.17	1.07
Sikkim	0.00	0.04	0.04	0.07	0.07	0.08	0.08
Tripura	0.00	0.03	0.01	0.01	0.01	0.01	0.01
West Bengal	1.21	0.54	1.24	1.04	0.37	0.37	0.39
East	1.33	2.06	3.89	6.38	5.99	5.59	5.28
Chhattisgarh	0.00	0.00	0.00	0.10	0.17	0.18	0.17
Goa	0.00	0.16	0.19	0.15	0.16	0.15	0.13
Gujarat	52.46	31.97	27.67	34.97	41.07	42.49	44.43
Madhya Pradesh	2.65	2.64	1.93	2.25	2.42	2.07	2.32
Maharashtra	6.44	19.29	18.05	11.59	8.56	7.94	7.50
West	61.55	54.07	47.85	49.04	52.39	52.83	54.56
Andhra Pradesh	3.08	7.86	5.33	5.24	3.13	3.16	2.52
Karnataka	10.19	9.45	11.43	14.29	15.23	15.29	14.88
Kerala	0.00	1.91	3.91	2.63	2.58	2.49	2.65
Tamil Nadu	11.75	11.40	9.80	8.01	7.14	7	6.39
Telangana	0.00	0.00	0.00	0.00	1.67	1.58	1.38
Pondicherry	0.00	0.27	0.27	0.13	0.10	0.12	0.11
South	25.02	30.89	30.75	30.29	29.86	29.64	27.93

Source: NDDB (2016, 2018, various issues & Authors Calculations)

The share of Gujarat in total milk procurement by Co-operative sectors in India was highest among various states at 44.43 % in 2017-18. In terms of milk procurement, Karnataka stands next (14.9 %) followed by Maharashtra (7.5 %), Rajasthan (6.0 %) and Tamil Nadu (6.4 %). Together, these states including Gujarat accounts for about three fourth of the total milk procurement, which is more than twice their share in total milk production of India (Table 1.4). These states also account for close to three fourth of the processing capacity in the cooperative sector.

1.4 Growth and Compositional Changes in Livestock Population:

India holds more than a quarter of world's bovine population (Kishore et al., 2016). From 1951 to 2012, livestock population in the country increased significantlyfrom 292.8 million to 512.1million (Table 1.5). Howeverin the recent past, the total livestock in the country registered a decline from 529.70 million in 2007 to 512.1 million in 2012. There were some changes in the composition of livestock at national level in broad groups like bovine, ovine and other livestock during the last six decades. The proportion of bovine population (includes cattle and buffalo) declined from nearly 68 per cent in 1951 to 58.5 per cent in 2012, while the proportion of ovines (sheep and goat) increased from about 29.5 per cent in 1951 to 39.11 per cent in 2012. The share of other animals also decreased from 2.7 per cent to 2.4 per cent during corresponding period. The population of bovine stock consisting of cattle and buffalo increased at zero rate during 1992-1997 and then registered decline in 2003, increased in 2007 and then again declined in 2012. Between these two species, stock of buffaloes increased at a much faster rate than that of cattle population indicating the rising importance of buffaloes because of higher price for buffalo milk, and substitution of drought animals with mechanical power in the country. The livestock density per hectare of net sown area has increased from 2.45 in 1951 to 3.42 in 1997 and 3.63 in 2012.

Table 1.5: Livestock Population in India by Species (in million numbers) for 1951-2012

Species	Livestock Population in India by Species (In Million Numbers)												
	1951	1956	1961	1966	1972	1977	1982	1987	1992	1997	2003	2007#	2012
Cattle	155.3	158.7	175.6	176.2	178.3	180	192.5	199.7	204.6	198.9	185.2	199.1	199.9
Adult Fe Cattle	54.4	47.3	51	51.8	53.4	54.6	59.2	62.1	64.4	64.4	64.5	73.0	76.7
Buffalo	43.4	44.9	51.2	53	57.4	62	69.8	76	84.2	89.9	97.9	105.3	108.7
Adult FeBuffalo	21	21.7	24.3	25.4	28.6	31.3	32.5	39.1	43.8	46.8	51	54.5	56.6
Total Bovine	**198.7**	**203.6**	**226.8**	**229.2**	**235.7**	**242**	**262.2**	**275.7**	**288.8**	**288.8**	**283.1**	**304.4**	**299.6**
Sheep	39.1	39.3	40.2	42.4	40	41	48.8	45.7	50.8	57.5	61.5	71.6	65.1
Goat	47.2	55.4	60.9	64.6	67.5	75.6	95.3	110.2	115.3	122.7	124.4	140.5	135.2
Horses, Ponies	1.5	1.5	1.3	1.1	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.6	0.6
Camels	0.6	0.8	0.9	1	1.1	1.1	1.1	1	1	0.9	0.6	0.5	0.4
Pigs	4.4	4.9	5.2	5	6.9	7.6	10.1	10.6	12.8	13.3	13.5	11.1	10.3
Mules	0.1	0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.2
Donkey	1.3	1.1	1.1	1.1	1	1	1	1	1	0.9	0.7	0.4	0.3
Yak	NC	NC	0	0	0	0.1	0.1	0	0.1	0.1	0.1	0.1	0.1
Mithun	NA	NA	NA	NA	NA	NA	NA	NA	0.2	0.2	0.3	0.3	0.3
Total Livestock	**292.9**	**306.6**	**336.5**	**344.5**	**353.2**	**369.4**	**419.6**	**445.2**	**470.9**	**485.4**	**485**	**529.7**	**512.1**
Poultry *	73.5	94.8	114.2	115.4	138.5	159.2	207.7	275.3	307.1	347.6	489	648.8	729.2

Notes: NC: Not Collected; NA: Not Available;*Includes Chicken, ducks, turkey & other birds; #Provisional-village level totals. Fe-Female.
Source: GOI (2016).

Thus, trends in the composition of bovine and milch animal stock over the years indicate that the breedable cow and buffalo population is important from the point of view of milk production. The composition of bovine breeding stock has improved in terms of increased share of in-milk animals in breeding stock as well as in total adult females. The adult females among cattle account for about 38.4 per cent, while for buffalo, it was 52 per cent. The rise in numbers of buffaloesis apparently noticeable in terms of ratio of buffalo to cows in the stock of adult females, or the milch animals. The ratio of milch buffalo to milch cows increased from 0.39 in 1951 to 0.79 in 1997 and then declined to 0.74 in 2012. Thus trends in size and composition of the bovine stock in the country show that the shift is taking place in favour of the bovines as milch animals (Table 1.6).

Table 1.6: Milch Animal Population by States (2012)

State / UT's	Adult Female Bovine Population by States (2012) (In thousands)						Total Livestock	
	Crossbred Over 2 1/2 years	Indigenous Over 3 years	Total Cows	Female Buffalo >3 years	Total Cows & Buffaloes	% to all India total	(000)	% to all India
A & N Islands	8	10	18	2	20	0.02	155	0.03
Andhra Pradesh	1251	2228	3479	5763	9241	6.93	56099	10.96
Arunachal Pradesh	11	133	144	1	145	0.11	1413	0.28
Assam	175	3335	3531	157	3688	2.77	19082	3.73
Bihar	2023	3959	5982	4017	9999	7.50	32939	6.43
Chandigarh	5	1	6	10	16	0.01	24	0.00
Chhattisgarh	89	3238	3327	409	3736	2.80	15044	2.94
D & N Haveli	0	9	9	1	10	0.01	50	0.01
Daman & Diu	0	1	1	0	1	0.00	5	0.00
Goa	10	14	25	16	41	0.03	146	0.03
Gujarat	1048	3092	4141	5646	9787	7.34	27128	5.30
Haryana	522	322	844	2914	3758	2.82	8820	1.72
Himachal Pradesh	549	403	952	423	1375	1.03	4844	0.95
J& K	703	525	1228	417	1644	1.23	9201	1.80
Jharkhand	137	2486	2622	398	3020	2.27	18053	3.53
Karnataka	1829	2540	4369	2056	6425	4.82	27702	5.41
Kerala	630	36	666	10	676	0.51	2735	0.53
Lakshadweep	0	2	2	0	2	0.00	50	0.01
Madhya Pradesh	415	6538	6954	4251	11204	8.41	36333	7.10
Maharashtra	2138	3302	5440	3359	8799	6.60	32489	6.34
Manipur	20	77	96	23	119	0.09	696	0.14
Meghalaya	19	333	352	4	357	0.27	1958	0.38
Mizoram	6	10	16	2	18	0.01	312	0.06
Nagaland	52	38	90	9	99	0.07	911	0.18
NCT Of Delhi	32	15	47	95	142	0.11	360	0.07
Odisha	575	2884	3459	250	3709	2.78	20732	4.05
Pondicherry	31	1	32	1	33	0.02	120	0.02
Punjab	1182	115	1297	2805	4101	3.08	8117	1.59
Rajasthan	929	5540	6470	6933	13403	10.06	57732	11.27
Sikkim	57	5	62	0	62	0.05	292	0.06
Tamilnadu	3411	1074	4485	423	4908	3.68	22723	4.44
Tripura	54	289	343	4	347	0.26	1936	0.38
Uttar Pradesh	1828	7241	9069	15432	24501	18.38	68715	13.42
Uttarakhand	259	548	807	582	1389	1.04	4795	0.94
West Bengal	1270	5053	6323	172	6494	4.87	30348	5.93
ALL	21268	55417	76685	56586	133271	100.00	512057	100.0

Source: GOI (2016)

There are significant regional variations in total livestock and bovine population. The highest livestock population was recorded in Uttar Pradesh, followed by Rajasthan, Andhra Pradesh, Madhya Pradesh and Bihar which together accounted for one half of the total livestock in the country. In case of bovine stock, Utter Pradesh accounted for highest share of 18.38 per cent of total bovine stock in India (2012) followed by Rajasthan, Madhya Pradesh, Bihar and Gujarat.

Livestock ownership is very widespread in rural India. Majority of marginal and small farmers own livestock. Farmers holding less than 4 ha of land constitute about more than 91 per cent of landholdings and they collectively own more than 80 per cent of the cattle and buffalo heard. The remaining 19.5 per cent of total livestock was owned by 8.8 per cent of the landowners with average size of cattle and buffalo holding of 7.2 animals. The average number of cows buffaloes owned by each of landowner was estimated to be 2.7 animals. The dairy farms in India are not large in size as large landowners owned on an average 9.2 animals having share of 4.8 percent of total livestock and 1.6 per cent of holdings by this group (Table 1.7).

Table 1.7: Livestock Holding Pattern among Land Owners

Category of Land Holdings	Distribution of Livestock (%)	Per Cent of Holding	Cattle & Buffalo per holding (Nos)
Marginal (Below 1.00 ha)	36.9	57.1	1.9
Small (1.00 to 1.99 ha)	23.5	20.3	3.6
Semi-medium (2.00 to 3.99 ha)	20.2	13.7	4.8
Medium (4.00 to 9.99 ha)	14.7	7.3	6.7
Large (10.00 ha & above)	4.8	1.6	9.2

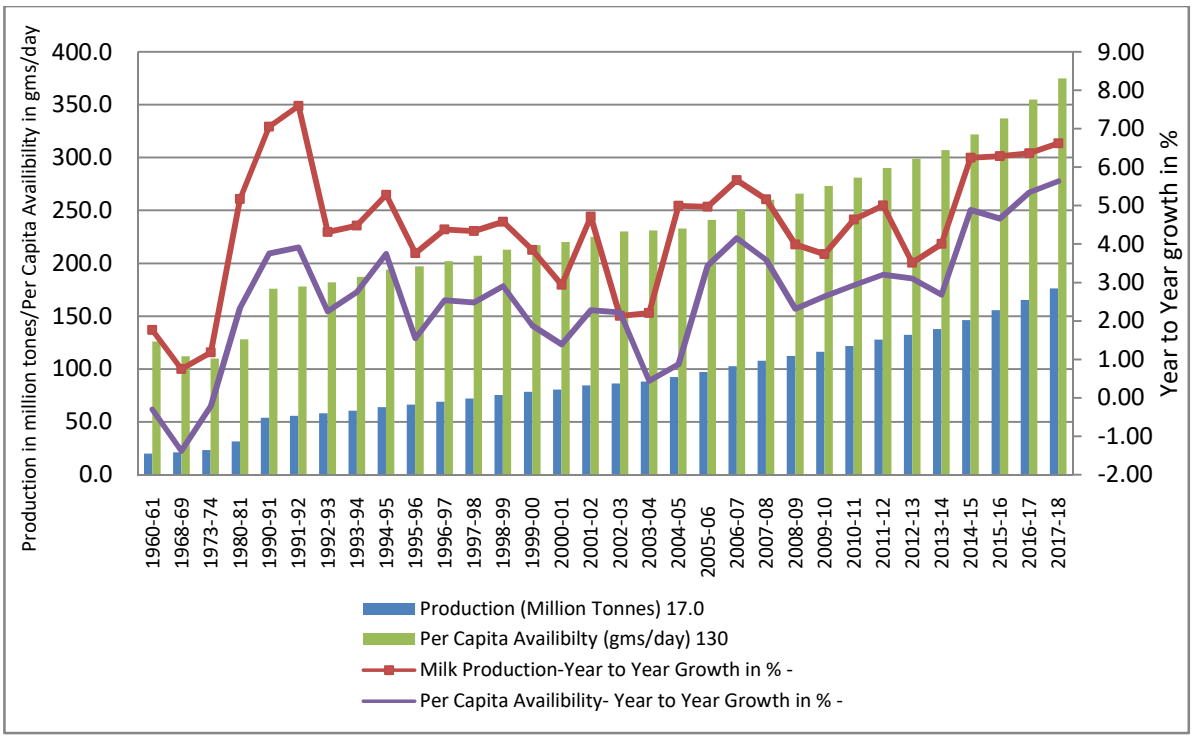
Source: Department of Agriculture & Cooperation, Govt. of India as quoted in Chawla (2009, p.28).

1.5 Milk Production and Productivity

The dairy sector has witnessed a quantum jump in all areas, including milk production, processing and marketing during the last three decades. Milk production in India increased from 17 million tonnes in 1950-51 to 176.4 million tonnes in 2017-18 (Fig 1.4, Table 1.8). From being a recipient of massive material support from the World Food Programme and European Economic Community in the 1960s & early 1970s, India has positioned itself as the world's largest producer of milk (Sharma, 2004) and produces 19 per cent of the world's total milk production. Milk production was stagnant during the decades of 1950s and 1960s and annual production growth was negative for many years, but it improved consecutively. During last two years, compensating dairy farmers to some

extent for the losses in crop sector and elsewhere due to two consecutive poor monsoon years, India continued to be the largest producer of milk in the world. Milk production has gone up from 11.2 million tonnes during 2008-09 to 146.3 million tonnes during 2014-15, and further to 176.4 million tons in 2017-18. It registered an annual growth rate of 6.29 and 6.59 per cent achieved during the previous two years respectively. It has achieved a significant jump in the annual growth rate over the previous years from 3.94 per cent during 2008-09 to 6.6 percent during 2017-18.

Fig.1.4: Milk Production and Per Capita Availibility in India



Source: https://www.nddb.coop/information/stats

Table 1.8: Milk Production and Per Capita Availability in India

Year	Production		Per Capita Availability	
	Million Tonnes)	Year on Year Growth in %	gms/day	Year on Year Growth in %
1950-51	17.0	-	130	-
1960-61	20.0	1.76	126	-0.31
1968-69	21.2	0.75	112	-1.39
1973-74	23.2	1.18	110	-0.22
1980-81	31.6	5.17	128	2.34
1990-91	53.9	7.06	176	3.75
1995-96	66.2	3.76	197	1.55
2000-01	80.6	2.94	220	1.38
2005-06	97.1	4.97	241	3.43
2010-11	121.8	4.64	281	2.93
2015-16	155.5	6.29	337	4.66
2017-18	176.3	6.59	375	5.63

Source: https://www.nddb.coop/information/stats

Table 1.9: State-wise Milk Production in India

State	Milk Production (000 tonnes)					% to all India Total 2017-18
	2001-02	2005-06	2010-11	2016-17	2017-18	
Andhra Pradesh	5814	7624	11203	12177.94	13724.99	7.8
Arunachal Pradesh	42	48	28	52.53	54.02	0.0
Assam	682	747	790	861.27	871.89	0.5
Bihar	2664	5060	6517	8711.07	9241.5	5.2
Goa	45	56	60	51.36	54.88	0.0
Gujarat	5862	6960	9321	12784.12	13569.06	7.7
Haryana	4978	5299	6267	8974.75	9809	5.6
Himachal Pradesh	756	869	1102	1329.11	1392.18	0.8
J & K	1360	1400	1609	2376.09	2459.79	1.4
Karnataka	4797	4022	5114	6562.15	7136.66	4.0
Kerala	2718	2063	2645	2520.34	2575.98	1.5
Madhya Pradesh	5283	6283	7514	13445.32	14713.17	8.3
Maharashtra	6094	6769	8044	10402.15	11102.29	6.3
Manipur	68	77	78	78.82	81.66	0.0
Meghalaya	66	73	79	83.96	85.03	0.0
Mizoram	14	15	11	24.16	25.02	0.0
Nagaland	57	74	76	79.37	74.09	0.0
Orissa	929	1342	1671	2003.42	2087.96	1.2
Punjab	7932	8909	9423	11282.06	11854.88	6.7
Rajasthan	7758	8713	13234	20849.59	22427.1	12.7
Sikkim	37	48	43	54.35	58.67	0.0
Tamil Nadu	4988	5474	6831	7556.35	7741.82	4.4
Tripura	90	87	104	159.59	174.26	0.1
Uttar Pradesh	14648	17356	21031	27769.74	29051.72	16.5
West Bengal	3515	3891	4471	5182.6	5388.61	3.1
A&N Islands	23	20	25	16.14	16.99	0.0
Chandigarh	43	46	45	36.39	42.3	0.0
D&N Haveli	8	5	11	7.5	7.5	0.0
Daman & Diu	1	1	1	0.62	0.83	0.0
Delhi	294	310	480	279.11	279.11	0.2
Lakshadweep	2	2	2	3.24	2.55	0.0
Pondicherry	37	43	47	48.31	48.68	0.0
Chhattisgarh	795	839	1029	1373.55	1469.38	0.8
Uttarakhand	1066	1206	1383	1692.42	1741.69	1.0
Jharkhand	940	1335	1555	1893.8	2015.62	1.1
Telangana	-	-	-	4681.09	4965.37	2.8
All India	84406	97066	121848	165404.38	176346.25	100.0

Source: https://www.nddb.coop/information/stats

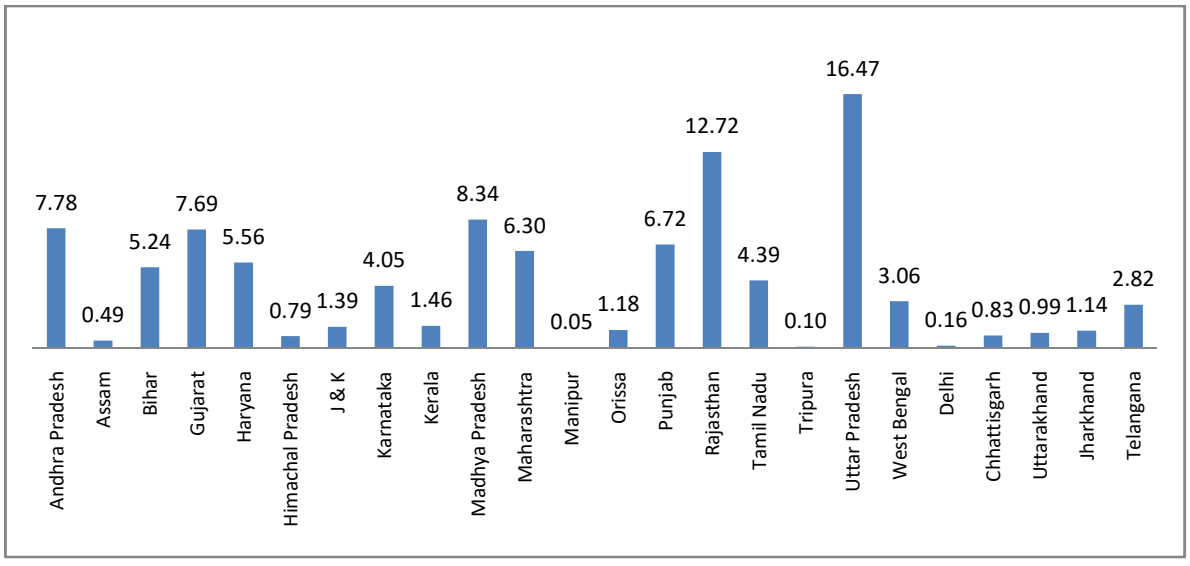
The regionwise contribution in total milk production is very diverse (Table 1.9) with contribution from north region at 45 per cent in total production followed by 23 per cent by West region, 20 percent by South regions and 12 per cent by East region. However, all the states are not doing well and the growth in milk production varies widely in various regions and among states within the regions. The western and central Indian states performed well in terms of growth in milk production during 2017-18, while the North-eastern and Eastern states, due to their regional peculiarities, were trying to match. Rajasthan (12.7 per cent) and Maharashtra (6.3 per cent) achieved a higher growth rate

during 2017-18 among all the western regional states while Madhya Pradesh achieved significant higher growth rate (8.3 per cent) in milk production among the two central regional states of Madhya Pradesh and Chhattisgarh during 2017-18. Eastern regions of the country need special attention as these states seem to be lagging behind dairying states such as Punjab, Gujarat and Karnataka (Kumar, 2016). Bihar (5.2 per cent) in the eastern region and Sikkim, Arunachal Pradesh, Tripura and Mizoram in the North Eastern region did not perform well during the mentioned years. Andhra Pradesh (7.8 percent) in the southern region and Jammu and Kashmir (1.4 per cent), Himachal Pradesh (0.8 per cent) and Haryana (5.6 per cent) among the northern region states achieved a higher growth rate than the national average during 2017-18.

In case of milk procurement, during the period from 2009-10 to 2017-18, the central and western Indian regions performed well in terms of milk production at 8.7 per cent and 7.58 per cent, respectively (Table 1.9, Fig. 1.5). The sector is witnessing more action from private dairies, which is likely to continue, especially in the area of milk procurement. They are now shifting their strategies to source milk directly from farmer and not through contractors. Simultaneously, they are continuing their focus on production and marketing of value added milk and milk products.

The per capita availability of the milk in the country has also increased significantly from 130 grams/day in 1950-51 to 375 gram per day in 2017-18 as against the world average of 294 grams per day during 2013. This represents sustained growth in the availability of milk and milk products for the growing population of India.

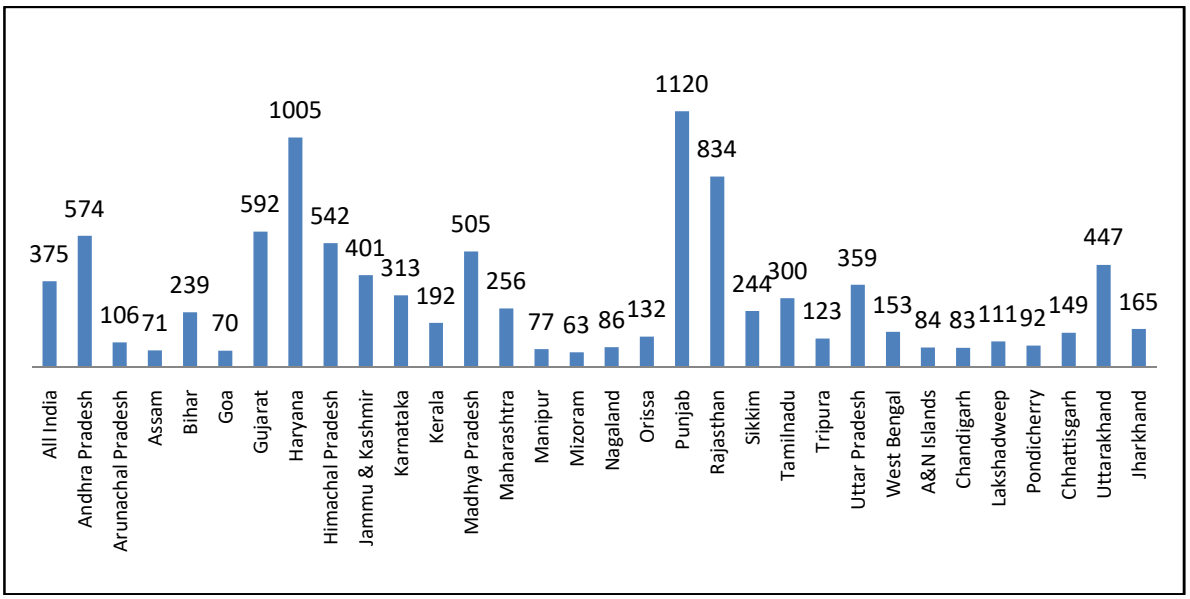
Fig. 1.5: Statewise share in total Milk Production 2017-18 (%)



Source: https://www.nddb.coop/information/stats

However, there are large interregional and interstate variations in milk production as well as in per capita availability in India. The largest producer of milk amongst states was Uttar Pradesh with a production of 16.5 per cent of the total milk production in the country followed by Rajasthan (12.7 percent) and Gujarat (7.7 percent). About 70 percent of national milk production came from eight major milk producing states, viz. Uttar Pradesh, Rajasthan, Andhra Pradesh, Gujarat, Punjab, Madhya Pradesh, Maharashtra and Haryana (Fig. 1.5). However, only 12 States were having per-capita availability more than the national average of 300 gm/day in the year 2017-18 (see, Fig. 1.6).

Fig. 1.6: State-wise Per Capita Milk Availability in India 2017-18 (gm/day)



Source: https://www.nddb.coop/information/stats

Table 1.10: Milk Yield in India and other Selected Countries (2012 & 2017)

Country	Milk yield in India and other selected countries- Yield (hg/animal)			
	Milk, whole fresh Cow		Milk, whole fresh Buffalo	
Year	2012	2017	2012	2017
India	13435	16429	17515	19974
Israel	115553	131817	NA	NA
Canada	89357	87568	NA	NA
Denmark	85067	97488	NA	NA
USA	98527	104574	NA	NA
Saudi Arabia	99750	83359	NA	NA
Republic of Korea	100954	100331	NA	NA
Pakistan	12301	12300	19349	19882
Sri Lanka	8373	11058	6545	7537
Australia	55753	57880	NA	NA
New Zealand	38183	42373	NA	NA
World average	23414	24302	16300	18098

Note: N.A. Not Available
Source: http://www.fao.org/faostat/es/

Inspite of the importance of livestock in Indian rural economy in generating sustainable livelihood for small farmers, meeting the growing demand for milk and meat, as well as being ranked at first position in terms of cattle and buffalo population in the world, the productivity of dairy animals in India is very low as compared to other countries (Table 1.10).

Table 1.11: Statewise Estimates of Milk Yield Rates 2013-14 & 2017-18

Sr. No.	States/ UTs	Cows-Exotic - Average Yield/ day - (kg)		Cows-Non Descript - Av Yield/day(kg)		Buffalo - Average Yield/ day - (kg)	
		2013-14	2017-18	2013-14	2017-18	2013-14	2017-18
1	Andhra Pradesh#	7.42	9.4	2.08	3.4	4.73	7.34
2	Arunachal Pradesh	6.6	6.52	1.4	1.39	-	2.54
3	Asham	3.99	4.49	0.99	1	2.92	3.43
4	Bihar	6.11	6.56	2.94	3.34	3.95	4.38
5	Chhattisgarh	5.41	6.17	1.33	2.09	5.26	4.82
6	Goa	6.93	8.02	1.59	1.96	4.13	4.39
7	Gujarat	8.94	9.13	4.07	4.33	4.87	5.02
8	Haryana	8.37	8.65	5.22	5.69	7.54	8.74
9	Himachal Pradesh	4.68	4.92	1.68	1.93	3.6	3.78
10	Jammu & Kashmir	5.65	7.8	2.62	3.63	4.83	5.16
11	Jharkhand	5.99	7.28	1.69	1.57	5.88	3.34
12	Karnataka	6.11	6.03	2.35	2.26	2.7	3
13	Kerala	8.55	10.19	0.59	2.99	3.28	4.98
14	Madhya Pradesh	7.38	8.42	2.52	2.84	3.98	4.46
15	Maharashtra	7.18	9.18	1.76	2.28	4.35	5.07
16	Manipur	7.31	7.32	1.46	1.47	3.3	3.32
17	Meghalaya	8.96	8.95	0.76	0.77	1.83	1.84
18	Mizoram	6.53	7.67	1.59	1.59	-	0
19	Nagaland	5.4	5.34	1.84	1.79	3.67	3.19
20	Odisha	6.18	6.3	1.63	1.37	3.87	3.94
21	Punjab	11.04	12.44	6.59	6.75	8.72	8.3
22	Rajasthan	7.75	8.26	3.68	4.89	5.76	6.61
23	Sikkim	5.74	5.03	1.78	0.6	4.66	0
24	Tamil Nadu	6.87	6.89	2.71	2.92	4.42	3.87
25	Telangana	-	7.61	-	2.38	-	5.07
26	Tripura	5.4	5.71	1.32	1.76	2.48	2.58
27	Uttar Pradesh	7.09	7.24	2.59	3.02	4.45	4.49
28	Uttarakhand	6.88	7.18	1.95	2.16	4.18	4.61
29	West Bengal	3.58	6.15	2.65	3.07	5.42	5.11
30	A & N Islands	4.54	5.72	2.95	3.24	3.4	3.64
31	Chandigarh	9.03	11.61	3	5.33	6.2	8.77
32	D. & N. Haveli	9.28	-	3.75	-	4.65	-
33	Daman & Diu	8.65	6.46	-	3.99	2.64	4.69
34	Delhi	5.91	-	3.97	-	5.8	-
35	Lakshadweep	5	5	3	3	-	0
36	Puducherry	5.83	5.89	2.56	2.58	5.59	5.47
	All India	**6.78**	**7.71**	**2.5**	**2.93**	4.91	5.47

Notes:#includes Telangana till 2013-14; "-" not available/not received;The yield rate for 2015-16 onwards is calculate based on the separate yield rate of exotic & CB.
Source: GOI (2018 , Basic Animal Husbandy Statistics 2018).

The milk yield no doubt has increased between 2012 and 2017 by around 22 per cent, but it is still less than 30 percent of the world average and about six times lower than milk yield in Europe. The performance of indigenous cows is observed to be poor if analysed separately from the performance of crossbred cows. Besides, milk yield varies significantly across the states of India (Table 1.11). The reason cited for this is inappropriate feeding as well as inadequate supplies of quality feeds and fodder in addition to the low genetic profile of the Indigenous breeds. It is not possible to achieve higher productivity in milching animal by merely increasing its genetic potential. Due attention needs to be given to proper feeding of milching animals. There is no shortcut to sustain livestock husbandry, without addressing the development of fodder and feed resources.

The average milk yield of indigenous breeds of cattle has been around 2.93 litres as compared to 7.71 liters for crossbreds and 5.47 liters for buffaloes. As noted by Hegde[3] (2006, p2), yield of indigenous cattle may not include the yield of draft breeds and non-descript cows which are hardly milked due to low yields. Thus, except 15-20 per cent of crossbreds and elite native breeds, about 80-85 per cent of the livestock, particularly the cattle are not contributing to the milk production. However, they compete for fodder and feed, resulting in huge shortage of feed resources. It is because of the large number of unproductive animals that there has been severe shortage of feed and fodder resources. Thus, feed scarcity is the main factor limiting the improvement of livestock productivity. For example, the actual milk yield of bovines is reported to be 26 to 51 per cent below the attainable yield under field conditions (Birthal and Jha, 2005).

1.6 Status of Availability of Feed and Fodder

Shortage of fodder and feed has been a major constraint in the development of the livestock economy of India (Seetharaman, et al., 1997). Feed accounts for 65-70 per cent of the total cost of production and maintenance of the animals. There is a direct relation between the nutritional status of the animals and the type of feed fed. One of the prominent characteristics of Indian livestock is that almost its entire feed requirement is met from crop residues and by-products like grasses, weeds, tree leaves gathered from cultivated and uncultivated lands, grazing on common lands and harvested fields. For

[3] http://www.baif.org.in/doc/Livestock_Devt/Livestock%20Devt%20for%20Sustainable%20Livelihood%20of%20Small%20Farmers.doc

improving the yield of milching animals, feeding of animal needs planned, scientific, practical as well as economic approach. Livestock feeds are generally classified as roughages and concentrates. Roughages are further classified into green fodder and dry fodder. Green fodder is cultivated and harvested for feeding the animals in the form of forage (cut green and fed fresh), silage (preserved under anaerobic condition) and hay (dehydrated green fodder). The cereals crops residues contribute about 71 per cent of overall feed resources used for animals feeding, green fodder accounts for 23 percent and concentrated feeds account for 6 per cent (GOI, 2017).

Table 1.12: Area under Fodder Cultivation and Permanent Pastures & Other Grazing Lands in India

States/UTs	Fodder Crops (2014-15)*		Permanent Pastures &Other Grazing Land 14-15	
	(000 ha)	% to GCA	(000 ha)	% to GCA
Andaman and Nicobar Islands	0	0.00	4	0.00
Andhra Pradesh	64	0.07	214	0.22
Arunachal Pradesh	0	0.00	18	0.02
Assam	4	0.00	167	0.17
Bihar	20	0.02	15	0.02
Chandigarh	0	0.00	0	0.00
Chhattisgarh	0	0.00	887	0.92
Dadra and Nagar Haveli	0	0.00	1	0.00
Daman and Diu	0	0.00	0	0.00
Delhi	1	0.00	0	0.00
Goa	0	0.00	1	0.00
Gujarat	850	0.88	851	0.88
Haryana	420	0.44	25	0.03
Himachal Pradesh	9	0.01	1510	1.57
Jammu and Kashmir	53	0.05	112	0.12
Jharkhand	0	0.00	114	0.12
Karnataka	28	0.03	904	0.94
Kerala	6	0.01	0	0.00
Lakshadweep	0	0.00	0	0.00
Madhya Pradesh	367	0.38	1303	1.35
Maharashtra	969	1.00	1249	1.29
Manipur	0	0.00	1	0.00
Meghalaya	0	0.00	0	0.00
Mizoram	0	0.00	11	0.01
Nagaland	0	0.00	0	0.00
Odisha	0	0.00	524	0.54
Pondicherry	0	0.00	0	0.00
Punjab	498	0.52	5	0.01
Rajasthan	4928	5.11	1674	1.74
Sikkim	0	0.00	0	0.00
Tamil Nadu	91	0.09	108	0.11
Telangana	27	0.03	299	0.31
Tripura	0	0.00	1	0.00
Uttar Pradesh	767	0.80	65	0.07
Uttarakhand	32	0.03	192	0.20
West Bengal	3	0.00	2	0.00
India	9137	9.47	10258	10.63

Source: www.indiastat.com

The major sources of fodder supply are crop residues, cultivated fodder and fodder from common property resources like forests, permanent pastures and grazing lands. The total area under cultivated fodders was 9.13 million hectares in 2014-15, which accounted for barely 4.6 per cent of gross cropped area (Table 1.12), while area under permanent pastures and other grazing land was 10.26 mha in 2014-15 (which accounted for barely 5.2 per cent of gross cropped area). The share of permanent pastures and other grazing land in gross cropped area declined from 4.68 per cent in 1960-61 to 3.33 per cent in 2014-15 (GOI, 2018). The pasture lands available in the different states are overgrazed and not properly managed which lead to lower productivity. In different states, grazing pressure on this land is very high compared to carrying capacity. About 70 per cent of grazing land comes under poor to very poor condition in Rajasthan having productivity below 500 kg/ha (GOI, 2017). The details about forage crops grown in India are presented in Table 1.13. Sorghum amongst the kharif crops (2.6 million ha) and berseem amongst the rabi crops (1.9 mha) occupy about 54 per cent of the total cultivated fodder cropped area.

Table 1.13: Forage Crops grown and their Area and Productivity in India

Sr. No.	Crop	Botanical name	Area (000 ha)	Green fodder yield (t/ha)
1	Berseem (Egyptian clover)	Trifolium alexandrinum	1900	60-110
2	Lucerne (Alfalfa)	Medicago sativa	1000	60-130
3	Senji (Sweet clover)	Melilotus indica	5	20-30
4	Shaftal (Persian clover)	Trifolium resupinatum	5	50-75
5	Metha (Fenugreek)	Trigonella foenum-graecum	5	20-35
6	Lobia (Cowpea)	Vigna unguiculata	300	25-45
7	Guar (Clusterbean)	Cyamopsis tetragonaloba	200	15-30
8	Rice bean	Vigna umbellata	20	15-30
9	Jai (Oat)	Avena sativa	100	35-50
10	Jau (Barley)	Hordeum vulgare	10	25-40
11	Jowar/Chari (Sorghum)	Sorghum bicolor	2600	35-70
12	Bajra (Pearl millet)	Pennisetum glaucum	900	20-35
13	Makka (Maize)	Zea mays	900	30-55
14	Makchari (Teosinte)	Zea mexicana	10	30-50
15	Chara sarson (Chinesecabbage)	Brassica pekinensis	10	15-35

Sources: NITI Ayog (2018, p.59), http://agropedia.iitk.ac.in/content/area-under-fodder-production-india;

The estimates suggests that there is a wide variation in the fodder production in the country. Fodder production and its utilization depend on various factors like cropping pattern followed, climatic condition of the area as well as the socio-economic conditions of the household and type of livestock reared. The cattle and buffaloes are normally fed on the fodder available from cultivated areas, supplemented to a small extent by harvested grasses. Thus, major sources of fodder for feeding the livestock in India are crop residues (54%), fodder from grasslands (18%) and cultivated fodder crops (28%) (Hegde, 2006).

Prominent among the crop residues were paddy straw, wheat straw, stalks of sorghum, maize, pearl millet, groundnut, beans and grams. Although these crop residues were considered as very valuable by the livestock keepers, there have been a lot of wastage in different parts of the country. In urban areas, particularly around Hyderabad and Bangalore, dairy animal owners purchased chaffed sorghum stalk at a price of Rs. 5500 to Rs. 6500 per ton. Even wheat straw was sold in the range of Rs. 2000 to Rs. 3 per ton, while paddy straw was sold at Rs.1500 to Rs. 2000 per ton. However in many regions of Punjab, Haryana and Uttar Pradesh, farmers have been burning these crop residues, because of lack of demand in local markets. Some of these crop residues have also been diverted for industrial uses such as manufacturing of paper and particle boards as well as for generation of electricity. Generally, crop residues such as fodder fetch better price than as an industrial raw material. Nevertheless, if farmers are selling crop residues at a lower price, it is clear that there is no demand for fodder in certain agriculturally rich areas, while certain other regions are facing fodder shortage. Approximate cost of one kg of cattle feed is Rs. 17/- with average dry matter content of 90 per cent, crude protein (CP) 20 per cent and total digestible nutrients (TDN) is 70 per cent, while same for one kg of legume green fodder is Rs. 2/- with average dry matter, CP and TDN content of 20, 18 and 65 per cent respectively (Garg, 2018). Thus availability of nutrients from green fodder is significantly cheaper than what is available in concentrate feed. This reflects on the need for developing necessary infrastructure to make best use of the available fodder resources, while aiming at enhancing the production further.

Availability of feed and fodder is a major constraint in promotion of dairy husbandry in India. A well balanced animal nutrition consist of green fodder, dry fodder, concentrates (Malik and Garg, 2013). India's livestock population was 512 million in 2012 and was expected to grow at the rate of 0.55 per cent in the consecutive years (IGFRI, 2018) (Table 1.14). Estimate of fodder requirement and availability by several committees vary considerably for two reasons: i) use of different estimates of livestock population and different feeding schedule for different classes of livestock, and ii) fodder requirements estimates considered only for cattle and buffaloes. However, there is a huge shortage of feed and fodder resources and the shortagesare likely to worsen in the coming decades. It has been estimated that only 880 million tons of dry fodder was available including greens, which is only sufficient to address 35-40 per cent of the demand. This clearly indicates that

as most of the livestock are unfed, they are not able to generate yield optimally. Out of the available dry matter, most of it is available in the form of agricultural by-products and dried grass collected from community wastelands and forests which are of inferior quality. Similarly, the concentrates required for feeding the livestock are also in acute shortage. As a result, even the high yielding animals, which are presumably well-fed suffer from nutritional imbalance.

In India, an estimated 50 million tonnes of 'concentrates feed ingredients' are available annually which yield about 10 million tonnes of Crude Protein (CP) and 32.5 million tonnes of Total Digestible Nutrients (TDN). In comparison, the annual production of green fodder is estimated at nearly 500 million tones, with a yield of around 12 million tonnes of CP and 55 million tonnes ofTDN. Thus, green fodder is a vital source of nutrients, especially vitamins, for livestock. Green fodder is primarily obtained through cultivation. Despite of large area under cultivation of fodder (9.137 mha), green fodder is scarce due to low yield levels, with an average annual yield of meagre 40 tonnes/hectare, which is low. In view of land constraints, efforts need to be put forth to enhance fodder production from available land and to increase availability of fodder by minimising wastage.

Table 1.14: Projected Livestock Population Estimates

Year	Projected Livestock Population Estimates* (million adults cattle unit, ACU#)						
	Cattle	Buffalo	Sheep	Goat	Equine	Camel	Total
2010	127.3	88.8	4.6	9.03	0.75	0.49	231.1
2020	129.1	95.3	5.03	10.32	0.63	0.43	240.8
2030	133.6	106.8	5.39	11.18	0.54	0.29	257.9
2040	136.6	115.0	5.76	11.99	0.40	0.20	270.1
2050	139.6	127.1	6.13	13.19	0.29	0.12	286.5

Notes: *estimates based on past livestock censuses published by the Directorate of Economics and Statistics and Department of Animal Husbandry and Dairying; # Category-wise population was multiplied with standard body weight to get total weight with conversion to ACU (1 ACU=350kg)
Sources: NITI, Ayog (2018), IGFRI (2013, Vision 2050).

Several studies have indicated deficit of fodder and feed resources in the country. At present, there is huge gap between demand and supply of animal feed and fodder (see, Tables 1.15 to 1.19). The 34th report of Parliamentary Standing Committee on Agriculture has also indicated shortage of 122 million tonnes dry fodder, 284 million tonnes of green fodder and 35 million tonnes of concentrate by 2024 (GOI, 2017). At present there is no feed and fodder security for more than 500 million animals in the country. The increased growth of livestock particularly that of genetically upgraded animals has further aggravated the situation. Additionally, the quality of the available fodder is also poor,

being deficient in energy, protein and minerals. The pattern of deficit varies in different parts of the country (NITI Ayog, 2018). For instance, the green fodder availability in Western Himalayan, Upper Gangetic Plains, Eastern Plateau and Hilly Zones is more than 60 per cent of the actual requirement. In Trans-Gangetic Plains, the feed availability is between 40 and 60 per cent of the requirement and in the remaining zones, the figure is below 40 per cent. In case of dry fodder, availability is over 60 per cent in the Eastern Himalayan, Middle Gangetic Plains, Upper Gangetic Plains, East Coast Plains and Hilly Zones. In Trans Gangetic Plains, Eastern Plateau and Hills and Central Plateau and Hills, the availability is in the range of 40-60 per cent, while in the remaining zones of the country the availability is below 40 per cent. The regional deficits are more important than the national deficit, especially for fodder, since it is not economical to transport over long distances (Satyanarayan, et al. 2017).

Table 1.15: Estimates of Feed and Fodder in India

Year	Estimates of feed and Fodder in India *(million tonnes)*								
	Dry			Greens			Concentrates		
	Available	Required	Deficit (%)	Available	Required	Deficit (%)	Available	Required	Deficit (%)
2015	387	491	21	619	840	26	58	87	34
2020	408	530	23	596	880	32	61	96	36
2025	433	550	21	600	1000	40	65	105	38

Source: NITI Ayog (2018); Gotri, et al, 2012 (NIANP, Bengalore), as quoted in Garg (2018).

Table 1.16: Supply and Demand of Green and Dry Fodder

Year	Supply (*million tonnes)*		Demand (*million tonnes)*		Deficits (*million tonnes)*		Deficits as a % of demand (*million tonnes)*	
	Green	Dry	Green	Dry	Green	Dry	Green	Dry
2010	525.51	453.28	816.83	508.99	291.32	55.72	35.66	10.95
2020	590.42	467.65	851.34	530.50	260.92	62.85	30.65	11.85
2030	687.46	500.03	911.67	568.10	224.21	68.07	24.59	11.98
2040	761.76	524.40	954.81	594.97	193.05	70.57	20.22	11.86
2050	826.05	547.78	1012.70	631.05	186.05	83.27	18.43	13.20

Note: Figures in Parentheses indicates actual deficit; quantities in million tonnes
Source: Indian Grassland and Fodder Research Institute (2013) and GOI (2017)

Table 1.17: Availability, Requirement & Deficit of Crude Protein (CP) & Total Digestible Nutrients (TDN) including CP & TDN from concentrates

Year	Crude Protein CP and Total Digestible Nutrients TDN *(Figures in million tonnes)*					
	Requirement		Availability		Deficit (%)	
	CP	TDN	CP	TDN	CP	TDN
2000	44.49	321.29	30.81	242.42	30.75	24.55
2005	46.12	333.11	32.62	253.63	29.27	23.86
2010	47.76	344.93	34.18	262.02	28.44	24.04
2015	49.39	356.73	35.98	273.24	27.15	23.41
2020	51.04	368.61	37.50	281.23	26.52	23.70
2025	52.68	380.49	39.31	292.45	25.38	23.14

Source: www.indiastat.com

Table 1.18: Availability, Requirements and Deficit of Concentrates for Livestock

Particulars	Availability, requirements and deficit of concentrates for livestock *(million tonnes)*				
	2002-03	2003-04	2004-05	2005-06	2006-07
Available	41.96	43.14	44.35	45.63	48.27
Required	117.44	120.52	123.59	127.09	130.55
Deficit (%)	64.27	64.21	64.12	64.10	63.03

Source: www.indiastat.com

Table 1.19: State-wise Production of Dry and Green Fodder('000 tonnes)

States/Union Territories	2000-01			2001-02			2002-03		
	Dry fodder	Green fodder	Total fodder	Dry fodder	Green fodder	Total fodder	Dry fodder	Green fodder	Total fodder
Andhra Pradesh	36759	14573	51333	33473	14405	47877	26053	14240	40293
Arunachal Pradesh	471	7731	8202	478	7731	8209	518	7731	8249
Assam	6146	3372	9518	5962	3372	9334	5745	3372	9117
Bihar	19523	1377	20901	19158	1361	20520	15612	1346	16957
Chhattisgarh	4710	21192	25903	8942	20957	29899	5189	20730	25919
Goa	251	189	440	223	189	412	233	189	421
Gujarat	12444	56158	68602	21515	56895	78411	15250	57643	72894
Haryana	19701	19400	39102	21136	19204	40340	18855	19011	37866
Himachal Pradesh	2573	3137	5710	3237	3183	6419	2187	3230	5417
Jammu & Kashmir	2365	6083	8448	2635	6113	8747	2510	6142	8652
Jharkhand	2863	3713	6577	3430	3708	7137	3839	3702	7542
Karnataka	41990	7409	49399	32759	7299	40058	28368	7195	35563
Kerala	1086	1738	2824	1026	1745	2771	1014	1752	2766
Madhya Pradesh	29287	34921	64208	37672	34059	71732	27223	33227	60450
Maharashtra	43915	80013	123928	44193	88363	132556	42390	97682	140073
Manipr	547	903	1450	549	903	1452	539	903	1442
Meghalaya	333	1400	1733	347	1400	1746	343	1399	1742
Mizoram	200	2615	2815	207	2692	2899	208	2771	2979
Nagaland	649	1311	1960	726	1314	2039	903	1316	2219
Orissa	7280	8856	16136	10564	8868	19432	5267	8881	14148
Punjab	31182	26704	57886	30983	26102	57085	29350	25513	54863
Rajasthan	24056	116890	140946	37460	117093	154553	16540	117297	133836
Sikkim	274	437	711	259	437	696	267	437	704
Tamil Nadu	25066	10549	35615	23300	10525	33824	21429	10500	31929
Tripura	705	909	1614	803	909	1712	751	909	1660
Uttar Pradesh	87014	37065	124079	91433	36438	127871	80798	35823	116621
Uttarakhand	4807	17495	22302	4747	17289	22036	4366	17087	21453
West Bengal	19806	1889	21695	23173	1887	25060	21646	1885	23530
A & Nicobar Island	45	1047	1092	37	1048	1085	40	1048	1088
Chandigarh	0	83	83	0	83	83	0	83	83
Dadra & Nagar Haveli	9	63	72	10	58	68	10	54	64
Daman & Diu	48	0	48	64	0	64	47	0	47
Delhi	132	35	167	157	33	190	113	31	144
Lakshadweep	0	0	0	0	0	0	0	0	0
Pondicherry	80	0	80	106	0	106	85	0	85
All-India	426318	489259	915577	460764	495659	956424	377688	503129	880818

Note:1. Green fodder production is estimated assuming an average yield per hectare of 1.5 tonnes from the forest area, 0.75 tonnes from permanent pastures and grazing lands and 40 tonnes from cultivated areas.

2. For dry fodder, production of various crops are projected using growth trends and crop residue production is estimated using standard conversion ratio foe cereals, pulses and oilseedsl.

3. Total fodder is the sum of dry and green fodder production. Total may not tally due to rounding off.

4. Area under forests, fodder crops and permanent pastures etc. for these years has been projected based on past data.

Source: http://www.iasri.res.in/agridata/08data/chapter1/db2008tb1_40.pdf (GOI, (2004) Basic Animal Husbandry Statistics, 2004, Dept of Animal Husbandry & Dairying, Ministry of Agriculture, GOI.)

Shortage of fodder is chronic in those areas where farming is dependent on rainfall or in areas having irrigation but large livestock population (Table 1.20). This is the case in Rajasthan, Gujarat, Maharashtra, Karnataka and certain parts of Andhra Pradesh where scarcities and droughts are more often. Availability of fodder is generally satisfactory during the monsoon season in all regions including areas of chronic fodder shortage, provided the rainfall is normal. August to October is considered flush season for fodder. Very acute shortage of fodder is felt from March to June, the period before the onset of monsoon season. If the monsoon fails, fodder availability becomes difficult from October. Since not all areas are self sufficient in fodder/grasses, there is movement of fodder/grasses from surplus area to deficit area. Even within an area, fodder/grasses are surplus with some farmers while some other have to purchase it to meet the deficit. Thus inter area production and intra area sale and purchase of fodder/grasses regularly take place. Such movement get impetus during periods of drought in some areas (Seetharaman, et al., 1997).

In animal feed supply, coarse cereals have a major role and these account for about 17 per cent of the total cereals production (Table 1.21). In fact traditionally crop and livestock sectors are interrelated to each other. The interactions between these two sectors are so complex that it would be difficult to estimate the contribution of one in another's progress. Availability of concentrates and crop residues are directly linked with agricultural production. However, agricultural production in India for last five decades has grown at around 2.2 per cent only. Availability of crop residues is further declining due to adoption of high yielding dwarf varieties/hybrids and field wastage due to extensive use of grain picker/mechanical harvester in cereal crops (Garg, 2018). The crop sector mainly supplies fodder to livestock, while livestock provides manure and resilience against drought to crop sector. Production of cereals was around 47 million tonnes. Maize accounted for around 60 per cent of the total coarse cereals produced in the India. Most of the coarse cereals in the developed countries are mainly used for cattle feed and some of the cereals like barley are used in breweries. However, in India their use is mainly for direct consumption mostly by poor in the villages.

Table 1.20: State-wise Availability and Requirement of Fodder in India (2008)

(Dry Matter in Million Tonnes)

States/UTs	Availability		Requirement	
	Crop Residues	Greens	Crop Residues	Greens
Andhra Pradesh	15.69	4.88	31.71	16.91
Arunachal Pradesh	0.47	1.57	1.00	0.53
Assam	5.82	0.95	12.39	6.61
Bihar	16.23	0.81	23.49	12.53
Chhattisgarh	9.93	2.83	14.93	7.96
Goa	0.13	0.05	0.15	0.08
Gujarat	10.61	14.48	22.32	11.9
Haryana	8.75	6.57	9.95	5.31
Himachal Pradesh	2.30	1.98	4.60	2.45
Jammu and Kashmir	2.53	0.64	6.79	3.62
Jharkhand	4.10	0.88	13.59	7.25
Karnataka	14.59	3.55	20.66	11.02
Kerala	0.71	0.39	2.91	1.55
Madhya Pradesh	24.3	11.65	37.41	19.95
Maharashtra	22.21	25.12	33.68	17.96
Manipur	0.36	0.00	0.72	0.38
Meghalaya	0.31	0.40	1.17	0.62
Mizoram	0.15	0.50	0.06	0.03
Nagaland	0.56	0.30	0.74	0.40
Orissa	12.25	2.46	22.27	11.88
Punjab	13.71	7.38	10.58	5.64
Rajasthan	21.67	33.53	33.53	17.88
Sikkim	0.23	0.01	0.25	0.13
Tamil Nadu	7.01	3.70	16.46	8.78
Tripura	0.53	0.19	1.09	0.58
Uttar Pradesh	42.07	15.73	57.19	30.5
Uttarakhand	2.05	1.73	4.9	2.61
West Bengal	13.77	0.51	30.3	16.16
A& N Islands	0.02	0.00	0.11	0.06
Chandigarh	0.00	0.00	0.04	0.02
Dadra & Nagar Haveli	0.04	0.20	0.80	0.40
Daman and Diu	0.01	0.00	0.10	0.00
Delhi	0.09	0.10	0.43	0.23
Lakshadweep	0.00	0.00	0.10	0.00
Pondicherry	0.06	0.01	0.11	0.06
India	**253.26**	**142.82**	**415.83**	**221.63**

Source: https://www.indiastat.com

Table 1.21: Production of Coarse Cereals in India

Crops	Production of Coarse Cereals in India *(Figures in million tonnes)*								
	1950-51	1960-61	1970-71	1980-81	1990-91	2000-01	2010-11	2015-16	2018-19
Coarse Cereals	15.4	23.7	30.6	29.0	32.7	31.1	43.4	38.4	42.6
Total Cereals	219.9	203.5	226.3	242.2	236.9	185.7	226.3	235.8	257.4
Coarse cereals % to total cereals	7.0	11.7	13.5	12.0	13.8	16.7	19.2	16.3	16.6
Maize % to total coarse cereals	0.8	2.0	3.3	2.9	3.8	6.5	9.6	8.9	10.8

Sources: GOI (2018) & http://pib.nic.in

Compound feed plays an important role in improvement in milk yields of cattle and buffalo by offering balanced diet. Driven by the strong growth in dairy industry, compound feed volumes have increased at an average rate of 6 per cent duringthe period from 2007-

08 to 2012-13. Based on the number of productive dairy animals and the currentrequirement (0.5 kg), the current estimated compound feed requirement is 65-70 million tonnes, while current production is sufficient to feed only about 7 per cent of the total breedable animals in India. Current consumption volumes are approximately 7.5 million tonnes. The actual market is much smaller because a large portion of this market is serviced by the unorganized (grazing) sector. The three key types of cattle-feed producers are (a) Home-mixers, (b) Dairy cooperatives; and (c) Private sector manufacturers of compound cattle feed. There would still be a significant gap between market potential and supply. Many cooperatives have also set up their own modern computerized feed plants. They have modern milk processing plants in which they produce and market pasteurized milk, butter, butter oil, chocolate, and other value added products. The feed production in cooperatives was about 2.5 million tonnes per year (Table 1.22).

Table 1.22: Region-wise Cattle Feed Production in India

Region	States	Private Sector (million MT/year)	Cooperative Sector (million MT/year)	Total (million MT/year)	% Share
Western	Gujarat, Maharashtra, Goa, Madhya Pradesh	1.80	1.70	3.50	48%
Northern	Punjab, Haryana, UP, Uttarakhand, Rajasthan	0.80	0.42	1.22	17%
Southern	Karnataka, AP,TN, Kerala, Pondicherry	1.20	1.11	2.31	31%
Eastern	Bihar, Jharkhand, Odisha, WB, Assam	0.20	0.10	0.30	4%

Source: FASR (2015), Yes Bank (*https://www.yesbank.in/.../indian_feed_industry-_revitalizing_nutritional_security.pdf*)

Deficit of feed and fodder resources results into exorbitant increase in the prices of concentrates and crop residues in many parts of the country. Higher cost of feed and fodder makes dairy farming a challenging enterprise for landless, marginal and small dairy farmers and their livelihood is at stake in rural areas. Due to deficiency of green fodder, farmers are feeding little quantity of green fodder to livestock affecting their health, breeding and milk yield. RBP data of few productive animals indicate that average dry matter intake from green fodder in indigenous cattle, buffalo and cross breed animals was in the range of 23-27 per cent while in the developed countries it is about 60 per cent including conserved fodder (silage and hay) (Garg, 2018). Therefore, to meet growing nutrient requirement of dairy animals in an economic way, there is urgent need to focus on green fodder production enhancement programme.

Fodder Seed[4] Production:

One of the stumbling blocks for lower fodder yield and availability is lack of sufficient quantity of quality seed of high yielding improved varieties/hybrid. At present seed replacement rate in fodder crops is less than 20 per cent[5]. Higher seed replacement rate is directly correlated with higher yield. The fodder crops are represented by several cereals, legumes and grasses. Out of these, few crops are under proper seed chain. Only few public sector agencies like Indian Grassland and Fodder Research Institute (IGFRI) and State Agricultural Universities (SAUs) are producing gross seeds that too under TL category. The seed requirement for the probable fodder crop area in the country estimated by taking into consideration seed multiplication through standard seed chain shows that the breeder seed is not being produced as per the requirement (Table 1.23).

Table 1.23: Estimated National Seed Requirement & Status of Breeder Seed Produced

Crops	Area (mha)	Av. Seed Rate (kg/ha)	Estimated seed requirement			Breeder seed produced (T) during 2012-13
			Certified Seed (T)	Foundation seed (T)	Breeder Seed (T)	
Maize	0.9	20	18000	180	1.8	18.160
Sorghum	2.6	10	26000	260	2.6	2.976
Bajra	0.9	10	9000	112	1.4	0.575
Oat	0.25	75	18700	937.5	46.9	53.960
Berseem	2	20	40000	1600	64.0	7.725
Lucerne	1	15	15000	562.5	21.6	0.104
Cowpea	0.3	20	6000	200	6.7	0.370
Guar	0.2	20	4000	89	2.0	37.220
Total			136700	3941	147.0	121.090

Source: Vijay, et al., 2014 (IGFRI).

The seed production for fodder crops face basic production problems of low Seed Multiplication Ratio (SMR) as the cultivated fodder varieties are not developed for seed. The Regional Fodder Stations of Department of Animal Husbandry and Dairying (DADF, GOI) reasonably produces foundation seeds of desired variety. It then supplies to States that fulfil their foundation seed needs for further multiplication and distribution as certified/quality seeds in the form of minikits. The seed production is around 500-600 tons annually in the form of foundation seed and TL seeds. Thus, there is significant gap in availability and requirement of quality fodder seed. As per IGFRI (2014), from the existing scenario it can be inferred that, (a) the actual breeder seed requirement is not being intended for seed production; (b) the produced breeder seed is not being multiplied

[4] See Annexure I for Glossary on Seed Concept

[5] Ministry has kept SRR rate for self pollinated crops at 33 per cent, 50 per cent for cross pollinated crops and 100 per cent for hybrids for all crops.

following seed chain, which is most common problem even with food crops, and (c) the actual area under fodder crops needs authenticated data by including them under agricultural statistics data collection.

Table 1.24: Details regarding Dual purpose Fodder species Cultivated in different regions

Sr. No.	Type of land	Rainfed	Irrigated
1	Arid Tracts	Jowar, Bajra, Moth, Guar, Lobia	Lucerne, Berseem, Oats, Maize, Jowar, Bajra, Barle
2	Semi-dry Tracts	Jowar, Bajra, Moth, Guar, Lobia, Velvet Bean, Field Bean, Guinea grass, *Setatia sphacelata*, Rhodes grass	Jowar, Maize, Lobia, Teosinte, Lucerne, Berseem, Sarson, Turnips, Hybrid Napier, Oats, Sudan grass, Guinea grass
3	Semi-wet Tracts	Dinanath grass, Jowar, Lobia, Rice Bean, Velvet Bean, Teosinte, Sun hemp	Berseem, Oats, Sudan grass, Hybrid Napier, Guar, Jowar, Maize, Para grass, Rhodes, Setaria
4	Wet regions	Jowar, Dinanath, Rice Bean, Coix	Berseem, Oats, Hybrid Napier, Guinea, Lucerne, Sarson, Turnips, Oats, Setaria, Para grass, Jowar
5	Lower Hills	Jowar, Lobia, Bajra, Velvet Bean, Field Bean, Guar	Maize, Jowar, Oats, Berseem, Lucerne, Hybrid Napier, Sudan grass, Setaria, Rhodes

Source: GOI (2016) Standing Committee.

Therefore use of quality fodder seeds including dual purpose grains like bajra, maize and jowar, etc., is essential for improving productivity. Some of the cultivated fodder species for different regions are indicated in Table 1.24. As suggested by Standing Committee on Agriculture (GOI, 2016), high yielding fodder varieties mentioned in Table 1.25 may be considered for seed production programme for improving fodder yield per hectare with regards to existing area under fodder: Forage crops and their varieties suitable for waterlogged soil is presented in table 1.26.

Table 1.25: High yielding Fodder Varieties suggested for Seed Production Programme

Sr. No.	Name of the fodder crop	Name of varieties
1	Maize	African tall, J – 1006, Vijay composite.
2	Sorghum	SSG 59-3, PC-23, PC-9, PC-6, HC-136, MP Chari, CO-FS-29
3	Hybrid Napier	IGFRI-6, IGFRI-10, CO-4, C-23, Yashwant, NB-21, PNB-84, NB-21
4	Bajra	Giant bajra, L-74, GFB-1, Raj. Bajra chari-2, HC 20, AVKB-19
5	Cowpea	BL-1, BL-2, UPC-622, UPC-5286, UPC-4200, EC-4216, NP-3
6	Guar	BG-1, BG-2, BG-3, Bundel-2, HG 365, HG563, RG-1003
7	Berseem	Wardan, Bundel berseem-2, BL-1, BL-10
8	Oats	JHO-851, JHO-822, UPO-212, Kent, OS-6
9	Chinese cabbage	-

Source: GOI (2016)

Table 1.26: Forage Crops and their Varieties suitable for Waterlogged Soil

Soil condition	Suitable crop
Standing water	Almon grass (*Echinochloa polyptachya*), Para grass, Coix sps., *Iseilema laxum, Chloris gayana,* signal grass, karnal grass, congosignal grass
Shallow water table	Teosinte (*Zea Mexicana*), shevary (*Sesbania sesban*)
Temporary water logged soil drained in rabi season	Sasuna (*Medicago denticulate*), teera (*Lathyrus sativus*), chatarimatri (*Vicia sativa*), oats and Berseem
Riverine flood water logging	Sorghum (PC-6), Teosinte (TL-6)
Saline water logged	Casuarinas and Populus

Source: GOI (2016)

The reasons for deficit of fodder is absence/lack of reliable data on cropwise area under different fodder crops due to which it is difficult to estimate the seed requirement. Besides, due to lack of priority of fodder development, lack of dedicated trained manpower in the District Animal Husbandry Department of State, and lack of long term vision to focus on this activity by Milk Unions, result into scarcity of fodder and fodder seed. Also fodder seed production is highly unorganised. Large public sector seed companies are focusing on production of food crop seeds, while organised private sector seed companies are focusing on high value low volume crops like vegetables, hybrids and Genetic Modified crops. Few organised private companies are involved in production of sorghum sudan grass hybrid fodder seed only. Considering that dairy farmers primarily suffer with deficit of certified fodder seeds of high yielding improved varieties/hybrids, NDDB initiated fodder seed production and marketing programme in Operation Flood II through dairy cooperatives. NDDB has supported 15 dairy cooperatives for production of around 4000 tones of fodder seeds annually.

1.7 Need for an Inclusive Fodder Development Programme

Fodder is an important component of animal ration and its adequate availability is essential to exploit the genetic potential of the livestock[6]. Despite of the fact that green fodder is an economic source of micro and macro nutrients; its availability is a limiting factor for the growth of dairy industry. The availability of green and dry fodder is constrained due to the fact that most of the milk producers are landless, marginal and small farmers and do not have sufficient land for fodder production. Also farmers are not adopting latest technologies like use of quality fodder seeds, leading to low productivity of green fodder. Besides, to meet the growing demand of humans for food, fiber and shelter, fodder production was never given due attention. The status of permanent pasture and common grazing lands are deteriorating due to huge grazing pressure, lack of adequate institutional arrangement, encroachment of land, etc. Poor awareness among farmers about various technologies is major obstacle to improve the availability and productivity of fodder.

In the current scenario, where competing demands on land renders even expansion of food/cash crops a difficult proposition, the probability of increasing area under fodder

[6] https://www.nddb.coop/sites/default/files/pdfs/guidelines/PIP-Vol-V-Guidelines-on-RBP-FD.pdf

crops is nearly impossible. It is therefore imminent to adopt a multi-pronged strategy for adequate availability of fodder in order to provide a buffer to the farmer even in times of climatic variability. This strategy interalia envisages supply of quality seeds, promoting production of fodder crops, extending fodder cultivation to currently fallow and unutilized lands, promotion of dual purpose varieties of crops which has the potential of meeting fodder requirements during season and off-season, promotion of non-traditional fodder, post-harvest technologies for preservation of fodder, etc. Besides, improving productivity in areas already under fodder cultivation, improving productivity of grazing and pasture lands, raising perennial fodder crops on field bunds and boundaries, peri-urban areas and exploiting unutilized and under-utilized fodder crops are also some of the promising options to enhance fodder availability. Plant breeders in India have also identified a number of varieties/hybrids which could give a better quality and higher yield of crop residue without any compromise in grain yield. This would provide an opportunity for augmenting the availability of fodder from crops like pearl millet, sorghum, maize and oat.

Several programmes and schemes for development of fodder and feed have been formulated and implemented under the five years plans[7]. Since 2014-15, Department of Animal Husbandry, Dairying and Fisheries (DADF) Government of India is implementing Centrally sponsored National Livestock Mission (approved outlay of Rs. 2800 crore) with sub-mission on Feed and Fodder Development (approved outlay of Rs. 465 crore). Under the sub-mission financial assistance is provided to the Animal Husbandry Departments of the States/UTs for feed and fodder development (GOI, 2016). However, very low allocation of funds for NLM and further lesser funds for sub-mission on fodder and feed development, has hampered the targeted impact of scheme. Due to this, efforts to improve production and availability of fodder by the Centre and State government prove to be insufficient to meet the demand of fodder.Therefore, under NDP I, fodder development programmes have been formulated with the objective to enhance the fodder availability for the livestock.

NDP-I Fodder Development Programme:

With an aim to increase productivity of milch animals and thereby increase milk production to meet the rapidly growing demand for milk as well as to provide rural milk

[7] See Annexure II for ongoing programmes of DAD&F, GOI.

producers with greater access to the organised milk-processing sector, Government of India approved the scientifically planned multi-state initiative, i.e. National Dairy Plan Phase I (NDP I) as a Central Sector Scheme[8] for a period of six years from 2011-12 to 2016-17[9]. This plan was launched to cover 15 major milk producing States viz. Andhra Pradesh, Telangana (after separation), Bihar, Gujarat, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal which account for over 90 per cent of the country's milk production, having 87 per cent of breedable cattle and buffalo population and 98 per cent of the fodder resources. In June/August 2015, the Union Government included three more states viz. Uttarakhand, Jharkhand and Chhattisgarh and it was extended up to 2018-19[10]. This plan was implemented wholly by National Dairy Development Board, Anand (Gujarat) through milk co-operatives and state agencies. The project includes a number of programs, of which Fodder Development Programme (FDP) was designed with an aim to enhance green fodder yield of cultivated fodder crops from the land already under fodder production as well as to increase seed production of fodder crops and enhance use of quality fodder seeds.To strengthen fodder seed multiplication and distribution chain, an important component of sub-project plan on Fodder Development, NDP Iwas to create required infrastructure of fodder seed production, processing, storage and marketing of fodder seeds at dairy cooperative level, encourage production and usage of fodder seeds by farmers for enhancing yield and availability of green fodder. About 3.18 per cent of total project cost (Rs. 2060 Crore[11]) was earmarked for this component.

Sub-projects on Fodder Development are being implemented by 49 End Implementing Agencies (EIAs) covering 13 states. The infrastructure of fodder seed production, processing and marketing have been established at 5 EIAs (Lucknow, Kota, Vijayawada, Kolar and Bellary milk unions) under NDP I while 3 other EIAs supported under the project viz. Bangalore, Guntur and Mithila milk unions had fodder seed processing

[8]NDP-I is implemented with a total investment of about Rs. 2242 crore comprising Rs. 1584 crore as International Development Association (IDA) credit, Rs. 176 crore as GOI share, Rs. 282 crore as share of End Implementing Agencies (EIAs) that carry out the projects in participating states and Rs 200 crore by NDDB and its subsidiaries for providing technical and implementation support to the project.

[9]Department of Animal Husbandry, Dairying and Fisheries, Govt. of India issued administrative approval of central sector scheme NDP I vide office memorandum F.No. 22-23/2011-DP, 16 March 2012.

[10]Department of Animal Husbandry, Dairying and Fisheries, Government of India's addendum dated August 3, 2015 (F.No. 22-23/2011-DP).

[11]see, Annexure III.

plants prior to NDP I. All the 49 EIAs are involved in marketing of improved fodder seeds under the sub project on Fodder Development. Under the FD programme of NDP I, it has been targeted that 7500 MT of improved fodder seeds will be produced and made available to the farmers.The programme is expected to increase availability of certified / truthfully labeled seeds of improved genetics of fodder crops to increase the yield of nutritious green fodder from the land already under green fodder cultivation. To sustain the programme, EIAs are also generating marginal profit. Efforts are being made to achieve it by strengthening fodder seed multiplication and distribution chain at dairy cooperatives for increasing production and usage of certified /truthfully labeled fodder seeds of best genetics to the farmers. The important Fodder crops with improved varieties under Fodder seed multiplication programme are presented in Box 1.1. Under NDP-I, NDDB trained 300 officers in 'Fodder Production and Conservation" and 45 officers of seed units of the diary cooperatives in 'Advanced seed production technology' (Box 1.2). Lately 12106 tones fodder seed was produced, which was about 61 per cent higher than targeted 7500 mt of seed under NDP-I (Table 1.27). NDDB continued to support dairy cooperatives in supplying breeder seeds of newly noticed genetics from ICAR/Agricultural Universities through MOA & FW, GOI.

Box 1.1: Important Fodder crops with improved varieties under Fodder seed multiplication programme of NDP I

Rabi		**Kharif**	
Crops	**Variety**	**Crops**	**Variety**
Berseem	BL - 1	Maize	African Tall
	BL - 10		Pratap Makka Chari 6
	Wardan (S-99-1)		J-1006
	BundelBerseem 2, 3	Bajra	BAIF Bajra-1, GFB 1
	UPB 110		Pant Chari-5 (UPFS-32)
	BL 42		Pant Chari -6 (UPMC -503
Lucerne	Anand - 2	Sorghum	HJ 513
	Anand Lucerne - 3		PhuleAmruta
	RL-88		CSV 27
Oats	Kent		Co -FS 29
	NDO -1	Guar	HG 563
	UPO - 212	Cowpea	EC-4216
	JHO 822		UPC-8705
	JHO-99 -2	Teosinte	TL-1
	OL 10	Styloseabrana	PhuleKranti
Teosinte	TL-1		
Mustard	Chinese Cab.-ChiniSarson		

Table 1.27: Fodder Seed Production under NDP I (2012-13 to 2018-19)

State	Seed production (MT)			Seed sale (MT)		
	T	A	% achievemnt	T	A	% achievemnt
Gujarat	28.00	30.42	8.6	3624.00	6594.16	82.0
MP	0.00	41.25	100.0	185.00	120.00	-35.1
Maharashtra	522.00	44.24	-91.5	1986.00	1495.87	-24.7
Harayana	0.00	0.00	-	268.00	259.04	-3.3
Punjab	0.00	0.00	-	1229.40	1883.45	53.2
Rajasthan	820.00	1326.97	61.8	970.00	2011.78	107.4
U P	1034.00	111.22	-89.2	603.10	279.32	-53.7
Bihar	1737.00	1539.45	-11.4	4717.00	5652.42	19.8
Odisha	0.00	0.00	-	72.50	30.19	-58.4
West Bengal	0.00	0.00	-	35.00	11.22	-67.9
Andhra Pradesh	1707.00	942.47	-44.8	872.00	959.70	10.1
Karnataka	8895.00	8069.63	-9.3	5591.00	7466.05	33.5
Telangana	0.00	0.00	-	202.00	451.93	123.7
Grand Total	14743.00	12105.65	-17.9	20355.00	27215.13	33.7
NDP	7500	12105.65	61.4	-	-	-

Source: NDDB, Anand.

Box 1.2: NDP-1 Progress Green Fodder Production & Conservation

- 18 MU/PC are implementing FDP under NDP-1.
- 11378 MT of quality seeds of high yielding improved varieties produced.
- 14706 MT of improved high yielding fodder seeds were sold.
- 2388 'on-farm demonstration' of silage making organized.
- 52 hectare of common/fallow land developed for cultivating green fodder/grasses. The fodder so produced are sold to the land less/marginal and small dairy farmers.
- 244 mowers/harvesters/choppers & balers produced & put under operation.
- 5 new fodder seed processing & storage plant established.
- 20 Micro-Training Centre (MTC) established at the progressive dairy farmers premises for speedy dissemination of improved fodder production & conservation technologies.
- Around 40,000 farmers were given an exposure to improved technologies at MT

1.8 Need of the Study

Dairy Industry in the country has shown spectacular growth during the last few decades. With an expected production of about 176 million MT of milk by the end of 2017-18, it is estimated that annual requirement of green fodder will be to the tune of 1,100 million MT and dry fodder to the tune of 610 million MT. The current availability of green and dry fodder, however, is estimated at 500 million MT and 380 million MT respectively. Efforts to increase livestock productivity / production is constrained by feed /fodder shortages. The shortages tend to be even more serious during natural calamities. To improve the availability of fodder, there is very little scope to increase the area under

fodder cultivation, particularly in view of the growing demand of human beings for food, fiber and shelter. It is therefore necessary to increase the availability of fodder by increasing the productivity of available forage resources per unit area, improve the efficiency of fodder utilization and minimize the fodder wastages to increase and thereby reduce the gap between demand and supply. The present average green fodder yield of 40 MT/hectare/year of cultivated land and 0.75 MT/hectare/year for common grazing land are too low and there is huge potential to improve their productivity through adoption of latest technologies.

The country's estimated demand for milk is likely to be about 200 million tonnes in 2021-22 (NDDB, 2014 & 2014a). To meet the growing demand, there is a need to increase the annual incremental milk production from 4 million tonnes per year as was the case for the last 10 years to 7.8 million tonnes in the next 8 years (total 210 million by 2021-22). To meet the growing demand, it is necessary to maintain the annual growth of over 4 per cent in the next 15 years. Quantum jump in milk production is possible through increase in productivity, and linking small holders to dairy cooperatives/producer groups/SHGs with forward linkages having milk processing facilities. Adequate availability of feed and fodder to livestock is vital to increase their productivity and also to sustain ongoing genetic improvement initiatives. Fodder Development Programme under NDP I had entered into its 5th year of operations in April, 2017. It was planned to undertake an impact assessment and evaluation forstrengthening fodder seed multiplication and distribution chain at dairy cooperative level under sub project of FDP.

Therefore, present study was undertaken for a comprehensive assessment of the present status of fodder development programme under NDP Ithereby enhancing dairy development. The study was undertaken with specific objectives as discussed further.

1.9 Objectives of the study

a) To estimate the per cent increase in area under green fodder with certified/truthfully labeled seeds.
b) To evaluate the increase in green fodder yield by using certified/truthfully labeled seeds with improved genetics in comparison to local /non descript varieties of seeds.

c) To estimate the reduction in cost of milk production as a results of higher green fodder yield obtained through fodder seed production and sale activities.
d) To estimate the cost of fodder seed production and green fodder production at the level of seed growers and dairy farmers; and compare it with other competing crops.

1.10 Data Sources

The study is based on both, secondary and primary level data pertaining to Fodder Development Programme under NDP-I. The secondary data pertain to the state-wise details on progress of fodder seed production and fodder seed distribution programme, villages covered under this programme, etc. that was compiled from the secondary sources available from NDDB, Anand; selected End Implementing Agencies (EIAs)/Milk Unions and Primary Dairy Cooperative Societies (PDCS) at village level. The information about End Implementing Agencies (EIAs) and their contacts details were provided by NDDB, Anand.

The primary data were collected from the sample farmers selected on the basis of the sampling design described further. The respondents selected in two seasons, viz. Rabi 2017-18 and Kharif 2018 season were drawn from the list provided by the dairy cooperative/milk unions. Thus, the respondents are not identical across two data points, and therefore data is analysed and discussed separately.

1.11 Survey Design

1.11.1 Sampling Framework

The primary data was collected from the stakeholders in Fodder Development Programme under NDP-I, viz., officials of EIAs and Primary Dairy Cooperative Societies (PDCS), sample beneficiary fodder seed and fodder growers, non beneficiary fodder grower households and other related personnels. The data on fodder seed and fodder crop cultivation were collected in pre-tested schedules/questionnaires.The survey wasundertaken 2-4 times per EIA and selected villages so as to include the sowing and harvesting time of both Rabi 2017-18 and Kharif 2018 season.The survey was separately conducted for seed growers' households in the areas of EIAs (parent seed distributed by EIA) and from fodder growers households (using fodder seeds distributed by PDCS at village level) in the area of 18 EIAs in selected eight states of India.

Selection of End Implementing Agency (EIAs):

FDP-NDP I programme has been implemented in 8 states of India. The study covered sample households, functionaries as well as EIAs from 8 states where fodder seed production and sale activities under the fodder development sub–project of NDP-I is undertaken, i.e. 18 EIAs (Table 1.28 and 1.29).

Table 1.28: States and EIAs covered under study

Sr. No	States	EIAs
1	Karnataka	Kolar, Bellary, Bengaluru
2	Andhra Pradesh	Vijaywada, Guntur
3	Uttar Pradesh	Lucknow, Ambedkarnagar
4	Rajasthan	Kota, Chittorgarh
5	Bihar	Mithila, Barauni
6	Maharashtra	Kolhapur, Solapur
7	Gujarat	Baroda, Sabarkantha
8	Punjab	Ropar, Jalandhar, Ludhiana

Source: NDDB, Anand

Map 1.1: Location Map of Selected States for the Study

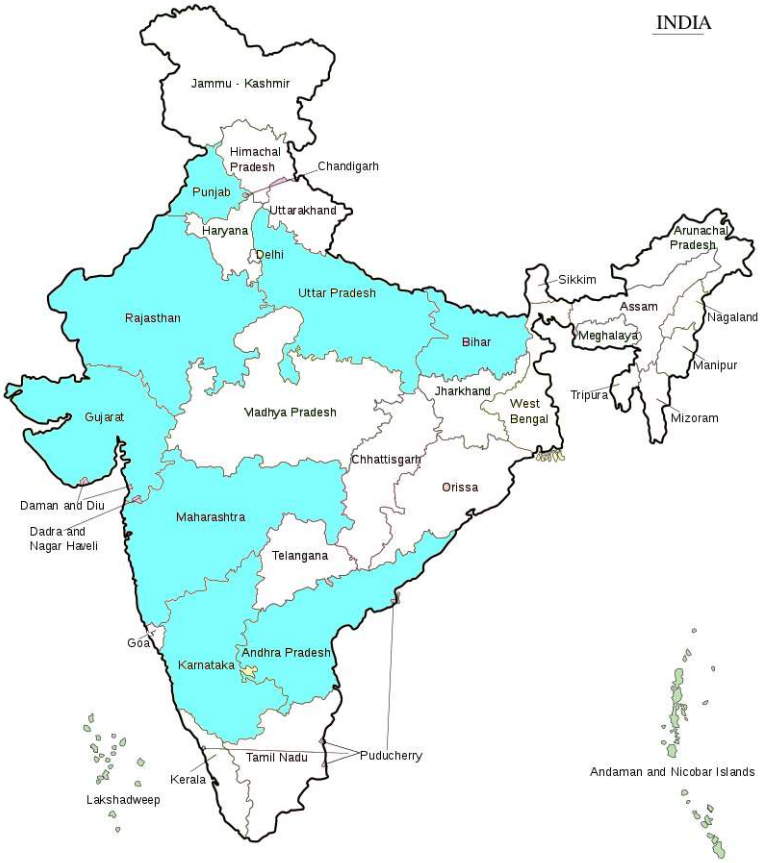


Table 1.29: Details regarding Selected Sample Households for the Study

Sr. No.	States	Season	Selected EIAs	Village Profile	Primary Dairy Coop. Society	Selected fodder growers			
						Fodder Seed Growers	Ben Fodder Growers	NonBen Fodder Growers	All Total
1	AP	Rabi 2017-18	Sangam Dairy	3	3	30	45	15	90
			Krishna Dairy	3	3	0	45	15	60
			Rabi	6	6	30	90	30	150
		Kharif 2019	Sangam Dairy	3	3	15	45	15	75
			Krishna Dairy	3	3	0	45	15	60
			Kharif	6	6	15	90	30	135
			GT	12	12	45	180	60	285
2	Karnataka	Rabi 2017-18	Ballari	3	3	15	45	15	75
			Banglore	0	0	0	0	0	0
			Kolar	0	0	0	0	0	0
			Rabi	3	3	15	45	15	75
		Kharif 2019	Ballari	3	3	0	45	15	60
			Banglore	3	3	15	45	15	75
			Kolar	3	3	15	45	15	75
			Kharif	9	9	30	135	45	210
			GT	12	12	45	180	60	285
3	MS	Rabi 2017-18	Kolhapur	3	3	0	45	15	60
			Solapur	3	3	0	18	12	30
			Rabi	6	6	0	63	27	90
		Kharif 2019	Kolhapur	0	0	0	0	0	0
			Solapur	0	0	0	0	0	0
			Kharif	0	0	0	0	0	0
			GT	6	6	0	63	27	90
4	Gujarat	Rabi 2017-18	Vadodara	8	8	15	45	15	75
			Surat	3	3	0	45	15	60
			Rabi	11	11	15	90	30	135
		Kharif 2019	Vadodara	0	7	0	45	15	60
			Surat	0	3	0	45	15	60
			Kharif	0	10	0	90	30	120
			GT	11	21	15	180	60	255
5	Rajasthan	Rabi 2017-18	Chittorgah	3	3	0	45	15	60
			Kota	3	3	15	45	15	75
			Rabi	6	6	15	90	30	135
		Kharif 2019	Chittorgah	3	3	0	45	15	60
			Kota	3	3	15	45	15	75
			Kharif	6	6	15	90	30	135
			GT	12	12	30	180	60	270
6	Bihar	Rabi 2017-18	Mithila	3	3	15	45	15	75
			Barauni	3	3	15	45	15	75
			Rabi	6	6	30	90	30	150
		Kharif 2019	Mithila	3	3	0	45	15	60
			Barauni	3	3	15	45	15	75
			Kharif	6	6	15	90	30	135
			GT	12	12	45	180	60	285
7	Punjab	Rabi 2017-18	Ropar	3	3	0	45	15	60
			Jalandhar	3	3	0	45	15	60
			Ludhiana	3	3	0	45	15	60
			Rabi	9	9	0	135	45	180
		Kharif 2019	Ropar	3	3	0	45	15	60
			Jalandhar	3	3	0	45	15	60
			Ludhiana	3	3	0	45	15	60
			Kharif	9	9	0	135	45	180
			Grand Total	18	18	0	270	90	360
8	UP	Rabi 2017-18	Lucknow	3	3	15	45	15	75
			Ambedkarnagar	3	3	0	45	15	60
			Rabi	6	6	15	90	30	135
		Kharif 2019	Lucknow	3	3	0	45	15	60
			Ambedkarnagar	3	3	0	45	15	60
			Kharif	6	6	0	90	30	120
			Grand Total	12	12	15	180	60	255
9	Grand Total		Rabi 2017-18	53	53	120	693	237	1050
			Kharif 2019	42	52	75	720	240	1035
			ALL	95	105	195	1413	477	2085

The survey was carried out separately i) for associated seed grower's households in the area of the 8 EIAs, which have the infrastructure for seed processing and sale and ii) dairy farmer households using fodder seeds in the area of the 18 EIAs. All the 18 EIA's are selling certified/TL seed to dairy farmers in their milk shed. However, 8 EIA's are exclusively having infrastructure i.e. Seed Processing Units for carrying out fodder seed production, procurement, processing and sale. They are Kolar, Bengaluru, Bellary, Vijaywada, Kota, Lucknow, Mithila, Solapur.

Selection of Villages:

The selection of sample villages was done in consultation with the EIAs by acquiring the details of the farmers that were selected for seed production and those who got seed from cooperative dairy for fodder production. EIA distributed the truthful seeds to member primary dairy cooperative societies for fodder production. The list of PDCS with quantity of seed distributed (under NDP-I) were collected from selected EIAs. On the basis of quantity of seed distributed, 3 village primary dairy cooperatives were selected, so as to cover 15 fodder producers from each village. For the seed growers selection, from each EIA, out of the total list of farmers covered under fodder seed development, 15 seed growers were selected (5 fodder seed grower from each village, if available).

Selection of beneficiary households (random):

A sample of 15 beneficiary and 5 non beneficiary fodder grower households from each village were selected randomly. In case the number of beneficiaries in the selected village was less than 15, a cluster of proximate villages constituted the sample frame for selection of beneficiary/non beneficiary respondents.In case of fodder seed grower category, total 5 fodder seed growers/farmers from each village were selected randomly. In very few cases, fodder seed growers and fodder growers selected were from same selected villages. The stratified multistage random sampling procedure was adopted for this survey.

i) ***Fodder growers***: The sample farmer households were selected randomly from the list of rabi fodder growers. The same farmer household were visited again in kharif 2018 season for data collection, even though some households may not grow any fodder crop in kharif season. Attempt was made to select the fodder growers who generally grow fodder crops in both seasons.The selection of fodder crop/variety was based on large area coverage of particular crop/variety.

ii) ***Fodder seed growers*:** Fodder seed growers were selected randomly from the list of rabi fodder seed growers in particular area/village. Wherever, seed multiplication program was executed in both seasons, same household were visited again in kharif 2018 season.

1.11.2 Development of Survey schedule:

The survey schedule for the collection of primary data collection was developed. Six types of survey schedules were canvassed in the study area:

- **Village Schedule 1.0:** pertaining to general information about the village regarding demographic particulars, dairy related infrastructure, basic information about the dairy cooperative society covering the village, etc.
- **Village Census Schedule 2.0:** pertaining to cropwise area under different seasons with separate data on area under fodder crops.
- **Fodder Seed Growers Household 3.0:** for collecting detailed information about seed production and marketing from the sample beneficiary farmers.
- **Fodder Growers Household 4.0:** for collecting detailed information about fodder production and marketing from the sample beneficiary and non beneficiary farmers.
- **PDCS Schedule 5.0:** semi-structured schedule to discuss the overall implementation of the Fodder programme with the officials of primary dairy cooperative society.
- **EIA Schedule 6.0:** semi-structured schedule to discuss the overall implementation of the Fodder programme with the officials of EIA.

1.11.3 Analytical Framework

The broad outline of the queries is to assess and evaluate the impact of the fodder seed production and marketing programme under the relevant key objectives of the projects. A tabular analysis was used for the study to cover the following sub-heads covering various aspects of Fodder Development Programme:

Effects and Outcomes:

Quantitative assessment:

In accordance with the first objective of the study, a quantitative assessment of impact of fodder development programme on increase in area under fodder crops and

yield of fodder crops with use of quality seed provided by dairy cooperatives in relation to their pre-project status was carried out. The database was collected from both beneficiary and non beneficiary (control group) farmers for comparison. The incomes of beneficiary seed growers and both beneficiay and non beneficiary fodder growers was estimatated. Cost of milk production was estimated to highlights the economics of same having use of green fodder on milk yield and milk cost. The cost of fodder seed production and green fodder production alonwith other competing crops was estimated.

Qualitative assessment:

In addition to the quantitative assessment, the effect on following were also evaluated on the basis of the opinion of beneficiary households: (i) milk fat (ii) animal health (iii) milk consumption (iv) employment opportunities (v) awareness about fodder development programme (vi) livelihood of women and vulnerable group beneficiaries (vii) capacity of households to scale up dairy activities

Effectiveness

Commensurate with the second objective of the study, the effectiveness of the programme was evaluated by using data from primary dairy cooperative society and Milk Union in terms of the program status with respect to its coverage, mode of implementation, increase in area under green fodder as well as yield of same by using certified, truthful labelled seeds of improved genetics in comparison to local/non descript varieties of seed, etc. In addition to the information collected from the farm households, the interaction and interviews with the various functionaries of EIA, primary dairy cooperative societies and other stakeholders associated with the project wasundertaken to examine these aspects.

1.12 Limitations of the Study

The study was confined to two agricultural seasons for two separate agriculture year (2017-18 & 2018-19), i.e. Rabi 2017-18 and Kharif 2018 season. During Rabi 2017-18 season, as most of the part of Solapur district in Maharashtra faced the water shortage, during rabi season 2017-18, most of farmers had not opted to go for seed multiplication or fodder production. Thus, the required number of sample farmers could not be acquired for data collection. Data for sample fodder growers were collected from Kolhapur district. Sabar Dairy (Sabarkanta, Gujarat) informed that they have not distributed any seed under

Fodder Development Program (NDP-I), thus request was sent to NDDB for change in EIA in Gujarat. Accordingly, Surat Dairy was selected in place of Sabar Dairy. Bengaluru & Kolar District Milk Union neither distributed the parental/foundation seed for seed multiplication to any farmer nor distributed truthful seed for green fodder production to any PDCS during the Rabi season 2017-18, thus no list of beneficiary farmers/primary cooperative dairy society was available for Rabi 2017-18. Thus no data collection for the season Rabi 2017-18 could be undertaken.

1.13 Organization of Report

The present study report is divided into nine chapters including this introductory chapter. The introductory chapter presents the introductory notes, need and scope of the study and sets out the main objectives of the study. It also presents in brief the dairy development in India, cooperative dairy sector in India, compositional changes in livestock population, milk production and productivity, status of availability of feed and fodder and about fodder development under NDP-I, data and methodology used for selection of districts/blocks/sample households, sample selection design, analytical and conceptual framework and concepts used in the study. Chapter II presents macro overview of dairy development in the selected states of India. It analyses the role of dairy sector in selected state economy, composition of livestock, growth in milk production and productivity, status of availability of feed and fodder; and policies adopted for fodder development by using secondary data. The profile of selected villages, PDCS & Milk Unions is presented in Chapter III. Chapter IV presents profile of selected fodder seed and fodder growers. Chapter V presents the details regarding fodder seed production covering seed received from milk union, changes in area under fodder seed crops, participation in fodder seed production under NDP- I, reasons for choosing to participate in seed production, reasons for choice of source of seed for fodder production, details regarding training related to fodder development by Milk Union/PDCS, details regarding cultivation practices adopted for seed production, cultivation of fodder seed and competitive crop, production and sale of green and dry fodder as well as seed, opportunity costs of fodder seed cultivation, constraints faced by the fodder seed growers, amongst others.

Chapter VI covers the issues related to production of green and dry fodder covering seeds received from milk union, changes in area under fodder crops, participation in

fodder production under NDP-I, reasons for choice of source of seed for fodder production, details regarding training related to fodder development by Milk Union/PDCS, details regarding cultivation practices adopted, cultivation of fodder and competitive crop, opportunity costs of fodder cultivation, production and sale of green fodder and dry fodder, and constraints faced by the fodder growers. Chapter VII presents details regarding milk production, use and sale, cost of milk production, types of fodder used, andeffect of green fodder on milk productivity. Awareness/Outreach of FDP under NDP-I, effect of fodder seed and fodder production programme; opinions, perceptions, constraints and suggestions by PDCS;constraints faced and suggestions by Milk Union are presented in Chapter VIII. Chapter IX presents the conclusions and recommendations that emerged from the study.

The next chapter presents dairy development in the selected State.

Chapter II

Dairy and Fodder Development in Maharashtra

2.1 Introduction:

Maharashtra is the state with the largest economy in India. It had the highest GSDP among 33 Indian States and Union Territories, and contributed 14.69 percent to India's total GDP (at current prices) in 2016-17. Maharashtra is also one of the top economic performers with respect to per capita income which is 1.54 times that of all India average. The per capita State Income (i.e. Per capita Nominal NSDP) is estimated at Rs. 1,76,102 during 2017-18 whereas it was Rs. 114598/- for country as a whole (GOM, 2019, Economic Survey). The relatively high per capita income in the state, however, conceals the enormous urban-rural contrast and the regional disparities in per capita income. This gets reflected from the fact that in 2017-18, the per capita nominal gross district value added (at current prices) for Mumbai was estimated to Rs. 2,94,764 which was exactly 1.67 times the state average. Around 21 percent of the districts only had per capita income above state average. Thus, eventhough Maharashtra is among the richest states in India in terms of per capita income, yet incidence of poverty in the state remains close to the national average. About 20 out of 34 districts, i.e. 59 percent of the districts, had around 70 percent of their workforce in the agricultural sector while 29 districts i.e. 85 percent of the districts had more than 60 percent of the workforce in agriculture. These percentages are more than the national average. Thus, while Maharashtra is a highly industrialized state of India, agriculture continues to be the main occupation in the state. This explains the importance of agricultural sector in the economic and social fabric of Maharashtra as majority of the labour force still depends on agriculture as their primary source of livelihood. Further, in nearly half the districts, the share of agricultural laborers is more than that of cultivators.

Maharashtra with a population of 11.24 crore (2011) ranked second in terms of population and third in terms of area with a geographical area of about 3.08 lakh sq. km. The State is highly urbanised with 45.2 percent population living in towns. Maharashtra has 36 districts, six revenue divisions including 355 talukas. Maharashtra is India's leading industrial state contributing 13 percent to the national industrial output.

2.2 Role of Dairy Sector in State Economy of Maharashtra:

Animal husbandry is a supporting occupation which not only supplements farm income but also generates gainful employment. It provides essential nutrients at low cost to the livestock rearing families. Accordingly, the Government of Maharashtra is framing and implementing policies for genetic up-gradation of livestock for sustainable production to enhance livestock sector. The state currently represents the largest dairy market in India. Maharashtra State has the distinction of being the pioneer state in the field of dairy development in the country. Maharashtra is the sixth largest producer of milk in the country, accounting for 6.29 percent share in 2017-18. However, per capita milk availability was lowest in the state at 256 gram per day in 2017-18. As compared to Punjab (1120 gms/day) and all India figures (375 gms/day), it was less by 4.375 times and 1.46 times respectively. The livestock population and milk production increased significantly over the years in the state due to the implementation of various dairy development programmes. Dairy development activities are encouraged and promoted all over the state and not restricted to specific pockets or areas in the state. It has been established that careful monitoring of the dairy development programme is a very effective and remunerative source of income for farmers throughout the year. Besides, it has good potential for employment generation both in rural and urban areas. For designing appropriate policies of dairy development and thereby giving further boost, it is extremely essential to focus on the nature and significance of changes takeing place in dairy sector in different regions of Maharashtra State over the period. Though the contribution of agriculture and allied sectors to the state gross domestic product declined during the last four decades (from 34.4 percent in 1960-61 to 11.9 percent in 2018-19), livestock sector has been among the few high-growth sectors in rural Maharashtra. Dairy and poultry are high growth sectors which is reflected in the growing importance of the contribution of these sub-sectors in the livestock economy.

It can be seen from Table 2.1 that contribution to GVO of livestock sector to agriculture and livestock sector combined increased from 21.88 percent in 2011-12 to 23.28 percent in 2016-17. Milk contribution to livestock was 72 percent in 2011-12 and 68 percent in 2016-17 (Table 2.2 and Fig. 2.1). The results indicate the dominance of milk group in total livestock output over the years. The growth in dairy sector is mainly attributed to the successful implementation of ‘Operation Flood’ and other dairy

programme implemented by the central and state government, while the growth in poultry sector can be attributed to a large part to the private poultry industry initiatives.

Table 2.1: Contribution of GVO & GVA from Agriculture and Livestock Sector to GSDP (Current Prices) of MS

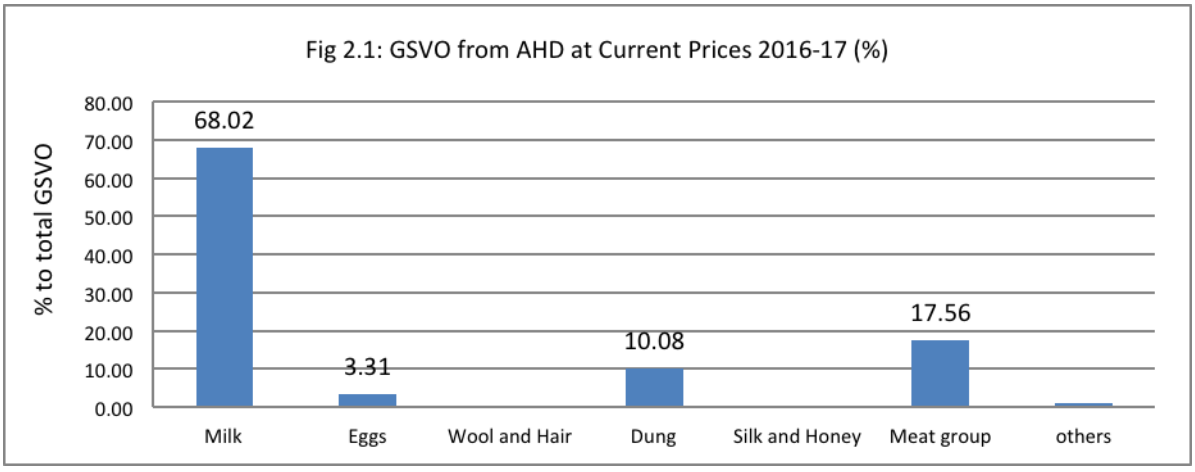
Sr. No.	Year	Total GSDP (Rs In Crores)	Contribution of GVO from Agriculture to Total GSDP (percent)	Contribution of GVO from Livestock to Total GSDP (percent)	Contribution of GVO from Agriculture & Livestock to Total GSDP (percent)	Contribution of GVA from Agriculture & Livestock to Total GSDP (percent)	Contribution of GVO from Livestock to Agriculture & Livestock sector (percent)
1	2011-12	1280369	7.96	2.23	10.19	11.40	21.88
2	2012-13	1459628	7.37	2.18	9.55	10.69	22.83
3	2013-14	1649695	8.17	2.06	10.24	11.46	20.14
4	2014-15	1780721	6.40	2.02	8.42	9.44	23.99
5	2015-16	1986721	5.54	1.97	7.51	8.50	26.23
6	2016-17	2257032	6.59	2.00	8.59	9.72	23.28

Source: Govt. of Maharashtra (2017).

Table 2.2: Value of Output: Agriculture and Livestock (Maharashatra)

Particular	Value of Output: Agriculture and Livestock in Maharashtra						
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
Value of Output ('billion)							
Agriculture & Allied	695	802	957	1,140	1,151	1,360	1,775
Agriculture	458	527	627	790	736	894	1,246
Livestock	130	142	165	191	231	246	279
Milk	100	108	122	138	155	173	199
Meat	28	30	39	43	57	54	60
Egg	4	5	5	7	9	8	9
Dung	5	8	8	8	9	9	9
Share of Value of Output to Agriculture and Allied (percent)							
Agriculture	65.96	65.68	65.52	69.24	63.89	65.74	70.20
Livestock	18.74	17.74	17.19	16.72	20.03	18.06	15.70
Share of Value of Output to Livestock Output (percent)							
Milk	77.11	75.56	74.40	72.35	67.13	70.42	71.52
Meat	21.20	21.15	23.56	22.49	24.63	22.00	21.46
Egg	3.43	3.49	3.21	3.51	3.73	3.21	3.13
Dung	3.80	5.28	4.84	4.36	3.70	3.51	3.11
Others^	-5.54	-5.49	-6.01	-2.71	0.81	0.86	0.78

Source: NDDB (20014), Dairying in Maharashtra: A Statistical Profile 2015.



2.3 Composition of Livestock in the State

As per the 19th Livestock Census 2012, with total livestock of about 3.25 crore, the State ranked sixth at national level, accounting for 6.34 percent of national livestock (Table 2.3). There is an overall decrease of 9.6 percent over the previous census. The total bovine (Cattle and Buffalo) population is 210.79 Lakh which accounts to 65 percent of total livestock. Maharashtra State ranked at fourth position in terms of total cattle at the national level. Livestock per lakh human population was about 29 thousand in 2012.

Table 2.3: Growth of the Livestock in Maharashtra and India

Sr. No.	Livestock Census Year	Total Livestock (000)		percent Share of MS to All India	percent Growth between two Census
		All India	Maharashtra		
1	1951	292784	--	--	--
2	1956	306615	--	--	---
3	1961	336432	26049	7.74	--
4	1966	344111	25448	7.40	-4.49
5	1972	353338	26362	7.46	0.89
6	1978	369525	29643	8.02	7.52
7	1982	419588	30920	7.37	-8.14
8	1987	445285	34242	7.69	4.35
9	1992	470830	36393	7.73	0.52
10	1997	485385	39631	8.16	5.63
11	2003	485002	37058	7.64	-6.42
12	2007	529698	35954	6.79	-11.17
13	2012	512057	32489	6.34	-6.53

Note: Figures without Dog & Rabbit
Source: GOI (2016) & GOM (2017)

The state accounts for 8.11 percent share in total cattle population, 5.15 percent in buffalo population, 3.97 percent in sheep population and 6.24 percent in goat population of the country (Table 2.4). Significant share of donkeys (9.09 percent) and horse and ponies (5.92 percent) in national stock has also been recorded (2012). A decline was observed in livestock population from 35.95 million in 2007 to 32.49 million in 2012 thereby registering a negative growth of 9.64 percent in the total number of animals of various species (Table 2.3). In fact, the share of the Maharashtra in all Indian total stock of livestock has also declined by 0.45 percent during the period from 2007 to 2012. Bovine population in Maharashtra declined by about 5 percent from 2.2 crore in 2007 to 2.1 crore in 2012. While crossbred cattle increased by 19 percent, local cows and buffaloes observed a decline of 8 to 9 percent. However, the indigenous cattle and buffalo milch population declined by 5 to 7 percent between 2007 and 2012, while there has been an impressive growth of 26 percent in crossbred milch animals.

Table 2.4: Species-wise Livestock population & its Share in total livestock

Sr. No.	Particulars	Maharashtra -2012				India 2012	
		Livestock-2012	percent share in India	percent share in total Livestock	Rank in All India	Livestock-2012	percent share in Total Livestock
1	Cattle	15484	8.11	47.66	--	190904	37.28
2	Buffaloes	5594	5.15	17.22	--	108702	21.23
3	Sheep	2580	3.97	7.94	-	65069	12.71
4	Goats	8435	6.24	25.96	-	135173	26.40
5	Pigs	326	3.17	1.00	-	10294	2.01
6	Horses & Ponies	37	5.92	0.11	-	625	0.12
7	Mules	2	1.02	0.01	-	196	0.04
8	Donkeys	29	9.09	0.09	-	319	0.06
9	Camel	0.2	0.05	0.00	-	400	0.08
10	Yaks	--	--	--	-	77	0.02
11	Mithun	--	--	--	-	298	0.06
12	Total Livestock	32489	6.34	100.00		512057	100.00

Note: Figures without Dog & Rabbit
Source: GOI (2016) & GOM (2017)

As per Livestock Census 2012, from among various species, cattle contributed highest share (47.66 percent) in total livestock population followed by goats (25.96 percent), buffaloes (17.22 percent) and sheeps (7.94 percent) (Table 2.4). A decline was observed in livestock population between 2007 to 2012. The highest decline in population was recorded in goats population (18.82 percent) followed by sheeps (11.31 percent), buffaloes (7.89 percent), and cattle population (4.33 percent). However, over the period, share of cattle population in total livestock population declined from 58.8 percent in 1951 to 47.7 percent in 2012, while share of buffalo population increased considerably (12 percent to 17.2 percent) during corresponding period (Table 2.4). Share of goat population in total livestock increased from 20 percent to 26 percent during corresponding period. In absolute terms, the rate of increase in buffaloes' population (81 percent) was much faster as compared to rate of increase in cows' population (1.02 percent). In case of small ruminants, goats population increased by 25 percent while sheep population increased by 24 percent in 2012 as compared to 1951 (Fig. 2.2). Besides this, cows are still a dominant milch animal in the state. Total livestock population in Maharashtra increased by 25 percent during a period of last six decades (Table 2.5).

Table 2.5: Growth in Livestock Population in Maharashtra - 1951 to 2012

Sr. No.	Year	Cattle		Buffalo		Sheep		Goat		Total Livestock	
		Nos.	GR (percent)	Nos.	GR (percent)	Nos.	GR (percent)	Nos.	GR (percent)	Nos.	GR (percent)
1	1961	15328	--	3087	--	2093	--	5181	--	26048	--
2	1966	14729	-3.91	3042	-1.46	2205	5.35	5121	-1.16	25449	-2.30
3	1972	14705	-0.16	3301	8.51	2128	-3.49	5911	15.43	26361	3.58
4	1978	15218	3.49	3899	18.12	2636	23.87	7563	27.95	29642	12.45
5	1982	16162	6.20	3972	1.87	2671	1.33	7705	1.88	30919	4.31
6	1987	16983	5.08	4755	19.71	2873	7.56	9195	19.34	34255	10.79
7	1992	17441	2.70	5447	14.55	3074	7.00	9941	8.11	36393	6.24
8	1997	18071	3.61	6073	11.49	3368	9.56	11434	15.02	39638	8.92
9	2003	16738	-7.38	6084	0.18	3175	-5.73	10449	-8.61	37058	-6.51
10	2007	16184	-3.31	6073	-0.18	2909	-8.38	10391	-0.56	35954	-2.98
11	2012	15484	-4.33	5594	-7.89	2580	-11.31	8435	-18.82	32489	-9.64

Note: GR- Growth rate over previous year.
Source: GOM (2017).

Marathawada and Vidarbha regions are characterised by frequent droughts, cracked soils, parched wells, dry hand pumps, low yielding livestock and accordingly, dairying is relegated to western parts of the state. The perpendicular strip of land in western part comprising of Ahmadnagar, Nasik, Pune, Satara, Sangli, Kolhapur and Solapur districts comprises of more than one-third of bovine population of the state, mainly crossbred cows and buffaloes. The district-wise share in total state livestock population presented in Table 2.6 & Fig. 2.3 indicates that Ahmednagar (5.7 percent) had the highest livestock population followed by Aurangabad (5.2 percent), Solapur (4.3 percent) and Yavatamal (4.3 percent).

Fig 2.2: Species-wise Share in Total livestock Population in Maharashtra (1961-2012)

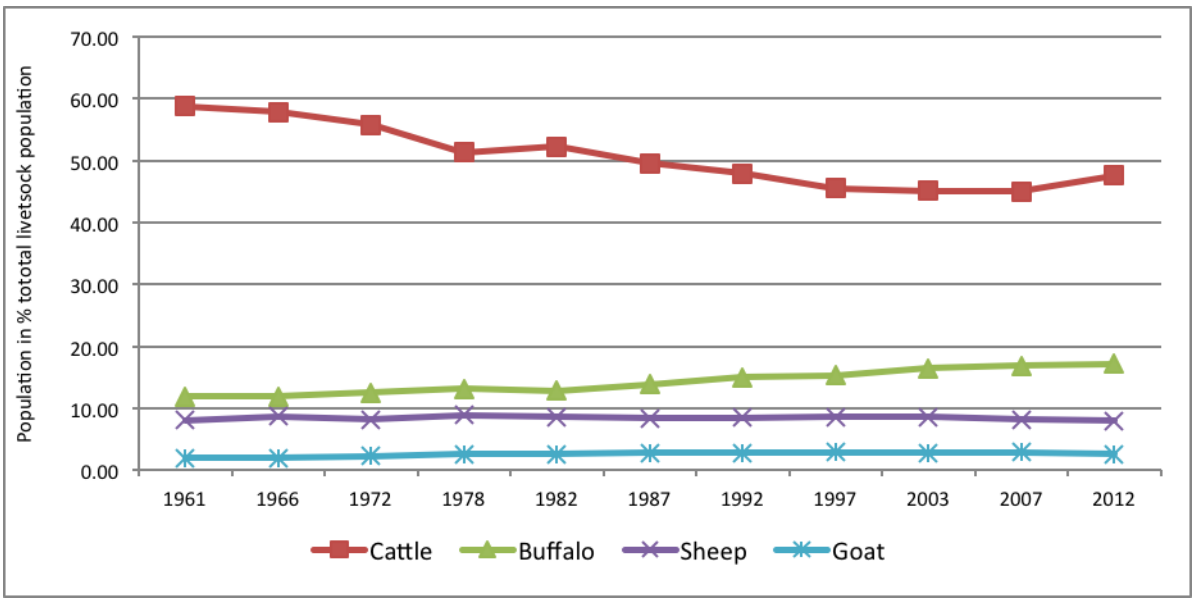


Table 2.6: District wise Percentage share of Animals in Total Livestock Population

District	District wise Percentage share of animals in Total livestock population Maharashtra in - 2012										
	Crossbred	Indigenous	Total Cow	Buffalo	Total Sheep	Goat	Total Pigs	Horses & Ponies	Donkey	Mules	Camel
Ahmadnagar	29.76	18.40	48.16	7.47	12.21	26.73	4.71	1.28	0.47	0.00	0.002
Akola	5.22	8.57	9.09	16.69	1.57	4.54	2.08	0.15	0.40	0.00	0.001
Amravati	15.73	16.51	18.09	4.22	23.69	9.85	1.92	0.21	0.69	0.00	0.000
Aurangabad	5.63	14.03	19.66	31.56	29.77	10.22	5.82	0.36	0.11	0.00	0.001
Bhandara	27.65	5.29	8.06	30.42	0.91	5.45	0.08	0.01	0.00	0.00	0.000
Bid	4.41	15.23	19.64	8.11	22.34	11.35	3.84	0.21	0.52	0.00	0.000
Buldana	17.88	14.40	16.19	4.04	3.56	8.89	3.44	0.13	0.59	0.01	0.001
Chandrapur	8.12	16.62	17.43	24.80	8.02	7.74	0.91	0.01	0.04	0.00	0.000
Dhule	13.67	10.65	12.02	3.38	6.98	9.30	10.29	1.37	0.09	0.20	0.002
Gadchiroli	2.43	16.92	17.16	25.77	2.44	6.77	13.08	0.00	0.00	0.00	0.000
Gondiya	7.48	10.64	11.39	29.71	0.87	5.25	0.44	0.01	0.01	0.00	0.000
Hingoli	5.43	8.77	9.31	22.38	2.23	3.75	1.04	0.02	0.02	0.00	0.000
Jalgaon	28.99	15.73	18.63	8.69	1.29	11.78	6.55	0.54	0.43	0.11	0.001
Jalna	14.54	12.52	13.98	26.71	8.66	6.20	6.32	0.11	0.03	0.00	0.000
Kolhapur	5.85	3.44	9.28	20.68	3.51	5.48	1.55	0.61	0.06	0.01	0.008
Latur	8.07	11.39	12.19	7.85	12.11	4.14	2.90	0.07	0.45	0.00	0.001
Mumbai	1.13	0.62	1.75	10.19	0.11	3.59	0.22	0.55	0.03	0.00	0.001
Nagpur	33.66	12.46	15.82	28.35	2.60	8.95	2.33	0.09	0.11	0.00	0.000
Nanded	5.16	21.43	21.94	7.14	13.89	8.55	4.39	0.11	2.24	0.00	0.004
Nandurbar	4.90	10.88	11.37	24.33	5.15	9.20	3.60	0.22	0.24	0.00	0.000
Nashik	88.97	25.38	3.43	8.01	12.03	20.24	9.93	2.01	0.31	0.14	0.013
Osmanabad	47.16	7.26	11.98	5.82	10.64	6.03	1.67	0.08	0.16	0.00	0.005
Parbhani	2.45	11.81	12.06	32.65	8.74	4.51	2.49	0.08	0.17	0.00	0.002
Pune	15.39	10.36	25.76	9.93	10.25	13.32	3.21	1.83	0.38	0.11	0.010
Raigarh	3.31	7.22	7.56	23.19	0.23	29.51	0.50	0.30	0.02	0.00	0.000
Ratnagiri	6.53	10.12	10.77	14.79	0.04	11.16	0.10	0.01	0.05	0.00	0.002
Sangli	5.78	5.75	11.52	16.62	5.31	10.95	1.27	0.31	0.57	0.01	0.000
Satara	6.58	6.15	12.73	11.91	8.92	10.43	1.50	0.62	0.53	0.03	0.000
Sindhudurg	4.42	4.53	4.97	22.59	0.00	9.49	0.57	0.01	0.01	0.00	0.000
Solapur	11.49	13.16	24.65	15.17	6.28	23.84	5.03	0.55	0.77	0.00	0.003
Thane	4.18	13.43	13.85	6.31	0.81	6.82	2.64	0.34	0.11	0.04	0.003
Wardha	15.69	8.70	10.27	16.46	0.57	4.40	0.95	0.02	0.03	0.00	0.000
Washim	2.98	7.90	8.20	21.09	3.58	4.47	3.31	0.09	0.09	0.00	0.001
Yavatmal	7.37	23.57	24.30	32.47	8.32	10.10	1.26	0.28	0.12	0.00	0.000

Source: NDDB (2014).

Livestock density was the highest in the Ahmednagar district and the lowest in Sidhudurg district, while bovine density was found to be highest in Kolhapur district and lowest in Sindhudurg (Table 2.7).

Fig 2.3: District wise Percentage share in Total livestock population Maharashtra in -2012

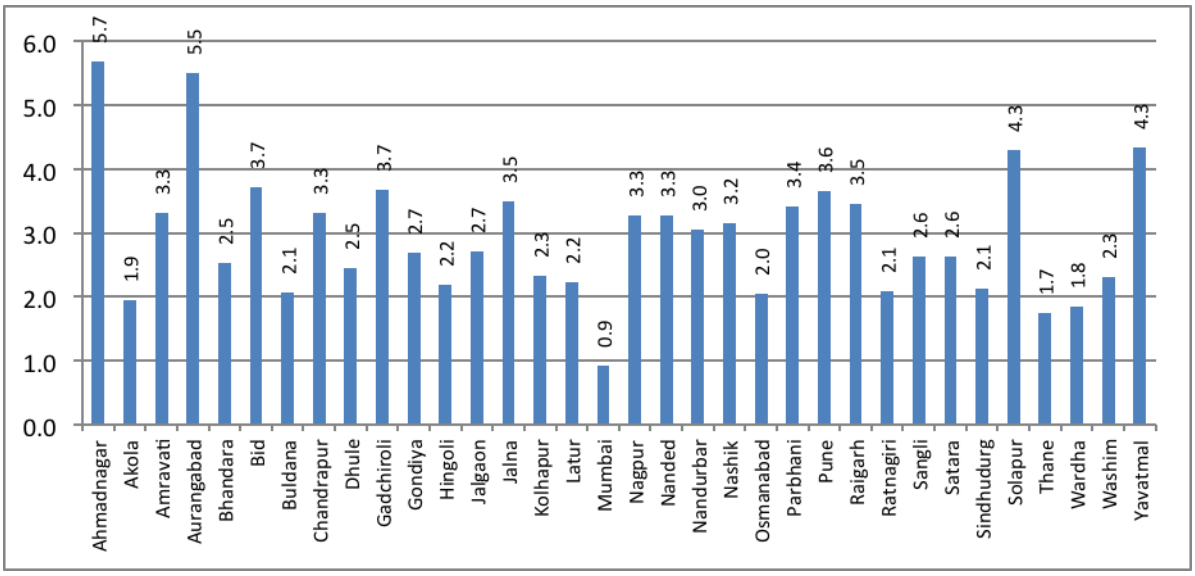


Table 2.7: District-wise Livestock and Bovine Density (1992-2012)

Districts	Livestock (No. per sq km)					Bovine (No. per sq km)				
	1992	1997	2003	2007	2012	1992	1997	2003	2007	2012
Ahmadnagar	--	187	165	170	166	--	85	85	95	97
Akola	--	116	101	94	82	--	77	65	61	56
Amravati	--	89	79	82	84	--	59	53	51	54
Aurangabad	-	124	109	108	107	--	71	60	62	67
Bhandara	--	149	128	137	121	--	101	88	87	80
Bid	--	143	130	139	116	--	76	75	87	77
Buldana	--	117	114	118	102	--	70	67	73	62
Chandrapur	--	95	89	86	74	--	68	62	58	51
Dhule	--	146	149	151	135	--	80	62	65	64
Gadchiroli	--	67	59	80	58	--	48	43	53	41
Gondiya	--	--	125	130	112	--	--	94	92	81
Hingol	--	--	114	110	96	--	--	78	75	71
Jalgaon	--	147	131	113	104	--	92	79	73	69
Jalna	--	121	147	97	94	--	72	111	64	64
Kolhapur	--	167	165	163	151	--	119	120	116	116
Latur	--	124	121	116	107	--	87	88	87	83
Mumbai	--	173	245	54	81	--	140	139	41	58
Nagpur	--	110	95	100	84	--	75	64	64	56
Nanded	--	136	130	129	112	--	94	88	86	82
Nandurbar	--	--	159	145	119	--	--	90	86	69
Nashik	--	167	148	145	145	--	93	79	78	81
Osmanabad	--	117	109	104	98	--	70	71	72	70
Parbhani	--	130	105	124	100	--	88	70	85	73
Pune	--	146	122	129	113	--	76	62	69	68
Raigarh	--	107	90	66	54	--	84	72	52	41
Ratnagiri	--	90	71	59	48	--	82	66	55	44
Sangli	--	156	165	162	154	--	87	93	93	97
Satara	--	157	140	135	125	--	79	70	67	70
Sindhudurg	--	72	63	55	47	--	64	56	49	41
Solapur	--	149	146	146	140	--	65	71	73	79
Thane	--	111	99	90	85	--	82	74	68	62
Wardha	--	109	93	97	77	--	78	66	65	56
Washim	--	--	86	116	94	--	--	52	77	62
Yavatmal	--	102	125	98	84	--	70	67	63	60
MS		129	119	117	106		78	73	72	68

Source: NDDB (2014).

The Government of Maharashtra identified Deoni, Dangi, Khillar, Gaolao and Red Kandhari as indigenous breeds of cattle. Deoni name has been derived from Deoni taluka of Latur district in Maharashtra (NDDB, 2015). Likewise, Red Kandhari originates from Kandhar taluka in Nanded district (Table 2.8). In order to protect and propagate these breeds, state introduced three pronged strategy : i) introduction of selected bulls in villages for natural service; ii) supply of frozen semen of proven/true-to-type indigenous breed for carrying out Artificial Insemination; and iii) Involve Breeder's Association in conservation of indigenous breeds. State also introduced system of herd registration, milk competition, etc. to identify high-milk yielders of indigenous breed to facilitate buy-back of pedigreed male-calves for getting quality-breeding bulls. In case of buffalo, it has developed agro-climatic specific breeding strategy and germ-plasm for genetic improvement. Buffaloes of descript breeds like Pandharpuri, Marathwadi, Nagpuri, etc are bred only with semen of bulls of respective breed, whereas non-descript buffaloes are bred with germ-plasm of identified breeds. The performance of these breeds is presented in Table 2.9.

Table 2.8: Distribution of Maharashtra's Cattle Breeds

Breeds	Breeding Tract	Utility	Distribution
A) Cattle			
Deoni	Bider district of Karnataka and Latur, Nanded, Osmanabad and Parbhani districts of Maharashtra	Draught and milk	Mainly in the Latur districts. Also found n Bid, Osmanbad Aurangabad and Parbhani districts. This breed is named after Deoni taluka of Latur districts.
Khillar	Baglakot, Belgom, Bijapur, dharward and Gulbarga, districts of Karnataka and Kolhapur, Osmanabad, Pune, Sangli Satara and Solapur district of Maharashtra	Draught	Mainly distributed in Solapur, Pune, Satara, Ahmanagar, Sangli, bid, Nasik, Osmanbad, Kolahapur districts. Four type of Khillari are prevalent in different parts. Atpati Mahal in southern Maharashtra, Mhaswad in solapur and satara area, Thillari in Satara area, Thillari in Satpura range of hills and Nakali in adjoining area of this region.
Red Kandhari	Ahmadnagar, Bid, Latur, Nanded and Parbhani districts of Maharastra	Draught	Mainly distributed across Nanded Latur, Parbhani and bid district of Maharashtra
Dangi	Ahmadnagar, Nasik and Thane district of Maharastra and Dangs district of Gujarat	Draught and milk	Mainly found in Ahmadnagar, Thane Nasik district
Gaolao	Balghat, Chindwara, Seoni district of Madhya Pradesh, Durg and Rajnandgaon districts of Chhattisgarh and Nagpur and Wardha district of Maharashtra	Draught and milk	Mainly distributed in Wardha district also found in Ahmadnagar, Dhule, Nasik, Bid, Osmanbad and Latur districts.

B) Buffalo			
Pandharpuri	Maharashtra (Kolhapur, Sangli and Solapur districts	Draught and milk	Mainly found in solar district. This breed is also found in Sangli, Pune Satara, Osmanbad, Bid and Ahmadnagar.
Nagpuri	Akola, amarabati, Nagapur, Wardha and Yavatmal districts of Maharashtra	Draught and milk	Mainly distributed across Nagpur, Wardha, Buldana, Bid, Sangli, Latur, Amarabati, Yavatmal districts Also scattered distribution reported in Bhandra,akola, Pune Solapur Wasim districts, this breed is native of Vidhava region of Maharashtra .
Marathawadi	Bid Jalana, Latur, Nanded and Parbhani districts of Maharashtra	Draught and milk	Mainly distributed in Latur, Osmanbad, bid, Nanded and Parbhani districts.

Source: AE Nivsarkar *et al.,* (2000), Animal Genetics Resources of India, Cattle and Buffalo, ICAR publication, as mentioned NDDB (2014).

Table 2.9: Performance of Cattle and Buffalo Breed

Parameter	Cattle				
	Deoni	khillar	Red kandhari	Dangi	gaolao
Breed Population ('000)	73.1	967.2	176.6	90.2	36.3
Colour	Usually spotted black and white	Khillar of deccan plateau are grayish white. The tapti khillar are white with carroty nose and carroty hooves.	The colour is uniform deep dark red, but variations from adull red to almost brown are also found	Distinct white coat colour with red or black spots distributed unevenly over the body	Blackish white in males and white in female.
Average Adult Body Weight (Kg)	Male:590 Female: 340	Male : 271 Female :219	Male : 430 Female :340	Male : 317 Female :228	Male : 430 Female :340
Lactation Yield (Kg)	868 (638-1,229)	451 (240-515)	598	430 (175-800)	604 (470-725)
Lactation Length (days)	299	228(190-275)	260	269	240
Calving Interval (days)	441 (390-510)	498 (450-630)	438	570 (510-630)	424 (390-540)
Age at First Calving (days)	1371 (1260-1440)	1272 (1110-1800)	1200	1590 (1380-1680)	1642 (1560-1830)
Average milk fat	4.3	4.2	4.6	4.3	4.3
Buffalo breeds	Pandharpuri	Nagpuri	Marathawadi	--	--
Breed Population ('000)	260.6	127.1	181.7	--	----
Colour	Usually black but varies from light to deep black.	Black coloured animals with white patches on face, legs and tail tips.	Grayish black to jet black. Some animals have white markings on forehead and lower parts of the limbs.	--	--
Average Adult Body Weight (Kg)	Female: 416	Male: 396 Female : 349	--	--	--
Lactation Yield (Kg)	1790	1039	1118	--	--
Lactation Length (days)	330 (296-346)	286 (263-297)	300	--	--
Calving Interval (days)	408	420 (330-720)	501	--	--
Age at First Calving (days)	1314	1710 (1500-1800)	1569	--	--
Average milk fat	8.0	8.3	8.8	--	---

Source: A E Nivsarkar *et al.,* (2000), Animal Genetics Resources of India, Cattle and Buffalo, ICAR publication, as mentioned NDDB (2014).

2.4 Growth in Milk Production and Productivity (Regional trend)

As mentioned earlier, Maharashtra is the seventh largest milk producer in the country. The total milk production during 2016-17 was 104.02 lakh MT whereas during 2017-18 it was 111.02 lakh MT. During 2017-18, the average daily collection of milk by the co-operative dairies was 35.68 lakh litres (NDDB, 2018). Number of initiatives were taken by the government, to facilitate improvement in the milk productivity over the last five decades or so. A trend showing the increase in milk production over the past three decades is depicted in Fig 2.4. The graph shows there is a consistent increase in the production of milk over the years. The milk production has increased from 6.09 million tonnes in 2000-01 to 11.10 million tonnes in 2017-18 registering a growth of 71 percent over base year. Except for the period of drought from 1987-88 to 1988-89, milk production in the state has been increasing continuously (Fig. 2.4). The milk production declined during 1987-1988 due to one of the worst droughts in the state. The rate of increase in milk production was faster than rate of increase in state's human population. As a result, the per capita availability of milk in the state increased from 172 gms/day in 2001-02 to 256 gm/day in 2017-18. Out of total milk production, about 45.51 percent of the milk production was contributed by crossbreed cattle followed by 39.6 percent by buffaloes. The contribution from local cows was 13.8 percent to the total milk production in the state whereas contribution form goats was 2.12 percent (Table 2.10). The productivity of cows and buffaloes as well as bovine animals in terms of daily milk yield is increasing continuously (Fig 2.5 & 2.6). Despite of increase in milk yield, there is still a wide scope for improving milk yield of milch animals.

Table 2.10: Estimated Milk Production in Maharashtra:1992-93 to 2016-17

Sr. No.	Year	Milk Production in ("000 MT)						Growth of Milk Prod (%) over base year	Per Capita availability (gms/day)
		In milk Cow		In Milk Buffalo	In milk Bovine	In Milk Goat	Total		
		Indi-genous	C.B.						
1	1992-93	996.5	1040.3	1869.1	3906.0	196.2	4102.2	--	140
2	1997-98	1016.1	1467.1	2471.7	4954.8	237.9	5192.7	26.58	160
3	2003-04	1206.5	1954.9	2914.9	6076.3	300.8	6377.1	22.81	175
4	2007-08	1033.8	2763.2	3147.4	6944.4	265.3	7209.7	13.06	187
5	2008-09	1066.2	2817.2	3294.5	7177.7	277.2	7454.9	3.40	190
6	2009-10	1154.4	2886.8	3355.1	7396.3	281.9	7678.2	3.00	193
7	2010-11	1229.4	3067.9	3473.7	7711.0	273.0	7984.0	3.98	199
8	2011-12	1277.1	3328.0	3571.0	8176.1	292.9	8469.0	6.07	206
9	2012-13	1312.9	3415.7	3702.1	8430.7	303.7	8734.4	3.13	210
10	2013-14	1295.1	3721.1	3822.4	8838.6	250.4	9089.0	4.06	215
11	2016-17	1432.3	4734.2	4015.39	10182.0	220.3	10402.0	14.45	256

Source: GOM (2013 and 2018).

Fig. 2.4: Trends in Total Milk production in Maharashtra (1983-84 to 2017-18)

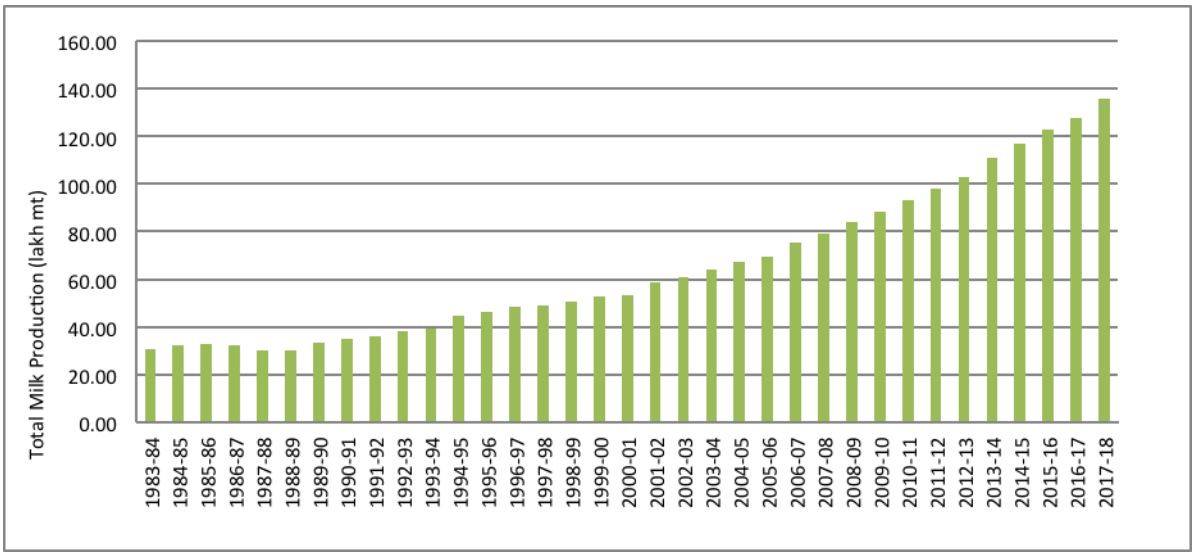


Fig. 2.5: Species wise Milk Yield in Maharashtra (Kg./Day)

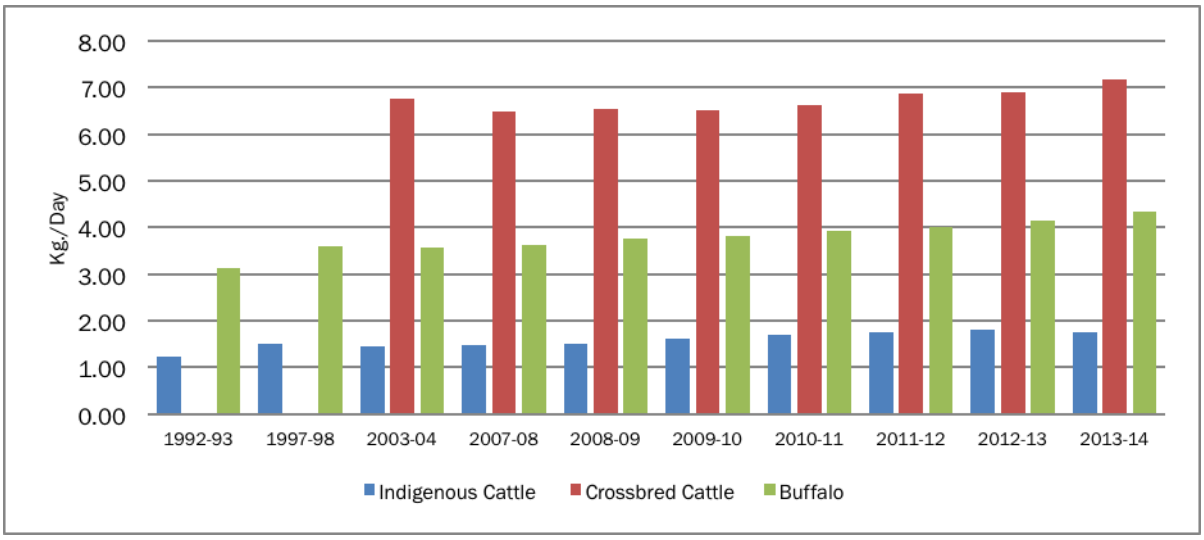
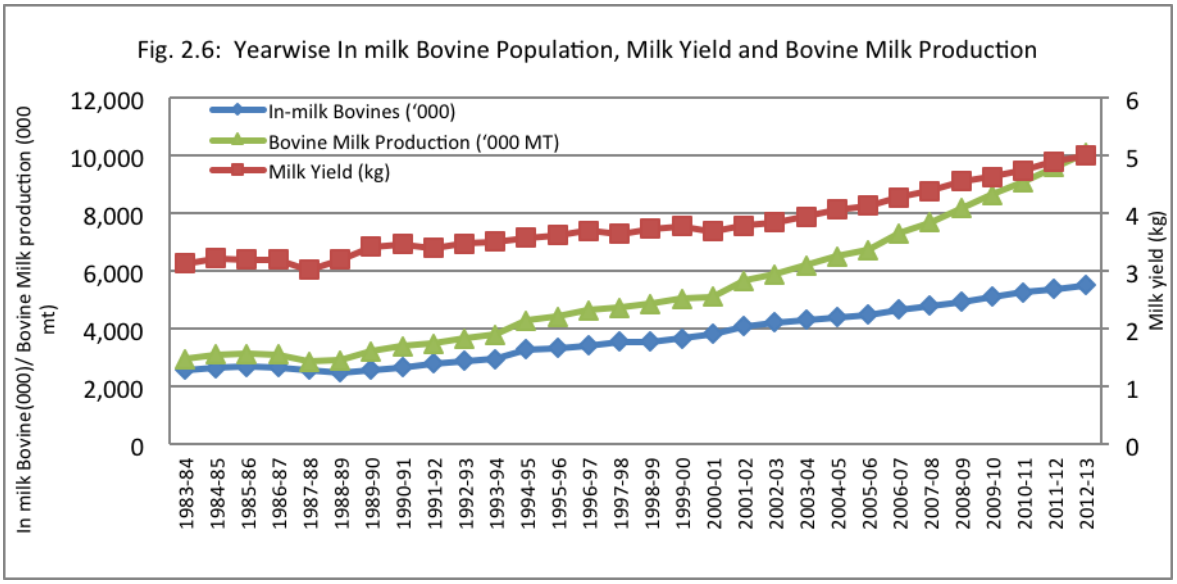


Fig. 2.6: Year wise in milk Bovine Population, Milk Yield and Bovine Milk Production



During Operation Flood (OF)- I (1970-71 to 1980-81), the milk production in the state increased significantly at the rate of 5.06 percent per annum. The state started taking quantum leaps in milk production from 1987-88 onwards when state's milk production was 2.66 million tonnes. Because of that during OF-II (1980-81 to 1984-85), rate of growth of milk production in the state was highest (8.73 percent) and subsequently in third phase also the improvement continued (1985-86 to 1995-96). During all three phases of Operation Flood Programme, Maharashtra state recorded higher growth in milk production than national level averages. However, during post OF period (1996-97 to 2003-04), the rate of growth of milk production reduced to 3.24 percent, which was less than national rate of growth (3.52 percent).

Out of total milk production, crossbreed cows accounted for 45.51 percent, buffalo milk accounted for 39.6 percent, and local cows accounted for 13.8 percent while goat milk accounted for remianing share. While out of total bovine milk production, was cross breed accounted for 46.5 percent, buffaloes accounted for 39.4 percent share and local cows accounted for remaining 14.1 percent. Significant growth in population of in-milk bovine animals supported an increase in milk yield of bovine animals which increased (bovine milk production) by 161 percent in 2016-17 over 1992-93. The share of cross bred cows in total milk production increased from 25.36 percent to 45.51 percent during 1992-93 to 2016-17, while share of indigenous cows and buffaloed declined from 24.3 and 45.6 percent in 1992-93 to 38.6 and 13.7 in 2016-17.

District-wise milk production in Maharashtra for the year 2016-17 is presented in Fig 2.7. It can be seen that Ahmednagar was the highest milk producing district in the state with an estimated milk production of about 17.21 lakh tonnes during 2016-17 accounting for 15.6 percent of total milk production in the state. Pune was the second largest producer of milk with an estimated share of about 12.3 percent, followed by Solapur (8.9 percent, Kolhapur (8.4 percent), Sangli (6.1 percent) and Nashik (5.2 percent). These top seven districts together contributed about 64 percent of milk production of the state. Category-wise share of milk production in Maharashtra clearly indicates that top ranked five milk producer districts in Maharashtra were dominated by the production of milk by cross bred cows, followed by buffaloes and goats (Table 2.11).

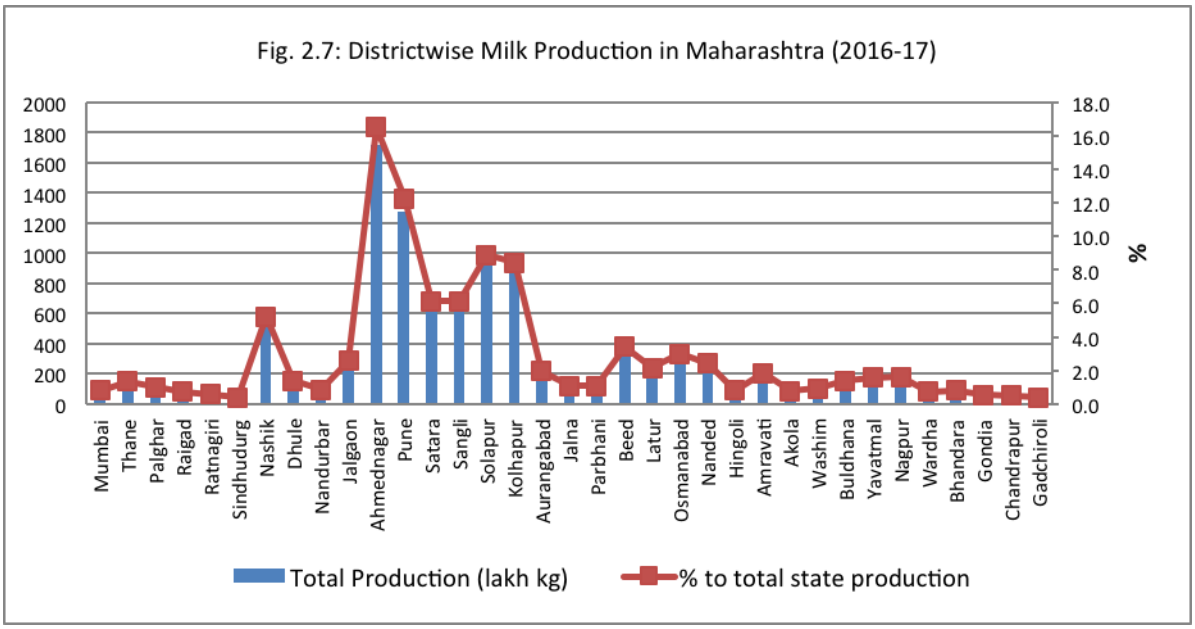


Table 2.11: District wise & category wise Percentage share of Milk Production in Maharashtra

Name of the District	District wise & category wise Percentage share of Milk Production in Maharashtra (2013-14)					
	% share of CB Cow	% share of Ind Cow	% share of Total Cattle	% share of Buffalo	Goat	%share to total Milk Prod
Ahmadnagar	31.2	9.3	25.6	4.4	12.7	16.3
Akola	0.3	1.7	0.6	1.3	1.4	0.9
Amravati	0.7	2.6	1.2	1.8	2.2	1.5
Aurangabad	2.1	2.3	2.2	1.8	3.3	2.0
Bid	5.1	4.0	4.8	4.1	4.6	4.5
Bhandara	1.0	1.9	1.2	1.2	1.4	1.2
Buldana	1.1	2.8	1.6	2.4	3.0	1.9
Chandrapur	0.3	2.1	0.8	1.1	1.3	0.9
Dhule	1.4	3.3	1.8	1.5	2.7	1.7
Gadchiroli	0.1	1.2	0.4	0.6	1.4	0.5
Gondiya	0.2	1.9	0.7	1.0	1.5	0.8
Hingol	0.2	1.1	0.4	1.0	1.5	0.7
Jalgaon	1.7	3.7	2.2	4.1	4.0	3.1
Jalna	0.6	3.1	1.3	1.5	2.1	1.4
Kolhapur	4.5	1.0	3.6	12.8	2.1	7.4
Latur	0.8	2.3	1.2	3.0	1.4	1.9
Mumbai	0.0	0.0	0.0	0.8	0.0	0.3
Nagpur	1.8	2.5	2.0	1.4	2.4	1.8
Nanded	0.5	5.4	1.8	5.1	3.3	3.2
Nandurbar	0.3	3.6	1.1	1.2	2.9	1.2
Nashik	4.5	5.4	4.8	3.4	6.6	4.2
Osmanaba	3.3	2.9	3.2	3.9	2.0	3.5
Parbhani	0.2	4.3	1.3	2.3	1.9	1.7
Pune	20.4	4.9	16.4	7.0	8.2	12.2
Raigarh	0.2	1.9	0.6	0.8	0.8	0.7
Ratnagiri	0.3	2.0	0.8	0.5	0.2	0.6
Sangli	2.7	2.7	2.7	10.0	3.4	5.8
Satara	6.6	2.8	5.7	7.1	3.8	6.2
Sindhudurg	0.2	0.8	0.3	0.8	0.2	0.5
Solapur	5.5	7.2	6.0	5.3	10.0	5.8
Thane	0.3	3.0	1.0	3.3	1.8	2.0
Wardha	1.2	1.3	1.2	0.8	1.4	1.1
Washim	0.2	2.1	0.7	1.4	1.4	1.0
Yavatmal	0.5	2.7	1.1	1.5	3.2	1.3

Source: GOM (2013).

The species-wise district wise milk yield data presented in Fig 2.8 indicates that among the species, the highest milk yield was recorded in cross bred cows. In case of indigenous cows, highest milk yield was recorded in Ahmedbagar (3.01 kg/day) and the lowest was in Gadchiroli (0.52 kg/day). Among the species, the highest milk yield was recorded in cross bred cows in Pune district (9.33 kg/day) and the lowest was in Solapur (4.19 kg/day). Mumbai's brihan district was the top ranking district in case of buffalo yield (7.55 kg/day) while same was recorded lowest in Ratnagiri (3.17 kg/day). The highest milk density was recorded in Kolhapur (240 kg/day/sq km), while highest per capita milk availability was recorded in Ahmednagar (874 gm/day) (Fig. 2.9). The highest bovine milk yield was recorded in Mumbai Brihan district (7.696 kg/day) and the lowest was in Gadchiroli district (1.058 kg/day).

Fig. 2.8: Species and District wise Milk Yield (kg/day) 2013-14

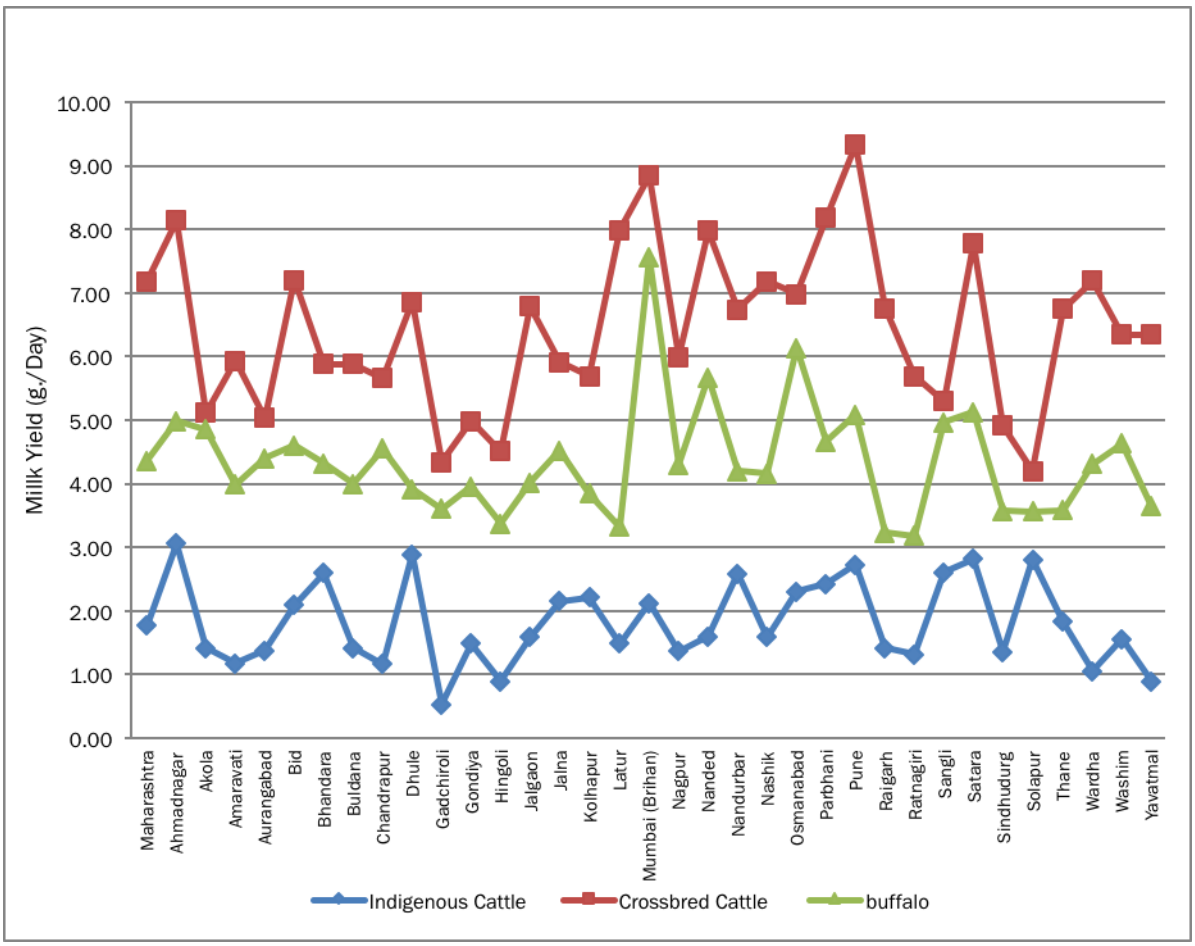
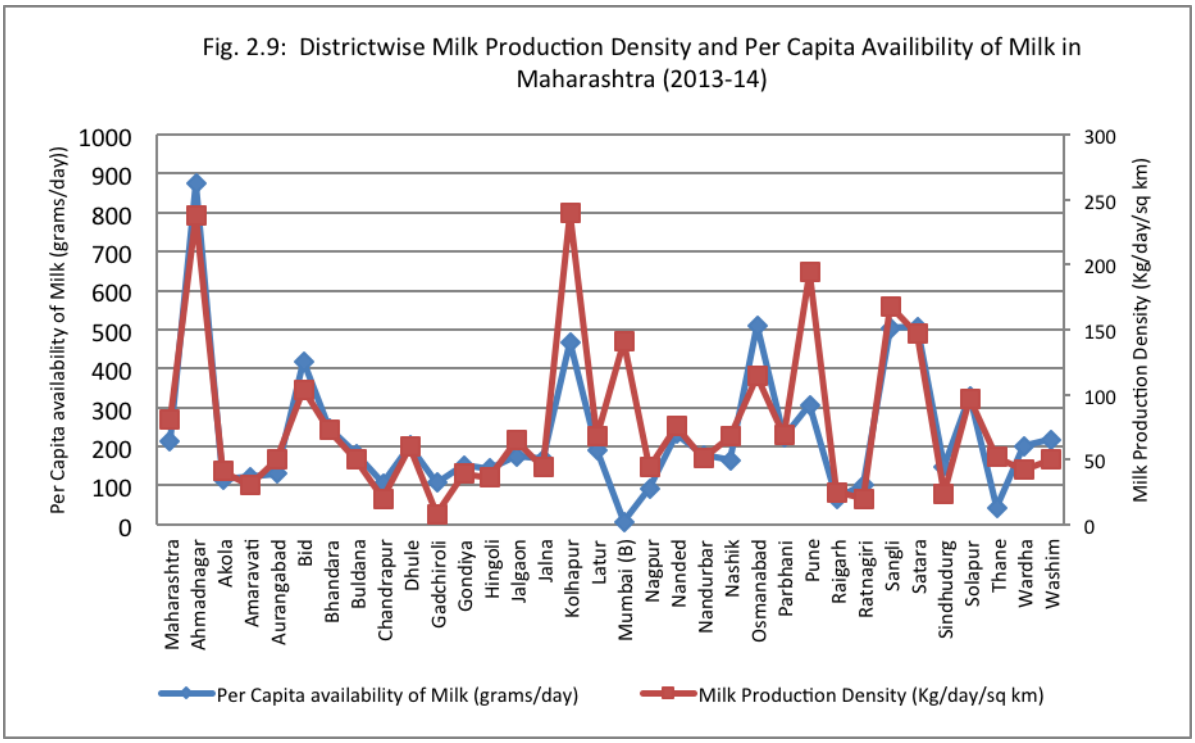


Fig. 2.9: District wise Milk Production Density and Per Capita Availability of Milk (2012-13)



2.5 Status of Availability of Feed and Fodder

In Maharashtra, total reporting area was 30.758 lakh ha. Out of this 17.345 lakh ha (56.39 percent) was net sown area, 32.09 lakh ha was land not available for cultivation and 9.19 lakh ha land was a cultivable waste land. The permanent pasture and other grazing land was 12.49 lakh ha, which was only 4.06 percent of the total area. The total human population of Maharashtra was reported at about 11.42 crore while the collective population of cattle, buffaloes, sheeps and goats were 320.93 lakh (i.e. about 28 percent of the human population) while their feeding area was only 4.06 percent.

Maharashtra has been struggling with droughts and water shortage for last many years and this has resulted in shortage of both green and dry fodder. As a relief measure, the government supports dairying by organizing free fodder camps every year in rainfall deficit areas. It also arranges for the procurement of sugarcane tops from cane growers, its transportation and ultimate distribution to the livestock owners in scarcity areas at subsidized rates. To cope up with fodder shortages, government is often forced to ban the sale of fodder outside the district where it is produced and prohibits cattle herders from the neighboring states from grazing their animals in Maharashtra[1]. Regionwise, dry matter

[1] https://www.downtoearth.org.in/coverage/starved-of-fodder-48980

availability from crop residues is considerably lower in the districts of Ahmadnagar, Pune, Kolhapur, Sangli and Satara due to higher density of dairy animals in these regions. In case of Gadchiroli, Gondia and Chandrapur, the area under forest is relatively greater reducing dry matter availability (NDDB, 2018). The animal husbandry department[2] estimated the requirement of fodder at around 1.63 lakh tonne of green fodder and 65,000 tonne of dry matter. It was estimated that a deficit about 8.63 percent of dry fodder was registered (Table 2.12), while another estimate indicated a deficit of crop residues and excess of green fodder (table 2.13). The Department of Animal Husbandry of Government of Maharashtra estimated the requirement and availability of feed and fodder by taking in to account livestock population of Census 2012 and observed a deficit of 59 percent of green fodder and 31 percent deficit of dry fodder (Table 2.14). There is no authentic data on area under forage and fodder crops at state as well as district level.

Table 2.12: Availability, Requirement and Surplus/Deficit of Feed Nutrient

Year	Dry Matter *('000 Mt)*		
	Availability	Requirement	Surplus/Deficit
1997	37,847	63,884	-26,037
2003	42,830	60,478	-17,648
2007	47,303	62,291	-14,989
2008	47,576	62,666	-15,090
2009	47,526	63,100	-15,574
2010	47,863	63,597	-15,733
2011	58,621	64,160	-5,539

Source: Feedbase 2012, National Institute of Animal Nutrition and Physiology, Bangalore,as cited in NDDB 2015.

Table 2.13: Availability and Requirement of Fodder in Maharashtra (2008)

Particulars	(Dry Matter in Million Tonne)	
	Crop Residues	Greens
Availability	22.21	25.12
Requirement	33.68	17.96
Deficit	- 11.47	7.16

Source: www.indiastat.com

Table 2.14: Availability and Requirement of Fodder in Maharashtra (2015)

Particulars	Lakh metric tones		
	Green	Dry	Concentrates
Availability	1108	443	110
Requirement	449	304	75
Deficit	649	139	35
Deficit (%)	59	31	32

Note: Estimates for 3.18 crore livestock as per provisional Livestock Census 2012
Source: GOM (2015, https://ahd.maharashtra.gov.in/pdf/booklet/2014_15/13.pdf)

[2] https://www.business-standard.com/article/pti-stories/maharashtra-government-pushes-for-fodder-production-118103001485_1.html

2.6 State Govt. Policies for Fodder Development

A large part of the state suffers from crop failures or periodical drought because of the failure or erratic nature of monsoon. The fact that the state was a drought prone area, was a critical additional stress factor that adversely affected productivity, livelihood, and the rural economy. Ironically the cultivated areas lie in drought affected districts. The 2013 drought in Maharashtra in India came about after the region received lower rainfall during the monsoon season - June to September 2012. It was considered to be the region's worst drought in 40 years. Thus, monsoon rain plays a critical role in the agricultural development of the state, as over 82 percent of the cropped area is cultivated under rainfed condition. Therefore, State Government should evolve a scheme to provide support for fodder production and distribution during drought situation through fodder camps. In this regards, schemes and GRs have been issued which are presented in Annexure IV. The Feed Policy adopted by the State Government is presented in Box 2.1

Box 2.1: Feed, Fodder, Animal Nutrition and Grazing Policy of Govt of Maharashtra

It is observed that fodder crop cultivation is not up to the desired level in the state. Usually the animals are fed with food crop residues. Only few progressive farmers and organized dairymen feed chaffed fodder to the animals. Stocking of dry fodder in the form of silage was also restricted to few places. The waste lands and Gairans (common grazing land) have not been developed as grazing lands. It was observed that green fodder and concentrate feed was supplied only to the productive animals (only during their productive period). The dry-pregnant cows, buffalo heifers and male calves do not receive the desired nutritious feed on account of negligence of owners. At present there is no legislation for regulation of the quality of cattle & poultry feed.

Following measures are therefore necessary and will be introduced by

a. Cattle & poultry feed manufacturing should be freed from reservation for small- scale sector.
b. Promoting the farmers to put at least 10% of the total cultivable land for fodder crop production while making their crop-plan. For this, area specific fodder varieties will be identified by and developed as is being done by Uttranchal Livestock Development Board.
c. Development of waste lands / gairans into community pasture lands through systematic efforts of green cover augmentation under soil & water conservation schemes with involvement of village panchayats and NGOs.
d. Democratization of management of grazing areas on forest land through effective implementation of joint-forest management and giving priority to plant and grass species which provide good quantity and quality of green fodder.
e. In order to protect the fodder cover on grass-land on CPRs stall-feeding shall be promoted by suitable extension tool, programme-based tools and regulatory interventions.
f. A study group will be set up to study the practice of free-grazing by cattle on community pasture land in larger parts of Konkan, Vidarbha, Marathwada and hilly and tribal areas, in order to get a suitable intervention tool designed for conserving grass land and at the same time improve the animal husbandry practices adopted by the local people in those areas; the study group will also study various aspects of sheep and goat rearing by shepherd community and intervention tools for improving their lot and also conserving pasture land resources.
g. Promotion of fodder enrichment techniques (nutritive value addition with use of urea & molasses) shall be researched and introduced suitably to address the problem of fodder shortage in hilly, tribal and drought prone areas.
h. Mineral deficiency pattern and its geo-climatic distribution be determined and updated from time to time so that suitable mineral supplementation (in feed) can be prescribed.
i. Establishment of fodder banks in the drought prone areas to deal with fodder scarcity.
j. Quality parameters for cattle & poultry feed, minerals & trace minerals (for supplementation in feed) should be up-graded. Stipulated quality parameters will be made mandatory for the manufacturers through enactment and enforcement of suitable legislation.

Source: Department of Animal Husbandry, Gov. of Maharashtra
https://ahd.maharashtra.gov.in/index.php?option=com_content&view=article&id=68&Itemid=62

2.7 Chapter Summary

Maharashtra is the largest economy in India as well as one of the top economic performers with respect to per capita income. At the same time, incidence of poverty in the state remained close to the national average. Although Maharashtra is a highly industrialized state of India, agriculture continued to be the main occupation in the state. The importance of the agricultural sector in the economic and social fabric of Maharashtra can be seen from the fact that majority of the labour force still depends on agriculture as their primary source of livelihood. The state currently represents the largest dairy market in India. Maharashtra State has the distinction of being the pioneer state in the field of dairy development in the country. Maharashtra is the sixth largest producer of milk in the country, accounting for 6.29 percent share in 2017-18. However, per capita milk availability was lowest in the state, which was 256 gram per day in 2017-18. Though the contribution of agriculture and allied sectors to the state gross domestic product declined during the last four decades (34.4 percent in 1960-61 to 11.9 percent in 2018-19), livestock sector has been among the few high-growth sectors in rural Maharashtra. The dairy and poultry are high growth sectors and is reflected in the growing importance of the contribution of these sub-sectors in the livestock economy. Milk contributed about 68 percent to livestock output in 2016-17. As per the 19th Livestock Census 2012, the State ranked sixth at national level with total livestock of about 3.25 crores, accounting for 6.34 percent of national livestock. There is an overall decrease of 9.6 percent over the previous census. The total bovine (Cattle and Buffalo) population was 210.79 Lakhs which accounting for 65 percent of total livestock. Maharashtra State ranked 4th in total cattle at the national level. The livestock per lakh population was about 29 thousand in 2012.

The state accounted for 8.11 percent share in cattle population, 5.15 percent in buffalo population, 3.97 percent in sheep population and 6.24 percent in goat population of the country. Significant share of donkeys (9.09 percent) and horse and ponies (5.92 percent) in national stock was also recorded (2012). There is a decline in livestock population from 35.95 million in 2007 to 32.49 million in 2012 registering a negative growth of 9.64 percent in the total number of animals of various species. In fact, the share of Maharashtra in all Indian total stock of livestock also declined by 0.45 percent in 2012 over 2007. Bovine population in Maharashtra declined by about 5 percent to 2.1 crore as against 2.2 crore in 2007. While crossbreds cattle increased by 19 percent, local cows and

buffaloes have shown a decline of 8 to 9 percent. However, the indigenous cattle and buffalo milch population declined by 5 to 7 percent between 2007 and 2012, while there has been an impressive growth of 26 percent in crossbred milch animals. As per Livestock Census 2012, among the species, cattle contributed highest share (47.66 percent) in total livestock population followed by goats (25.96 percent), buffaloes (17.22 percent) and sheeps (7.94 percent). Cows still dominanted milch animal in the state. Total livestock population in Maharashtra increased by 25 percent during last six decades period.

Marathawada and Vidarbha regions are characterised by frequent droughts, cracked soils, parched wells, dry hand pumps, low yielding livestock and accordingly, dairying is relegated to western parts of the state. The perpendicular strip of land in western part comprising of Ahmadnagar, Nasik, Pune, Satara, Sangli, Kolhapur and Solapur districts had more than one-third bovine population of the state, mainly crossbred cows and buffaloes. Ahmednagar (5.7 percent) had the highest number of livestock population followed by Aurangabad (5.2 percent), Solapur (4.3 percent) and Yavatamal (4.3 percent). The livestock density was the highest in the Ahmednagar district and the lowest in Sidhudurg district, while bovine density was found the highest in Kolhapur district and the lowest in Sindhudurg. The Government of Maharashtra identified Deoni, Dangi, Khillar, Gaolao and Red Kandhari as indigenous breeds of cattle. Deoni name has been derived from Deoni taluka of Latur district in Maharashtra. Likewise, Red Kandhari originates from Kandhar taluka in Nanded district. The milk production increased from 6.09 million tonnes in 2000-01 to 11.10 million tonnes in 2017-18 registering a growth of 71 percent over base year. Except for the period of drought from 1987-88 to 1988-89, milk production in the state had increased continuously.

Out of total milk production, crossbreed cows accounted for 45.51 percent, buffalo milk accounted for 39.6 percent, local cows accounted for 13.8 percent while goat milk accounted for remianing share. While out of total bovine milk production, cross breed accounted for 46.5 percent, buffaloes accounted for 39.4 percent share and local cows accounted for remaining 14.1 percent. Significant growth in population of in-milk bovine animals supported an increase in milk yield of bovine animals which increased (bovine milk production) by 161 percent in 2016-17 over 1992-93. The share of cross bred cows in total milk production increased from 25.36 percent to 45.51 percent during 1992-93 to 2016-17,

while share of indigenous cows and buffaloed declined from 24.3 and 45.6 percent in 1992-93 to 38.6 and 13.7 in 2016-17.

Ahmednagar was the highest milk producing district in the state with an estimated milk production of about 17.21 lakh tonnes during 2016-17 and accounted for 15.6 percent of total milk production in the state. Pune was the second largest producer of milk with an estimated share of about 12.3 percent, followed by Solapur (8.9 percent), Kolhapur (8.4 percent), Sangli (6.1 percent) and Nashik (5.2 percent). These top seven districts together contributed about 64 percent of milk production of the state. Category-wise share of milk production in Maharashtra clearly indicates that five top ranked milk producer districts in Maharashtra are dominated by the production of milk by cross bred cows, followed by buffalo and goat.

The species-wise district wise milk yield data indicates thatthe highest milk yield was recorded in cross breed cows. In case of indigenous cows, highest milk yield was recorded in Ahmedbagar (3.01 kg/day) and the lowest in Gadchiroli (0.52 kg/day). The highest milk yield was recorded in cross breed cows in Pune district (9.33 kg/day) and the lowest in Solapur (4.19 kg/day). Mumbai brihan district was the top ranking district for buffalo yield (7.55 kg/day) while same was recorded lowest in Ratnagiri (3.17 kg/day). The highest milk density was recorded in Kolhapur (240 kg/day/sq km), while highest per capita milk availability was recorded in Ahmednagar (874 gm/day). The highest bovine milk yield was recorded in Mumbai Brihan district (7.696 kg/day) and the lowest was in Gadchiroli district (1.058 kg/day).

In Maharashtra, total reporting area was 30.758 lakh ha. Out of this 17.345 lakh ha (56.39 percent) was net sown area, 32.09 lakh ha was land not available for cultivation and 9.19 lakh land was a cultivable wasteland. The permanent pasture and other grazing land was 12.49 lakh ha, which was only 4.06 percent of the total area. The total human population of Maharashtra was reported at about 11.42 crore while the collective population of cattle, buffalo, sheep and goats are 320.93 lakh (i.e. about 28 percent of the human population), while their feeding area was only 4.06 percent. Maharashtra has been struggling with droughts and water shortage since many years and this has resulted in shortage of both green and dry fodder. As a relief measure, government supports dairying by organizing free fodder camps every year in rainfall deficit areas. It also arranges for the procurement of sugarcane tops from cane growers, its transportation and ultimate

distribution to the livestock owners in scarcity areas at subsidized rates. To cope up with fodder shortages, government is often forced to ban the sale of fodder outside the district where it is produced and prohibited cattle herders from the neighboring states from grazing their animals in Maharashtra. Regionwise, dry matter availability from crop residues is considerably lower in the districts of Ahmadnagar, Pune, Kolhapur, Sangli and Satara due to higher density of dairy animals in these regions. In case of Gadchiroli, Gondia and Chandrapur, the area under forest was relatively larger reducing dry matter availability. The animal husbandry department estimated the requirement of around 1.63 lakh tonne of green fodder and 65,000 tonne of dry variety. About 8.63 percent of deficit of dry fodder was estimated, while another estimate indicates deficit of crop residues and excess of green fodder. Department of Animal Husbandry of Government of Maharashtra estimated the requirement and availability of feed and fodder by taking in to account livestock population as per Census 2012 and observed a deficit of 59 percent of green fodder and 31 percent deficit of dry fodder. There is no authentic data on area under forage and fodder crops at state as well as district level.

The fact that the state is a drought prone area, it is a critical additional stress factor that adversely affects productivity, livelihood, and the rural economy. Ironically the cultivated areas lie in drought affected districts. The 2013 drought in Maharashtra was due to lesser rainfall during the monsoon season - June to September 2012. It is considered as the region's worst drought in 40 years. Thus, monsoon rain plays a critical role in the agricultural development of the state, as over 82 percent of cropped area is cultivated under rainfed condition as of today. Therefore, State Government should introduce schemes to provide support for fodder production and distribution during drought situation through fodder camp.

The next chapter presents the profile of selected area, milk unions, villages & PDCS in Maharashtra.

Chapter III

Profile of Selected Area, Milk Unions, Villages & PDCS

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3.1 About Selected Study Area

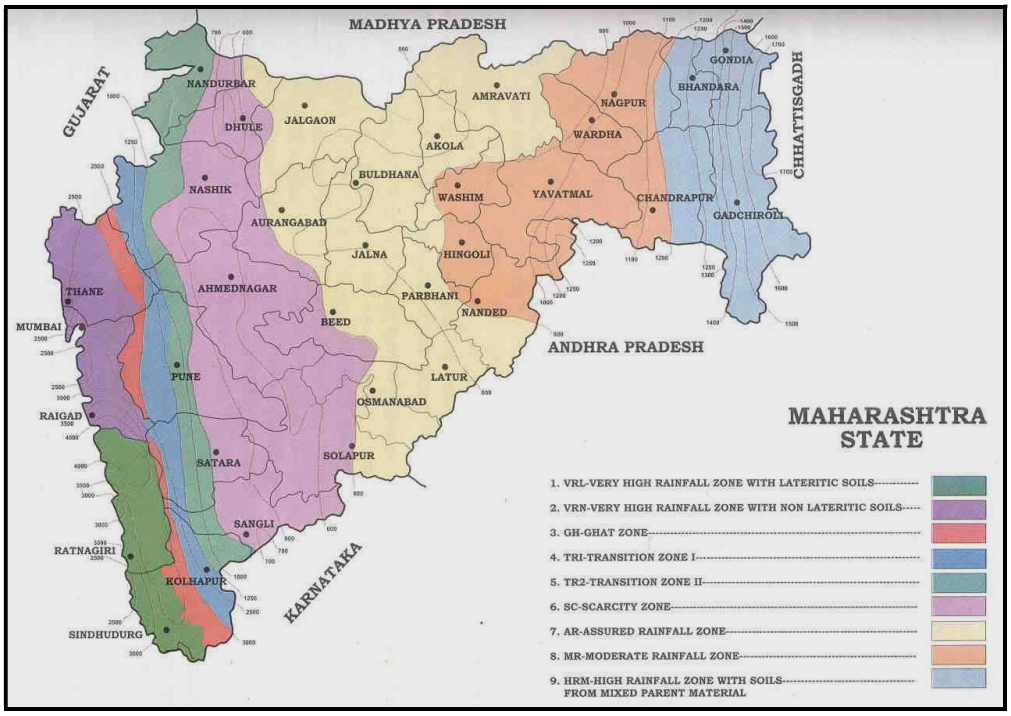
Maharashtra is the third largest state of India occupies the western and central part of the country and has got 720 km long coastline along the Arabian Sea and is also fortified naturally by Sahyadri and Satpuda mountain ranges. Maharashtra is occupying a substantial portion of the Deccan plateau in the western peninsular part of the subcontinent. Maharashtra is the third largest state in area and second largest state in terms of population of India. It has an area of 307,713 sq. km. with 35 districts, 358 blocks and 43711 villages and a population of 112,372,972. 45 percent population of the state is urban. All the districts of Maharashtra are grouped into six divisions: Aurangabad Division, Amravati Division, Konkan Division, Nagpur Division, Nashik Division and Pune Division. Inter-regional inequality within Maharashtra has been a matter of concern for long (Mishra and Panda, 2006). Among the four regions in the state, viz. Konkan, Western Maharashtra, (with Khandesh), Vidarbha and Marathawada, Vidarbha ranked third out of fourth while considering developed region, while least developed region was Marathawada. Thus, Marathawada and Vidarbha with weak industrial sectors were most underdeveloped regions in the state over the years (Shaban, 2006).

The total operational holdings is 1.37 crore (Agriculture Census 2011) covering 1976.70 lakh ha with an average size of operational holdings at 1.44 ha. Out of this 1.37 crore holdings, 78.6 percent were small and marginal holdings. Major problems faced by the small and marginal farmers were - fragmented land-holdings, non-availability of good quality seeds, lack of proper integration of cropping and farming systems suited to different regions, lack of farm mechanization, non-availability of customized skill development programme, poor purchasing power, inadequate transport and storage facilities,, limited access to inputs, technology, credit, market etc. Out of 307.58 lakh ha geographical area of the State, the gross cropped area was 228.63 lakh ha, while the net sown area was 171.91 lakh ha with cropping intensity of 133 percent. Hardly 19 percent area was under irrigation indicating dry land farming leading to more of mono cropping systems. Total cultivable area of the State was 223 lakh ha of which 40 percent was

drought prone. The state suffers with more than 24 percent of drought prone area of the country and almost 73 percent of the area falls in semi-arid region. The state therefore faces major problems and constraints associated with rainfed agriculture, such as low yields, crop uncertainties, failure due to erratic rainfall pattern and also cyclones.

Maharashtra is economically among the most developed states in the country, but it is not counted among the advanced states in India in terms of agricultural production, though most of the state's workforce still depend on agriculture. Agriculture in the state is mainly rainfed and only 19 percent of gross cropped area is irrigated. Agricultural production therefore largely depends on the level and distribution of rainfall. Failure of monsoon at a critical stage of plant growth results in crop failure. The adoption of high yielding varieties of seeds also does not give the potential yield in case of failure of monsoons. The timeliness and spread of rainfall across months are also not always favourable which acts as a constraint on the state's agriculture. Taking into consideration the rainfall pattern, topography, soil characteristics, climatic condition and cropping pattern, nine zones have been identified (see, Map 3.1).

Map 3.1: Agro-Climatic Zones of Maharashtra



Source: http://agricoop.nic.in/sites/default/files/Maharashtra-SAP_V1.3-2.pdf

The history of dairy development in Maharashtra dates back to 1940s. At that juncture, the then Civil Supplies department controlled dairy development. In 1947, Aarey Milk Colony was established to supply clean milk to the consumers. In 1958, an independent Dairy Development Department was established which was headed by a Milk Commissioner. After 1970, substantial funds were disbursed through cooperatives for dairy development during Operation Flood Programme. The State also initiated Integrated Dairy Development Programmes in districts not covered under Operation Flood. In due course of time, Animal Husbandry Department was strengthened with independent Commissioner

MRSDMM[1] (Maharashtra Rajya Sahakari Dudh Mahasangh Maryadit) is an Apex Federation of District / Taluka milk unions established to implement the Operation Flood programme in the state of Maharashtra. The main objectives of MRSDMM was to procure milk from the member milk unions at remunerative rates and distribute the same to the consumers at reasonable rates. MRSDMM was established on 9th June, 1967. At present MRSDMM has 85 member unions (25 District + 60 Talukas) with more than 24000 primary milk societies and 25 lakh milk producers including approximately 27000 women members.

MAHANAND dairy is the unit run by the MRSDMM. Mahanand Dairy has made significant growth and progress in the field of productivity improvement, quality improvement, energy conservation, cost control etc. due to sincere and dedicated efforts at all levels. MRSDMM, Mahanand Dairy has milk procurement system spread across Maharashtra, producing and marketing liquid milk and other value added milk products. Milk procurement volumes widely varyied throughout the year as per seasonal changes. In order to take care of seasonal fluctuations in milk procurement, the dairy installed its own Milk Powder Plant of 30 tons per day capacity. The total sale of milk under Mahanand Brand name in the state was 4.00 lakh lite epr day (LLPD) including the sale of milk in Konkan, Pune, and Nagpur region.

[1] http://www.mahanand.in/

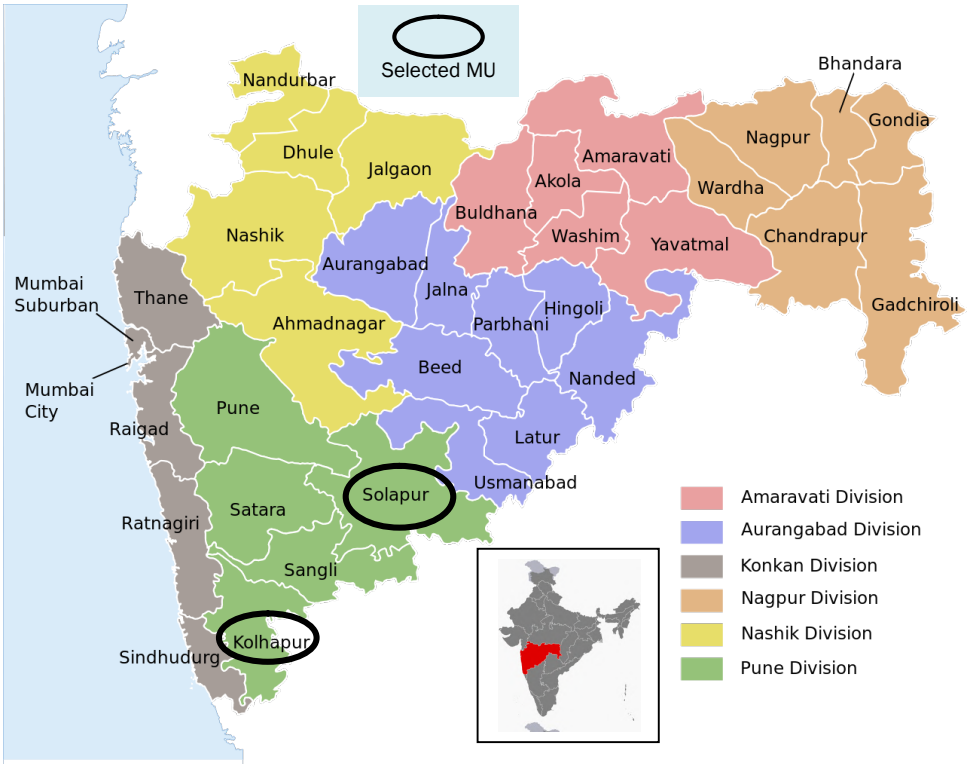
3.2 Selected Milk Unions

Under NDP-FDP programme, seed production was undertaken in Solapur and Baramati Milk Union, while fodder seed sale was done though Kolhapur, Solpaur, Baramati, Pune, Rajarambapu and ADT KAK, Baramati. These unions are named as End Implementation Agencies (EIAs). As per the sampling framework, two milk unions covered under FDP (NDP-I) were selected, i.e. Kolhapur Milk Union (Gokul), Kolhapur and Solapur District Coop. Milk Producers, Solapur, Maharashtra. The details about the selected milk producers' cooperative unions in Maharashtra are presented in Tables 3.1 and location of same is presented in Map 3.2.

Table 3.1: Selected Milk Producers' Cooperative Unions in Maharashtra

Sr. No.	Name of Milk Producers' Cooperative Union	District	Agro-Climatic Zone	Region
1	Kolhapur Milk Union (Gokul) B -1, M.I.D.C, Bit No. 2, GokulShirgaon, Karveer, Kolhapur	Kolhapur	IIII to V	Western Ghat mountain zone & transition zone I & II
2	Solapur District Coop. Milk Producers Union Ltd., 24/1A Morarjeepeth, Near Navbharat Factory, Solapur, Maharashtra	Solapur	VI and VII	Western drought prone area & Central plateau assured rainfall

Map 3.2: Location of Selected Milk Unions in Maharashtra



3.2.1 Kolhapur Milk Union (Gokul):

Kolhapur Zilla Sahakari Dudh Utpadak Sangh Ltd is well known with its popular brand 'Gokul' which was established on 16th March 1963. At present Gokul has a 12 Lakh Liters/day capacity modern dairy plant, Satellite dairy at Udgaon, Taluka Shirol and 4 chilling centers having 4.75 Lakh Liters/day milk handling capacity with modern Packing Unit at Navi Mumbai. For milk production enhancement in milk shed, GOKUL has 45 mobile veterinary routes , 406 Cluster A. I. Centers, 300 MT/day capacity new Cattle Feed Plant with popular 'Mahalaxmi' brand is operational at Kagal-Hatkanangale while old cattle feed plant with 200 MT/day capacity plant is simultaneously operational. GOKUL covers 1873 villages, 5773 village level dairy co-operatives on 477 milk routes for Milk procurement every day. Gokul is associated with almost 3,85,000 milch animal owning households in and around Kolhapur district. Milk is collected from 1433 villages. During the year 2017-2018, the average milk procurement was 11.59 Lakh Liters per day. The ratio of buffalo milk to cow milk procurement was 48:52 respectively. Average milk purchase price for buffalo milk was Rs. 44.39 and for cow milk, Rs. 28.95. Gokul Milk Union not only renders extension services for taking care of animal health, but also provides extension services for fodder development to enhance milk production.

Gokul established a new advanced 12 MT per day capacity mineral mixture plant from NDDB and supply of same is under the brand name of Mahalaxmi. To cater the increasing demands of cattle feed within the milk shed, union established a new 300 TPD expandable to 500 TPD Cattle Feed Plant at Kagal-Hatkanangle, Dist. Kolhapur under the guidance of National Dairy Development Board 'On Turnkey Basis' with the facility of Bypass Protein Feed Plant having capacity 50 MT./day. Due to constant efforts in production of quality cattle feed and providing input facilities to the farmers for maximizing output from dairy business, the CFP unit was awarded NPC Awards by National Productivity Council, New Delhi.

Gokul provides season wise improved verities of fodder seeds and by considering the feasibility of cultivation, sangh has decided to provide certain fodder seeds on 100 percent subsidy. In addition, for increasing palatability & nutritive value of available non-conventional fodder like paddy straw & wheat straw, urea treatments are practiced under GOKUL supervision. Further, improved multi-cut grass verities e.g. CO3, Marvel & also multicut Lucerne seed was provided to milk producers. Lucerne was recommended for mix

cropping with sugarcane. Gokul Milk Union provided indigenous fodder cutters & chaff cutters for utilizing cultivated fodder and also to minimize the losses of fodder. Gokul Milk Union has also prorogated silopits/silage for maintaining and enhancing quality of fodder. Under NDP-I, Gokul milk union have taken activities like silage pits, fodder seed distribution, revegitation, grass cutting machine demonstrations, bio-mass bunkers & extension programmes (Table 3.2). Farmers' orientation programmes are regularly carried out on demand of DCS at village level where farmers are groomed in respect of overall management of dairy animals.

Table 3.2: Fodder Development Services provided by GOKUL

Sr. No.	Particulars	Units
1	Fodder seed cultivated (mt)	269
2	Improved varieties of multicut grass sets cultivated (lakh sets)	4.09
3	Indigenous Fodder cutter supplied (Nos)	3,192
4	Chaff cutters supplied to the farmers (Nos)	1,003
5	Silage Bags (Nos)	13,388
6	Silo Pits (Nos)	38
7	Hydrophonic Sets (Nos)	35

3.2.2 Solapur Milk Union (Dudhpandhari)

Solapur District Coop Milk Producers Union Ltd., Solapur is one of the oldest dairy in Maharashtra popularly known as Dudhpandhari. It was established on 10th December 1981 and collects the milk produced in the district. It also caters to the demand of milk in the district. The popular Pandharpuri buffalo breed of Maharashtra is named after the geographical area i.e. Pandharpur block in Solapur district of Maharashtra. The breeding tract includes Solapur, Sangli and Kolhapur districts of Maharashtra[2]. These buffaloes are concentrated in Pandharpur, North Solapur, South Solapur, Barshi, Akkalkot, Sangola and Mangalvedha tehsils of Solapur district; Miraj, Walwa, Jathand Tasgaon tehsils of Sangli district; and Karveer, Shirol, Panhala, Radhanagri, Hatkanangale and Gadhinglaj tehsils of Kolhapur district. The animals have multiple milk let down capability. Farmer takes animals to customer's door and milks as per requirement. Then the animals are taken to the next customer and are milked again. Pandharpuri buffaloes are usually black in colour, but colour varies from light to deep black. White markings are found on forehead; legs and tail

[2] dairyknowledge.in › ... › Cattle & Buffalo Breeds of India › Buffalo Breeds

in few animals. Horns are very long and extend beyond shoulder blade, sometimes up to pin bones. The Nasal bone is very prominent, long and straight. The buffaloes produce on an average 1790 kilo grams of milk per lactation with fat percent of 8.

3.2.3 Basic Information of Selected EIAs

The basic information of two selected EIAs is presented in Table 3.3. The coverage of the selected EIA was only one district. The management of any union depends on how democratically a union operates which can be determined through its election process. Both the EIAs had elections in the year 2015-16 and it was reported that regular meetings of general body were organized to address various issues. As per the coverage of districts, GOKUL covered 1200 villages while Dudhpandhari covered 1215 villages, while number of DCS covered by GOKUL were 642 while same was 3659 in Solapur district. Thus, every two villages are covered by one PDCS in Kolhapur while opposite picture was observed in Solapur where one village had three PDCS. During visit, it was observed that some of the villages had three milk cooperatives in one villages, which must have hampered the growth of dairy.

Table 3.3: Details of Selected Milk Producers' Cooperative Unions in Maharashtra

Sr. No.	Item No	Selected Co-operative Milk Producers' Union	
		Solapur	Kolhapur
1	No. of Districts covered	1	1
2	No. of Village covered	1200	1215
3	No of PDCS* covered	642	3659
4	Total Number of Dairy Members Households covered	900	NR
5	Total Number of Dairy Members Pouring (regularly)	6584	400000
6	Total Milk Collection /day (2 times total) in lakh litres	1.8	1.1
12	Last Election held in (year)	2015	2014-15
13	Total members in General Body	18	21
14	General Body Meeting 2016-17	14	NR

Note: NR- Not Reported.
Source: Selected Milk unions.

The details of purchase and sale of milk and fodder seed by selected EIAs in Maharashtra is presented in Table 3.4. It indicates that payment towards purchase of milk from members was made through electronic transfer within 10 to 11 days. No information was provided by any milk union on share of profit which was transferred back to PDCS and its members every year.

Table 3.4: Details of Milk Purchase Sale and Fodder Seed by Selected EIAs in Maharashtra

Sr. No	Item No	Selected Milk Union	
		Solapur	Kolhapur
1	Share of profit goes back to PDCS and then dairy households every year (%)	No	No
2	Payment towards milk collection to society (Daily, Weekly, fortnightly, monthly)	10 days	11 days
3	Payment mode to PDCS (electronic transfer, cheque, cash)	Electronic transfer	Electronic transfer
4	Milk sale rate to people (Rs/litre)	36	50
5	Milk purchase rate from PDCS (Rs/litre)	24	
6	Chilling Centre/Bulk Milk Cooler Capacity (liters)	635000	NR
7	Does Union has Fodder Seed Multiplication Farm (Milk union farm), If yes, area in ha	NA	No
8	Does Union has Fodder Seed Processing Unit of MU, if yes, capacity (mt)	NA	NR
9	Payment to seed growers (in cash, cheque, online transfer)	Cheque	NR
10	Payment to seed growers–after depositing seed produce (in days)	NA	NR
11	Proportion of Seed produce rejected after processing (in %)	10	NR
12	Average Seed Germination (%) of seed produce received from farmer	92	NR

Notes: NA- Not Available; NR- Not Reported.

3.2.4 Fodder Seed Multiplication and Distribution

The details regarding fodder seed production and distribution by selected milk unions are presented respectively in Tables 3.5 to 3.7. It can be seen from the tables that Solapur dairy milk union has been undertaking fodder seed multiplication programme since 2012-13 as well as fodder production since 2013-14 by making available truthful seed to farmers. Kolhapur Union is not undertaking seed multiplication programme, while data on seed distributed to PDCS for fodder production was not reported.

Table 3.5: Fodder Seed Multiplication and Fodder production programme by selected EIAs

Sr. No	Year	Targets & Achievements- Solapur						Targets & Achievements- Kolhapur					
		Seed Production (MT)			Fodder Production			Seed Production (MT			Fodder Production		
		T	A	R	T	A	R	T	A	R	T	A	R
1	2011-12	--	--	-	-	-	-	NA	NA	NA	NA	NA	NA
2	2012-13	30.00		-	-	-	-	NA	NA	NA	NA	NA	NA
3	2013-14	52.00	10.83	-	-	1624.5	-	NA	NA	NA	NA	NA	NA
4	2014-15	69.00	11.29	-	-	1693.49	-	NA	NA	NA	NA	NA	NA
5	2015-16	97.00	14.51	-	-	2122.2	-	NA	NA	NA	NA	NA	NA
6	2016-17	130.00	57.65	-	-	19.21	-	NA	NA	NA	NA	NA	NA
7	2017-18	135.00	4.75	-	-	1.583	-	NA	NA	NA	NA	NA	NA

Notes: T- Target; A- Achievement and R- Remarks; NA- Not applicable.

It can be seen from the table that maize crop fodder seed of breeder type was provided by Solapur milk union to selected farmers (3 to 15 farmers) for multiplication purpose covering both seasons. While rates charged for breeder seed of Maize crop increased over the period from 2013-14 to 2018-19 from Rs. 46/ per kg to Rs. 100/- per

kg, while it was reported that purchase price for seed produced by farmers was the same since last four years at Rs. 24 per kg.

Table 3.6: Fodder Seed (SEED multiplication programme under NDP- I) supplied by Union

Year	Season	Seed multiplication						
		Crop	Seed distributed (kg)	Type (breeder, Foundation)	Seed rate charged (Rs./kg)	No. of farmers covered	Produced Seed procured by Union (qtls)	Seed rate (Rs./kg)
Solapur								
2013-14	Kharif	Maize	648	Breeder	46	6	108.57	24
	Rabi	-	-	-	-	-	-	-
2014-15	Kharif	Maize	504	Breeder	55	13		
	Rabi	Maize	180	Breeder	55	15	112.94	24
2015-16	Kharif	Maize	72	Breeder	81	2	38.7	24
	Rabi	Maize	228	Breeder	81	9	106.44	24
2016-17	Kharif	Maize	348	Breeder	81	8	17.69	24
	Rabi	Maize	42	Breeder	-	3	39.96	24
2017-18	Kharif	Maize	270	Breeder	82	10		
	Rabi	-	-	-	-	-	-	-
2018-19	Kharif	Maize	120	Breeder	100	13		
Kolhapur								
	Kharif	NA	NA	NA	NA	NA	NA	NA
	Rabi	NA	NA	NA	NA	NA	NA	NA

Notes: TS- Truthful seed; NA- Not applicable

In case of fodder seed distribution to PDCS by respective milk union, it was observed that truthful type maize fodder seed was supplied by Solapur milk union to PDCS as per the demand at the rate of Rs. 44/- per kg and around 33 to 220 PDCS were covered. While Kolhapur milk union had supplied Sorghum fodder seed of truthful type as per the demand of PDCS at the rate of Rs. 52/- per kg to large number of PDCS. The coverage of PDCS for distribution of seed was quite large covering number of PDCS between 1090 to 1460.

Table 3.7a: Fodder Seed (for FODDER production) supplied by the Solapur Milk Union to PDCS

Year	Season	Solapur- Seed for FODDER Production given to diary cooperatives					
		Crop	Seed demanded (qtls)	Quantity of Seed given (qtls)	Type (certified/ truthful)	Union Rate (Rs./kg)	No. of dairy cooperatives covered
2013-14	Kharif	Maize	15.50	10.26	Truthful	44	63
	Rabi	Maize	20.34	18.79	Truthful	44	88
2014-15	Kharif	Maize	25.30	19.90	Truthful	44	102
	Rabi	Maize	55.5	53	Truthful	44	220
2015-16	Kharif	Maize	22.30	19.42	Truthful	44	82
	Rabi	Maize	40.1	34.75	Truthful	44	175
2016-17	Kharif	Maize	45.00	27.95	Truthful	44	57
	Rabi	Maize	50	35.6	Truthful	44	122
2017-18	Kharif	Maize	9.00	7.63	Truthful	44	33
	Rabi	Maize	10.5	11.05	Truthful	44	38
2018-19	Kharif	Maize	8.00	7.65	Truthful	44	51

Source: Solapur milk Union.

Table 3.7b: Fodder Seed (for FODDER production) supplied by the Milk Union to PDCS

Year	Season	Kolhapur- Seed for FODDER Production given to diary cooperatives					
		Crop	Seed demanded (qtls)	Quantity of Seed given (qtls)	Type (certified/ truthful)	Union Rate (Rs./kg)	No. of dairy cooperatives covered
2013-14	Kharif	Sorghum	700	700	Truthful	52	1145
	Rabi	Sorghum	900	900	Truthful	51	1250
2014-15	Kharif	Sorghum	600	600	Truthful	52	1090
	Rabi	Sorghum	800	800	Truthful	51	1290
2015-16	Kharif	Sorghum	700	700	Truthful	53	1148
	Rabi	Sorghum	800	800	Truthful	52	1310
2016-17	Kharif	Sorghum	950	950	Truthful	55	1261
	Rabi	Sorghum	1050	1050	Truthful	52	1370
2017-18	Kharif	Sorghum	950	950	Truthful	50	1290
	Rabi	Sorghum	1050	1050	Truthful	52	1460
2018-19	Kharif	Sorghum	950	950	Truthful	53	1400

Source: Kolhapur milk Union.

3.2.5 Fodder Seed Management:

As can be seen from Tables 3.8 to 3.9, the requirement of seeds by Solapur dairy union was short of requirement of seed and thus they had procured seed from SAUs, Research institutes, Regional stations as well as from private seed company. The Solapur union has preferred purchase of maize seed from the SAUs and Research institutions to fullfill their requirement. The rate of maize seed purchase from outside was around Rs. 41.41/per kg while Milk union sale rate to PDCS was Rs. 44/- per kg.

Table 3.8: Fodder Seed Management (Quantity in qtls)

Sr	Item	Solapur							Kolhapur	
		Crop	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Crop	2013-14 to 2018-19
1	Total production of Fodder seed (OWN + Seed farmers)	Maize	108.6	112.9	145.1	57.65	47.49	23.45	NA	NA
2	Total requirement of fodder seed	Maize	125.6	140.2	160.8	110.6	115.1	89.15	NA	NA
3	If inadequate, where from you got fodder seed & quantity	-	-	-	-	-	-	-	NA	NA
	(a) Other Milk Union	-	-	-	-	-	-	-	NA	NA
	(b) National /State Seed Corp.	-	-	-	-	-	-	-	NA	NA
	(c) GOI/ICAR	-	-	-	-	-	-	-	NA	NA
	(d) Agriculture Universities/ Research Institutions	Maize/ Cowpea breeder	7.02	6.48	3.36 0.5	3.48	2.7	1.2	NA	NA
	(e) Regional Station for Forage Production & Demonstration	Lucerne	-	0.56	-	-	-	-	NA	NA
	(f) Private Seed Company	Maize	-	14.8	-	10	-	-	NA	NA
	(g) Any other								NA	NA
4	Process of Seed procurement	-	-	-	-	-	-	-	NA	NA
	(a) Invite quotes through tender	-	-	-	-	-	-	-	NA	NA
	(b) work order to lowest bidder	-	-	-	-	-	-	-	NA	NA
	(c) Negotiation with other dairy Cooperative	-	-	-	-	-	-	-	NA	NA
	(d) Any other	-	-	-	-	-	-	-	NA	NA

While Kolhapur preferred to purchase truthful type Sorghum crop fodder seed from MAHABEEJ (Maharashtra State Seeds Co. Ltd., Akola), at the rate ranging between Rs. 50 to 52 per kg and was sold at subsidized rate of Rs. 39 to Rs. 41 per kg. Thus, Kolhapur milk had offered subsidy of Rs. 10 per kg on truthful fodder seed, which was a welcome step for enhancement of area under fodder production.

Table 3.9a: Fodder Seed Availability and Disbursement - Fodder Production- Solapur Milk union

Year	Season	Crop Name	Milk Union - Seed availability			Seed Purchased from outside			Seed sold to PACS	
			Quantity (qtls)			Agency	Quantity	Rate (Rs./kg)	Quantity	Rate (Rs./kg)
			Opening Stock	Produced	Total					
2013-14	Kharif	Maize	40.18	-	40.18	-	-	-	11.62	44
	Rabi	Maize	28.56	108.6	137.13	-	-	-	12.12	44
2014-15	Kharif	Maize	101.5	-	101.5	-	-	-	25.0	44
	Rabi	Maize		112.9	112.9	-	14.8	41.41	33.0	44
2015-16	Kharif	Maize	120.7		120.7	-	-	-	20.67	44
	Rabi	Maize	100.1	104.3	204.4	-	-	-	53.2	44
2016-17	Kharif	Maize	134.3	17.69	152	-	-	-	97.2	44
	Rabi	Maize	10.57	-	10.57	-	-	-	10.25	44
2017-18	Kharif	Maize	134.3	17.69	152	-	-	-	97.25	44
	Rabi	Maize	10.57	-	10.57	-	-	-	10.25	44
2018-19	Kharif	Maize	14.38	-	14.38	-	-	-	4.95	44
	Rabi	Maize	9.48	-	56.97	-	-	-	1.3	44

Source: Selected Milk Union.

Table 3.9b: Fodder Seed Availability and Disbursement- Fodder Production-Kolhapur Milk Union

Year	Season	Crop Name	Milk Union - Seed availability			Seed Purchased from outside			Seed sold to PACS	
			Quantity (qtls)			Agency	Quantity	Rate (Rs./kg)	Quantity	Rate (Rs./kg)
			Opening Stock	Produced	Total					
2013-14	Kharif	-	-	-	-	Mahabeej	700	52	700	39
	Rabi	-	-	-	-	Mahabeej	900	51	900	38
2014-15	Kharif	-	-	-	-	Mahabeej	600	52	600	39
	Rabi	-	-	-	-	Mahabeej	800	51	800	38
2015-16	Kharif	-	-	-	-	Mahabeej	700	53	700	40
	Rabi	-	-	-	-	Mahabeej	800	52	800	39
2016-17	Kharif	-	-	-	-	Mahabeej	950	55	950	41
	Rabi	-	-	-	-	Mahabeej	1050	52	1050	39
2017-18	Kharif	-	-	-	-	Mahabeej	950	50	950	40
	Rabi	-	-	-	-	Mahabeej	1050	52	1050	39
2018-19	Kharif	-	-	-	-	Mahabeej	950	53	950	40

Source: Selected Milk Union.

3.2.6 Training Programmes on Fodder Development

Selected milk unions conducted training programmes covering the important aspects of fodder. Solapur milk union had conducted training programmes for farmers through its micro training centres in selected PDCS for dairy owners. While Kolhapur milk union did not report anything on this aspect (Table 3.10).

Table 3.10: Training on Fodder Development provided by Milk Unions in Maharashtra/PDCS

Sr. No.	Details of training provided BY Milk Union/Dairy Society during last year	Solapur				Kolhapur			
		Nos.	No. of participants	Period (days)	Any Cost /Free	Nos.	No. of participants	Period (days)	Any Cost /Free
1	Best practices for fodder seed/production	NA	-	-	-	130	4703	01	80/ 100
2	Non use of banned pesticides	NA	-	-	-				
3	Minimize fodder wastage	NA	-	-	-				
4	Latest technologies (quality fodder seeds)	NA	-	-	-				
5	Use of Field mowers/reapers demonstrations	NA	-	-	-				
6	Demonstration of biomass stores/bunkers	NA	-	-	-				
7	Silage making demonstrations	NA	-	-	-				
8	Hay making	NA	-	-	-				
9	Grass land development	NA	-	-	-				
10	Introduction of biomass store	NA	-	-	-				

Note: F- free

3.2.8 Development Activities

As a part of developmental activities, both the milk union had undertaken developmental activities such as re-vegetation of common grazing land for fodder production and construction of model biomass stored at strategic locations, while it could not complete target of re-vegetation. Further fodder seed production and distribution target set by Solapur milk union could not be achieved, may be due to less and erratic rainfall during last two years (table 3.11).

Table 3.11: Details of Development Activities undertaken by Milk Unions under FDP: NDP-I

Sr. No.	Details of training provided BY Milk Union/Dairy Society during last year	Solapur				Kolhapur			
		Target	Status ndertaken	Status Completed	Remark	Target	Status ndertaken	Status Completed	Remark
1	Re-vegetation of common grazing land for fodder production (ha)	22		1	8	10		10	-
2	Creation of required infrastructure for fodder seed production, storage, processing, treating, packing and marketing	-	-	-	-	-	-	-	-
3	Creation of required infrastructure for crop residues enrichment and densification	-	-	-	-	-	-	-	-
4	Improvement technical skills of the manpower through training	-	-	-	-	-	-	-	-
5	Establishment of straw enrichment cum densification plants	-	-	-	-	1	-	1	-
6	Construction of model biomass stored at strategic locations	2	-	2	-	13	-	13	-
7	Storage silos	-	-	-	-	-	-	-	-
8	Any Grievance Redressal Mechanism for complaints of no germination of seed	-	-	-	-	-	-	-	-
9	Fodder seed Production (mt)	513	-	390.97	-	-	-	-	-
10	Fodder seed distribution (mt)	513	-	181.83	-	1125	-	1125	-

Notes-* No land development

3.3 About Selected Villages

The information on selected villages such as basic details, like workers' population and amenities available are presented in Tables 3.12 and 3.13. It can be seen from these tables that selected villages covered by both selected EIAs are relatively small villages having population less than 5100 (having households as low as 361 and as high as 1087). The social distribution of population in selected villages indicates the dominance of population other than SC and ST. Maje Vadagon and Shiral villages had one fifth of the total population belonging to SC category. The proportion of ST population was meager in the selected villages. Rate of literacy in selected villages of both EIAs was estimated to be between 60 to 76 percent, which was however, lower than the state average of 82.34 percent (2011).

Table 3.12: Basic details of Selected Villages in Maharashtra (2011 Census)

Sr. No.	Name of village	Total area of village (ha)	Number of households	Total population	SC pop (%)	ST pop (%)	Literates (%)
A	Kolhapur						
1	Maje vadagon	681	799	3812	21.53	0.02	74.10
2	Kasarwadi	625.24	447	2210	2.53	0.0	76.19
3	Sambhapur	320.67	532	2474	3.55	0.12	73.12
B	Solapur						
4	Shiral	1096.92	361	1583	19.89	0.06	64.49
5	Umarad	2566	751	3492	10.25	1.14	59.65
6	Veet	3874.09	1087	5053	12.26	2.21	66.71

Source: https://data.gov.in/catalog/villagetown-wise-primary-census-abstract-2011-Maharastra

As far as the distribution of population is concerned, the proportion of total workers to total population was found to be lowest in Sambhalpur (34 percent) and the highest was in Shiral village (61 percent). Except in case of Shiral village where half of the population were categorized as main workers, in other villages the corresponding share was more than 70 percent. Cultivators comprised of major proportions in main workers in the villages in Solapur district, while majority of villagers in Kolhapur district were engaged in non-farm employment activities.

Table 3.13: Details of Workers Population in Villages in Maharashtra (2011 Census)

Sr. No.	Name of village	Total workers (% to total pop)	Main workers (% to total workers)	% to Main workers			
				Cultivators	Agricultural labour	Household industry workers	Other workers
A	Kolhapur						
1	Maje vadagon	36.41	71.46	28.96	23.19	0.64	47.21
2	Kasarwadi	43.25	75.62	31.90	4.07	0.94	63.09
3	Sambhapur	33.75	80.47	21.67	3.83	2.15	72.35
B	Solapur						
4	Shiral	61.08	50.56	44.67	49.32	0.20	5.81
5	Umarad	55.78	98.92	73.56	17.81	0.77	7.86
6	Veet	49.07	99.59	59.59	24.11	0.28	16.02

Source: https://data.gov.in/catalog/villagetown-wise-primary-census-abstract-2011-maharashtra.

3.4 About Selected PDCS

The information was collected for various parameters from selected villages' primary dairy cooperative societies and are accordingly presented and discussed in this section. The selected village PDCS covered one or less than one village area as few villages had more than one PDCS in each village (Table 3.14). The average share of members pouring milk to total number of members was estimated to be highest in Shiral and Kasarwadi while in other villages, it ranged between 52 to 79 percent of total members. Milk collection in PDCS compared to estimated total milk production in village was the highest in Moje Vadegaon followed by Shiral and Kasarwadi, while lowest share was recorded in Vet village. The remaining milk has either sold outside or consumed at home (Table 3.15). The rate of purchase of milk (Rs. 32-42 per litre) by the PDCS was on the basis of Fat. Online payment was made to the dairy members on weekly basis.

Table 3.14: Identification of PDCS in Selected Villages

Sr. No.	Particulars	No. of Villages Covered	Chilling Centre/Bulk Milk Cooler Capacity (lit)	Total members in General Body	Total Number of Dairy Members/ Households in Village	Total Number of Dairy Members Pouring milk (regularly)	Total Milk Production in Village /day (2 times) in litres	Total Milk Collection /day (2 times) in litres
		Nos.	Lit	Nos.	Nos.	Nos.	Lit	Lit
A	Kolhapur							
1	Kasarwadi	1	0	8	150	90	2000	375
2	Kasarwadi	1	0	7	160	150	2000	750
3	Sambhapur	1	0	15	170	100	850	470
4	Moje Vadgaon	1	0	10	240	189	2500	850
5	Moje Vadgaon	1	0	11	850	450	2600	1600
B	Solapur							
1	Veet	1	0	11	110	65	5000	1100
2	Shiral	1	0	9	51	51	1600	1000
3	Umrad	1	0	9	35	25	2500	500

Table 3.15: General Information of PDCS in Selected Villages

Sr. No	Particulars	Primary Dairy Cooperative Society					Private Agency					Others (, sweet shop,, hotels, consumers, etc) & home consumption				
		Milk Procurement by (Litres)	Milk purchase Rate given by (Rs./fat	Payment mode	Period of payment	Milk sale rate to consumer (Rs./Lit)	Milk Procurement by (Litres)	Milk purchase Rate given by (Rs./Lit)	Payment mode	Period of payment	Milk sale rate to consumer (Rs./Lit)	Milk Procurement by (Litres)	Milk purchase Rate given by (Rs./Lit)	Payment mode	Period of payment	Milk sale rate to consumer (Rs./Lit)
A	Kolhapur	375	36.20	3	2	38	0	0	0	0	0	1625	-	-	-	-
1	Kasarwadi	750	36.20	3	2	40	0	0	0	0	0	1250	-	-	-	-
2	Kasarwadi	470	37.09	3	2	40	0	0	0	0	0	380	-	-	-	-
3	Sambhapur	850	36.05	1	2	42	0	0	0	0	0	1650	-	-	-	-
4	Moje Vadgaon	1600	35.00	1	2	44	0	0	0	0	0	1000	-	-	-	-
5	Moje Vadgaon	1100	31.00	3	2	35	0	0	0	0	0	3900	-	-	-	-
B	Solapur	1000	29.00	3	2	30	600	29	3	2	30	0	-	-	-	-
1	Veet	500	27.50	1	2	29.5	0	0	0	0	0	2000	-	-	-	-
2	Shiral	375	36.20	3	2	38	0	0	0	0	0	1625	-	-	-	-
3	Umrad	750	36.20	3	2	40	0	0	0	0	0	1250	-	-	-	-

Notes: Payment mode (1cash, 2 cheaque,3 online); Period of payment (1dairy, 2weekly, 3fortnightly)

The details regarding cultivated area dedicated to fodder cultivation indicates that the fodder crops which were grown were Jowar, Maize, napier, Methi grass (Table 3.16).

Table 3.16: Major Fodder Crops Cultivated in Village

Sr. No.	Particulars	Jowar			Maize			Napier		
		Season	Type of seed	Seed rate (Rs./kg)	Season	Type of seed	Seed rate (Rs./kg)	Season	Type of seed	Seed rate (Rs./kg)
A	Kolhapur									
1	Kasarwadi	R/W	T	40-45	W	F	40-50	R/W/S	T	
2	Kasarwadi	R/W	T	40-45	W	F	40-50	R/W/S	T	
3	Sambhapur	R/W	T	40-45	W	F	40-50	R/W/S	T	
4	Moje Vadgaon	R/W	T	40-45	W	F	40-50	R/W/S	T	
5	Moje Vadgaon	R/W	T	40-45	W	F	40-50	R/W/S	T	
B	Solapur									
1	Veet	R/W	T	40-45	W	F	40-50	R/W/S	-	
2	Shiral	R/W	T	40-45	W	F	40-50	R/W/S	F	
3	Umrad	R/W	T	40-45	W	F	40-50	R/W/S	F	45

Notes: Season-R-Rainy, W-Winter and S-Summer; Type of Seed T- Truthful seed

The details regarding fodder seed (for fodder production) supplied by the milk union to dairy cooperative (PDCS) during 2016-17 and 2017-18 is presented in Table 3.17. As suggested in the table truthful fodder seed for fodder crops such as Jowar and Maize crops was supplied. Besides providing quality fodder seed at subsidized rate, PDCS also provided selected concentrates and supplements to the members of the PDCS at subsidized rates on both cash payment and credit (Table 3.18).

Table 3.17: Fodder Seed (for fodder production) supplied by the Milk Union to Dairy Cooperative (PDCS)

Sr No.		Fodder Seed (for fodder production) supplied by the MU to PDCS -Rabi 2017-18								Fodder Seed (for fodder production) supplied by the MU to PDCS -Rabi 2017-18							
		Crop Name	Seed demanded (kg)	Seed received (kg)	Type (certified/ truthful)	Milk Union Rate (Rs./kg)	No. of farmers Covered by PDCS	Rate charged (Rs./kg)	Prevailing market rate for same seed (Rs./kg)	Crop Name	Seed demanded (kg)	Seed received (kg)	Type (certified/ truthful)	Milk Union Rate (Rs./kg)	No. of farmers Covered by PDCS	Rate charged (Rs./kg)	Prevailing market rate for same seed (Rs./kg)
	2013-14	Kharif								Rabi							
1	Kasarwadi	Jowar	150	150	2	32	40	36	45	0	0	0	0	0	0	0	0
2	Kasarwadi	Jowar	440	440	2	32	40	36	45	0	0	0	0	0	0	0	0
3	Sambhapur	Jowar	40	40	2	30	22	35	55	Jowar	80	80	2	33	80	38	50
4	M Vadgaon	Jowar	350	350	2	25	50	30	40	Bajara	50	50	2	25	16	25	33
5	M Vadgaon	Jowar	800	800	2	25	60	30	40	0	0	0	0	0	0	0	0
6	Veet	Maize	500	500	1	44	45	45	50	0	0	0	0	0	0	0	0
7	Shiral	Maize	30	30	2	44	45	45	50	0	0	0	0	0	0	0	0
8	Umrad	Maize	20	50	2	45	8	45	50	0	0	0	0	0		0	0
	2014-15																
1	Kasarwadi	Jowar	150	150	2	34	40	40	50	0	0	0	0	0	0	0	0
2	Kasarwadi	Jowar	450	450	2	34	40	40	50	0	0	0	0	0	0	0	0
3	Sambhapur	Jowar	50	50	2	30	20	35	50	Jowar	100	100	2	38	70	43	65
4	M Vadgaon	Jowar	500	500	2	30	65	35	60	Maize	60	60	2	20	25	25	40
5	M Vadgaon	Jowar	1000	1000	2	30	70	35	60	Jowar	850	850	2	35	90	40	60
6	Veet	Maize	750	750	1	44	45	45	53	0	0	0	0	0		0	0
7	Shiral	Maize	35	35	2	44	45	45	50	0	0	0	0	0	0	0	0
8	Umrad	Maize	25	25	2	45	9	45	52	0	0	0	0	0	0	0	0
	2015-16																
1	Kasarwadi	Jowar	160	160	2	36	42	41	60	0	0	0	0	0	0	0	0
2	Kasarwadi	Jowar	410	410	2	36	42	41	60	0	0	0	0	0	0	0	0
3	Sambhapur	Jowar	50	50	2	42	42	48	68	Jowar	100	100	2	39	60	42	60
4	M Vadgaon	Jowar	600	600	2	35	85	40	60	Maize	70	70	2	28	22	33	40
5	M Vadgaon	Jowar	900	900	2	38	90	40	60	Maize	2	2	2	29	4	35	40
6	Veet	Maize	600	600	1	44	42	45	55	0	0	0	0	0	0	0	0
7	Shiral	Maize	40	40	2	44	6	45	55	0	0	0	0	0	0	0	0
8	Umrad	Maize	30	30	2	46	10	46	55	0	0	0	0	0	0	0	0
	2016-17																
1	Kasarwadi	Jowar	160	160	2	39	42	41	65	0	0	0	0	0	0	0	0
2	Kasarwadi	Jowar	336	336	2	39	47	42.5	65	0	0	0	0	0	0	0	0
3	Sambhapur	Jowar	50	50	2	43	65	48	67	100	100	39	126	43	60	0	0
4	M Vadgaon	Jowar	450	450	2	38	55	43	70	Bajara	30	30	2	29	15	33	45
5	M Vadgaon	Jowar	864	864	2	40	125	45	80	Jowar	5	5	2	115	2	360	700
6	Veet	Maize	500	500	1	44	44	45	55	0	0	0	0	0	0	0	0
7	Shiral	Maize	50	50	1	45	7	45	55	0	0	0	0	0	0	0	0
8	Umrad	Maize	40	40	1	45	12	46	48	0	0	0	0	0	0	0	0
	2017-18																
1	Kasarwadi	Jowar	280	280	2	39	47	42.50	65	0	0	0	0	0	0	0	0
2	Kasarwadi	Jowar	280	280	2	39	47	42.50	65	0	0	0	0	0	0	0	0
3	Sambhapur	0	0	0	0	0	0	0	0	Jowar	150	150	2	35	46	45	62
4	M Vadgaon	Jowar	500	500	2	40	80	45	80	Maize	60	60	2	40	20	25	50
5	M Vadgaon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Veet	Maize	600	600	1	44	44	45	55	0	0	0	0	0	0	0	0
7	Shiral	Maize	60	60	2	44	10	45	55	0	0	0	0	0	0	0	0
8	Umrad	Maize	50	50	1	45	6	45	60	0	0	0	0	0	0	0	0
	2018-19																
1	Kasarwadi	0	0	0	0	0	0	0	0	-	-	-	-	-	-	-	-
2	Kasarwadi	0	0	0	0	0	0	0	0	-	-	-	-	-	-	-	-
3	Sambhapur	0	0	0	0	0	0	0	0	-	-	-	-	-	-	-	-
4	M Vadgaon	0	0	0	0	0	0	0	0	-	-	-	-	-	-	-	-
5	M Vadgaon	0	0	0	0	0	0	0	0	-	-	-	-	-	-	-	-
6	Veet	Maize	550	550	1	54	50	45	60	-	-	-	-	-	-	-	-
7	Shiral	0	0	0	0	0	0	0	0	-	-	-	-	-	-	-	-
8	Umrad	0	0	0	0	0	0	0	0	-	-	-	-	-	-	-	-

Table 3.18: Concentrates supplied by the Society/Firm during Last One Year

Villages	Brand Name	Unit (Bag 50 kg)	Total Quantity sold (Bags)	No. of members purchased	PDCS Rate (Rs./50 kg)	Credit/ Cash	Market Rate (Rs./50 kg)
1.Concentrate1 - Rabi 2017-18							
Kasarwadi	Goldpalet Moti	1	70250	250	960	1	1000
Kasarwadi	Goldpalet Moti	1	72850	1429	960	1	1000
Sambhapur	Goldpalet Moti	1	1265	1221	955	1	1000
M Vadgaon	Goldpalet Moti	1	2195	955	955	1	1000
M Vadgaon	Goldpalet Moti	1	5887	5872	955	1	1000
Veet	Goldpalet Moti	1	3000	50	1050	1	1050
Shiral	Goldpalet Moti	1	50400	15	1240	1	1240
Umrad	Goldpalet Moti	1	30000	25	1050	1	1050
2. Concentrate2 - Rabi 2017-18							
Kasarwadi	0	0	0	0	0	0	0
Kasarwadi	0	0		0	0	0	0
Sambhapur	0	0	0	0	0	0	0
M Vadgaon	Sarki Pend	1	785	775	940	1	970
M Vadgaon	Bhusaa	1	1945	1893	855	1	985
Veet	0	0	0	0	0	0	0
Shiral	Bharda	1	300	15	50	1	0
Umrad	0	0	0	0	0	0	0
1. Mineral Mixture – Rabi							
Kasarwadi	-Fartimin	1	34	34	80	1	150
Kasarwadi	Tartimin	1	225	795	80	1	150
Sambhapur	0	0	0	0	0	0	0
M Vadgaon	1	1	375	360	80	1	150
M Vadgaon	Fartimin	1	660	660	80	1	0
Veet	Bestmin Gold	1	500	115	30	1	2700
Shiral	0	0	0	0	0	0	0
Umrad	Minapha Gold	1	500	25	25	1	3700
1. Mineral Mixture – Rabi							
kasarwadi	0	0	0	0	0	0	0
Kasarwadi	Cack Oil	1	2500	40	880	1	950
Sambhapur	0	240	234	80	0	1	100
M Vadgaon	Bhusa	1	897	888	80	2	150
M Vadgaon	Teeding Packing	1	280	280	1135	1	560
Veet	0	0	0	0	0	0	0
Shiral	0	0	0	0	0	0	0
Umrad	Agrimin Parte	1	200	25	2100	1	0

Selected villages' PDCS had organized training programme for the dairy members of society like, best practices for fodder production, minimize fodder wastage, latest technologies (quality fodder seeds), demonstration on silage making and use of field mowers/reapers (Table 3.19). Some of the fodder development activities such as productivity enhancement, with support provided by DCS for National Project for Bovine Breeding and Dairy Development, Feed and Fodder Development was undertake by PDCS under NDP-I (Table 3.20). The target set for fodder seed distribution for fodder production could not be achieved by the selected PDCS (Table 3.21).

Table 3.19: Training arranged/provided by Society during Last One Year

Sr. No.	Item	Training arranged/provided by Society during Last One Year							
		Kasarwadi	Kasarwadi	Sambhapur	M Vadgaon	M Vadgaon	Veet	Shiral	Umrad
1	Best practices for fodder seed/ production	Y	Y	N	N	N	N	N	N
a	Period (days)	2	2	1	1	1	1	1	1
b	No. of members participated	20	20	N	N	N	N	N	N
c	Any cost/ Free -1	F	F	N	N	N	N	N	N
2	Non use of banned pesticides	N	N	N	N	N	N	N	N
3	Minimize fodder wastage	Y	Y	N	Y	N	N	N	Y
a	Period (days)	1	1	N	1	N	N	N	N
b	No. of members participated	30	30	N	82	N	N	N	N
c	Any cost/ Free -1	F	F	N	F	N	N	N	N
4	Latest technologies (quality fodder seeds)	N	N	N	N	Y	N	N	N
a	Period (days)	N	N	N	N	1	N	N	N
b	No. of members participated	N	N	N	N	126	N	N	N
c	Any cost/ Free -1	N	N	N	N	F	N	N	N
5	Use of Field mowers/reapers demonstrations	N	N	Y	N	N	N	N	N
a	Period (days)	N	N	10	N	N	N	N	N
b	No. of members participated	N	N	30	N	N	N	N	N
c	Any cost/ Free -1	N	N	F	N	N	N	N	N
6	Demonstration of biomass stores/bunkers	N	N	N	N	N	N	N	N
7	Silage making demonstrations	Y	Y	N	N	Y	N	N	N
a	Period (days)	2	2	N	N	1	N	N	N
b	No. of members participated	15	15	N	N	7	N	N	N
c	Any cost/ Free -1	F	F	N	N	F	N	N	N
8	Hay making	N	N	N	N	N	N	N	N
9	Grass land development	N	N	N	N	N	N	N	N
10	Introduction of biomass store	N	N	N	N	N	N	N	N

Table 3.20: Details of Development Programmes/Support

Sr. No.	Particular	Training arranged/provided by Society -Last One Year							
		Kasarwadi	Kasarwadi	Sambhapur	M Vadgaon	M Vadgaon	Veet	Shiral	Umrad
1	Productivity Enhancement Components of NDP I - in Operation								
a	*RBP*	N	N	N	N	Y	Y	Y	Y
b	*Fodder Cultivation*	Y	Y	Y	Y	Y	Y	Y	Y
c	*Animal Breeding*	N	N	N	N	N	N	N	N
d	*Animal Health*	Y	Y	Y	Y	Y	Y	Y	Y
2	Support Presently Provided By DCS-	y	y	y	y	y	y	y	y
a	*Supply Of Mineral Mixture*	y	y	y	y	y	y	y	y
b	*LRP Remuneration*	N	N	N	N	y	N	N	y
c	*Awareness Campaign*	y	y	y	N	y	y	y	y
d	*Other*	N	N	N	N	N	N	N	N
3	National Project For Bovine Breeding and Dairy Dev	Y	Y	Y	N	N	Y	N	N
4	Feed and Fodder Development	Y	Y	Y	Y	Y	Y	Y	Y
5	Special Livestock Breeding Project	Y	Y	N	N	N	N	N	N
6	Any Other Development Programme/Facility by Co-Operative Or Other Agency								
a	Subsidy for Cattle Shed	N	N	Y	Y	Y	Y	Y	Y
b	Fodder Demonstration Plots/ Minikits	N	N	Y	Y	Y	Y	Y	Y
c	Chaff Cuter (Round wheel)	Y	Y	Y	Y	Y	Y	Y	Y
d	Chaff Cuter (Hand Operated)	Y	Y	Y	N	Y	N	N	N
e	Silopits	Y	Y	N	N	N	N	N	N

Table 3.21: Details of Development Activities undertaken under FDP-NDP-I

Sr. No.	Particular	Details of Development Activities undertaken under NDP-I							
		Kasarwadi	Kasarwadi	Sambhapur	M Vadgaon	M Vadgaon	Veet	Shiral	Umrad
1	Re-vegetation of common grazing land for fodder production	0	0	0	0	0	0	0	0
2	Creation of required infrastructure for fodder seed production, storage, processing, treating, packing and marketing	0	0	0	0	0	0	0	0
3	Creation of required infrastructure for crop residues enrichment and densification	0	0	0	0	0	0	0	0
4	Improvement technical skills of the manpower through training	0	0	0	0	0	0	0	0
5	Establishment of straw enrichment cum densification plants	0	0	0	0	0	0	0	0
6	Construction of model biomass stored at strategic locations	0	0	0	0	0	0	0	0
7	Storage silos	0	0	0	0	0	0	0	0
8	Any Grievance Redressal Mechanism for complaints of no germination of seed	0	0	0	0	0	0	0	0
9	Fodder seed production (%	0	0	0	0	0	0	0	0
10	Fodder seed distribution for fodder production - Target completed	N	N	N	N	N	N	N	N

Note- N- Not completed.

Table 3.22: General Opinion, Perception, Constraints and Suggestions regarding Particular Program

Sr. No.	Particular	Details of Development Activities undertaken under NDP-I							
		Kasarwadi	Kasarwadi	Sambhapur	M Vadgaon	M Vadgaon	Veet	Shiral	Umrad
1	Whether permanent pasture and common grazing lands are deteriorating or not?	Y	Y	Y	Y	Y	Y	Y	Y
	If yes, what are the reasons								
	(a) Huge grazing pressure,	Y	Y	Y	Y	Y	Y	Y	Y
	(b) Lack of adequate institutional arrangements,	N	N	N	N	N	N	N	N
	(c) encroachment of land,	Y	Y	N	N	N	N	N	N
2	Whether village is self sufficient in green fodder requirement (yes)	N	N	N	Y	Y	N	N	Y
3	What is the general opinion about program in the village B = Beneficial, N = Not beneficial, C = can't say	NB	NB	NB	C	B	C	B	C
4	Is there any change in financial status of PDCS after program (From milk or Input Sales) *N = No, Y = Improved-2, C = Can't Say*	Y	Y	C	C	C	I	C	C
5	What are the constraints in implementation of program in the village (Yes)	Y	Y	Y	Y	Y	Y	Y	Y
	a) less demand for fodder seed from members	Y	Y	N	N	N	N	N	N
	b) less availability of land thus famer cannot invest land under fodder	N	N	Y	N	Y	N	N	N
	c) seed provided by Union is costlier than market	--	--	--	--	--	--	--	--
	d) delay in receipt of seed from Union	--	--	--	--	--	--	--	--
6	suggestion for improvement in procurement of fodder seed from dairy cooperative (Yes)	Y	Y	Y	N	Y	Y	Y	Y
	Good Quality Seed Required	Y	Y	--	--	--	--	Y	Y
	Subsidy For Seeds	--	--	Y	--	Y	Y	--	--

The general opinion, perception, constraints and suggestions regarding particular program are presented in Table 3.22. All of the selected village PDCS officials opined that

permanent pasture and common grazing lands are deteriorating mainly due to huge grazing pressure and at some places due to encroachment of land. Few villages were reported to be self sufficient in fodder production. Regarding FDP program, not much positive response was recorded and main reason for the same was less availability of land. Some PDCS suggested an improvement in the quality of fodder seed and subsidy on seed.

3.5 Chapter Summary:

Maharashtra is economically among the most developed states in the country, but it is not counted among the advanced states in India in terms of agricultural production, though most of the state's workforce still depends on agriculture. Agriculture in the state is mainly rainfed and only 19 percent of gross cropped area is irrigated. Agricultural production therefore largely depends on the level and distribution of rainfall. Failure of monsoon at a critical stage of plant growth results in crop failure. The adoption of high yielding varieties of seeds also does not give the potential yield in case of failure of monsoons. The timeliness and spread of rainfall across months are also not always favourable which acts as a constraint for the state's agriculture. Taking into consideration the rainfall pattern, topography, soil characteristics, climatic condition, and cropping pattern, nine zones have been identified.

The history of dairy development in Maharashtra dated back to 1940s. At that juncture, the then Civil Supplies department controlled dairy development. In 1947, Aarey Milk Colony was established to supply clean milk to the consumers. In 1958, an independent Dairy Development Department was established which was headed by a Milk Commissioner. After 1970, substantial funds were disbursed through cooperatives for dairy development during Operation Flood Programme. The State also initiated Integrated Dairy Development Programmes in districts not covered under Operation Flood. In due course of time, Animal Husbandry Department was strengthened with independent Commissioner

MRSDMM (Maharashtra Rajya Sahakari Dudh Mahasangh Maryadit) is an Apex Federation of District / Taluka milk unions established to implement the Operation Flood programme in the state of Maharashtra. The main objectives of MRSDMM is to procure milk from the member milk unions at remunerative rates and distribute the same to the consumers at reasonable rates. MRSDMM was established on 9th June, 1967. At present

MRSDMM has 85 member unions (25 District † 60 Taluka) with more than 24000 primary milk societies and 25 lakh milk producers, including approximately 27000 women members.

Under NDP-FDP programme, seed production was undertaken in Solapur and Baramati Milk Union, while fodder seed sale was done though Kolhapur, Solpaur, Baramati, Pune, Rajarambapu and Agrocultural Development Trust, KVK, Baramati. These unions are named as End Implementation Agencies (EIAs). As per the sampling framework, two milk unions covered under FDP (NDP-I) were selected, i.e. Kolhapur Milk Union (Gokul), Kolhapur and Solapur District Coop. Milk Producers, Solapur, Maharashtra.

Kolhapur Zilla Sahakari Dudh Utpadak Sangh Ltd is well known with its popular brand 'Gokul' which was established on 16th March 1963. Solapur District Coop Milk Producers Union Ltd., Solapur is one of the oldest dairy in Maharashtra and is popularly known as Dudhpandhari. It was established on 10th December, 1981. The coverage of the selected EIAs was only one district. The management of any union depends on how democratically a union operates which can be determined through its election process. Both the EIAs had elections in the year 2015-16 and it was reported that regular meetings of general body were organized to address various issues. As per the coverage of districts, GOKUL covered 1200 villages while Dudhpandhari covered 1215 villages, while number of DCS covered by GOKUL were 642 while same was 3659 in Solapur district. Thus, every two villages were covered by one PDCS in Kolhapur while opposite picture was observed in Solapur where one village had three PDCS. During visit, it was observed that some of villages has three milk cooperatives in one village, which must have hampered the growth of dairy. The details of purchase and sale of milk and fodder seed by selected EIAs in Maharashtra indicates that payment towards purchase of milk from members was made through electronic transfer within 10 to 11 days. No information was provided by both milk unions on share of profit, which was transferred back to PDCS and its members every year. Solapur dairy milk union has been undertaking fodder seed multiplication programme since 2012-13 as well as fodder production since 2013-14 by providing truthful seeds to farmers. Kolhapur Unions was not undertaking seed multiplication programme, while data on seed distributed to PDCS for fodder production was not reported. Maize crop fodder seed of breeder type was provided by Solapur milk union to selected farmers (3 to 15 farmers) for multiplication purpose covering both seasons. While rates charged for

breeder seed of Maize crop had increased over the (2012-2018) period from Rs. 46/ per kg to Rs. 100/- per kg, while it was reported that purchase price for seed produced by farmers was same since last four years at Rs. 24 per kg. In case of fodder seed distribution to PDCS by respective milk union, it was observed that truthfull type maize fodder seed was supplied by Solapur milk union to PDCS as per the demand at the rate of Rs. 44/- per kg and around 33 to 220 PDCS were covered. While Kolhapur milk union had supplied Sorghum fodder seed of truthful type as per the demand of PDCS at the rate of Rs. 52/- per kg to large number of PDCS. The coverage of PDCS for distribution of seed was quite large covering between 1090 to 1460 PDCS. Solapur dairy union was short of requirement of seed and thus they had procured seed from SAUs, research institutes, from regional stations as well as from private seed company. The Solapur union has preferred to purchase maize seed from the SAUs and Research institutions to fullfill their requirement. The rate of maize seed purchase from outside was around Rs. 41.41/per kg while sale rate to PDCS was Rs. 44/- per kg. While Kolhapur preferred to purchase truthful type Sorghum crop fodder seed from MAHABEEJ (Maharashtra State Seeds Co. Ltd., Akola), ranging between Rs. 50 to Rs. 52 per kg and was sold at subsidized rate of Rs. 39 - 41/- per kg. Thus, Solapur milk union had offered subsidy on fodder truthful seed of Rs. 10 per kg, which was a welcome step for enhancement of area under fodder production. Selected milk unions had conducted training programmes covering the important aspects of fodder. Solapur milk union had conducted training programmes for farmers through its micro training centres in selected PDCS for dairy owners. While Kolhapur milk union did not report on this aspect. As a part of developmental activities, both the milk union had undertaken developmental activities such as re-vegetation of common grazing land for fodder production and construction of model biomass stored at strategic locations. However, unions could not complete target of re-vegetation. Further, fodder seed production and distribution target set by Solapur milk union could not achieved, may be due to less and erratic rainfall during last two years.

The selected villages covered by both selected EIAs are relatively small villages having population less than 5100 (having households as low as 361 and as high as 1087). The social distribution of population in selected villages indicates the dominance of population other than SC and ST. Maje Vadagon and Shiral villages had one fifth of total

population belonging to SC category. ST population was meager in selected villages. However, rate of literacy in selected villages of both EIAs was estimated to be between 60 to 76 percent, which was lower than state average of 82.34 percent (2011). As far as the distribution of population is concerned, the total worker to total population was found to be lowest in Sambhalpur (34 percent) and the highest was in Shiral village (61 percent). Except in case of Shiral village, wherein half of the population were categorized as main workers, in other villages corresponding share was more than 70 percent. In the villages in Solapur district cultivators comprised of major proportion in main workers, while majority of villagers in Kolhapur district were engaged in non-farm employment activities.

The selected village PDCS covers one or less than one village area while few villages had more than one PDCS in village (Table 3.18). The average share of members pouring milk to total number of members was estimated to be highest in Shiral and Kasarwadi while in other villages, it ranged between 52 to 79 percent of total members. Milk collection in PDCS compared to estimated total milk production in village was the highest in Moje Vadegaon followed by Shiral and Kasarwadi, while lowest share was recorded in Vet village. The remaining milk was either sold outside or consumed at home (Table 3.16). The rate of purchase of milk (Rs. 32 to Rs. 42 per litre) by the PDCS was on the basis of Fat. Online payment was made to the dairy members on weekly basis. Jowar, Maize, napier, Methi grass were major fodder crops grown in the villages. Few elected villages PDCS had organized training prgrammes i.e. best practices for fodder production, minimizing fodder wastage, latest technologies (quality fodder seeds), demonstration on silage making and use of Field mowers/reapers for the dairy members of society. Some of the fodder development activities such as productivity enhancement, support provided by DCS for National Project for Bovine Breeding and Dairy Development, Feed and Fodder Development was undertake by PDCS under NDP-I. The target set for fodder seed distribution for fodder production could not be achieved by the selected PDCS. All of the selected villages PDCS officials opined that permanent pasture and common grazing lands are deteriorating mainly due to huge grazing pressure and at some places encroachment of land. Few villages were reported to be self sufficient in fodder production. A highly positive response was not recorded regarding FDP and main reason for same was less

availability of land. Some PDCS suggested an improvement in the quality of fodder seed and subsidy on seed.

The next chapter presents details on profile of the selected sample growers' households in selected milk unions in the state of Maharashtra.

Chapter IV

Profile of Selected Fodder Growers

4.1 Introduction

Various socio-economic factors for instance size of family, education and training of dairy producer, availability of land and off-farm income, experience in dairy, etc have direct influence on dairy farmers' decision regarding whether they want to expand and improve their dairy operations. This chapter presents the profile of the selected sample fodder grower households in selected milk unions in the state of Maharashtra. During Rabi 2017-18 season, as most of the part of Solapur district in Maharashtra faced the water shortage, farmers had not opted for seed multiplication. Thus, we could not get sample farmers involved in seed production. Data on sample fodder growers were collected from Kolhapur and Solapur district. During Kharif 2018, in both the selected districts of Maharashtra (Solapur and Kolhapur), we were informed that due to low rainfall, union had not offered seed for seed multiplication programme as well as for fodder production. In fact, there was no demand for truthful seed by farmers through PDCS for fodder production. The list of seed distributed my Milk Union to PDCS was very scattered. Besides, during the visits of PDCS, no data was available about seed distribution. With this limitation, this chapter presents the profile of fodder growers covered during Rabi 2017-2018.

4.2 Fodder Growers

4.2.1 Profile of Selected Households

The profile of selected sample fodder growers households are presented in Table 4.1. It can be seen from the table that the average size of households of all selected (BENFGH - beneficiary fodder grower households and NONBFGH - nonbeneficiary fodder grower households) households ranged between 6 to 7 members. The family composition for both the groups (BENFGH and NONBFGH) indicates that beneficiary households were having about half of family members as adult males followed by 40 percent females and remaining were children, while non-beneficiary households had 42 percent adult females,

39 percent adult males and remaining were children. Thus, non beneficiary households size was larger than beneficiary household with larger share of children and female adults. All the respondents were males. The average age of respondents was between 43 to 49 years while their educational achievement was on an average up to 8th standard. The beneficiary household respondents were relatively older and more educated than the non beneficiary respondents. Despite of large family size of non beneficiary household, the share of family member working in dairy was higher in case of beneficiary households (41 percent). As was expected from the age of respondents, beneficiary household respondents were more experienced in dairy having average experience of 20 years while same was around 18 years for its counterpart in non-beneficiary households.

Table 4.1: Family Profile of Selected Fodder Seed and Fodder Growers Households

Sr. No	Particulars	Rabi 2017-18	
		BENFGH (n=63)	NONBFGH (n=27)
A	Av. Household Size (Nos.)		
	Male	3.03	2.55
	Female	2.41	2.81
	Children(>15 years)	0.54	1.26
	Total	5.98	6.62
B	Gender of Respondent (%)		
	Male	100	100
	Female		
C	Av. Age of respondent (years)		
	Male	48.77	43.67
	Female		
	Average		
D	Av. Education of respondent/HH (years)	8.47	7.77
E	% of Family members works in dairy	41.25	32.97
F	Experience in Dairy (Av. years)	20.14	18.46

Note: HH- Households,
Source: Field survey data.

Field data indicates that males were decision makers in dairy activity, while during survey female members of households had also supported the information/decision provided by male respondents on specific parameters such as use of milk at home, time for dairy activity, fodder feeding, etc. (Table 4.2). More than 90 percent selected households belonged to Hindu religion while rest were from Muslim religion.

Table 4.2: Socio-Economic Characteristics of Selected Households

Sr. No	Particulars	Socio-Economic Characteristics	
		Rabi 2017-18	
		BENFGH	NONBFGH
1	Gender of Decision Maker (%)		
	Male	100.00	100.00
	Female	0.00	0.00
2	Religion (% to total)		
	Hindu	90.48	96.30
	Muslim	4.76	0.00
	Christian	0.00	0.00
	Sikh	0.00	0.00
	Other/Buddhism	4.76	3.70
3	Social Group (% to total)		
	Scheduled Tribe	6.35	11.11
	Scheduled Caste	1.59	0.00
	Other Backward Class	9.52	11.11
	General/Open	82.54	77.78
4	Income Group (%)		
	BPL	23.81	29.63
	APL	71.43	70.37
	Antodya	4.76	0.00
5	House Structure (%)		
	Pucca	42.86	51.85
	Semi-Pucca	26.98	18.52
	Kuccha	30.16	29.63
6	Do you maintain farm financial record (Yes)	36.51	33.33
7	Kisan Credit Card (Yes)	11.11	14.81
8	Are you Member of Dairy Cooperative (Yes)	100.00	0.00
9	House Distance from Dairy Cooperative (mts)	599.53	808.15
10	Have Facility at home		
	LPG Gas Cylinder	92.06	96.30
	Biogas	42.86	18.52
	Toilet	92.06	92.59
	Roof top solar	7.94	0.00

Source: Field survey data.

The distribution of selected households as per social group indicates the dominance of respondents from general category followed by Other Backward Class and Scheduled Tribe. The share of Scheduled Caste households was relatively higher in non-beneficiary group (11.11 percent) than beneficiary group (6.35 percent). Scheduled Caste category got selected in beneficiary group though their share was less than 2 percent in total households selected for survey. As far as income group is concerned, more than 70 percent of the households were categorized under APL and rest were under BPL or Antyodya category. Most of them had either pucca or semi-pucca houses. It was very surprising and pleasant to note that around one third of selected households from both

groups reported that they have been maintaining farm financial records or dairy business records. However, relatively poor reach of Kisan Credit card was observed with selected households. The distance from the dairy cooperative society to their home was between 600 to 800 meters. More than 92 percent of total selected households had LPG gas cylinders at their home. Besides, significant number of beneficiary households had biogas plant also. Around 92 percent households had toilet facility available in their house. Very few beneficiary households only had roof top solar fixed at home.

The details regarding occupation of selected fodder grower households are presented in Table 4.3. It can be seen from the table that the main occupation of the selected households was agriculture and comprised of cultivation of land as a farmer along with supportive allied activity of animal husbandry and dairying. Few households had reported service as a main source of income. Almost all selected households were involved in most of the subsidiary activities to support their household income like animal husbandary and dairying, cultivator, non farm labour, own non-farm establishment, among others. It also shows that the respondents wanted to rely less on principal occupation only.

Table 4.3: Details on Occupation and Land Holdings Size of Selected Households

Sr. No	Particulars	Rabi 2017-18	
		BENFGH	NONBFGH
1	Occupation (%)		
	Principal		
	Cultivator	88.89	100.00
	AH & Dairying	0.00	0.00
	Agri. Labour	4.76	0.00
	Nonfarm Labour	0.00	0.00
	Own Non-Farm Establ.	0.00	0.00
	Trade	0.00	0.00
	Employee in Service	6.35	0.00
	Other (Specify)	0.00	0.00
2	*Subsidiary*		
	Cultivator	3.17	0.00
	AH & Dairying	77.78	85.19
	Agri. Labour	1.59	0.00
	Nonfarm Labour	3.17	3.70
	Own Non-Farm Establ	12.70	11.11
	Trade	0.00	0.00
	Employee in Service	1.59	0.00
	Other (Specify)	0.00	0.00

Source: Field survey data.

The operated land holding wise classification of selected households indicate that all the selected households from both categories for both seasons had very small size of holding (1.2 to 1.4 ha) as compared to state average of 1.44 ha (2015-16). Thus all the selected households belonged to small land holding group. Around half of the land of beneficiary household was rainfed while corresponding share for non beneficiary households was around 36 percent. All the land taken on leased-in basis was rainfed land. As was mentioned earlier, the Solapur district was severely affected by less rainfall and part of Kolhapur also suffered from scanty rainfall. Thus, crop production as well as fodder production in the district has been heavily affected by the rainfall pattern and during last two years, deficit rainfall has severely affected crop as well as fodder production.

Table 4.4: Details on Land Holdings by Selected Sample Fodder Growers

Sr. No.	Particulars	Rabi 2017-18 Land holdings (ha)		
		Total	Unirrigated	Irrigated
A	BENFGH			
1	Owned land	1.37	0.67	0.7
2	Leased-in	0.06	0.06	0
3	Leased-out	0.00	0.00	0.00
4	Fallow land	0.00	0.00	0.00
5	Total Operational land	1.43	0.73	0.7
B	NONBFGH	0.00	0.00	0.00
1	Owned land	1.14	0.39	0.75
2	Leased-in	0.03	0.03	0
3	Leased-out	0.00	0.00	0.00
4	Fallow land	0.00	0.00	0.00
5	Total Operational land	1.17	0.42	0.75

Notes: Sources of irrigation- Tube well, Canal
Source: Field survey data.

4.2.2 Breedable Animals

The data of the state Statistical department of Animal Husbandry shows that Deoni, Dangi, Khillar, Gaolao and Red Kandhari were identified as indigenous breeds of cattle. Deoni name has been derived from Deoni taluka of Latur district in Maharashtra. Likewise, Red Kandhari originates from Kandhar taluka in Nanded district. Therefore, it is important to have information on distribution of local and crossbreed cows and buffaloes with selected households. The details regarding the herd strength and cattle shed are

presented in Tables 4.5 and 4.6. It can be seen from the table that on observing collectively, BENFGH had the highest share of crossbred cows, followed by buffaloes and then local cows in total herd strength. It was reported by the selected households that they preferred cross breed cows for better milk yield and buffaloes for high fat content, which help them to fetch higher income as compared to local cows. Though the milk yield of cross breed cows is higher than buffalo and local cows, fat percentage is lower. Out of the total herd strength of selected households, more than 96 percent of total animals were in-milk animals. It was surprising to note that none of the household from any category had enrolled under animal insurance scheme.

Table 4.5: Herd Strength of Selected Fodder Growers Households

Sr. No.	Items	In milk Animal				Other Animals				% of total animals insured
		No. /hh	Total Estimated value (Rs/animal)	Av. Productive Life (years)	Total Value after productive life (Rs./animal)	No. /hh	Total Estimated value (Rs/animal)	Av. Productive Life (years)	Total Value after productive life (Rs./animal)	
A	Rabi- BENFGH									
1	Local Cattle	0.38	14667	7.7	735	0.02	5000	0.0	0.0	0.0
2	Cross Bread	2.41	46497	8.73	650	0.05	33000	7	500	
3	Buffalo	1.03	42539	9.24	1150	0.00	0.0	0.0	0.0	0.0
4	Bullocks	0.11	35714	10.2		0.00	0.0	0.0	0.0	0.0
5	Goats	0.27	7882	4		0.00	0.0	0.0	0.0	0.0
6	Others	0.00				0.08	1400	0.0	0.0	0.0
B	Rabi-NONBFGH									
1	Local Cattle	0.19	17000	8	675	0.00	0.0	0.0	0.0	0.0
2	Cross Bread	1.81	63449	7.7	550	0.00	0.0	0.0	0.0	0.0
3	Buffalo	1.19	45125	9.25	950	0.00	0.0	0.0	0.0	0.0
4	Bullocks	0.11	4333	10.2	0.0	0.00	0.0	0.0	0.0	0.0
5	Goats	0.26	5571	4.2	0.0	0.00	0.0	0.0	0.0	0.0
6	Others	0.00	0.0	0.0	0.0	0.33	24250	0.0	0.0	0.0

Source: Field survey data.

Table 4.6: Cattle Shed and Fodder Storage Selected Fodder Growers Households

Sr. No.	Items	Cattle Shed			Fodder Storage		
		No.	Value (Rs.)	Life (years)	No.	Value (Rs.)	Life (years)
A	Rabi- BENFGH						
1	Pucca	0.51	81437	14.56	0.02	40000	15
2	Kachcha	0.52	35212.1	8.06	0.02	20000	10
B	Rabi-NONBFGH						
1	Pucca	0.51	70333.3	13.17	0.00	0.00	0.00
2	Kachcha	0.52	34736.8	6.25	0.00	0.00	0.00

Source: Field survey data.

Beneficiary households had higher herd strength as compared to non-beneficiary households. On an average, beneficiary households had more than two crossbreed cows, and at least one buffalo, while every non beneficiary household had one crossbreed cows and one buffalo. The selected households also had significant number of goats. All the beneficiary households had cattle shed of either pucca or kuchha nature. While some of non beneficiary households had no cattle shed, hence they use public places to tie their animals. Few beneficiary households have reported to have fodder storage structures also. The cost of pukka constructed cattle shed ranged between Rs. 70,000 To Rs. 80,000 while kuccha shed costed them between Rs. 34,000 To Rs. 35000. It can be seen from the table 4.7 that almost two in one selected household had some productive assets with them. Overall, household under survey had grass choppers and fodder chaffers (power).

Table 4.7: Holding of Productive Assets by Selected Fodder Growers Households

Sr. No.	Assets (No. /hh)	Fodder Growers (No. /hh) Rabi 2017-18	
		BENFGH	NONBFGH
1	Tractor	0.16	0.07
2	Tractor Trolly	0.13	0.07
3	Harrow	0.03	0.04
4	Tiller	0.08	0.00
5	Plank	0.05	0.00
6	Threshing machine	0.17	0.00
7	Combine harvester	0.02	0.00
8	Pumpset diesel	0.24	0.19
9	Pumpset -submersible	0.32	0.22
10	Pumpset Non-submersible	0.19	0.19
11	Sprinkler set	0.06	0.04
12	Bullock cart	0.06	0.00
13	Spray Pump- Manual	0.51	0.63
14	Spray Pump- Power	0.17	0.15
15	Land leveller	0.05	0.00
16	Fodder Chaffer-manual	0.78	0.74
17	Fodder Chaffer Power	0.21	0.30
18	Seed Drill	0.05	0.04
19	Seed Grading	0.02	0.00
20	Seed Cleaner	0.03	0.07
21	Seed Bin	0.02	0.00
22	Seed Thresher	0.03	0.00
23	Storage Bin	0.71	0.59
24	Grass Cutter	0.22	0.44
25	Milking Machine	0.02	0.00
26	Milk cans	0.19	0.11
27	Grass Chopper	4.11	2.74
28	Feed Mixer	0.14	0.00
29	Fodder Harvester/mowers	0.06	0.04
30	Cultivator	0.0	0.0

Source: Field survey data.

4.2.4 Source-wise Farmers' Income:

The information on gross income of the sample fodder grower households collected and presented in Table 4.8 shows that there is significant increase in income during last six years period (387 percent in case of beneficiary households and 227 percent in case of non beneficiary households respectively from the respondents from Rabi 2017-18 season). The share of dairy business in total income of the household ranged between 11 to 19 percent in case of fodder respondents while corresponding figure for beneficiary households was higher than that for non-beneficiary households. As compared to base year, except few cases, significant increase in income from dairy was registered, relatively higher in case of beneficiary households than non beneficiary households. The income as agricultural labour was also reported by the respondents as supportive income source.

Table 4.8: Source-wise Farmer's Households Income

Sr. No.	Sources of Income	BENFGH		NONBFGH	
		Annual Income (% to total)		Annual Income (% to total)	
		2010-11	2016-17	2010-11	2016-17
A	Rabi 2017-18				
1	Agriculture	46.51	36.25	44.65	46.98
2	Agri Labour	1.88	0.92	0.70	0.83
3	Fodder seed sale	0.00	0.00	0.00	0.00
4	Green Fodder sale	0.00	0.00	0.00	0.00
5	Dry Fodder sale	0.00	0.00	0.00	0.00
6	Sale of milk	37.27	31.23	42.15	40.12
7	Sale of Dung/FYM, Urine	1.17	0.17	0.00	0.00
8	Sale of cattle	5.28	1.89	0.15	2.48
9	Non Farm Employment	5.20	27.85	12.36	9.59
10	Service	2.68	1.69	0.00	0.00
11	Any Other	0.00	0.00	0.00	0.00
	Av. Total Income (Rs./hh)	94613	461111	50352	164596

Source: Field survey data

4.2.5 Cropping pattern

The details regarding cropping pattern of selected households during 2015-16 are presented in Table 4.9. It can be seen from the table that out of total gross cropped area, major crops grown were Jowar, Maize, Soybean, Groundnut, Wheat and Sugarcane.

Table 4.9: Cropping Pattern of Selected Fodder and Fodder Seed Growers

Sr. No.	Crops	Fodder Growers (% to GCA)	
		Rabi 2017-18	
		BENFGH	NONBFGH
1	Jowar	27.2	19.1
2	Maize	23.3	9.9
3	Rice	1.2	0.8
4	Tur	1.5	0.0
5	Mung	0.2	0.0
6	Soybean	14.9	10.8
7	Groundnut	8.0	12.9
8	Sunflower	2.9	0.0
9	Wheat	1.5	0.0
10	Onion	4.2	15.4
11	Sugarcane	15.0	31.1

Source: Field survey data.

4.3 Chapter Summary

The profile of selected sample fodder growers households indicate that the average size of households of all selected (BENFGH - beneficiary fodder grower households; NONBFGH - nonbeneficiary fodder grower households) households ranged between 6 to 7 members. The family composition from both the groups (BENFGH and NONBFGH) indicates that beneficiary households had about half of family members as adult males followed by 40 percent females and remaining children, while non-beneficiary households had 42 percent of adult females, 39 percent of adult males and remaining were children. Thus, non beneficiary households size was larger than beneficiary households with larger share of children and female adults. All the respondents were males. The average age of respondents was between 43 to 49 years while education level was up to 8^{th} standard. The beneficiary household respondents were relatively of bigger age and were more educated than the non beneficiary respondents. Despite of large family size of non beneficiary households, the share of family member working in dairy was higher in case of beneficiary households (41 percent). Beneficiary household respondents were more experienced in dairy with average experience of 20 years while same was around 18 years for its counterparts from non-beneficiary households. Field data indicates that males were decision makers in dairy activity, while duing survey female member of households have also supported the information provided by male respondents on specific parameters such

as use of milk at home, time for dairy activity, fodder feeding, etc. More than 90 percent selected households belonged to Hindu religion while rest were from Muslim religion.

The distribution of selected households as per social group indicates the dominance of respondents from general category followed by Other Backward Class and Scheduled Tribe. As far as income group is concerned, more than 70 percent of the households were categorized under APL and rest were under BPL or Antyodaya category. It was a pleasant surprise to note that around one third of selected households from both groups reported that they had been maintaining farm financial records or dairy business records. More than 92 percent of total selected households had LPG gas cylinders in their homes. Besides, significant number of beneficiary households had biogas plant also. Around 92 percent households had toilet facility available in their house. Very few beneficiary households had roof top solar fixed at home.

The main occupation of the selected households was agriculture and comprised of cultivation of land as a farmer along with supportive and allied activity of animal husbandry and dairying. While few households had reported service as a main source of income. All selected households were involved in most of the subsidiary activities to support their household income. The operated land holding wise classification of selected households indicate that all the selected households from both categories for both seasons had very small size of holding (1.2 to 1.4 ha) as compared to state average of 1.44 ha (2015-16). Thus all the selected households belonged to small land holding group. Around half of the land of beneficiary household was rainfed while corresponding share for non beneficiary households was around 36 percent. All the land taken on 'lease-in' basis was rainfed land. As was mentioned earlier, Solapur district was severely affected by less rainfall and part of Kolhapur also suffered from same. Thus, crop production as well as fodder production in the district has been heavily affected by the rainfall pattern and during last two years, scanty rainfall has severely affected crop as well as fodder production.

The data of the state Statistical Department of Animal Husbandry shows that Deoni, Dangi, Khillar, Gaolao and Red Kandhari were identified as indigenous breeds of cattle. The details regarding the herd strength and cattle shed indicates that every BENFGH had the highest share of crossbred cows, followed by buffaloes and then local cows in total herd strength. It was reported by the selected households that they preferred cross breed

cows for better milk yield and buffalos for high fat content, which help them to fetch higher income as compared to local cows. Though the milk yield of cross breed cows was higher than buffalo and local cows, fat percentage was lower. Out of the total herd strength of selected households, more than 96 percent of total animals were in-milk animals. It was surprising to note that none of the household from any category had enrolled under animal insurance scheme.

Beneficiary households had higher herd strength as compared to non-beneficiary households. On an average, beneficiary households had more than two crossbreed cows, and at least one buffalo, while every non beneficiary household had one crossbreed cows and one buffalo. The selected households also had significant number of goats. All the beneficiary households had cattle shed either pucca or kuchha in nature while some of the non beneficiary households had no cattle shed, means they use public places to tie their animals. Few beneficiary households reported to have fodder storage structures also. The cost of pukka constructed cattle shed ranged between Rs. 70,000 to Rs. 80,000 while kuccha shed costed them between Rs. 34000 to Rs. 35000. Almost two in one selected household had some productive assets with them. Overall, household under survey had grass choppers, fodder chaffers (power) and spray pumps.

There is significant increase in income during last six years period (387 percent in case of beneficiary households and 227 percent in case of non beneficiary households respectively from the respondents from Rabi 2017-18 season). The share of dairy business in total income of the household ranged between 11 to 19 percent in case of fodder respondents while corresponding figure for beneficiary households was higher than that for non-beneficiary households. As compared to base year, except few cases, significant increase in income from dairy was registered, relatively higher in case of beneficiary households than non beneficiary households. The income derived from agricultural labour was also reported by the respondents as supportive income source. The cropping pattern of selected households shows that out of total gross cropped area, out of total gross cropped area, major crops grown were Jowar, Maize, Soybean, Groundnut, Wheat and Sugarcane.

The next chapter presents the details regarding fodder crop cultivation.

Chapter V

Cultivation of Fodder Crops

5.1 Introduction

As mentioned earlier, the biggest challenge for the development of the dairy industry in the state is inadequate fodder availability and thus rising cost of fodder. One of the important factors, which determine the cropping pattern in Maharashtra is availability of irrigation. Owing to limited availability of irrigation, which is only around 19 percent of GCA as of today, rainfed crops have been predominantly cultivated in Maharashtra. While large part of the State suffers from crop failures or periodical drought because of the failure or erratic nature of the monsoon. Variations in the dates of the onset and cessation of the rainy season, in the number of rainy days and in the frequency and duration of the dry spells govern the character of the rainy season. In these circumstances, therefore, farming practices and cropping patterns have necessarily to be adjusted to the variation in the rainy season and since this is not always possible. Though Maharashtra is the one of the largest producer of Jowar, Tur, Cotton, Soybean crops, productivity level of all crops is very low. Thus, in such situation, fodder crop get less attention.

Farmers are making investments in maintaining high productivity animals to pursue dairy husbandry as an income generation activity. For these farmers, procuring good quality fodder is a major challenge. While majority of them are small holders, who are unable to use their holdings for fodder cultivation, for others, cultivation is a loss of opportunity to earn higher income by cultivating other high value cash crops. Over 90 percent farmers being marginal (69.4%) and small holders (21.75%) owning over 90 to 95 percent livestock, they are not able to devote their small-holdings for cultivation of fodder crops with their priority to produce food grains. Non-availability of critical inputs such as good quality seeds required for cultivating traditional fodder crops is another problem. Thus, the area under fodder cultivation remained stagnant for a long period. It was estimated that only 4.4 percent of the total cropped area was devoted to fodder production. This area has remained almost static since 2 to 3 decades and there is very little scope for increasing the area under fodder production due to the pressure on land

holding to divert the area for other uses. In this section, the details on cultivation of fodder crop by the selected farmers is presented and discussed.

5.2 Seed received from Milk Union

Under NDP-I, the selected farmers reported that two fodder crop seeds were provided by the dairy cooperatives during rabi season (i.e. Sorghum and Maize) since beginning of the fodder development programme. Kolhapur milk union had provided certified/truthful type seed of Sorghum (Maldandi), while Solapur milk union had provided Maize (African Tall) variety seed for rabi season (Table 5.1).

Table 5.1: Seed received from Milk Union for Fodder production (under NDP)

Sr.	Year	**Under NDP-I:** Seed provided by Milk Union/Dairy Cooperative for (kg)		
		Rabi 2017-18		Kharif 2018
		Sorghum	Maize	
1	2011-12	120	-	-
2	2012-13	111	31	-
3	2013-14	120	31	-
4	2014-15	225	31	-
5	2015-16	266	86	-
6	2016-17	368	89	-
7	2017-18	309	265	-

Source: Field survey data.

5.2 Changes in Area under Fodder Crops

The data on area under fodder crops at two time period i.e. 2010-11 and 2017-18 indicates that there is significant growth in area under fodder crop during rabi season in 2017-18 as compared to rabi season in 2010-11, while area under Kharif fodder crops has declined in both the groups (Table 5.2). As the selected area is rainfed drought prone area, these varieties are suitable to grow as it can grow on less moisture content in soil.

Table 5.2: Changes in Area under Fodder crops

Sr. No.	Season & Fodder crop	Rabi 2017-18- Area (ha)	
		2010-11	2017-18
A	BENFGH (63)		
1	Kharif	0.0	0.0
2	Rabi	14.17	22.03
3	Summer	0.0	0.0
4	Perennial	0.0	0.0
	Total	14.17	22.03
B	NONBFGH (27)		
1	Kharif	2.05	0.0
2	Rabi	0.00	7.43
3	Summer	0.0	0.0
4	Perennial	2.05	0.0
	Total	--	7.43

5.3 Participation in Fodder Production under NDP- I

The selected households have been producing fodder seed since about three years or so and some of them had taken fodder seed cultivation on their own for their own livestock requirement. The Sorghum and Maize certified fodder seed was distributed by PDCS at the average rate of Rs. 42.5 and Rs. 45 per kg respectively (Table 5.3). All the households that responded were satisfied with seed cost. Majority of the households were satisfied with sale rate for green and dry fodder received in market. None of the sorghum fodder grower from Kolhapur union revealed that they would purchase fodder seed from market if it was not possible to procure from cooperative society at subsidized rate, while majority of Maize fodder growers found to be ready for same.

Table 5.3: Details about Participation in Fodder Production under NDP- I

Sr. No	Particulars	Details about Participation in Fodder production		
		Units	Rabi	
			Sorghum (n=45)	Maize (n=18)
1	Since when you are taking green fodder production (year)	total years	2.22	2.83
2	Do you take fodder production on your own (seed purchased other than dairy)	YES (%)	71.11	50.00
3	(i) for self livestock	% to total	100.0	100.0
	(ii) for green fodder sale to other farmers	% to total	0.0	0.0
4	Seed rate charged to you for fodder seed (PDCS)	Rs./Kg	42.5	45
	Do you think fodder seed (truthful seed) price charged by dairy cooperative is proper (YES/NO)	YES	100.0	100.0
	If no, what is market rate for seed which you have received from dairy	Rs./qtl	--	--
5	Do you think price received by you towards sale of green fodder was adequate: (YES/NO)	Yes	93.33	83.33
6	Do you think price received by you towards sale of dry fodder was adequate: (YES/NO)	YES	80.00	77.78
7	Will you ready to purchase seed from market (without any subsidy by Co-operative society): Yes/No.	YES	0.00	84.00

5.4 Reasons for Choice of Source of Seed for Fodder Production

The major reasons for procuring seed from the primary dairy cooperative society were availability of quality seed, easy availability of credit and reliability (Table 5.4). While non beneficiary households purchased fodder seed from agro-service centre, few of them

also used seed retained by them during earlier seasons. They too had full faith about quality and reliability of their own seed.

Table 5.4: Reasons for Choice of Source of Seed for Green Fodder production

Sr. No.	Reasons for Choice of Source of Seed for Fodder	Source of Seed for Fodder Production					
		Home Grown (retained produce)	Village/ Fellow Farmers	Agricultural Universities	Seed Corporations	Agro-Service Centre/Market	Purchased from MU/Dairy Cooperative Society -NDP I
	BENFGH- – Rabi						
1	Get quality seed	0.0	0.0	0.0	0.0	0.0	100.0
2	Reliable	0.0	0.0	0.0	0.0	0.0	100.0
3	Confidence in own seed	0.0	0.0	0.0	0.0	0.0	0.0
4	Not available elsewhere	0.0	0.0	0.0	0.0	0.0	100.0
5	For experimenting	0.0	0.0	0.0	0.0	0.0	100.0
6	Easy availability & quick credit	0.0	0.0	0.0	0.0	0.0	100.0
7	Available at cheaper or subsidized rate	0.0	0.0	0.0	0.0	0.0	100.0
	NONBFGH – Rabi						
1	Get quality seed	100.0	0.0	0.0	0.0	100.0	0.0
2	Reliable	100.0	0.0	0.0	0.0	100.0	0.0
3	Confidence in own seed	100.0	0.0	0.0	0.0	0.0	0.0
4	Not available elsewhere	0.0	0.0	0.0	0.0	100.0	0.0
5	For experimenting	0.0	0.0	0.0	0.0	100.0	0.0
6	Easy availability & quick credit	0.0	0.0	0.0	0.0	100.0	0.0
7	Available at cheaper or subsidized rate	0.0	0.0	0.0	0.0	100.0	0.0

5.5 Training on Fodder Development by Milk Union/PDCS

The awareness and training to beneficiary group about the various dairy development schemes implemented by the Government was the key factor in recording the success of the scheme. In this fodder development programme too, both the Milk unions had organised training programmes and demonstrations on various important topics such as best practises for fodder production; non use of banned pesticides, minimum fodder wastage, latest technology use of latest technologies and demonstrations on use of biomass stores (Table 5.5). The training programme was of a day or two and no fee was charged form the participants. Thus, selected milk unions and respective dairy cooperative societies had sincerely attempted to create awareness among the fodder growers about the production, proper storage and use of fodder crop production.

Table 5.5: Details of Training Provided by Milk Union/Dairy Society

Sr. No.	Training on	Rabi 2017-18		
		Nos.	Period (days)	*Any cost*
1	Best practices for fodder seed/production	9	2	0
2	Non use of banned pesticides	3	1	0
3	Minimize fodder wastage	3	2	0
4	Latest technologies (quality fodder seeds)	20	1-2	0
5	Use of Field mowers/reapers demonstrations	24	1-2	0
6	Demonstration of biomass stores/bunkers	2	1	0
7	Silage making demonstrations	-	-	-
8	Hay making	-	-	-
9	Grass Land development	-	-	-
10	Introduction of biomass store	-	-	-

5.6 Details Cultivation Practices adopted

The milk union/PDCS had only provided fodder seed for green fodder production at subsidized rate. It was uniquely reported that other inputs like fertiliser and insecticides were also provided by the dairy for the farmers' use (Table 5.6).

Table 5.6: Inputs received from Union/Dairy for Production of fodder

Sr. No.	Particulars	Quantity (kg)	Rate paid (Rs/kg)	Rate prevailing for same in market (Rs/kg)
A	Rabi 2017-18			
1	Seed			
	Sorghum	309	42.5	68.77
	Maize	265	45.0	55.95
2	Fertilizer			
3	Insecticide			

Note: Few have reported that fertiliser and Insecticide support through PDCS.

The details on cultivation practises followed during fodder production are presented in Table 5.7. The fodder seed received by the selected households was of certified type and was received in adequate quantity as demanded by the farmers. The germination percentage of Maize seed was reported cent percent while in case of Sorghum crop, the germination percentage for 82 per cent of seed ranged between 70 to 90 percent. It was very surprising to note that two case have reported germination percentage less than 50. In such cases, Union should take matter seriously and should compensate the farmers if any grievances were reported about the quality of seed. Also training should be provided to farmers about propeor cultivation of fodder crops. Only one cut was taken by selected fodder growers.

Table 5.7: Details Cultivation Practices adopted for Fodder production

Sr. No.	Crop	Rabi	
		Jowar	Maize
1	Seed Class		
	Breeder	0.0	0.0
	Foundation	0.0	0.0
	Certified/Truthful	100.00	100.00
	not aware	0.0	0.0
2	Variety of seed	Maldandi	Afrian Tall
3	Paid amount towards purchase of seed -Rate/Kg	42.5	45
4	Seed quantity demand to Milk Union for seed production (kg)	309	265
5	Seed quantity received from Milk Union (kg)	309	265
6	Was seed received was adequate (Yes)	100.0	100.0
8	Seed germination percentage		
	(>90%)	0.0	0.0
	(70-90%)	82.22	100.0
	(50-70%)	4.44	0.0
	(less than 50%)	4.44	0.0
10	No. of Cuttings of green fodder taken before leaving for dry fodder	1	1

Note: Note reported

5.7 Cultivation of Fodder and Competitive Crop

The comparative economics of cost of cultivation of fodder crops and its competitive crops during the same season are presented in Table 5.8. It can be seen from the table that fodder crop cultivation undertaken by the selected farmers during rabi 2017-18 season was comparatively profitable than its counterpart and thus should be provided necessary support as it could reduce fodder deficit and yield additional income for the farmer households. As mentioned earlier, the area under study was rainfed and drought prone, no competitive crop is as such available. Exceptionally those who have adequate irrigation had grown Sugarcane, which has different economics.

Table 5.8: Cost of Cultivation of Fodder Seed Crop and Competitive crop

Sr. No.	Particulars	b/nb	Cost of Cultivation of Fodder Seed Crop and Competitive crop (Rs./ha)				
			Crop	Variety	Cost of Cultivation	Income	Profit
(I)	Rabi 2017-18						
A	Fodder Crops	FG	Sorghum	Maldandi	25353	104496	79143
		NB	Sorghum	Maldandi	17408	44440	27032
		FG	Maize	African Tall	21675	68088	46413
		NB	Maize	African Tall	23536	46364	22827

Table 5.9: Production and Sale of Green and Dry Fodder - RABI

Sr. No	Particulars	Sorghum		Maize	
		BENFGH	NONBFGH	BENFGH	NONBFGH
B	Total Production (qtls)	15340	4844	4687.18	1020.00
C	a) Kept for Home used (qtls)	15320		4663.18	
	b) Prevailing market rate (Rs/qtls)	2000	--	1800-2000	
D	Sold to				
i)	Sold to dairy owner/villager	20	--	24	--
	Sold at Rate (Rs/qtls)	2000	--	1800-2000	--
ii)	Processed Sold outside the village	--	--	--	--
	Sold at Rate (Rs/qtls)	--	--	--	--
iii)	Sold to local trader	--	--	--	--
	Sold at Rate (Rs/qtls)	--	--	--	--
iv)	Sold outside village	--	--	--	--
	Sold at Rate (Rs/qtls)	--	--	--	--

5.8 Opportunity Costs of Fodder Cultivation

The opportunity cost of fodder cultivation and production heavily depends upon the availability of land and need of growing alternative crop. The trade off between food and fodder crops in terms of net income realised by the dairy owners and farmers is an important factor. Except non-beneficiary households during rabi season, all other respondents opined that fodder cultivation fetch them higher returns than competitive crop.

Table 5.10: Opportunity Costs of Fodder Cultivation

Sr. No.	Particulars	Opportunity Costs of Fodder Cultivation		
			Rabi	
		Unit	BENFGH	NONBFGH
1	What are the reasons for less area under fodder production			
	a) Do not have sufficient land for fodder seed production	Nos.	37.0	9.5
	b) Do not aware of latest technologies like use of quality fodder seeds	Nos.	25.9	20.6
	c) Priority for food, fiber and shelter	Nos.	218.5	28.6
2	Which other crop you would have preferred in the place of fodder seed crop as the second option?	Crop	Sugarcane Onion, Grass	Sugarcane
3	Do you think that you earn more income by growing fodder seed crop than competitive crop (Yes/No)	yes	na	na
	If yes, approximate return you are getting from fodder seed production compared to second option?	Rs./ha	na	na
	If no, the reasons for continuation of fodder seed production:	% to total	nr	nr

Note NR- No response.

5.9 Constraints Faced by the Fodder Growers

Among the various constraints faced by the respondents, major economic constraint was high cost of cultivation and production of fodder crop. Other constraints included irregular sale of fodder seed by DCS/Union, due to land scarctiy farmer cannot afford to put more land under fodder seed/crop production, poor Livestock extension services, lack of awareness about government programmes on subsidy on seeds and non availability of labour.

Table 5.11: Constraints faced by the Fodder growers in Punjab

Constraints		BENFGH - Rabi			NONBFGH - Rabi		
		Never	Sometime	Always	Never	Sometime	Always
A)	Economic Constraints						
1	High cost of fodder seed	93.65	6.35	0.00	88.89	0.00	11.11
2	High Cost of Cultivation/Production	52.38	22.22	25.40	59.26	18.52	22.22
3	No provision of quality seed by society on credit	74.60	23.81	1.59	74.07	7.41	18.52
4	Low price prevails for green fodder in market	73.02	22.22	4.76	59.26	40.74	0.00
5	No compensation by DCS/Union in case fodder crop fails due to poor germination of seed supplied by them	42.86	55.56	1.59	37.04	62.96	0.00
6	No compensation by DCS/Union in case fodder crop fails due to natural calamities	30.16	68.25	1.59	37.04	62.96	0.00
7	Low return on fodder production	9.52	84.13	6.35	51.85	48.15	0.00
B)	Marketing Constraints						
1	No regular sell of fodder seed by DCS/Union	47.62	17.46	34.92	0.00	40.74	59.26
2	Non- availability seeds in adequate quantity	31.75	63.49	4.76	0.00	51.85	48.15
3	Non availability of quality fodder seed in market	44.44	53.97	1.59	0.00	37.04	62.96
4	Poor seed germination of seed provided by society	47.62	50.79	1.59	0.00	59.26	40.74
5	Poor seed germination of seed available in market	44.44	44.44	11.11	0.00	37.04	62.96
C)	Resources Constraints						
1	Land is very less therefore cannot afford to put more land under fodder seed/crop production	44.44	36.51	19.05	0.00	22.22	77.78
2	Non availability of adequate irrigation water	41.27	39.68	19.05	0.00	18.52	81.48
3	Non Availability of labour	26.98	52.38	20.63	0.00	51.85	48.15
4	Land is not suitable for fodder production	61.90	22.22	15.87	0.00	59.26	40.74
5	Water logging led to loss of fodder crops	46.03	22.22	31.75	0.00	25.93	74.07
D)	Other Constraints						
1	Availability of Grazing lands	88.89	6.35	4.76	18.52	44.44	37.04
2	Poor access to organized markets for fodder	33.33	47.62	19.05	37.04	33.33	29.63
3	Non availability of improved fodder seed	49.21	31.75	19.05	0.00	29.63	70.37
4	Lack of training facilities	38.10	39.68	22.22	7.41	48.15	44.44
5	Poor Livestock extension services	19.05	52.38	28.57	40.74	37.04	22.22
6	Lack of awareness about seeds tag colour	58.73	15.87	25.40	25.93	37.04	37.04
7	Lack of awareness about seed treatment methods	47.62	33.33	19.05	40.74	48.15	11.11
8	Lack of awareness about government programmes on subsidy on seeds	20.63	60.32	19.05	55.56	29.63	14.81

5.9 Chapter Summary:

Under NDP-I, the selected farmers reported that two fodder crop seed were provided by the dairy cooperatives during rabi season (i.e. Sorghum and Maize) since the beginning of the fodder development programme. Kolhapur milk union had provided certified/truthful type seed of Sorghum (Maldandi), while Solapur milk union had provided Maize (African Tall) variety seed for rabi season. There was a significant growth in area under fodder crop during rabi season in 2017-18 as compared to rabi season in 2010-11, while area under Kharif fodder crops had declined in both the group. As the selected area is rainfed drought prone area, these varieties were suitable to grow as they can grow on less moisture content in soil. The selected households have been producing fodder seed since about three years or so and some of them had taken fodder seed cultivation on their own for their own livestock requirement. The Sorghum and Maize certified fodder seed was distributed by PDCS at the average rate of Rs. 42.5 and Rs. 45 per kg respectively. All the households that responded were satisfied with seed cost. Majority of the households were satisfied with sale rate for green and dry fodder rate received in market. None of the sorghum fodder grower from Kolhapur union had revealed that they would purchase fodder seed from market if it was not possible to procure from cooperative society at subsidized rate, while majority of Maize fodder growers were found to be ready for same.

The major reasons for procuring seed from the primary dairy cooperative society were availability of quality seed, easy availability of credit and reliability. While non beneficiary households purchased fodder seed from agro-service centre, and few of them also used seed retained by them during earlier seasons. They too had full faith about quality and reliability of their own seed. The PDCS and Milk unions had organised training programmes and demonstrations on various important topics such as best practises for fodder production; non use of banned pesticides, minimum fodder wastage, use of latest technologies and demonstrations on use of biomass stores. The training programme programme was of a day or two and no fee was charged form the participants. Thus, selected milk unions and respective dairy cooperative societies had sincerely attempted to create awareness among the fodder growers about the production, proper storage and use of fodder crop production. The milk union/PDCS had only provided fodder seed for

green fodder production at subsidized rate. While it was reported that other inputs like fertiliser and insecticides were also provided by the dairy for use by the farmers.

The fodder seed received by the selected households was of certified type and was received in adequate quantity as demanded by the farmers. The germination percentage of Maize seed was reported cent percent while in case of Sorghum crop, the germination percentage for 82 per cent of seed ranged between 70 to 90 percent. It was very surprising to note that two case have reported germination percentage less than 50. In such cases, union should take matter seriously and should compensate the farmers if any grievances were reported about the quality of seed. Only one cut was taken by the selected fodder growers. The fodder crop cultivation undertaken by the selected farmers during rabi 2017-18 season was comparatively profitable than its counterpart and thus should be provided necessary support as it could reduce fodder deficit and yield additional income for the farmer households. As mentioned earlier, the area under study was rainfed and drought prone, no competitive crop was as such available. Exceptionally those who had adequate irrigation had grown Sugarcane, which has different economics. The opportunity cost of fodder cultivation and production heavily depends upon the availability of land and need for growing alternative crop. The trade off between food and fodder crops in terms of net income realised by the dairy owners and farmers is an important factor. Except non-beneficiary households during rabi season, all other respondents opined that fodder cultivation fetch them higher returns than competitive crop. Among the various constraints faced by the respondents, major economic constraint was high cost of cultivation and production of fodder crop. Other constraints included irregular sale of fodder seed by DCS/Union, due to land scarcity farmers cannot afford to put more land under fodder seed/crop production, poor Livestock extension services, lack of awareness about government programmes on subsidy on seeds and non availability of labour.

The next chapter presents details on milk production and use by the respondent.

Chapter VI

Milk Production, Use and Sale

6.1 Introduction

Milk is a raw material for the dairy industry. Therefore, feasibility and development potential of a dairy project depends upon efficient milk production. For this, feed and fodder resources should be in optimum quantity and quality to exploit the genetic potential of the livestock. The economic viability of livestock husbandry is dependent on the genetic potential for production, good health care, balanced feeding of animals and efficient marketing of the produce. While genetic improvement and health care are the prerequisites for sustainability, efficient feeding and marketing helps in increasing the profitability. However, the profitability is directly dependent on the sources of feed and fodder, since about 65 to 70 percent of the total cost of livestock farming is attributed to feeding. Any saving in feed and fodder cost would directly contribute to increase in profitability. Balanced feeding of milch animals is more critical, as the results are reflected within a short span, almost immediately, in the form of milk production. In case of growing stock of bullocks, sheep and goats, quality of feed will reflect on the growth rate, body weight and fertility, which are often unnoticed by the owners. Hence feeding of milch animals has greater significance for farmers, although feed management for other species is equally important.

The economics of milk production is heavily dependent on the quantity of nutritious forage fed to milch animals. With feeding of good quality forage, particularly leguminous fodder, feeding of concentrates can be reduced significantly. Animals yielding upto 5 to 8 kg of milk per day can be maintained exclusively on 48 to 55 kg Lucerne or berseem greens, as a substitute for 4.5 to 5.0 kg concentrate. However, there are not many dairy animals, having genetic potential to produce high milk yield, by efficiently converting the fodder. With regard to inferior quality animals, in-spite of feeding good quality fodder, the milk yield remains low and the farmers find it uneconomical to feed such animals. As there are no opportunities to sell surplus fodder in local markets, farmers are reluctant to cultivate fodder exclusively on fertile agricultural lands, without owning

high yielding animals. Therefore, it can be said that, although the promotion of forage production is a critical factor, which has a direct influence on the livestock industry, forage cultivation is closely linked to the productivity of livestock and the available critical veterinary support services.

After having discussed about the issues related to milk production, it is important to discuss the issues related to milk marketing. As mentioned earlier, more than 80 percent of the milk marketed is handled by the unorganised sector (private organisations) and remaining 20 percent is handled by the organised sector (government or cooperative societies). Even though co-operatives provide a remunerative price to the producer, the unorganized sector plays a major role in milk marketing because of three factors. The first factor is the pricing policy of the co-operatives: their purchase price is based on the fat content of the milk, whereas the private sector pays a flat rate per liter of milk. The second factor, which motivates the milk producers to sell milk to private vendors, involves the type of animal reared by the producer. Crossbred cows yield more milk with a lower fat than buffalo. The crossbreed cow population increased over the years because of animals' artificial insemination and improvement in management practices. The third factor is payment policy. Private sector can pay their producers every day, whereas the co-operatives pay weekly or fortnightly. Producers sometimes have to fight with the co-operatives to get their payments. Within the organized sector, the co-operative sector is by far the largest in terms of volumes of milk handled, installed processing capacities, and marketing infrastructure. Cooperatives pay back the highest share of consumer rupee to the milk producer. Besides, input services are also provided to member milk producer. This chapter discuses details regarding milk production, its use, its marketing, and constraints faced in milk marketing.

6.2 Cost of Milk Production & Types of Fodder

Cost plays an important role in portraying economic viability of a dairy enterprise. It is a critical economic indicator for milk producers, consumers and policy makers in order to provide an effective linkage between the milk producers and consumers by fixing the price of milk rationally. Generally, a milk producer can increase his dairy income in two ways either by increasing the milk production or by reducing cost of milk production. Cost of milk production often becomes a policy issue, when milk producers complain that the

price of milk they are getting does not cover the cost of milk production. Keeping the above background in mind, it is necessary to study the comparative analysis of per litre cost of milk production as well as break even analysis of both groups - members and non members of dairy cooperative society for the categories of in-milk cow and buffalo.

Table 6.1: Cost of Milk Production (Rs. per day per animal) - RABI

Sr. No.	Particulars	BENFGH			NONBFGH		
		Cattle		Buffalo	Cattle		Buffalo
		Local	Cross Breed		Local	Cross Breed	
A	Cost of Milk Production						
	Fodder	116.08	138.69	181.22	146.91	177.01	171.98
	Labour	7.76	4.84	4.65	9.67	3.77	7.41
	Veterinary Cost	0.98	1.0	1.37	1.11	1.01	0.35
	Other Cost	1.13	0.90	1.41	0.58	1.04	0.45
	Total Variable Cost	125.95	145.43	188.65	158.27	182.83	180.18
B	Revenue						
	Sale of Milk	69.12	196.08	180.18	72.80	283.5	202.5
	Other Income	2.16	2.40	3.00	1.80	2.40	3.40
	Total Income	71. 28	198.48	183.18	74.60	285.90	205.90
C	Profit/Loss	-54.67	53.05	-5.47	-83.67	103.07	25.72
D	Milk Yield (lit/day)	2.88	8.17	4.62	2.60	8.1	4.5

It was estimated that milk yield of all types of animals among beneficiary households was higher than non beneficiary households (Table 6.1 and 6.2). However, cost of milk production was higher for buffalo milk production by beneficiary farmers than non-beneficiary farmers. Though, milk quantity was higher in case of the beneficiary households, per litre rate realised by the non-beneficiary households was higher than beneficiary households and thus yield price offset the lower milk yield. The cost of non-beneficiary households may be higher than beneficiary households due to cost of fodder. Profit level estimated for local cows were negative while those of crossbreed cows were positive in both the cases.

The selected households had hardly any choice for selection of dry and green fodder and thus used sorghum fodder or Napier grass to feed their animals. The rate prevailing for the same in the market during respective season are presented in Table 6.3.

Table 6.3: Prevailing market rates for Green and Dry Fodder[1] - 2017-18

Sr. No.	Crop	Prevailing market rates (Rs./kg)					
		Green			Dry		
		Rainy	Winter	Summer	Rainy	Winter	Summer
1	Sorghum or Chari, Jowar	13.0	15.0	20.0	15	12	08
2	Maize/Makka	-	-	-	-	-	-
3	Napier Grass	10	10	12	-	-	-

6.3 Effect of Green Fodder on Milk Productivity

An attempt was made to estimate the effect of green fodder on milk productivity by analysing data on milk yield during three seasons. However it was based on the assumption that availability of green fodder generally is better in winter season called flush season, relatively lower in rainy season known as pre-flush season and summer season know as post flush season when deficit of green fodder is noticed. Also during each season, due to the availability of green and dry fodder, the difference in milk productivity realised by the sample households was estimated. Thus as per the field survey data, as was expected, milk yield after feeding green fodder to all type and breeds of animals was higher than animals fed with dry fodder. Across the seasons, mixed picture among the selected households was recorded. Fodder growers had recorded highest milk yield during winter season followed by rainy season (Table 6.4).

Table 6.4: Effect of Green Fodder on Milk Productivity 2017-18

Sr. No.	Animal	Av. Yield (lit/animal/day)					
		Rainy season		Winter		Summer	
		Green	Dry Fodder	Green	Dry Fodder	Green	Dry
A	BENFGH Rabi						
1	Cattle Local	4.20	3.90	3.60	3.30	2.20	2.10
2	Cattle CB	8.24	8.19	8.94	8.36	6.99	6.21
3	Buffalo	6.83	5.47	5.65	5.05	4.70	4.34
B	NONBFGH Rabi						
1	Cattle Local	3.00	1.50	4.00	2.5	2.5	1.5
2	Cattle CB	8.18	7.36	8.08	7.28	6.88	6.53
3	Buffalo	5.47	5.20	5.93	5.47	4.87	4.27

6.4 Milk Production, Use and Sale

The data collected on production and use of milk on the day prior to the visit is presented in Table 6.5.

[1] The Government of Maharashtra (GOI, 2018) in its report on 'Integrated Sample Survey 2016-17 (, 47th report) has mentioned the range for fodder rates as: green fodder (type 1-3) from Rs. 5.11 to Rs. 9.76 per kg, while for dry fodder (type 1-3), rate noted were Rs. 4.16 to Rs. 15.21 per kg .

Table 6.5: Milk Production, Use and Sale (Previous day)

Sr. No.	Animal	Milk Drawn		Use of Milk at Home (% to total)	Sale of Milk					Transport Charges (Rs.)
		(Kg/Lit or Lit/day)	No. of days /annum		Sale Qty (% to total)	Av. Sale Rate (Rs./lit)	PDCS (% to total)	Agent (% to total)	Others (% to total)	
A	BENFGH-Rabi									
1	Cow Local	2.88	241	31.88	68.12	24.0	100.0	0.0	0.0	---
2	Cow CB	8.17	232	9.40	90.59	31.0	100.0	0.0	0.0	---
3	Buffalo	4.62	252	18.33	81.67	39.0	100.0	0.0	0.0	---
B	NONBFGH									
1	Cow Local	2.60	230	38.46	65.53	28.0	0.0	0.0	100	---
2	Cow CB	8.10	236	11.08	88.92	55.0	0.0	0.0	100	---
3	Buffalo	4.50	256	25.53	78.47	45.0	0.0	0.0	100	---

Source: Field survey data.

It can be seen from the table that around 90 percent of crossbreed cow milk and 80 per cent of buffalo milk was sold and remaining milk was consumed at home. The local cow milk was preferred for use at home. The sale price for buffalo milk realised by the selected non beneficiary dairy farmers was higher than price received for milk from cross breed and local cow, while corresponding figures were higher for buffalo in case of beneficiary households,may be due to high fat content in buffalo milk. The rate per litre of milk was higher for non beneficiary dairy farmers.

6.5 Chapter Summary

The economics of milk production is heavily dependent on the quantity of nutritious forage fed to milch animals. It was estimated that milk yield of all types of animals among beneficiary households was higher than non-beneficiary households. However, cost of production was higher in buffalo milk production of beneficiary households than non-beneficiary households. Though, milk was higher in case of the beneficiary households, per litre rate realized by the non-beneficiary households was higher than beneficiary households and thus yield price offset the lower milk yield. The cost of non-beneficiary households may be higher than beneficiary households due to cost of fodder. Profit level estimated for local cows were negative level while those of crossbreed cows were positive in both the cases. The selected households had hardly any choice for selection of dry and green fodder and thus used sorghum fodder or Napier grass to feed their animals and the rate prevailing for same in the market during respective season were around Rs. 10 to Rs. 15 per kg. As per the field survey data, as was expected,

milk yield after feeding green fodder to all type and breeds of animals was higher than animals fed with dry fodder. Across the seasons, mixed picture among the selected households was recorded. Fodder growers had recorded highest milk yield during winter season followed by rainy season. Around 90 percent of crossbreed cow milk and 80 per cent of buffalo milk was sold and remaining milk was consumed at home. Local cow milk was preferred for use at home. The sale price for buffalo milk realized by the selected non beneficiary dairy farmers was higher than price received for milk of cross breed and local cows, while corresponding figure was higher for buffalo in case of beneficiary farmers may be due to high fat content in buffalo milk. The rate per litre of milk was higher for non beneficiary dairy farmers.

The next chapter presents the constraints faced in production and marketing of milk and suggestions.

Chapter VII

Awareness /Outreach of FDP under NDP-I

7.1 Introduction

After having discussed about the animals, breed, feed and fodder, milk production and its disposal, this chapter presents the details regarding awareness about the programme, perceptions of the selected households about benefit of program, constraints in implementation/adoption of programme by PDCS and Milk Union and also suggestions received from them to improve the impact of programme.

7.2 Awareness about FDP

The details about the awareness about FDP under NDP-I among selected beneficiary and non beneficiary households are presented in Table 8.1. It can be seen from the table that all the selected households were aware about the programme. The two major sources of information about the programme for beneficiary households were milk union and dairy cooperative society. Very few households during both season had got an opportunity to see documentary on FDP, while in case of exposure to poster and banner all the seed growers had exposure to the same while two third of fodder growers had that opportunity. Only seed growers had received pamphlets on FDP. At the same time, attendance of households in village awareness programmes was very poor. However, none of sample households were aware about FDP programme before taking part in this programme. This indicates the grave concern regarding the interests of respective dairy cooperative societies in dissemination of information about the programme and weak agricultural extension mechanism in rural areas of the State.

Table 7.1: Awareness /Outreach of FDP under NDP- I

Sr. No.	Particulars	Awareness about the programme (% to responses)
		Rabi- BENFGH
1	Have you heard of FDP (%)	
	No	0.0
	Yes	100.0
	If yes, source of information on FDP (multiple)	
	Milk Union-1	68.25
	PDCS-2	100.00
	LRPs-3	55.56
2	Have you seen any documentary on FDP	
	No	1.59
	Yes	98.41
3	Have you seen any poster/banner on FDP	
	No	50.79
	Yes	49.21
4	Have you received any pamphlet on FDP	
	No	1.59
	Yes	98.41
5	Have you attended village awareness program (VAP)	
	No	93.66
	Once	6.34
	Twice	0.0
	Thrice	0.0
	More	0.0
6	Were you aware about FDP before producing fodder	
	No	90.48
	Somewhat	7.94
	Well aware	1.59

7.3 Effect of Fodder Seed and Fodder Production Programme

The respondents were asked to provide their opinion about the effects of fodder seed multiplication and green fodder production programme under NDP I. Majority of the households opined that area under fodder production had increased. All the selected households have opined that after FDP, availability of fodder for animal had increased (kg/day/animal) which has resulted in not only increase of milk production but also an improvement in milk fat. Besides, health of animals had also improved due to adequate availability of green and dry fodder (Tables 7.2a and 7.2b).

Table 7.2a: Effect of Fodder Seed & Fodder Production programme under NDP I

Sr. No.	Particulars	Effect of Fodder Seed & Fodder Production programme
		Fodder –Rabi- BENFGH
1	Area under fodder seed production increased after FDP under NDP I (area in ha)	
	Yes	100.0
	No	0.0
	If yes,	
	Before FDP (2011-12)	14.17
	During FDP (2017-18)	22.03
2	Availability of fodder for your animal increased after FDP (kg/day/animal)	
	Yes	100.0
	No	0.0
	If yes,	
	Before FDP (2011-12)	0.00
	During FDP (2017-18)	16.84
3	Has milk production of your animal increased after FDP (due to availability of fodder) avg. Milk yield (lit./day)	
	Yes	100.0
	No	0.00
	If yes,	
	Before FDP (2011-12)	0.00
	During FDP (2017-18)	6.65
4	Has milk fat improved (due to availability of green fodder)	
	Yes	100.0
	No	0.00
5	Any change in general health of animal after FDP (due to availability of green fodder)	
	Yes	100.00
	No	0.0
	Cannot say	0.0

About one fifth of respondents had opined that feed cost of milch animal decreased due to increase in availability of fodder in their own field; majority of respondents opined that there was no change in the situation; while rest have reported an increase in cost. Almost half of the respondents had reported savings on purchase of fodder from market. One third of respondents felt that their monthly income had increased. Most of the beneficiary households noted that there was no positive change in employment opportunities after FDP. Some households reported environmental benefit

due to the use of biogas, which has not only reduced the expenditure on liquid gas and firewood but also expenditure on health of females.

Table 7.2b: Effect of Fodder Production programme under NDP I

Sr. No	Particulars	Effect of Fodder Seed & Fodder Production programme
		Rabi
		BENFGH
1	Do you think that the feed cost of your milch animal has changed after FDP (due to availability of fodder)	
	Increased	11.11
	Decreased	20.63
	Unchanged	68.25
2	Do you think that saving on purchase of fodder from market-	
	Increased	49.21
	Decreased	3.17
	Unchanged	47.62
3	Do you find change in employment opportunity after FDP	
	Decreased	0.0
	Increased	4.76
	Unchanged	95.24
4	Due to green and dry fodder availability the following benefits	
	a) improvement of soil health,	28.57
	b) environmental benefit (use of biogas reduced the burden on gas and firewood)	28.57
	c) improvement in women health due to use of biogas.	65.08
	d) time saved for search of firewood	69.84
5	Do you think that your monthly income from dairy has changed	
	Increased	33.33
	Decreased	6.35
	Unchanged	60.32
6	Do you feel that your savings from dairy have increased after adopting FDP	
	Increased	11.11
	Decreased	26.98
	Unchanged	61.90

In view of availability of green fodder, respondents were asked about their future plan of extension of herd size strength. Very few respondents expressed the willingness of extension of herd strength, while some of them had purchased livestock after joining the FDP. Almost all felt that they were somewhat or totally involved in the programme. More than 80 percent of the households opined that they would recommend this programme to other dairy farmers. They have rated the fodder development programme with 9.03 points (out of 10) along with a suggestion that there is a need to ensure the quality of fodder seed with supply on subsidized rate.

Table 7.2c: Effect of Fodder Production programme under NDP I

Sr. No.	Particulars	Effect of Fodder programme
		Rabi
		BENFGH
7	Would you like to increase your herd strength due to assured fodder availability	
	Yes	14.29
	No	47.62
	May be	38.10
8	Have you purchased new livestock after joining the FDP? (due to assured supply of fodder)	
	Yes	4.76
	No	95.24
	If yes, when and how many	05
9	Do you feel involved in the program	
	Yes	49.21
	No	19.05
	somewhat	31.75
10	Do you recommend other farmers also join FDP-fodder seed production	80.95
11	On a 10 point scale how many points you will give to FDP-seed production program	9.03
12	Would you like to give suggestion for improvement in FDP-fodder seed production – more subsidy on Seed Required and good quality seed required	69.84

7.4 Perception of Non Beneficiary Households

The non-beneficiary households were asked about their perception regarding FDP and their interest in the same. The responses received indicated willingness of the farmers to be a part of this programme in future. While majority of them had opined that the programme was beneficial to the dairy owners and they could notice change in feeding pattern after implementation of FDP in the village.

Table 7.3: Perceptions of non beneficiary households about the FDP

Sr. No.	Particulars	Responses (% to total)		
		NDCS Rabi		
		Yes	No	Cannot say
1	Are you interested in Fodder production programme	55.56	44.44	0.0
2	Do you think it is a beneficial program	62.96	37.04	0.0
3	Do you interact with FDP farmers to learn about benefits	77.78	22.22	0.0
4	Do you try to learn from FDP farmers and grow fodder production	81.48	18.52	0.0
5	Have you thought about any change in feeding pattern after FDP is implemented in village	81.48	18.52	0.0
6	Do you think selection of beneficiaries under FDP is biased	29.63	70.37	0.0

7.5 Constraints faced by PDCS and Suggestions

While implementing the programme, PDCS faced major constraints in terms of unavailability of required quantity of seed for fodder production (from dairy union), less availability of irrigation in the area and thus low demand for fodder seed, inability to provide fodder seed on credit, and lack of training facilities (Table 7.4). While among infrastructure related constraints, lack of training facilities was a major constraint. PDCS had recorded the shortage of trained manpower, shortage of finance, issues related to governance and political interference in the functioning of society was reported. PDCS suggested that water resources need to be developed, milk union should supply quality seeds in required quantity, and further steps need to be taken to increase production of required fodder crops.

Table 7.4: Constraints faced by PDCS

Sr. No.	Constraints	Responses % to total		
		Never	Sometime	Always
A	Constraints- Seed Supply and Price, other			
1	Unavailability of required quantity of seed for fodder production (from dairy union)	0.0	0.0	100.0
2	High rate of seed supplied by Union	75.0	25.0	0.0
3	Low margin on seed received from Union	62.5	25	12.5
4	Fodder seed available in market at cheaper rate than Union	62.5	25	12.5
5	Less availability of irrigation in area thus low demand	62.5	37.5	62.5
6	Unable to provide fodder seed on credit	62.5	37.5	62.5
7	Unavailability of green/ dry fodder throughout the year	37.5	37.5	25
8	Low average milk yield of the milk animals in area	50	37.5	12.5
9	Lack of cooperation and coordination among members	62.5	37.5	0
10	Large number of small producers (less than 1 lit/day)	87.5	12.5	0
11	Irregular & inadequate supply of milk	87.5	0	12.5
12	No/less provision for advance payment for milk by society or vendor	62.5	37.5	0
13	Received complaints about less germination of seed	50	50	0
B	Infrastructure related			
1	Unavailability of chilling facilities at village level for milk preservation.	37.5	37.5	25
2	Lack of improved equipments	12.5	37.5	50
3	Lack of necessary space required for dairy operation	12.5	37.5	50
4	Lack of training facilities	0	37.5	62.5
C	Suggestion Other Constraints			
1	Manpower constraints (inadequate staff, untrained staff,etc.) – No trained staff	100.0		
2	Technical constraints: (eg. Problems in availability of inputs, shortfall in technical assistance provided, etc.) - YES	87.5		
3	Governance issues: (*eg. autonomy in deciding seed prie, extent of political interference, if any, facilitating and hindering state policies etc.*) - YES	50.0		
4	Financial constraints yes	62.5		
5	Any other -	0.0		

Table 7.5: Suggestions regarding Particular Program by PDCS

Sr No.	Item	% to responses
1	Potential for Future	
a	Water resources need to be develop	50.0
b	New Project on fodder development	
2	Suggestions	
a	More subsidy on seed	40.0
b	Milk price should be increase for attract the producer	
2	Awareness should be increase about Daily Policy and schemes to producers	100
3	Personal Observations of Investigator	0.0
a	No proper maintenance of the record	100

7.6 Constraints faced by Milk Unions and Suggestions:

The milk unions were asked about constraints faced by them in implementation of fodder development programme and their suggestion to improve the same. While Solapur milk union responded that they had faced the problem of seed availability. They opined that the seed availability with other dairy cooperative society was costlier than market where cheaper seeds were available. Kolphaur Union reported that they faced problem of less demand for fodder seed from PDCS (Table 7.6). It was very strange to note that Maharashtra was deficit in fodder production and yet demand for fodder seed was not growing. During field visit, it was observed that Solapur milk union had only one officer who looked after fodder development and he too was given other additional work. Thus, a need was felt for concrete action by Milk Union for fodder development.

Table 7.6: Constraints faced by Milk Unions in Maharashtra and Suggestions

Sr. No.	Constraints	Frequency	
		Solapur	Kolhapur
A	Constraints- Seed Supply and Price, other		
1	Less demand for fodder seed from PDCS	never	Sometime
2	Low availability of foundation/breeder seed from National/State Seed Corporation fodder seed with Union	never	never
3	Unwillingness to undertake fodder seed multiplication by PDCS/Dairy households	never	never
4	Seed available with other Dairy cooperative society is costlier than market	Sometime	never
5	Cheaper seed available in market	Sometime	never
6	High cost of seed purchase by union	never	never
7	Received complaints about less germination of seed	never	never
B	**Other Constraints**		
1	Manpower constraints (eg. Problems in recruiting staff, etc.) – STAFF Problem	No	No
2	Technical constraints: (eg. Problems in availability of inputs, shortfall in technical assistance provided, etc.)	No	No
3	Governance issues: (*eg. autonomy in deciding seed price, autonomy in recruitment & transfers, extent of political interference, if any, facilitating and hindering state policies etc.*)	No	No
4	Financial constraints -	No	No
C	**Suggestion**		
1	suggestion for improvement in procurement of fodder seed from dairy cooperative	No	No

Note: - no response received.

7.7 Chapter Summary

From the field survey, it was observed that all the selected households were aware about the programme. The two major sources of information about the programme for beneficiary households were milk union and dairy cooperative society. Very few households during both season had got an opportunity to see documentary on FDP, while in case of exposure to poster and banner all the seed growers had exposure to the same while two third of fodder growers had that opportunity. Only seed growers had received pamphlets on FDP. At the same time, attendance of households in village awareness programmes was very poor. However, none of sample households were aware about FDP programme before taking part in this programme. This indicates the grave concern regarding the interests of respective dairy cooperative societies in dissemination of information about the programme and weak agricultural extension mechanism in rural areas of the State. Majority of the households opined that area under fodder production had increased. All the selected households opined that after FDP, availability of fodder for animal had increased (kg/day/animal) which resulted in not only increase of milk production but also an improvement in milk fat. Besides, health of animals had also improved due to adequate availability of green and dry fodder. About one fifth of respondents opined that feed cost of milch animal decreased due to increase in availability of fodder in their own field, majority of respondents opined no change in situation, while rest of the respondents had reported an increase in cost. Almost half of the respondents had reported savings on purchase of fodder from market. One third of respondents felt that their monthly income had increased. Most of the beneficiary households noted that there was no positive change in employment opportunities after FDP. Some households reported environmental benefits due to the use of biogas, which had not only reduced the expenditure on liquid gas and firewood but also expenditure on health of females. In view of availability of green fodder, respondents were asked about their future plan of extension of herd size strength. Very few respondents expressed the willingness of extension of herd strength, while some of them had purchased livestock after joining the FDP. Almost all felt that they were somewhat or totally involved in the programme. More than 80 percent households opined that they would recommend this programme to other dairy farmers. They had rated the fodder development programme with 9.03 points (out of

10) along with a suggestion that there was a need to ensure the quality of fodder seed with supply on subsidized rates. The non-beneficiary households were asked about their perception regarding FDP and their interest in the same. The responses received indicated willingness of the farmers to be a part of this programme in future. While majority of them had opined that the programme was beneficial to the dairy owners and they could notice change in feeding pattern after implementation of FDP in the village.

While implementing the programme, PDCS faced major constraints of unavailability of required quantity of seed for fodder production (from dairy union), less availability of irrigation in area thus low demand, inability to provide fodder seed on credit, and lack of training facilities. Among infrastructure related constraints, lack of training facilities was a major constraint. PDCS had recorded the shortage of trained manpower, shortage of finance and governance and political interference in the functioning of society was reported. PDCS suggested that water resources need to be developed and milk union should supply quality seeds in required quantity. Further steps need to be taken to increase production of required fodder crops. While Solapur milk union responded that they had faced the problem of seed available from other dairy cooperative society was costlier than market where it was cheaply available, while Kolhapur Union reported that they had faced problem of less demand for fodder seed from PDCS. It was very strange to note that Maharashtra was deficit in fodder production and yet the demand for fodder seed was not growing. During the field visit, it was observed that Solapur milk union had only one officer who looked after fodder development and he was given other additional works too. Thus, there was a need for a concrete action by Milk Union for fodder development.

The next chapter provides the conclusion and policy implications.

Chapter VIII

Conclusions and Recommendations

8.1 Introduction:

Dairy development in India has been acclaimed as one of the most successful development programmes under the world's largest integrated dairy development programme 'Operation Flood'. India ranks first in the world in terms of milk production (19.6 % of world's milk production). Milk production increased to 176.4 million tonnes in 2017-18 (from 17 million tonnes in 1950-51) and by 2023-24 the target is to produce 300 million tonnes. The per capita availability of the milk in the country has also increased significantly from 130 grams/day in 1950-51 to 375 gram per day in 2017-18 as against the world average of 294 grams per day during 2013. This represents sustained growth in the availability of milk and milk products to address the demands from the growing population of India. Nearly 49 percent of milk production was contributed by buffalo followed by cow (47%) and goats (4%) in 2017-18. While more than 75 million households in India were engaged in dairy farming, about 16.6 million farmers were brought under the ambit of 1,85,903 village level dairy cooperative societies up to March 2017. Livestock plays a pivotal role in generating sustainable livelihood for small farmers in rural Indian economy and, meets the growing demand for milk and meat. India is ranked at first position in terms of cattle and buffalo population in the world. Despite these facts, it cannot be ignored that the productivity of dairy animals in India is very low as compared to other countries.

While the milk yield had increased between 2012 and 2017 by around 22 percent, it was still lesser than 30 percent of the world average and about six times lower than milk yield in Europe. The performance of indigenous cows was observed to be poor if analysed separately from the performance of crossbreed cows. Besides, milk yield varied significantly across the states of India. The reasons cited for this were inappropriate feeding, inadequate supplies of quality feeds and fodder in addition to the low genetic profile of the indigenous breeds. It is not possible to achieve higher productivity in milching animals by merely increasing its genetic potential. Due attention needs to be given to proper feeding of milching animals. There is no shortcut to sustainable livestock husbandry, without addressing the development of fodder and feed resources.

Shortage of fodder and feed was a major constraint in the development of the livestock economy of India. Feed accounts for 65 to 70 percent of the total cost of maintenance of the animals. There is a direct relation between the nutritional status of the animals and the type of feed fed. One of the prominent characteristics of Indian livestock is that almost its entire feed requirement is met from crop residues and by-products like grasses, weeds, tree leaves gathered from cultivated and uncultivated lands, grazing on common lands and harvested fields. For improving the yield of milching animals, feeding of animal needs planned, scientific, practical as well as economic approach. Livestock feeds are generally classified as roughages and concentrates. Roughages are further classified into green fodder and dry fodder. Green fodder is cultivated and harvested for feeding the animals in the form of forage (cut green and fed fresh), silage (preserved under anaerobic condition) and hay (dehydrated green fodder). The cereal crops' residues contributed about 71 percent of overall feed resources used for animal feeding, green fodder accounts for 23 percent and concentrated feeds accounted for 6 percent.

With an aim to increase productivity of milch animals, increase milk production to meet the rapidly growing demand for milk, to provide rural milk producers with greater access to the organised milk-processing sector, Government of India approved the scientifically planned multi-state initiative, i.e. National Dairy Plan Phase I (NDP I) as a Central Sector Scheme for a period of six years from 2011-12 to 2016-17. This plan was launched to cover 15 major milk producing States viz. Andhra Pradesh, Telangana (after separation), Bihar, Gujarat, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal which account for over 90 percent of the country's milk production, have 87 percent of breedable cattle and buffalo population and have 98 percent of the fodder resources. During June/August 2015, the Union Government included three more states viz. Uttarakhand, Jharkhand and Chhattisgarh and the program was extended up to 2018-19. This plan was entirely implemented by National Dairy Development Board (NDDB), Anand (Gujarat) through milk co-operatives and state agencies. The project includes a number of programs, of which Fodder Development Programme (FDP) was designed with an aim to enhance green fodder yield of cultivated fodder crops from the land already under fodder production, to increase seed production of fodder crops and increase the use of quality fodder seeds. An important component of sub-project plan of NDP I related to Fodder Development, was to

strengthen fodder seed multiplication and distribution chain, to create required infrastructure for fodder seed production, processing, storage, marketing of fodder seeds at dairy cooperative level, and encourage produion and usage of fodder seeds by farmers for enhancing yield and availability of green fodder. About 3.18 percent of total project cost (Rs. 2060 Crore) was earmarked for this component. Fodder Development Programme (FDP) under NDP I had entered into its 5th year of operations in April, 2017. It was planned to undertake an impact assessment and evaluation of the programme for strengthening fodder seed multiplication and distribution chain at dairy cooperative level under sub project of FDP. Therefore, the present study was undertaken for a comprehensive assessment of the present status of fodder development programme under NDP I thereby enhancing dairy development. The study was undertaken across eight states of India (Karnataka, Andhra Pradesh, Uttar Pradesh, Rajasthan, Bihar, Maharashtra, Gujarat and Punjab) and this report presents the findings from the state of Maharashtra.

8.2 Findings:

- Maharashtra is the largest economy in India as well as one of the top economic performers with respect to per capita income. At the same time, incidence of poverty in the state remained close to the national average. Although Maharashtra is a highly industrialized state of India, agriculture continued to be the main occupation in the state. The importance of the agricultural sector in the economic and social fabric of Maharashtra can be seen from the fact that majority of the labour force still depends on agriculture as their primary source of livelihood.
- The state currently represents the largest dairy market in India. Maharashtra State has the distinction of being the pioneer state in the field of dairy development in the country. Maharashtra is the sixth largest producer of milk in the country, accounting for 6.29 percent share in 2017-18. However, per capita milk availability was lowest in the state, which was 256 gram per day in 2017-18.
- Though the contribution of agriculture and allied sectors to the state gross domestic product declined during the last four decades (34.4 percent in 1960-61 to 11.9 percent in 2018-19), livestock sector has been among the few high-growth sectors in rural Maharashtra. The dairy and poultry are high growth sectors and is reflected in the

growing importance of the contribution of these sub-sectors in the livestock economy. Milk contributed about 68 percent to livestock output in 2016-17.

- As per the 19th Livestock Census 2012, the State ranked sixth at national level with total livestock of about 3.25 crores, accounting for 6.34 percent of national livestock. There is an overall decrease of 9.6 percent over the previous census. The total bovine (Cattle and Buffalo) population was 210.79 Lakhs which accounting for 65 percent of total livestock. Maharashtra State ranked 4th in total cattle at the national level. The livestock per lakh population was about 29 thousand in 2012.
- The state accounted for 8.11 percent share in cattle population, 5.15 percent in buffalo population, 3.97 percent in sheep population and 6.24 percent in goat population of the country. Significant share of donkeys (9.09 percent) and horse and ponies (5.92 percent) in national stock was also recorded (2012).
- There is a decline in livestock population from 35.95 million in 2007 to 32.49 million in 2012 registering a negative growth of 9.64 percent in the total number of animals of various species. In fact, the share of Maharashtra in all Indian total stock of livestock also declined by 0.45 percent in 2012 over 2007. Bovine population in Maharashtra declined by about 5 percent to 2.1 crore as against 2.2 crore in 2007. While crossbreds cattle increased by 19 percent, local cows and buffaloes have shown a decline of 8 to 9 percent. However, the indigenous cattle and buffalo milch population declined by 5 to 7 percent between 2007 and 2012, while there has been an impressive growth of 26 percent in crossbred milch animals.
- As per Livestock Census 2012, among the species, cattle contributed highest share (47.66 percent) in total livestock population followed by goats (25.96 percent), buffaloes (17.22 percent) and sheeps (7.94 percent). Cows still dominanted milch animal in the state. Total livestock population in Maharashtra increased by 25 percent during last six decades period.
- Marathawada and Vidarbha regions are characterised by frequent droughts, cracked soils, parched wells, dry hand pumps, low yielding livestock and accordingly, dairying is relegated to western parts of the state. The perpendicular strip of land in western part comprising of Ahmadnagar, Nasik, Pune, Satara, Sangli, Kolhapur and Solapur districts had more than one-third bovine population of the state, mainly crossbred cows and

buffaloes. Ahmednagar (5.7 percent) had the highest number of livestock population followed by Aurangabad (5.2 percent), Solapur (4.3 percent) and Yavatamal (4.3 percent). The livestock density was the highest in the Ahmednagar district and the lowest in Sidhudurg district, while bovine density was found the highest in Kolhapur district and the lowest in Sindhudurg.

- The Government of Maharashtra identified Deoni, Dangi, Khillar, Gaolao and Red Kandhari as indigenous breeds of cattle. Deoni name has been derived from Deoni taluka of Latur district in Maharashtra. Likewise, Red Kandhari originates from Kandhar taluka in Nanded district. The milk production increased from 6.09 million tonnes in 2000-01 to 11.10 million tonnes in 2017-18 registering a growth of 71 percent over base year. Except for the period of drought from 1987-88 to 1988-89, milk production in the state had increased continuously.
- Out of total milk production, crossbreed cows accounted for 45.51 percent, buffalo milk accounted for 39.6 percent, local cows accounted for 13.8 percent while goat milk accounted for remaining share. While out of total bovine milk production, cross breed accounted for 46.5 percent, buffaloes accounted for 39.4 percent share and local cows accounted for remaining 14.1 percent. Significant growth in population of in-milk bovine animals supported an increase in milk yield of bovine animals which increased (bovine milk production) by 161 percent in 2016-17 over 1992-93. The share of cross bred cows in total milk production increased from 25.36 percent to 45.51 percent during 1992-93 to 2016-17, while share of indigenous cows and buffaloed declined from 24.3 and 45.6 percent in 1992-93 to 38.6 and 13.7 in 2016-17.
- Ahmednagar was the highest milk producing district in the state with an estimated milk production of about 17.21 lakh tonnes during 2016-17 and accounted for 15.6 percent of total milk production in the state. Pune was the second largest producer of milk with an estimated share of about 12.3 percent, followed by Solapur (8.9 percent), Kolhapur (8.4 percent), Sangli (6.1 percent) and Nashik (5.2 percent). These top seven districts together contributed about 64 percent of milk production of the state. Category-wise share of milk production in Maharashtra clearly indicates that five top ranked milk producer districts in Maharashtra are dominated by the production of milk by cross bred cows, followed by buffalo and goat.

- The species-wise district wise milk yield data indicates that the highest milk yield was recorded in cross breed cows. In case of indigenous cows, highest milk yield was recorded in Ahmedbagar (3.01 kg/day) and the lowest in Gadchiroli (0.52 kg/day). The highest milk yield was recorded in cross breed cows in Pune district (9.33 kg/day) and the lowest in Solapur (4.19 kg/day). Mumbai brihan district was the top ranking district for buffalo yield (7.55 kg/day) while same was recorded lowest in Ratnagiri (3.17 kg/day). The highest milk density was recorded in Kolhapur (240 kg/day/sq km), while highest per capita milk availability was recorded in Ahmednagar (874 gm/day). The highest bovine milk yield was recorded in Mumbai Brihan district (7.696 kg/day) and the lowest was in Gadchiroli district (1.058 kg/day).
- In Maharashtra, total reporting area was 30.758 lakh ha. Out of this 17.345 lakh ha (56.39 percent) was net sown area, 32.09 lakh ha was land not available for cultivation and 9.19 lakh land was a cultivable wasteland. The permanent pasture and other grazing land was 12.49 lakh ha, which was only 4.06 percent of the total area. The total human population of Maharashtra was reported at about 11.42 crore while the collective population of cattle, buffalo, sheep and goats are 320.93 lakh (i.e. about 28 percent of the human population), while their feeding area was only 4.06 percent.
- Maharashtra has been struggling with droughts and water shortage since many years and this has resulted in shortage of both green and dry fodder. As a relief measure, government supports dairying by organizing free fodder camps every year in rainfall deficit areas. It also arranges for the procurement of sugarcane tops from cane growers, its transportation and ultimate distribution to the livestock owners in scarcity areas at subsidized rates. To cope up with fodder shortages, government is often forced to ban the sale of fodder outside the district where it is produced and prohibited cattle herders from the neighboring states from grazing their animals in Maharashtra.
- Regionwise, dry matter availability from crop residues is considerably lower in the districts of Ahmadnagar, Pune, Kolhapur, Sangli and Satara due to higher density of dairy animals in these regions. In case of Gadchiroli, Gondia and Chandrapur, the area under forest was relatively larger reducing dry matter availability. The animal husbandry department estimated the requirement of around 1.63 lakh tonne of green

fodder and 65,000 tonne of dry variety. About 8.63 percent of deficit of dry fodder was estimated, while another estimate indicates deficit of crop residues and excess of green fodder. Department of Animal Husbandry of Government of Maharashtra estimated the requirement and availability of feed and fodder by taking in to account livestock population as per Census 2012 and observed a deficit of 59 percent of green fodder and 31 percent deficit of dry fodder. There is no authentic data on area under forage and fodder crops at state as well as district level.

- The fact that the state is a drought prone area, it is a critical additional stress factor that adversely affects productivity, livelihood, and the rural economy. Ironically the cultivated areas lie in drought affected districts. The 2013 drought in Maharashtra was due to lesser rainfall during the monsoon season (June to September 2012). It is considered as the region's worst drought in 40 years. Thus, monsoon rain plays a critical role in the agricultural development of the state, as over 82 percent of cropped area is cultivated under rainfed condition as of today. Therefore, State Government should introduce schemes to provide support for fodder production and distribution during drought situation through fodder camp.
- The history of dairy development in Maharashtra dated back to 1940s. At that juncture, the then Civil Supplies department controlled dairy development. In 1947, Aarey Milk Colony was established to supply clean milk to the consumers. In 1958, an independent Dairy Development Department was established which was headed by a Milk Commissioner. After 1970, substantial funds were disbursed through cooperatives for dairy development during Operation Flood Programme. The State also initiated Integrated Dairy Development Programmes in districts not covered under Operation Flood. In due course of time, Animal Husbandry Department was strengthened with independent Commissioner.
- MRSDMM (Maharashtra Rajya Sahakari Dudh Mahasangh Maryadit) is an Apex Federation of District / Taluka milk unions established to implement the Operation Flood programme in the state of Maharashtra. The main objective of MRSDMM is to procure milk from the member milk unions at remunerative rates and distribute the same to the consumers at reasonable rates. MRSDMM was established on 9th June, 1967. At present MRSDMM has 85 member unions (25 District † 60 Taluka) with more

than 24000 primary milk societies and 25 lakh milk producers, including approximately 27000 women members.

- Under NDP-FDP programme, seed production was undertaken in Solapur and Baramati Milk Union, while fodder seed sale was done though Kolhapur, Solpaur, Baramati, Pune, Rajarambapu and Agrocultural Development Trust, KVK, Baramati. These unions are named as End Implementation Agencies (EIAs). As per the sampling framework, two milk unions covered under FDP (NDP-I) were selected, i.e. Kolhapur Milk Union (Gokul), Kolhapur and Solapur District Coop. Milk Producers, Solapur, Maharashtra.
- Kolhapur Zilla Sahakari Dudh Utpadak Sangh Ltd is well known with its popular brand 'Gokul' which was established on 16th March 1963. Solapur District Coop Milk Producers Union Ltd., Solapur is one of the oldest dairy in Maharashtra and is popularly known as Dudhpandhari. It was established on 10th December, 1981. The coverage of the selected EIAs was only one district. The management of any union depends on how democratically a union operates which can be determined through its election process. Both the EIAs had elections in the year 2015-16 and it was reported that regular meetings of general body were organized to address various issues. As per the coverage of districts, GOKUL covered 1200 villages while Dudhpandhari covered 1215 villages, while number of DCS covered by GOKUL were 642 while same was 3659 in Solapur district. Thus, every two villages were covered by one PDCS in Kolhapur while opposite picture was observed in Solapur where one village had three PDCS.
- During visit, it was observed that some of villages have three milk cooperatives in one village, which must have hampered the growth of dairy. The details of purchase and sale of milk and fodder seed by selected EIAs in Maharashtra indicates that payment towards purchase of milk from members was made through electronic transfer within 10 to 11 days. No information was provided by both milk unions on share of profit, which was transferred back to PDCS and its members every year. Solapur dairy milk union has been undertaking fodder seed multiplication programme since 2012-13 as well as fodder production since 2013-14 by providing truthful seeds to farmers.
- Kolhapur Unions was not undertaking seed multiplication programme, while data on seed distributed to PDCS for fodder production was not reported. Maize crop fodder seed of breeder type was provided by Solapur milk union to selected farmers (3 to 15

farmers) for multiplication purpose covering both seasons. While rates charged for breeder seed of Maize crop had increased over the (2012-2018) period from Rs. 46/ per kg to Rs. 100/- per kg, while it was reported that purchase price for seed produced by farmers was same since last four years at Rs. 24 per kg. In case of fodder seed distribution to PDCS by respective milk union, it was observed that truthful type maize fodder seed was supplied by Solapur milk union to PDCS as per the demand at the rate of Rs. 44/- per kg and around 33 to 220 PDCS were covered. While Kolhapur milk union had supplied Sorghum fodder seed of truthful type as per the demand of PDCS at the rate of Rs. 52/- per kg to large number of PDCS.

- The coverage of PDCS for distribution of seed was quite large covering between 1090 to 1460 PDCS. Solapur dairy union was short of requirement of seed and thus they had procured seed from SAUs, research institutes, from regional stations as well as from private seed company. The Solapur union has preferred to purchase maize seed from the SAUs and Research institutions to fullfill their requirement. The rate of maize seed purchase from outside was around Rs. 41.41/per kg while sale rate to PDCS was Rs. 44/- per kg. While Kolhapur preferred to purchase truthful type Sorghum crop fodder seed from MAHABEEJ (Maharashtra State Seeds Co. Ltd., Akola), ranging between Rs. 50 to Rs. 52 per kg and was sold at subsidized rate of Rs. 39 - 41/- per kg. Thus, Solapur milk union had offered subsidy on fodder truthful seed of Rs. 10 per kg, which was a welcome step for enhancement of area under fodder production.
- Selected milk unions had conducted training programmes covering the important aspects of fodder. Solapur milk union had conducted training programmes for farmers through its micro training centres in selected PDCS for dairy owners. While Kolhapur milk union did not report on this aspect. As a part of developmental activities, both the milk union had undertaken developmental activities such as re-vegetation of common grazing land for fodder production and construction of model biomass stored at strategic locations. However, unions could not complete target of re-vegetation. Further, fodder seed production and distribution target set by Solapur milk union could not achieved, may be due to less and erratic rainfall during last two years.
- The selected villages covered by both selected EIAs are relatively small villages having population less than 5100 (having households as low as 361 and as high as 1087). The social distribution of population in selected villages indicates the dominance of

population other than SC and ST. Maje Vadagon and Shiral villages had one fifth of total population belonging to SC category. ST population was meagre in selected villages. However, rate of literacy in selected villages of both EIAs was estimated to be between 60 to 76 percent, which was lower than state average of 82.34 percent (2011). As far as the distribution of population is concerned, the total worker to total population was found to be lowest in Sambhalpur (34 percent) and the highest was in Shiral village (61 percent). Except in case of Shiral village, wherein half of the population were categorized as main workers, in other villages corresponding share was more than 70 percent. In the villages in Solapur district cultivators comprised of major proportion in main workers, while majority of villagers in Kolhapur district were engaged in non-farm employment activities.

- The selected village PDCS covers one or less than one village area while few villages had more than one PDCS in village. The average share of members pouring milk to total number of members was estimated to be highest in Shiral and Kasarwadi while in other villages, it ranged between 52 to 79 percent of total members. Milk collection in PDCS compared to estimated total milk production in village was the highest in Moje Vadegaon followed by Shiral and Kasarwadi, while lowest share was recorded in Vet village. The remaining milk was either sold outside or consumed at home. The rate of purchase of milk (Rs. 32 to Rs. 42 per litre) by the PDCS was on the basis of Fat. Online payment was made to the dairy members on weekly basis. Jowar, Maize, napier, Methi grass were major fodder crops grown in the villages. Few elected villages PDCS had organized training prgrammes i.e. best practices for fodder production, minimizing fodder wastage, latest technologies (quality fodder seeds), demonstration on silage making and use of Field mowers/reapers for the dairy members of society.
- Some of the fodder development activities such as productivity enhancement, support provided by DCS for National Project for Bovine Breeding and Dairy Development, Feed and Fodder Development was undertake by PDCS under NDP-I. The target set for fodder seed distribution for fodder production could not be achieved by the selected PDCS. All of the selected villages PDCS officials opined that permanent pasture and common grazing lands are deteriorating mainly due to huge grazing pressure and at some places encroachment of land. Few villages were reported to be self sufficient in fodder production. Positive response was not recorded regarding FDP and main reason

for same was less availability of land. Some PDCS suggested an improvement in the quality of fodder seed and subsidy on seed.

- The profile of selected sample fodder growers households indicate that the average size of households of all selected (BENFGH - beneficiary fodder grower households; NONBFGH - nonbeneficiary fodder grower households) households ranged between 6 to 7 members. The family fat from both the groups (BENFGH and NONBFGH) indicates that beneficiary households had about half of family members as adult males followed by 40 percent females and remaining children, while non-beneficiary households had 42 percent of adult females, 39 percent of adult males and remaining were children. Thus, non beneficiary households size was larger than beneficiary households with larger share of children and female adults. All the respondents were males. The average age of respondents was between 43 to 49 years while education level was up to 8^{th} standard. The beneficiary household respondents were relatively older and more educated than the non beneficiary respondents.
- Despite of large family size of non beneficiary households, the share of family member working in dairy was higher in case of beneficiary households (41 percent). Beneficiary household respondents were more experienced in dairy with average experience of 20 years while same was around 18 years for its counterparts from non-beneficiary households. Field data indicates that males were decision makers in dairy activity, while duing survey female member of households have also supported the information provided by male respondents on specific parameters such as use of milk at home, time for dairy activity, fodder feeding, etc. More than 90 percent selected households belonged to Hindu religion while rest were from Muslim religion.
- The distribution of selected households as per social group indicates the dominance of respondents from general category followed by Other Backward Class and Scheduled Tribe. As far as income group is concerned, more than 70 percent of the households were categorized under APL and rest were under BPL or Antyodaya category. It was a pleasant surprise to note that around one third of selected households from both groups reported that they had been maintaining farm financial records or dairy business records. More than 92 percent of total selected households had LPG gas cylinders in their homes. Besides, significant number of beneficiary households had

biogas plant also. Around 92 percent households had toilet facility available in their house. Very few beneficiary households had roof top solar fixed at home.

- The main occupation of the selected households was agriculture and comprised of cultivation of land as a farmer along with supportive and allied activity of animal husbandry and dairying. While few households had reported service as a main source of income. All selected households were involved in most of the subsidiary activities to support their household income. The operated land holding wise classification of selected households indicate that all the selected households from both categories for both seasons had very small size of holding (1.2 to 1.4 ha) as compared to state average of 1.44 ha (2015-16). Thus all the selected households belonged to small land holding group. Around half of the land of beneficiary household was rainfed while corresponding share for non beneficiary households was around 36 percent. All the land taken on 'lease-in' basis was rainfed land. As was mentioned earlier, Solapur district was severely affected by less rainfall and part of Kolhapur also suffered from same. Thus, crop production as well as fodder production in the district has been heavily affected by the rainfall pattern and during last two years, scanty rainfall has severely affected crop as well as fodder production.
- Deoni, Dangi, Khillar, Gaolao and Red Kandhari were identified as indigenous breeds of cattle. The details regarding the herd strength and cattle shed indicates that every BENFGH had the highest share of crossbred cows, followed by buffaloes and then local cows in total herd strength. It was reported by the selected households that they preferred cross breed cows for better milk yield and buffalos for high fat content, which help them to fetch higher income as compared to local cows. Though the milk yield of cross breed cows was higher than buffalo and local cows, fat percentage was lower. Out of the total herd strength of selected households, more than 96 percent of total animals were in-milk animals. It was surprising to note that none of the household from any category had enrolled under animal insurance scheme.
- Beneficiary households had higher herd strength as compared to non-beneficiary households. On an average, beneficiary households had more than two crossbreed cows, and at least one buffalo, while every non beneficiary household had one crossbreed cows and one buffalo. The selected households also had significant number of goats. All the beneficiary households had cattle shed either pucca or kuchha in

nature while some of the non beneficiary households had no cattle shed, means they use public places to tie their animals. Few beneficiary households reported to have fodder storage structures also. The cost of pukka constructed cattle shed ranged between Rs. 70,000 to Rs. 80,000 while kuccha shed cost them between Rs. 34000 to Rs. 35000. Almost two in one selected household had some productive assets with them. Overall, household under survey had grass choppers and fodder chaffers.

- There is significant increase in income during last six years period (387 percent in case of beneficiary households and 227 percent in case of non beneficiary households respectively from the respondents from Rabi 2017-18 season). The share of dairy business in total income of the household ranged between 11 to 19 percent in case of fodder respondents while corresponding figure for beneficiary households was higher than that for non-beneficiary households. As compared to base year, except few cases, significant increase in income from dairy was registered, relatively higher in case of beneficiary households than non beneficiary households. The income derived from agricultural labour was also reported by the respondents as supportive income source. The cropping pattern of selected households shows that out of total gross cropped area, out of total gross cropped area, major crops grown were Jowar, Maize, Soybean, Groundnut, Wheat and Sugarcane.
- Under NDP-I, the selected farmers reported that two fodder crop seed were provided by the dairy cooperatives during rabi season (i.e. Sorghum and Maize) since the beginning of the fodder development programme. Kolhapur milk union had provided certified/truthful type seed of Sorghum (Maldandi), while Solapur milk union had provided Maize (African Tall) variety seed for rabi season. There was a significant growth in area under fodder crop during rabi season in 2017-18 as compared to rabi season in 2010-11, while area under Kharif fodder crops had declined in both the group. As the selected area is rainfed drought prone area, these varieties were suitable to grow as they can grow on less moisture content in soil. The selected households have been producing fodder seed since about three years or so and some of them had taken fodder seed cultivation on their own for their own livestock requirement. The Sorghum and Maize certified fodder seed was distributed by PDCS at the average rate of Rs. 42.5 and Rs. 45 per kg respectively. All the households that responded were satisfied with seed cost. Majority of the households were satisfied with sale rate for

green and dry fodder rate received in market. None of the sorghum fodder grower from Kolhapur union had revealed that they would purchase fodder seed from market if it was not possible to procure from cooperative society at subsidized rate, while majority of Maize fodder growers were found to be ready for same.

- The major reasons for procuring seed from the primary dairy cooperative society were availability of quality seed, easy availability of credit and reliability. While non beneficiary households purchased fodder seed from agro-service centre, and few of them also used seed retained by them during earlier seasons. They too had full faith about quality and reliability of their own seed. The PDCS and Milk unions had organised training programmes and demonstrations on various important topics such as best practises for fodder production; non use of banned pesticides, minimum fodder wastage, use of latest technologies and demonstrations on use of biomass stores. The training programme programme was of a day or two and no fee was charged form the participants. Thus, selected milk unions and respective dairy cooperative societies had sincerely attempted to create awareness among the fodder growers about the production, proper storage and use of fodder crop production. The milk union/PDCS had only provided fodder seed for green fodder production at subsidized rate. While it was reported that other inputs like fertiliser and insecticides were also provided by the dairy for use by the farmers.
- The fodder seed received by the selected households was of certified type and was received in adequate quantity as demanded by the farmers. The germination percentage of Maize seed was reported cent percent while in case of Sorghum crop, the germination percentage for 82 per cent of seed ranged between 70 to 90 percent. It was very surprising to note that two cases have reported germination percentage less than 50. In such cases, union should take matter seriously and should compensate the farmers if any grievances were reported about the quality of seed. Only one cut was taken by the selected fodder growers.
- The fodder crop cultivation undertaken by the selected farmers during rabi 2017-18 season was comparatively profitable than its counterpart and thus should be provided necessary support as it could reduce fodder deficit and yield additional income for the farmer households. As mentioned earlier, the area under study was rainfed and drought prone, no competitive crop was as such available. Exceptionally those who had

adequate irrigation had grown Sugarcane, which has different economics. The opportunity cost of fodder cultivation and production heavily depends upon the availability of land and need for growing alternative crop. The trade off between food and fodder crops in terms of net income realised by the dairy owners and farmers is an important factor. Except non-beneficiary households during rabi season, all other respondents opined that fodder cultivation fetch them higher returns than competitive crop.

- Among the various constraints faced by the respondents, major economic constraint was high cost of cultivation and production of fodder crop. Other constraints included irregular sale of fodder seed by DCS/Union, due to land scarcity farmers cannot afford to put more land under fodder seed/crop production, poor Livestock extension services, lack of awareness about government programmes on subsidy on seeds and non availability of labour.
- The economics of milk production is heavily dependent on the quantity of nutritious forage fed to milch animals. It was estimated that milk yield of all types of animals among beneficiary households was higher than non-beneficiary households. However, cost of production was higher in buffalo milk production of beneficiary households than non-beneficiary households. Though, milk was higher in case of the beneficiary households, per litre rate realized by the non-beneficiary households was higher than beneficiary households and thus yield price offset the lower milk yield. The cost of non-beneficiary households may be higher than beneficiary households due to cost of fodder. Profit level estimated for local cows were negative level while those of crossbreed cows were positive in both the cases. The selected households had hardly any choice for selection of dry and green fodder and thus used sorghum fodder or Napier grass to feed their animals and the rate prevailing for same in the market during respective season were around Rs. 10 to Rs. 15 per kg.
- As per the field survey data, as was expected, milk yield after feeding green fodder to all type and breeds of animals was higher than animals fed with dry fodder. Across the seasons, mixed picture among the selected households was recorded. Fodder growers had recorded highest milk yield during winter season followed by rainy season. Around 90 percent of crossbreed cow milk and 80 per cent of buffalo milk was sold and remaining milk was consumed at home. Local cow milk was preferred for use at home.

The sale price for buffalo milk realized by the selected non beneficiary dairy farmers was higher than price received for milk of cross breed and local cows, while corresponding figure was higher for buffalo in case of beneficiary farmers may be due to high fat content in buffalo milk. The rate per litre of milk was higher for non beneficiary dairy farmers.

- From the field survey, it was observed that all the selected households were aware about the programme. The two major sources of information about the programme for beneficiary households were milk union and dairy cooperative society. Very few households during both season had got an opportunity to see documentary on FDP, while in case of exposure to poster and banner all the seed growers had exposure to the same while two third of fodder growers had that opportunity. Only seed growers had received pamphlets on FDP. At the same time, attendance of households in village awareness programmes was very poor. However, none of sample households were aware about FDP programme before taking part in this programme. This indicates the grave concern regarding the interests of respective dairy cooperative societies in dissemination of information about the programme and weak agricultural extension mechanism in rural areas of the State.
- Majority of the households opined that area under fodder production had increased. All the selected households opined that after FDP, availability of fodder for animal had increased (kg/day/animal) which resulted in not only increase of milk production but also an improvement in milk fat. Besides, health of animals had also improved due to adequate availability of green and dry fodder. About one fifth of respondents opined that feed cost of milch animal decreased due to increase in availability of fodder in their own field, majority of respondents opined no change in situation, while rest of the respondents had reported an increase in cost.
- Almost half of the respondents had reported savings on purchase of fodder from market. One third of respondents felt that their monthly income had increased. Most of the beneficiary households noted that there was no positive change in employment opportunities after FDP. Some households reported environmental benefits due to the use of biogas, which had not only reduced the expenditure on liquid gas and firewood but also expenditure on health of females.

- In view of availability of green fodder, respondents were asked about their future plan of extension of herd size strength. Very few respondents expressed the willingness of extension of herd strength, while some of them had purchased livestock after joining the FDP. Almost all felt that they were somewhat or totally involved in the programme.
- More than 80 percent households opined that they would recommend this programme to other dairy farmers. They had rated the fodder development programme with 9.03 points (out of 10) along with a suggestion that there was a need to ensure the quality of fodder seed with supply on subsidized rates.
- The non-beneficiary households were asked about their perception regarding FDP and their interest in the same. The responses received indicated willingness of the farmers to be a part of this programme in future. While majority of them had opined that the programme was beneficial to the dairy owners and they could notice change in feeding pattern after implementation of FDP in the village.
- While implementing the programme, PDCS faced major constraints of unavailability of required quantity of seed for fodder production (from dairy union), less availability of irrigation in area thus low demand, inability to provide fodder seed on credit, and lack of training facilities. Among infrastructure related constraints, lack of training facilities was a major constraint. PDCS had recorded the shortage of trained manpower, shortage of finance and governance and political interference in the functioning of society was reported. PDCS suggested that water resources need to be developed and milk union should supply quality seeds in required quantity. Further steps need to be taken to increase production of required fodder crops. While Solapur milk union responded that they had faced the problem of seed available from other dairy cooperative society was costlier than market where it was cheaply available, while Kolhapur Union reported that they had faced problem of less demand for fodder seed from PDCS. It was very strange to note that Maharashtra was deficit in fodder production and yet the demand for fodder seed was not growing.
- During the field visit, it was observed that Solapur milk union had only one officer who looked after fodder development and he was given other additional works too. Thus, there was a need for a concrete action by Milk Union for fodder development.

8.3 Policy Suggestions:

- The selected area is suffering from deficit of fodder which has ultimately affected the milk yield of animals. Therefore, there is a need create awareness among the farmers and dairy owners about the same through continuous efforts rather than taking up same on piecemeal basis.
- Fodder seed should be made available to villagers well in advance of seasons and information of same should be displayed as well as communicated in villages through traditional method of munari/public announcement through rikshaw.
- There is a need to increase protective irrigation coverage to the crops grown through various water saving techniques and technology in order secure crop from failure due to erratic and unseasonal rainfall.
- Most of the villages are having more than primary dairy cooperative societies and thus, hinder the prospectus of the each diary society by having rivery among them and milk pourer due to political interference. The Milk Union should play a decisive role in making consensus among them rather keeping itself away from this aspect. Ultimately, Union is based on the dairy societies in villages and thus growth of these village societies is must for growth of union.
- Solapur Union found to be going through the manpower constraints which has hinder the implementation of the beneficial programmes like seed production, fodder production and many other. There should be specific fodder development cell in each dairy union to take care the needed of seed and supply of same with stipulated time period.
- Milk Union should come out with the supportive strategies and policies for enhancement of coverage under fodder production through quality and in time supply of seed to farmers in each season and every years, then only changes would notices.
- There is a lack of adequate and genuine data on production and availability of various types of fodder and feed grains. Therefore, competent agencies should be encouraged to generate real time and time-period data on fodder production, feed grain production, land availability for grassland and other pasture grounds along the lines of Cost of Cultivation scheme.

- It was observed during field survey that proper record or systematic entry of distribution of seeds to farmers under Fodder Development Programme was not maintained by the PDCS. Also the milk unions' approach towards fodder development activities was found to be less enthusiastic. Thus, there is an urgent need to revamp fodder development mechanism by making them accountable for success or failure of the scheme.
- As there is a demand for fodder seed by the farmers and farmers are ready to allot land for fodder cultivation, quality seed in adequate quantity and in time needs to be provided by the PDCS.
- Quality seed production is an important area that needs to be strengthened for vertical growth in cultivated fodder. Multi-pronged strategic policy and research interventions are required to take care of all aspects of fodder seed production technology, quality, seed standards, certification, distribution and marketing.
- Fodder based cheaper feeding strategies are required to reduce the cost of production of quality livestock since feed alone constitutes 70 percent of milk production costs. To meet the current level of demand by livestock and its annual growth in population, the deficit in all components of fodder, dry crop residues and feed need to be met by either increasing productivity, utilising untapped feed resources, and increasing land under fodder cultivation.
- Efforts need to be made to increase production of quality fodder seeds through necessary incentives, arranging foundation seeds of different high yielding fodder varieties and modern scientific farming procedures. Appropriate resources and technologies need to be made available to ensure quality fodder seed production.
- Round the year availability of quality fodder through promotion of hay, silage and fodder banks need to be emphasised. Non conventional sources of feeds such as azolla, processed vegetables and fruits waste, need to be promoted.
- While fertile lands with assured irrigation are diverted for growing high value crops, large stretches of marginal and wastelands are lying under utilised across the country. Fodder cultivtation can be undertaken in such wastelands. There are also opportunities to introduce fodder as an intercrop or as a soil binder under the watershed development programme.

- Shortage of quality fodder and feed is another major constraint for dairy development. The gap between the requirement and availability of feed and fodder is increasing due to decreasing area under fodder cultivation and reduced availability of crop residues as fodder. Besides common property resources are continuously shrinking leading to over-grazing of the existing grass land. Therefore, there is a need to frame strategies for sufficient availability of good quality feed and fodder for efficient utilisation of genetic potential of the various livestock species and thereby sustainable improvement in productivity.
- The role of institutions in fodder development especially district dairy cooperatives needs to be strengthened and there should be dedicated fodder officer to take up fodder development activity on a large scale.
- The fodder seed growers had also noted constrains like no compensation by DCS/Union in case of failure of fodder seed crops due to crop failure, thus attempt should be made to provide support to such fodder grower by providing either new seed or some compensation.
- There is a need to establishment of fodder banks in the drought prone areas to tackle with fodder scarcity.

Maharashtra being a fodder deficit state that to agriculture depends on vagaries of monsoon, concrete efforts is needed to enhancement in area under fodder and its management throughout the years, particularly during summer season. Development of waste lands / Gairans into community pasture lands through systematic efforts of green cover augmentation under soil and water conservation schemes with involvement of village panchayats and NGOs need to be undertaken. Implementation of such policy imperatives in Maharashtra would prove helpful in assuring that fodder and fodder seed production is given its due importance. The fact that fodder accounts for the single largest share of expenditure in dairy, any strategies associated with making dairy business profitable cannot afford to ignore incentivizing fodder development through various strategies. Besides as discussed, farmers are motivated to indulge in fodder production, and they also find it to be comparatively profitable. Therefore, policy directives that motivate the farmers further towards developing efficient fodder and fodder seed production may hold answers to issues related to the scarcity of fodder, given the ever-increasing demands for fodder from the ever expanding dairy business.

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Seed Concepts

- **Seed Replacement Ratio** denotes how much of the total cropped area was sown with certified seeds in comparison to farm saved seeds. It also denotes actual quality seed distributed to farmers vis-a-vis actual seed required for cultivation of crops.

- **Seed Multiplication Ratio denoted** number of seeds to be produced from a single seed when it is sown and harvested.

- **Generation system of seed multiplication**

  Generation system of seed multiplication is nothing but the production of a particular class of seed from specific class of seed up to certified seed stage. The choice of a proper seed multiplication model is the key to further success of a seed programme which basically depends upon,
  a. The rate of genetic deterioration
  b. Seed multiplication ratio and
  c. Total seed demand

  Based on these factors different seed multiplication models may be derived for each crop and the seed multiplication agency should decide how quickly the farmers can be supplied with the seed of newly released varieties, after the nucleus seed stock has been handed over to the concerned agency, so that it may replace the old varieties. In view of the basic factors, the chain of seed multiplication models could be,

  a. Three -Generation model: Breeder seed - Foundation seed - Certified seed

  b. Four-Generation model: Breeder seed - Foundation seed (I) Foundation seed (II) - Certified seed

  c. Five-Generation model: Breeder seed - Foundation seed (I)- Foundation seed (II) – Certified seed (I)- Certified seed (II)

  Seed is the cheapest and basic input for sustained agricultural production. At the time of release of a variety, small quantity of seed normally known as **nucleus seed** is available with the plant breeder. Commercial quantity of seed is produced after a series of multiplication steps. Starting from maintenance programme in which nucleus seed is multiplied in a generation system of multiplication as breeder, foundation and certified seed.

  Nucleus Seed: 100 per cent genetically purse seed produced by the plant breeder to developed a particular variety

  Breeder seed (Tag colour: Yellow)- Breeder seed is produced from nucleus seed under the supervision of a qualified plant breeder in a research institute of Agricultural University. This provide for initial and recurring increase of foundation seed. Breeder seed is monitored by a joint inspection team of scientists and officials of certification agency and National Seed Corporation. The genetic purity of breeder seed crop should be maintained at 100 per cent.

Foundation seed (Tag Colour: White): Foundation seed is the progeny of breeder seed and is produced by State Farm Corporation of India, National Seed Corporation, State seed Corporation under technical control of qualified plant breeders or technical officers. Its production is supervised and approved by certification agency. The genetic purity of foundation seed should be maintained at 99.5 per cent.

Certified seed (Tag Colour: Azar blue): Certified seed is the progeny of foundation seed and its production is supervised and approved by certification agency. The seed of this class is normally produced by the State and National Seeds Corporation and Private Seed companies on the farms of progressive growers. This is the commercial seed which is available to the farmers and its genetic purity should be 99 per cent.

Truthfully Labelled seed (Opal Green tag)- produced by seed production agencies on self certification basis.

Differences between certified seed and truthful labelled seed

Certified seed	Truthful labelled seed
Certification is voluntary	Truthful labelling is compulsory for notified kind of varieties
Applicable to notified kinds only	Applicable to both notified and released varieties
It should satisfy both minimum field and seed standards	Tested for physical purity and germination
Seed certification officer, seed inspectors can take samples for inspection	Seed inspectors alone can take samples for checking the seed quality.

Certified and truthful labelled seeds are used for commercial production of crops.

Details on Fodder Development Programmes & Seed distributed/Imported

A. 2.1: Ongoing programmes of DAD & F

S.N	Name of the Components
1	Fodder Production from Non-forest wasteland/rangeland/grassland/non-arable land
2	Fodder production from Forest land
3	Fodder Seed Procurement/ Production & Distribution
4	Introduction of Hand Driver Chaff-Cutter
5	Introduction of Power Driven Chaff Cutter
6	Distribution of low capacity, tractor mountable Fodder Block Making units, hay baling Machines/reapers/ forage harvesters
7	Established of silage making Units
8	Establishment of by-pass protein production units
9	Establishment of Area Specific Mineral Mixture/Feed pellleting/feed Manufacturing Units
10	Establishment/modernization of feed Testing Laboratories

Source: GOI (2017).

A. 2.2: State wise release of funds under Sub Mission Feed and Fodder of National Livestock Mission

State & UTs	2014-15 (Rs. In lakh)	2015-16 (Rs. In lakh)	2016-17 (Rs. In lakh)
Andaman & Nicobar	NA	NA	2.25
Andhra Pradesh	NA	NA	558.00
Bihar	343.00	NA	
Chhatisgarh	NA	212.61	41.57
Gujarat	1500.00	NA	1095.83
Haryana	490.00	NA	
Himachal Pradesh	74.99	NA	
Jharkhand	500.00	NA	200.00
Karnataka	NA	422.00	1.04255
Maharashtra	157.14	500.00	1338.205
Nagaland	39.94	23.25	
Odisha	178.50	72.60	131.40
Rajasthan	NA	338.817	177.45
Sikkim	7.65	15.11	
Tamil Nadu	600.00	NA	
Tripura	5.70	NA	
Uttarakhand	NA	101.55	
Uttar Pradesh	321.00	NA	
West Bengal	550.35	NA	27.72
Total	4768.27	16.85.937	3573.4675

Source: GOI (2017).

A. 2.3: Component wise physical progress for all India under NLM

Sl.	Component	201-15	2015-16	2016-17	Total
1	Fodder Production from Non-forest wasteland/rangeland/grassland/non-arable land (Ha)	535	NA	715	1250
2	Fodder production from Forest land (ha)	NA	45	100	145
3	**Fodder Seed Procurement/ Production & Distribution (Qtls)**	**46031.1**	**44778.44**	**5511.15**	**96320.69**
4	Introduction of Hand Driver Chaff-Cutter(Nos)	21516	3634	600	25750
5	Introduction of Power Driven Chaff Cutter (Nos)	9307	12331	7522	29160
6	Distribution of low capacity, tractor mountable Fodder Block Making units, hay baling Machines/reapers/ forage harvesters (Nos)	2	0	0	2
7	Established of silage making Units (Nos)	2272	56	1495	3823
8	Establishment of by-pass protein production units (Nos)	3	0	0	3
9	Establishment of Area Specific Mineral Mixture/Feed pellleting/feed Manufacturing Units (Nos)	1	0	0	1
10	Establishment/modernization of feed Testing Laboratories (Nos)	5	0	2	7

Source: GOI (2017).

A.2.4: Physical Achievement for Feed & Fodder Development

Sr. No.	**Name of the Component**	**2014-15**	**2015-16**	**2016-17**	**Total**
1	Hand driven Chaff Cutter(nos)	21516	3634	600	25750
2	Power Driven Chaff Cutter(nos)	9307	12351	7522	29180
3	Silage Making Unit (nos)	2272	56	1495	3823
4	Fodder Seed Distribution(in Qt.)	46031	44778	5511	96320
5	Fodder Production For non-forest(in ha)	535	Nil	715	1250
6	Fodder Production From forest(in ha)	Nil	45	100	145

A 2.5: Import of Berseem seed variety i.e. Mescavi

Sr No	Year	Import (MT)
1	2004-05	2062
2	2005-06	2930
3	2006-07	7912
4	2007-08	7622
5	2014-15	13204
6	2016-17	10474

Source: NITI Ayog (2018); GOI (2017)

A. 2.6: Fodder Seeds produced and Distributed/sold to the States during 2014-15 to 2016-17

Name of the station	Fodder Crop/Grass/Variety	Price (Rs/Kg)	Quantity of seed produce			Quantity procured by the states		
			2014-15	2015-16	2016-17	2014-15	2015-16	2016-17
RFS Chennai (kgs)	Cowpea EC4216	100	9900	7703	6330	4050	5750	7500
	Sorghum CO-29	400	1202	1468	1870	0	600	800
	Stylosanthes	350	18.5	1617	1811.5	400	852	1020
	Calopogonium	200	18	67	0	0	0	0
RFS Banglore	Maize African Tall	50	1730.76	733.5	605.08	1216	1060	1018.5
	Sorghum MP chari PC23 CoFS 29	52.50 65.00 350	59.22 146.3	1.74 144.8 14.44	227.9	0 145	0 24	0
	Cowpea EC4216	75	26	29.86	0	0	20.5	6.0
	Rhodes Callide	450	18.21	14.90	19.03	0.20	1.0	1.5
	Guinea Grass	400	10.3	12.05	36.99	0.2	1.0	1.0
	Signal Congo	400	0.91	0	3.36			
RFS Hyderabad	Maize African Tall	50	5895	9608	11012	4575	6917	4273
	Sorghum PC23	55	8340	5387.5	1377	6200	5000	101
	Sorghum CoFS 29	380	0	48	52	0	42	40
	Cowpea APFC-10-1	90	183	14	78			45
	Oats UPO 212	50	142	530	0	85	510	0
	Guinea	400	0	29	384	0	22	140
	Stylo	400	0	14	156	0	10	45
	Rhodes Callide	400	36	6	12	8	0	5
	Cenchrus	400	106	187.5	134	94	177	30
RFS Kalyani	Maize J 1006		31842	36125	8751	28576	2048	8751
	Ricebean		15800	559	3330	2829	2751	583
	Bidhan							
	Sorghum PC-23		5403	489	120	1422	4054	1865
	Cowpea BL-1,2		5797	3235	2580			
RFS Dhamrod	Sorghum MP chari	50		4690	5923		2301	
	Sorghum PC-23	50	1650	0	0	0	1050	
	Sorghum CoFS 29	400	840	955	266	0	1715	
	Sorghum PC-9	350		3635	659	1145	1400	965
	Sorghum CSV-21F	50		240	419			
	Bajra HC-20	65	440	535	940	0	156	
RFS Hisar	Chinese Cabbage	70	7660	4610	1120	10	3500	800
	Bajra hc 20	30	440	1400	6980	915	0	8000
	teosinite	45	340	620	1380	0	0	0
	Sorghum MP chari	45	0	160	1730	0	0	1000
	Sorghum PC-23	45	0	4660	4480	0	0	1450
	PC09	45	0	0	1266	0	0	1045
	Oats HJ8	45	25210	6400	5195	2778	1505	500
	Oats OS6	40	24229	800	7093	7748	0	5000
	Oats Kent	40	5655	2660	21410	2048	125	15000
RFS Suratgarh	-	-	-	-	-	-	-	-
RFS Srinagar	Tall Fesue Demeter	550	130	330	200	6	9	12.5
	Orchard Grass commit	550	8	30	10	0.5	9	1.5
	Orchard Grass-curries	550	7	20	33	0.5	2	1.5
	Orchard Grass –Apunui	550	0	0	0			
	Annual Rye Grass Grassland Manwa	250	338	350	985	1	206	1.5
	Saifoin Melrose Crown Vetch-Local	550	12	30	16	0.5	2	2
	Red Clover	550	38	35	120	1	7	1.5
	Oat-Subjar	55			250			

Source: GOI (2017).

Progress under NDP-I

Annexure 3.1: NDP I- Components and Sub-components with Project Outlay

Sr. No.	Particulars	Outlay (Rs. in Crore)				% to Total Outlay
		IDA Credit	GoI's Share	EIA's share	Total Outlay	
A	Productivity Enhancement	1026	114	22	1162	56.90
(a)	Production of high genetic merit (HGM) cattle and buffalo bulls and import of bulls/ semen/ embryos of HF and Jersey breeds for semen production.	267	30	0	297	14.54
(b)	Strengthening existing Semen Stations/ Starting new stations for producing high quality disease free semen doses	213	24	22	259	12.68
(c)	Setting up a pilot model for viable doorstep AI delivery services (based on Standard Operating Procedures [SOPs]) through a professional service provider including animal tagging and performance record	163	18	0	181	8.86
(d)	Scientific nutrition programme for milch animals to produce milk commensurate with their genetic potential and to reduce methane emission	383	42	0	425	20.81
	i) Ration Balancing Programme	324	36	0	360	17.63
	ii) Fodder Development	**59**	**6**	**0**	**65**	**3.18**
B	Village based milk procurement systems for weighing, testing quality of milk received and making payment to milk producers	439	49	259	747	36.58
C	Project Management & Learning	119	13	0	132	6.46
(a)	a) ICT for MIS	53	6	0	59	2.89
(b)	b) Learning and Evaluation	66	7	0	73	3.57
D	Grand Total	1584	176	282	2042	100.00

Source: http://www.nddb.org/services/animalnutrition/rationbalance

Annexure 3.2 Green Fodder Yield Potential

Crop	Variety/Hybrid	Production Potential (MT/Hect/crop)
Sorghum	Harasona 855	75
Bajra	Giant Bajra	95
Maize	African Tall	80
Guar	GL-80	40
Hybrid Napier	CO-4	400*
Berseem	BL-1/Wardhan	110
Oats	IGFRI-99-1	70
Lucerne	LLC-3/ LLC-5	105

A. 3.3: Seed Production by EIAs under NDP- I (2012-13 TO 2018-19)

State/ Region	EIA	Seed production (MT)						
		2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
Gujarat	Sabarkantha MU	0	0	0	0	0	0	0
	Surat MU	0	0	0	0	0	0	0
	Banaskantha MU	0	0	0	0	0	0	0
	Panchmahal MU	0	0	0	0	0	0	0
	Bharuch MU	0	0	0	0	0	0	0
	Baroda MU	0	0	0	21.45	3.27	5.7	0
MP	Indore MU	0	0	0	0	0	21.5	20
Maharashtra	Kolhapur MU I	0	0	0	0	0	0	0
	Kolhapur MU II	0	0	0	0	0	0	0
	Solapur MU	0	10.82	13.96	11.87	4.75	0	0
	Baramati MU	0	0	0	0	0	0	0
	Pune MU	0	0	0	0	0	0	0
	Rajarambapu MU	0	0	0	0	0	0	0
	ADT KVK, Baramati	0	0	0.88	0	1.96	0	0
Western Region		0	10.82	14.84	33.32	9.98	27.2	19.75
Harayana	Sirsa MU	0	0	0	0	0	0	0
	Ambala MU	0	0	0	0	0	0	0
	Ballabgarh MU	0	0	0	0	0	0	0
Punjab	Jalandhar	0	0	0	0	0	0	0
	Ropar (total)	0	0	0	0	0	0	0
	Ludhiana	0	0	0	0	0	0	0
Rajasthan	Bhilwara MU	0	0	0	0	0	0	0
	Ganganagar MU	0	0	0	0	0	0	0
	Kota MU	0	0	146.56	71.67	594.19	115.02	399.53
	Chittorgarh MU	0	0	0	0	0	0	0
U P	Lucknow MU	0	0	1.161	22.378	70.04	12.744	4.9
	Farrukhabad MU	0	0	0	0	0	0	0
	Bijnore MU	0	0	0	0	0	0	0
	Abmedkarnagar MU	0	0	0	0	0	0	0
	Meerut/Gangol MU	0	0	0	0	0	0	0
Northern Region		0	0	147.721	94.048	664.23	127.764	404.43
Bihar	VaishalPatliputra/Patna MU	0	0	0	0	0	0	0
	Bihar milk federation	0	0	0	0	0	0	0
	Shahabad MU	0	0	10	3.5	8.7	12	9.51
	Barauni MU	0	0	5	0	0	7.5	51
	Tirhut /Mujaffarpur MU	0	0	0	0	0	0.8	0.78
	Vikramshila/ Bhagalpur MU	0	0	0	2.1	7.25	11	4.15
	Mithila/Samastipur MU	0	0	0	250	235	372.64	548.52
Odisha	Balasore	0	0	0	0	0	0	0
	Samleshwari	0	0	0	0	0	0	0
	Koraput	0	0	0	0	0	0	0
West Bengal	Bhagirathi	0	0	0	0	0	0	
Eastern Regio		0	0	15	255.6	250.95	403.94	613.96
Andhra Pradesh	Guntur MU	0	158.8	240	22.6	14.36	71	30
	Krishna MU	0	10.82	1.83	134.81	49	131	78.25
Karnataka	Kolar MU	112.76	66.27	277.61	384	0.3	57.6	0
	Bangalore MU	0	0	325.78	711.65	144.57	0	78
	Raichur MU	0	0	748	1024	1975.5	1550.11	0
	Tumkur MU	0	0	37.96	57.7	47.31	58	131.7
	Hassan MU	0	0	69.35	55.62	76.73	79.11	0
Telangana	Mulukanoor MU	0	0	0	0	0	0	0
Southern Region		112.76	235.89	1700.53	2390.38	2307.77	1946.82	317.95
Grand Total		112.76	246.71	1878.091	2773.348	3232.93	2505.724	1356.09

A. 3.4: Details on Seed Sale by EIAs under NDP- I

State	EIA	Seed sale (MT)						
		2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
Gujarat	Sabarkantha MU	0	20.5	224.2	265.95	0	0	0
	Surat MU	0	771.31	780.42	1023.94	1267.47	1303.79	0
	Banaskantha MU	0	0	0	0	0	0	0
	Panchmahal MU	0	0	99.3	121.55	150.68	234.04	107
	Bharuch MU	0	0	0	14.68	0	0	0
	Baroda MU	0	0	2	76.08	52.32	58.81	20
MP	Indore MU	0	55	25	0	0	29	11
Maharashtra	Kolhapur MU I	19.68	181.58	164.78	284.31	258.13	226.7	181
	Kolhapur MU II	0	0	0	0	0	0	0
	Solapur MU	0	2.62	8.7	13.59	5.78	0.41	1
	Baramati MU	0	0.23	3.5	4.26	7.24	1.33	2
	Pune MU	0	9.3	8.76	13.3	26.81	25.26	23
	Rajarambapu MU	0.76	3.34	3.51	2.07	5.05	2.56	1
	ADT KVK, Baramati	0	0	1.1	0	2.66	0.11	0
Western Region		**20.44**	**1043.88**	**1321.27**	**1819.73**	**1776.14**	**1882.01**	**346.56**
Harayana	Sirsa MU	0	25	69.54	25.5	44	0	0
	Ambala MU	0	0	0	28.58	30.42	11	0
	Ballabgarh MU	0	0	0	9.5	6	6.5	3
Punjab	Jalandhar	0	13.25	11.04	48.58	33.13	11	0
	Ropar (total)	39	228.18	280.4	199.92	92.5	660	0
	Ludhiana	0	0	0	134.53	91.97	39.95	0
Rajasthan	Bhilwara MU	0	75	80	90.85	100.15	148.2	0
	Ganganagar MU	0	20	24.99	0	426.4	0	0.04
	Kota MU	0	0	57.08	84.26	382.64	147.9	276.27
	Chittorgarh MU	0	0	43.34	0	8	46.66	0
U P	Lucknow MU	16	14.32	3.575	30.978	72.04	33.441	13.37
	Farrukhabad MU	0	0	0	7.4	0	1	2
	Bijnore MU	0	0	0	10	0	22	0
	Abmedkarnagar MU	0	0	0	24.39	8.13	0	10
	Meerut/Gangol MU	0	0	0	9.68	0	1	0
Northern Region		55	375.75	569.965	704.168	1295.38	1128.651	304.68
Bihar	VaishalPatliputra/Patna MU	0	0	22.63	110	175	183	105
	Bihar milk federation	0	0	70.16	87	49.5	267.04	157
	Shahabad MU	0	0	41.45	73	70.5	74.6	52
	Barauni MU	0	0	61.61	225.7	296.88	255	398
	Tirhut /Mujaffarpur MU	0	0	1.1	270.1	275.92	298	184
	Vikramshila/Bhagalpur MU	0	0	11.64	67	41.42	61.22	2.18
	Mithila/Samastipur MU	0	0	347.03	289.99	332.99	410.11	284.65
Odisha	Balasore	0	0	0	0	0	0	0
	Samleshwari	0	0	5.7	5.8	4.85	2.62	0
	Koraput	0	0	0	0	0	0	0
West Bengal	Bhagirathi	0	9.64	1.58	0	0	0	
Eastern Region		0	9.64	562.9	1128.59	1247.06	1551.59	1182.83
Andhra Pradesh	Guntur MU	0	323.12	141.45	33.75	57.5	52.87	28.04
	Krishna MU	0	58.74	18.53	68.17	42.13	66.59	68.81
Karnataka	Kolar MU	287.96	320.1	398.24	553.33	600.35	440.05	269.87
	Bangalore MU	0	0	391.74	241.89	296.75	52.58	153.58
	Raichur MU	0	0	728.14	120.45	723.87	0.63	40.01
	Tumkur MU	0	0	0	183.9	374.96	431.04	0
	Hassan MU	0	0	0	202.02	397.18	13	244.41
Telangana	Mulukanoor MU	0	0	28.95	25.7	161.54	95.37	140.37
Southern Region		287.96	701.96	1707.05	1429.21	2654.28	1152.13	945.09
Grand Total		363.4	2131.23	4161.185	5081.698	6972.86	5714.381	2779.16

Source: NDDB, Anand.

Details on Districtwise Fodder Production, Requirement and Consumption in Karnataka

A.4.1 Year-wise FeedConsumption–Cattle

(kg/animal/day)

Year	In-Milk animal			Dry animal *(Including Not Calved even Once)*		
	Green Fodder	Dry Fodder	Concentrate	Green Fodder	Dry Fodder	Concentrate
1992-93	3.196	5.476	0.39	1.519	3.379	0.014
1997-98	4.692	5.614	0.862	2.538	3.488	0.105
2003-04	4.178	5.605	0.628	2.156	3.52	0.074
2007-08	4.528	7.185	0.692	2.695	5.484	0.095
2008-09	5.024	7.541	0.9	3.263	5.541	0.609
2009-10	4.867	7.702	1.063	3.301	5.784	0.502
2010-11	5.08	7.625	0.981	3.265	5.665	0.554
2011-12	5.024	7.541	0.9	3.263	5.541	0.609
2012-13	7.718	6.022	1.73	4.695	6.048	0.676
2013-14	6.809	6.458	1.723	5.018	5.796	0.884

Notes: Fed to adult animals
Source: Integrated Sample Survey reports, Directorate of Animal Husbandry & Veterinary Services, Government of Karnataka, Bangalore.

Table A.4.2: Year-wise Feed Consumption – buffalo

(kg/animal/day)

Year	In-Milk animal			Dry animal *(Including Not Calved even Once)*		
	Green Fodder	Dry Fodder	Concentrate	Green Fodder	Dry Fodder	Concentrate
1992-93	4.101	7.002	1.084	2.830	5.391	0.048
1997-98	5.468	5.761	1.698	2.876	3.666	0.109
2003-04	5.872	6.768	1.823	2.829	4.953	0.092
2007-08	7.767	9.570	1.603	3.905	6.680	0.070
2008-09	7.860	9.092	1.909	4.467	8.349	0.432
2009-10	7.767	9.106	2.214	4.678	6.580	0.213
2010-11	7.993	9.133	2.061	4.620	6.622	0.323
2011-12	7.860	9.092	1.909	4.467	8.349	0.432
2012-13	8.993	7.911	1.937	5.774	7.211	0.951
2013-14	8.930	9.886	2.341	5.735	7.784	1.169

Source: Integrated Sample Survey reports, Department of Animal Husbandry, Govt. of Maharashtra.

Table A.4.3: Area under Fodder Crops and Gross Sown Area

Districts	available/ Required/ balance	Dry Matter availability, Requirement and balance *('000 MT)*						
		1997	2003	2007	2008	2009	2010	2011
Ahmadnagar	Available	2,274	1,950	2,656	3,098	3,085	3,128	3,797
	Required	4,044	4,346	5,218	5,402	5,599	5,808	6,031
	Balance	-1,770	-2,397	-2,562	-2,304	-2,513	-2,680	-2,234
Akola	Available	1,580	997	1,414	791	793	1,174	1,301
	Required	1,970	927	869	859	850	842	835
	Balance	-390	71	545	-68	-57	332	466
Amravati	Available	1,449	1,557	1,827	1,290	1,297	1,757	2,068
	Required	1,716	1,549	1,556	1,563	1,571	1,582	1,596
	Balance	-267	8	270	-273	-274	175	472
Aurangabad	Available	1,409	1,861	2,522	2,826	2,827	2,579	3,075
	Required	1,758	1,553	1,668	1,695	1,725	1,760	1,800
	Balance	-349	308	855	1,131	1,102	819	1,275
Bhandara	Available	1,048	511	588	414	414	466	592
	Required	2,071	876	896	903	911	921	931
	Balance	-1,023	-364	-308	-489	-497	-454	-340
Bid	Available	1,276	1,787	1,890	1,996	1,996	1,828	2,035
	Required	2,074	2,144	2,509	2,585	2,668	2,757	2,855
	Balance	-798	-356	-620	-589	-672	-929	-820
Buldana	Available	1,199	1,614	1,777	1,637	1,635	2,021	2,420
	Required	1,640	1,625	1,808	1,845	1,886	1,931	1,981
	Balance	-441	-10	-31	-208	-252	89	438
Chandrapur	Available	1,100	1,003	1,247	971	971	802	1,116
	Required		1,538	1,439	1,424	1,411	1,401	1,392
	Balance		-535	-191	-453	-441	-599	-276
Dhule	Available	1,863	885	1,071	801	800	1,171	1,748
	Required	2,558	1,221	1,287	1,296	1,305	1,316	1,329
	Balance	-696	-336	-217	-495	-505	-146	419
Gadchiroli	Available	837	760	915	799	799	785	957
	Required	1,448	1,310	1,629	1,707	1,792	1,884	1,984
	Balance	-610	-550	-715	-909	-993	-1,098	-1,028
Gondiya	Available		531	598	471	471	557	697
	Required		1,081	1,098	1,106	1,116	1,129	1,145
	Balance		-549	-500	-634	-645	-572	-448
Hingoli	Available		959	960	740	737	843	1,074
	Required		901	901	901	902	904	906
	Balance		58	59	-161	-164	-61	168
Jalgaon	Available	2,136	2,229	2,480	1,907	1,868	2,531	3,112
	Required	2,897	2,604	2,371	2,340	2,321	2,315	2,326
	Balance	-760	-375	109	-433	-453	216	786
Jalna	Available	956	1,651	1,862	1,169	1,168	1,664	1,875
	Required	1,306	1,798	1,207	1,195	1,193	1,200	1,211
	Balance	-350	-146	655	-26	-25	464	664
Kolhapur	Available	2,161	1,916	1,645	2,428	2,437	2,016	2,307
	Required	3,412	3,544	3,577	3,586	3,597	3,611	3,627
	Balance	-1,252	-1,628	-1,931	-1,158	-1,160	-1,595	-1,321
Latur	Available	1,060	1,423	1,223	1,420	1,417	1,402	2,219
	Required	1,665	1,691	1,689	1,691	1,696	1,703	1,712
	Balance	-605	-268	-466	-271	-279	-301	507
Mumbai	Available	1	1	1	1	1	1	1
	Required			2	2	1	1	1
	Balance			-1	0	0	1	1

Districts	available/ Required/ balance	Dry Matter availability, Requirement and balance *('000 MT)*						
		1997	2003	2007	2008	2009	2010	2011
Nagpur	Available	1,023	1,171	1,498	1,225	1,219	1,268	1,450
	Required	1,665	1,493	1,550	1,566	1,584	1,604	1,625
	Balance	-642	-322	-52	-342	-365	-336	-175
Nanded	Available	1,246	1,798	1,503	1,417	1,416	1,204	1,897
	Required	2,478	2,335	2,315	2,315	2,317	2,320	2,326
	Balance	-1,231	-537	-812	-899	-901	-1,116	-429
Nandurbar	Available		690	727	981	982	943	1,124
	Required		1,285	1,239	1,235	1,235	1,238	1,245
	Balance		-595	-512	-255	-253	-295	-120
Nashik	Available	1,909	2,001	2,082	2,717	2,721	2,400	3,278
	Required	3,544	3,103	3,547	3,602	3,665	3,734	3,811
	Balance	-1,635	-1,102	-1,464	-886	-944	-1,335	-534
Osmanabad	Available	829	1,325	1,386	1,678	1,676	1,642	1,848
	Required	1,431	1,530	1,564	1,574	1,588	1,606	1,627
	Balance	-602	-205	-178	104	88	36	221
Parbhani	Available	1,627	1,560	1,537	1,491	1,491	1,374	1,552
	Required	2,309	1,077	1,324	1,377	1,435	1,496	1,561
	Balance	-683	483	213	114	57	-121	-9
Pune	Available	2,246	2,056	2,255	2,925	2,925	2,605	2,988
	Required	3,536	3,187	4,049	4,184	4,326	4,477	4,636
	Balance	-1,289	-1,130	-1,794	-1,258	-1,401	-1,872	-1,649
Raigarh	Available	693	632	678	699	699	668	646
	Required	1,383	1,226	901	851	806	765	728
	Balance	-690	-594	-223	-152	-107	-97	-82
Ratnagiri	Available	504	522	598	570	570	572	595
	Required	1,430	1,144	998	986	977	969	963
	Balance	-926	-623	-400	-416	-406	-397	-368
Sangli	Available	1,648	1,380	1,483	1,808	1,813	1,822	2,427
	Required	2,423	2,667	2,811	2,842	2,879	2,924	2,975
	Balance	-775	-1,286	-1,328	-1,034	-1,067	-1,101	-549
Satara	Available	1,742	1,752	1,580	2,126	2,126	1,962	2,197
	Required	2,585	2,476	2,415	2,406	2,399	2,393	2,389
	Balance	-843	-724	-835	-280	-273	-431	-192
Sindhudurg	Available	433	390	457	412	412	401	402
	Required	755	675	618	615	614	615	616
	Balance	-321	-285	-161	-204	-203	-214	-215
Solapur	Available	1,614	1,715	2,001	3,060	3,061	2,679	3,133
	Required	2,864	3,250	3,474	3,528	3,586	3,650	3,720
	Balance	-1,250	-1,536	-1,474	-468	-525	-971	-587
Thane	Available	865	644	778	803	812	792	774
	Required	2,036	1,878	1,765	1,746	1,727	1,710	1,695
	Balance	-1,171	-1,235	-987	-943	-916	-919	-921
Wardha	Available	618	938	1,030	754	735	676	889
	Required	1,121	965	984	990	999	1,009	1,022
	Balance	-502	-27	47	-236	-263	-334	-133
Washim	Available		940	1,182	711	711	826	1,231
	Required		712	925	930	938	946	957
	Balance		227	257	-219	-227	-121	274
Yavatmal	Available		1,678	1,850	1,442	1,439	1,305	1,795
	Required	2,140	2,119	1,985	1,975	1,969	1,967	1,969
	Balance		-441	-135	-533	-530	-662	-173

A5.1. State Schemes

Sr. No.	Name of the scheme	Project phase wise	Project cost (Rs)	Subsidy (per cent)	Implementing Officer	Rights of selection of beneficiary
1	Navinypuarn Scheme - 06/04/02 milch animal group distribution scheme	**A)** 06 Crossbred cows / buffaloes distribution - as per @ 40000/-, per animal cost	Rs. 240000/-	General 50%, schedule cast and schedule tribes 75 %	District Deputy Commissioner Animal Husbandry	Committee under chairmanship of the Collector
		Cattle shed (33X35 sq. foot)	Rs. 30000/-			
		Automatic fodder cutting machine	Rs. 25000/-			
		Shed for storing food	Rs. 25000/-			
		Insurance	Rs. 15184/-			
		Total	Rs. 335184/-			
		B) 04 Crossbred cows / buffaloes distribution - as per @ 40000/-, per animal cost	Rs. 160000/-			
		Insurance	Rs. 10125/-			
		Total	Rs. 170125/-			
		C) 02 Crossbred cows / buffaloes distribution - as per @ 40000/-, per animal cost	Rs. 80000/-			
		Insurance	Rs. 5061/-			
		Total	Rs. 85061/-			
2	Navinypuarn Scheme- Semi: Stallfed 10 goats and 1 male goat group distribution	10 + 1 goat group rates (Osmanabadi / Sangamneri breed per goat - Rs.6000/- and male goat Rs. 7000/-)	Rs.67000/-	General 50%, schedule cast and schedule tribes 75 %	District Deputy Commissioner Animal Husbandry	Committee under chairmanship of the Collector
		Local breeds per goat - Rs. 4000/- and male goat Rs.5000/-	Rs.45000/-			
		insurance 4 per cent of the cost of livestock including service charges (Osmanabadi / Sangamneri breeds per goat				
		Local breeds Per Goat	Rs. 2957/-			
			Rs.1986/-			
		Goat Wada	Rs. 15750/- (for 225 Sq. foot)			
		Goat management	Self beneficiary			
		Feeding utensils and water pots	Rs.1000/-			
		Health facilities and treatment	Rs.1150/-			
		Total(For Osmanabadi / Sangamneri)	Rs.87857/-			
		Total Local breeds	Rs. 64886/-			
3	Navinypuarn Scheme - 1000 starting poultry farming (avocation) in Maharashtra state by rearing 1000 broiler birds	Bird shed, Store room, Electrification etc.	Rs. 200000/-	General 50%, schedule cast and schedule tribes 75 %	District Deputy Commissioner Animal Husbandry	Committee under chairmanship of the Collector
		Equipment, Food- water vessels, Brooder	Rs. 25000/-			
		Total	Rs. 225000/-			
		Poor fodder Process materials, Seeds , Saplings	Rs. 2100/-			
		Training / Beneficiary	Rs. 2000/-			
		Total Group cost	Rs. 300000/-			

A.5.2 District Planning Committee Scheme (DPC)

Sr. No.	Name of the scheme	Project phase wise	Project cost (Rs)	Subsidy (per cent)	Implementing Officer	Rights of selection of beneficiary
1.	02 Milch animals group distribution to District's Schedule cast Beneficiary	02 crossbred cows / buffaloes distribution-as per Rs. 40000/- and insurance	Rs. 85061	75 % Subsidy	District Animal Husbandry Officer	Committee under the chairmanship of District Deputy Commissioner Animal Husbandry.
2	Fooder supply to livestock of beneficiary for draught (Bhakad) milch animals of Schedule cast Beneficiary.	Supply of fodder for draught period to the milch animals distributed in government schemes or beneficiaries own milch animals (crossbred cows/ buffaloes 190 kg and 225 kg respectively, in pregnancy period 90 Kg. feed 100 % Subsidy	In the form of object	100 %	District Animal Husbandry Officer	Committee under the chairmanship of District Deputy Commissioner Animal Husbandry.
3	Training to schedule cast beneficiaries regarding Animal Husbandry.	By giving training to schedule cast beneficiaries regarding Animal Husbandry, giving them the opportunity of self-employment 3 days daily allowance and travel allowance Rs.1000/- per beneficiary	3 Days training	rs. 1000/- per beneficiary	District Animal Husbandry Officer	District Animal Husbandry Officer
4	10 Goats & 1 male goat group distribution to the beneficiaries of schedule cast	10 + 1 goat group rates (Osmanabadi / Sangamneri breed per goat - Rs.6000/- and male goat Rs. 7000/-)	Rs. 71239/-	75 % subsidy foe schedule cast	District Animal Husbandry Officer	Committee under the chairmanship of District Deputy Commissioner Animal Husbandry.
		Local breeds per goat - Rs. 4000/- and male goat Rs.5000/-	Rs. 47848/-			
5	Integrated Poultry Development Scheme	Day old 100 chicks group distribution scheme	Rs.16000/-	On 50 % subsidy for general. From 50 % self contribution bird shelter and equipment expenditure	District Animal Husbandry Officer	Committee under the chairmanship of District Deputy Commissioner Animal Husbandry.
		8 to 10 weeks age 25 pullets & 3 cocks group distribution scheme	Rs. 6000/-			
6	Genetic improvement programme to increase productivity of cows / Buffaloes of the state	Selection of high yielding/ producing cows /buffaloes of farmers to give priority to the breeding facility and give incentives to the farmers	Rs.5000/- Female calf Rs.25,000/- male calf purchase	100 % Subsidy,	1. Livestock Development officer, 2. District Animal Husbandry Officer,	Committee under the chairmanship of District Deputy Commissioner Animal Husbandry.
7	Kamdhenu Village adoption scheme (Communal benefit scheme)	Selection of one village from the jurisdiction of dispensary/clinic and implementation of programme for increase in milk production and fodder etc.	Rs.1,52,500/-	100 % subsidy, Communal benefit scheme	District Animal Husbandry Officer	Committee under the chairmanship of District Deputy Commissioner Animal Husbandry.
8	Encouraging for the development of fodder.	100 % subsidy limited to Rs.600/- per acre. Fodder seeds / Perennials fodder saplings supply.	Limited to Rs.600/-	100 % subsidy.	District Animal Husbandry Officer	Committee under the chairmanship of District Deputy Commissioner Animal Husbandry.

A.5.3 Centrally Sponsored Scheme under the National Livestock Mission

Sr. No.	Name of the scheme	Project phase wise	Project cost (Rs)	Subsidy (per cent)	Implementing Officer	Rights of selection of beneficiary
1.	Fodder seed production, collection and distribution scheme	For the production of Fodder Jowar /Maize/Bajari/berseem/ lucern etc. certified seed production in order to distribute the seed of improved fodder crops species to the farmers.	--	75 % subsidy from Centrally Government	District Deputy Commissioner Animal Husbandry	District Livestock Mission Committee.
2.	Fodder production from Nan forest wasteland/rangelands/grassland/non-arable land.	Develop the Nan forest wasteland/rangelands/grassland/ nonarable land & produce the legumes & grasses.	Rs. 30,000/- to Rs. 1,00,000/- according to land type	75 % subsidy from Centrally Government	District Deputy Commissioner Animal Husbandry	District Livestock Mission Committee.
3.	Incentive for hand driven chaff cutter machine	Distribution of hand driven chaff cutter machines according to the Indian standard certification	Rs. 5000/- per unit	75 %, Limited to Rs. 3750/-	District Deputy Commissioner Animal Husbandry	District Livestock Mission Committee.
4.	Incentive for power driven chaff cutter machine	Distribution of power driven chaff cutter machines according to the Indian standard certification	Rs. 20000/- per unit	50% Limited to Rs. 10000/-	District Deputy Commissioner Animal Husbandry	District Livestock Mission Committee.
5.	Establishment of silage making units	Subsidy for the making of silage from the excess produce of green fodder in rainy season	Rs.50,000/- to 1,00000/- per unit	75% Central Share maximum Rs.10000/-	District Deputy Commissioner Animal Husbandry	District Livestock Mission Committee.
6.	Establishment of high capacity fodder block making units.	Subsidy for the establishment of fodder block making unit from crop residue by modern technique which would useful in scarcity period.	Rs.150 lakh per unit.	50% Central Share maximum Rs.75 lakh	District Deputy Commissioner Animal Husbandry	District Livestock Mission Committee.
7.	Distribution of low capacity tractor mountable fodder block making units/ Hay Bailing Machine/ Reaper/ Forage Harvester	Subsidy for the establishment of fodder block making unit from crop residue by modern technique which would useful in scarcity period.	Rs.20 lakh per unit	50% Central Share maximum Rs.10 lakh	District Deputy Commissioner Animal Husbandry	District Livestock Mission Committee.
8.	Establishment of area specific mineral mixture/feed processing units.	Subsidy for the establishment of Area Specific Mineral Mixture/Feed Pelleting/Feed Manufacturing Unit.	--	25% Central Share maximum Rs.200 lakh	District Deputy Commissioner Animal Husbandry	District Livestock Mission Committee.
9.	Establishment of Bypass protein/fat Making units.	Subsidy for the establishment of Bypass protein making units.	--	25% Central Share maximum Rs.200 lakh	District Deputy Commissioner Animal Husbandry	District Livestock Mission Committee.
10	To promote Backyard poultry rearing.	Distribution of 45 poultry birds of 4 week age group i 3 phases on 100 % subsidy to the BPL beneficiaries of backward District and for rearing Rs. 1500/- per beneficiaries. In one mother unit 393 beneficiaries.	To each mother unit holder Rs. 50/- per bird. After distribution Rs. 60,000/- subsidy.	100 %	District Deputy Commissioner Animal Husbandry	District Livestock Mission Committee.

Source: https://ahd.maharashtra.gov.in/index.php?option=com_content&view=article&id=673&Itemid=74

RKVY Feed & Fodder Development

Under this scheme to strenghthen basic irrigation facilities and to produce fodder at farms the total 513 hectare land on the farms of corporation Padegaon dist. Aurangabad, Bilakhed dist Jalgaon, Ambejogai dist. Beed, Dahiwadi dist. Satara, Ranjani Dist. Sangli, Mukhed dist Nanded, Pohara dist. Amravati, Mahud dist. Solapur, Bondri dist. Nagpur is proposed for cultivation of legumes, grasses trees and shrubs. The following farm wise range land will be covered under cultivation for fodder production.

No.	Name of Sheep & Goat Breeding farm	Grassland Proposed (In hectare)
1	Ranjani, Dist: Sangali	200
2	Mahud, Dist: Solapur	100
3	Dahiwadi, Dist: Satara	4
4	Padegaon, Dist: Aurangabad	25
5	Bilakhed, Dist: Jalgaon	100
6	Ambajogai, Dsit: Beed	10
7	Mukhed, Dist: Nanded	4
8	Tirth, Dist: Osmanabad	10
9	Pohara, Dist: Amaravati	50
10	Bondri. Dist: Nagpur	10
	Total	513

Source: https://ahd.maharashtra.gov.in/index.php?option=com_content&view=article&id=636&Itemid=138

Mahatma Gandhi National Employment Guarantee Scheme

Sr. No.	Name of the scheme	Project phase wise	Project cost (Rs)	Subsidy (per cent)	Implementing Officer	Rights of selection of beneficiary
1.	Poultry farming shed	3.75 x 2 Meter, (For 100 Poultry birds)	Rs. 40000/-	Limited to Rs. 40000/-	Block Development Officer	Gram panchayat & Panchayat samittee
2.	Goat farming shed	3.75 x 2 Meter, (For 10 goats)	Rs. 35000/-	Limited to Rs. 35000/-	Block Development Officer	Gram panchayat & Panchayat samittee
3.	In the sheds of cow / buffalo pucca bottom, crib, & tank for storage of urine	26.95 Sq. meter (For 06 milch animals)	Rs. 35000/-	Limited to Rs. 35000/-	Block Development Officer	Gram panchayat & Panchayat samittee
4.	Supplimentary feed for livestock / animals (Azola)	2 x 2 x 0.2 Meter	Rs. 2000/-	Limited to Rs. 2000/-	Block Development Officer	Gram panchayat & Panchayat samittee

GRs- Fodder Scarcity 2018

Additional Chara Production	Srcaity G.R.2018
Available Chara Production	RKVY Fodder seed Distribution Guidlines
Chara Production	Scarcity Circle G.R. 2018
Chara Tanchai	Gala Pera .G.R. 2018
Chara Tanchai Sell	Fodder seed Distribution Under RKVY
Chara Tanchai Upay Yojana	G.R. of 931 drought affected villages 2018
Drought	G.R. of cattle relief and fodder camp 2019
Farmer Land Chara Production	Feed Analysis GR
Fodder Grant Expenditure	Pocra Silage G.R. 2019
Gal Pera Land	Cattle Camps G.R. 2019
Press Note on Scarcity	CattleCampsG.R. 4may2019
RKVY- Fodder seed 2018 G.R.	feedanalysisCircular 20-8-2013
	G.R. of Fodder Camp in Drought area 2018-19 (16 May 2019)
	Tanker Instruction Circular (23.05.2019)
	Sheep & Goat Chavani G.R 31may2019

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वैरण विकास विभाग

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वैरण विकास विभाग

पशुधन संगोपनात पशुधनाची शारिरीक वाढ, प्रजोत्पादन, दुग्धउत्पादन व आरोग्य संवर्धन तसेच पशुधनापासून अपेक्षित लाभ व पशुसंगोपन, दुग्धव्यवसाय आर्थिकदृष्ट्या किफायतशीर वर्धनक्षम होण्यासाठी सकस हिरव्या व वाळलेल्या वैरणीची आवश्यकता असून यासाठी सुधारित, संकरित व अधिक उत्पादन देणाऱ्या बहुवर्षिय एकदल/द्विदल वैरण प्रजातींची लागवड करून वैरण उत्पादन वाढविणे व कमी खर्चात पशुधनासाठी प्रथिनयुक्त व सकस आहार उपलब्ध करण्यासाठी वैरण विकास घटक महत्वाचा, असून वैरण विकासाच्या विविध योजना अंमलबजावणी करून पशुपालकांना आहाराचे महत्व पटवून, तसेच विविध सुधारित संकरित बहुवर्षिय एकदल/द्विदल वैरण प्रजातींची लागवड व प्रसार करणे आवश्यक असते.

सदरबाब विचारात घेवून, पशुसंवर्धन विभागात सन १९५८-५९ वर्षात आधारभूत ग्रामकेंद्रांतर्गत वैरण विकास शाखेचे काम सुरू करण्यात आले. सन १९६५-६६ या वर्षापासून सघन पशुसुधार प्रकल्पात वैरण विकास कार्यक्रमाचा अंर्तभाव करण्यात आला.

सन २०१२ च्या पशुगणनेनुसार राज्यातील ३,१७.९६ लक्ष पशुधनासाठी हिरवी व वाळलेली वैरण व पशुखाद्य याबाबतची आवश्यकता, उपलब्धता व कमतरता याबाबतची स्थिती खालील प्रमाणे.

अ.क्र.	प्रकार	आवश्यकता लक्ष मे.टन	उपलब्धता लक्ष मे.टन	कमतरता लक्ष मे.टन	कमतरतेची टक्केवारी
१	हिरवी वैरण	११०८	४४९	६५९	५९%
२	वाळलेली वैरण	४४३	३०४	१३९	३१%
३	पशुखाद्य	११०	७५	३५	३२%

वरील बाबीच्या अनुषंगाने वैरण विकास शाखेकडून खालील प्रमाणे कामकाज केले जाते.

१. केंद्र पुरस्कृत वैरण लघुप्रात्यक्षिक योजनेअंतर्गत राज्यातील शेतकऱ्यांच्या जमिनीवर सुधारित वैरण पिके लागवडीसाठी बियाणांचे वाटप करणे.

२. विविध वैरण विकास योजनांसाठी केंद्र शासनाकडून प्राप्त होणाऱ्या निधी खर्चाबाबतचे सनियंत्रण करणे. राज्यातील सध्याची व भविष्यातील पशुधन संस्थेच्या आधारावर वैरण व पशुखाद्यांची उपलब्धता व गरज याबाबत माहिती प्राप्त करून, वैरण विकास योजनांचे नियोजन व अंमलबजावणी करणे.

३. राज्यातील वैरणीच्या आवश्यकतेनुसार नविन संकरित वैरण पिके घेण्याची शक्यता पडताळून प्रस्ताव सादर करणे.

४. वैरण विकास कार्यक्रम राबविण्याच्या दृष्टीने कर्मचाऱ्यांचे/शेतकऱ्यांचे राज्यस्तरावर प्रशिक्षण कार्यक्रम आयोजित करून, वैरण विकास विषयक आवश्यक तंत्रज्ञानाची माहिती देणे.

५. दुष्काळ सदृष्य परिस्थिती, अतिवृष्टी, महापूर, भूकंप इत्यादी नैसर्गिक आपत्ती विचारात घेवून, महसूल व वन विभागाच्या मदतीने पशुधनास वैरण खाद्य, सुविधा उपलब्ध करून देण्याबाबत प्रयत्न करणे.

६. केंद्र आणि राज्य शासनास आवश्यकतेनूसार नैसर्गिक आपत्ती, दुष्काळ सदृष्य परिस्थिती बाबत अहवाल सादर करणे.

७. पशुपक्षी खाद्य निर्मिती करिता भारतीय अन्नमहामंडळ यांचे कडील अखाद्य अन्नधान्य पशुखाद्य उत्पादनाकरिता कच्चे घटक उपयोगात आणण्याकरिता पशुखाद्य उत्पादन करणाऱ्या संस्थांना नोंदणी करिता शिफारस पत्र देणे तसेच अन्न महामंडळाकडील अखाद्य अन्नधान्याच्या लिलावाबाबत पशुखाद्य संस्थांना माहिती अवगत करणे.

८. पशुखाद्य निर्मितीसाठी मळीचा कोटा उपलब्धेबाबत शिफारशी करणे.

९. पशुसंवर्धन विभाग तसेच शासकीय/निमशासकीय प्रक्षेत्रावरील जनावरांसाठी, कुक्कुट पक्षांसाठी पशुपक्षी खाद्याचा दर करार करणे.

१०. राज्यात विविध योजनांतर्गत आवश्यक विविध वैरण बियाणे खरेदी करीता वाटप करण्यात येणाऱ्या बी-बियाण्याचा दर करार करणे.

१. केंद्र पुरस्कृत योजना

१) **वैरणीच्या विटा तयार करणे :** ५० टक्के केंद्र हिस्सा व ५० टक्के लाभार्थी हिस्सा असलेली योजना असून एकून युनीट उभारणीसाठी रू. ७५ लाख अनुदान अनुज्ञेय आहे. पिक काढणीनंतर वाया जाणारे पिकांचे अवशेष वाया न घालवता त्याचा जनावरांसाठी वैरणीच्या विटा तयार करण्यासाठी उपयोग करणे, जनावरांसाठी टंचाई, अतिवृष्टी, पुरपरिस्थितीच्या काळात पोषणयुक्त खाद्य उपलब्ध करणे ही या योजनेची उद्दिष्टे आहेत.

२) **पडीक जमिनीत वैरण उत्पादन घेणे :** (Fodder production from fallow land) हलक्या/पडीक जमिनी विकसित करून, त्यावर योग्य प्रकारचे एकदल/द्विदल गवत प्रजाती व वैरणदेय वनस्पती/वृक्ष (फॉडर ट्री) यांची लागवड करून, जमिनीची अतिरिक्त धूप थांबविणे, जनावराच्या पोषणासाठी वैरणीचे उत्पादन करणे, उत्पादित वैरणीचा राखीव साठा, वैरणीचे संचय स्वरूपात जतन करणे, हा या कार्यक्रमाचा उद्देश आहे.

या कार्यक्रमांतर्गत जमिनीची प्रतवारी निश्चित करून, कृषी हवामान प्रभागानुसार योग्य, गवत प्रजातींची लागवड करणे, जेणेकरून सदर जमिनीची धूप थांबविण्याबरोबरच सुपीकता वाढविण्यास मदत होईल. या अंतर्गत सामाईक/वरकस जमिनी/गायरान/पडीक जमिनी/शासकीय प्रक्षेत्राच्या जमिनी/गोशाळांच्या जमिनी/वनक्षेत्रातील जमिनी आणि शेतकऱ्यांच्या वैयक्तिक जमिनीवर, सदर कार्यक्रम राबविण्यात येतो. सदर कार्यक्रमांतर्गत १ हेक्टरच्या एका युनिट करीता केंद्र शासनाचे ७५ टक्के अर्थसहाय्य देण्यात येते. तसेच जमिनीच्या प्रभागानुसार रूपये ३० हजार ते रूपये १.०० लक्ष अनुदान अनुज्ञेय आहे.

३. **वैरण बियाणे उत्पादन/संकलन आणि वितरण** (Fodder Seed Procurement and Distribution) **:**

राज्यात उत्तम दर्जाचे ब्रिडर वैरण बियाणे, पायाभूत बियाणे आणि प्रमाणित बियाणे यांचे उत्पादन वाढवून उत्पादित बियाणांना खात्रीशीर बाजारपेठ उपलब्ध करून देणे, आणि शेतकऱ्यांना वैरण उत्पादनासाठी दर्जेदार प्रमाणित वैरण बियाणे वाटप करणे, हा या कार्यक्रमाचा उद्देश आहे. या कार्यक्रमाकरिता शासकीय यंत्रणा/शासन अंगीकृत उपक्रमांना केंद्र शासनाचे ७५ टक्के अनुदान व राज्य शासनाचे २५ टक्के अनुदान अनुज्ञेय आहे.

४) **खाद्य विश्लेषण प्रयोगशाळांचे बळकटीकरण :** राज्यात पशु व कुक्कुट खाद्याचा तसेच या खाद्याच्या निर्मितीसाठी लागणाऱ्या खाद्य घटकांचा दर्जा, विहित मानंकानुसार व उच्च प्रतीचा राखण्यासाठी, उच्च दर्जाचे खाद्य उत्पादन वाढविणे व उपलब्ध करून देणे, हा या कार्यक्रमाचा उद्देश आहे. या कार्यक्रमांतर्गत राज्यातील पशुसंवर्धन विभागाची खाद्य विश्लेषण प्रयोगशाळा, तसेच महाराष्ट्र पशु व मत्स्य विज्ञान विद्यापीठ यांचे अधिनस्त कार्यरत असलेल्या पशुवैद्यकीय महाविद्यायातील खाद्य विश्लेषण प्रयोगशाळा तसेच कृषी विद्यापीठांतर्गत कार्यरत खाद्य विश्लेषण प्रयोगशाळांमध्ये, खाद्य नमुन्यांचे पृथ:करण करणेसाठी आवश्यक असलेली आधुनिक यंत्रसामुग्री व उपकरणे खरेदी करण्यासाठी अनुदान उपलब्ध करण्यात येत. याकरीता केंद्र शासनाचे ७५ टक्के अनुदान अनुज्ञेय असून उर्वरीत २५ टक्के खर्च राज्य हिस्सा आहे. एका खाद्य विश्लेषण प्रयोगशाळेकरीता केंद्र शासनाच्या अनुदानाची अनुज्ञेय कमाल मर्यादा रूपये. २००.०० लक्ष (रूपये दोनशे लक्ष) आहे.

५) **अ) हस्तचलीत कडबाकुट्टी यंत्राच्या वापरास प्रोत्साहन देणे** (Introduction of Hand Driven Chaff Cutter)**:**

राज्यात उत्पादित होणाऱ्या वैरणीचा पुरेपुर वापर व्हावा व वैरण वाया जाण्याचे प्रमाण कमी व्हावे, हा या कार्यक्रमाचा उद्देश आहे. एका हस्तचलीत कडबाकुट्टी यंत्र खरेदीसाठी रू. ५०००/- (रूपये पाच हजार फक्त) खर्च अपेक्षित आहे. सदर खर्चाच्या ७५ टक्के अथवा कडबाकुट्टी यंत्राच्या प्रत्यक्ष खरेदी किंमतीच्या ७५ टक्के यापैकी जी रक्कम कमी असेल, तेवढी केंद्र शासनाचे अनुदान या कार्यक्रमांतर्गत अनुज्ञेय आहे.

ब) विद्युतचलीत कडबाकुट्टी यंत्राच्या वापरास प्रोत्साहन देणे (Introduction of Power Driven Chaff cutter)**:**

राज्यात उत्पादीत होणाऱ्या वैरणीचा पुरेपुर वापर व्हावा व वैरण वाया जाण्याचे प्रमाण कमी व्हावे, हा या कार्यक्रमाचा उद्देश आहे. एका विद्युतचलीत कडबाकुट्टी यंत्र खरेदीसाठी रू. २००००/- (रूपये वीस हजार फक्त) खर्च अपेक्षीत आहे. सदर खर्चाच्या ५०% अथवा कडबाकुटी यंत्राच्या प्रत्यक्ष खरेदी किंमतीच्या ५०% यापैकी जी रक्कम कमी असेल, तेवढे केंद्र शासनाचे अनुदान या कार्यक्रमांतर्गत अनुज्ञेय आहे.

६. **मुरघास तयार करण्याच्या युनीटची स्थापना करणेसाठी अर्थसहाय्य** (Assistance for Establishment of Silage making Units)

अतिरिक्त उत्पादित हिरव्या वैरणीचे मुरघास तयार करून, त्याचा चारा टंचाईच्या काळात गुरांना पोषणमूल्य युक्त वैरण उपलब्ध करून देणे या कार्यक्रमाचा उद्देश आहे.

८. **बायपास प्रोटीन उत्पादन केंद्रांच्या स्थापनेकरीता अर्थसहाय्य** (Assistance for Establishment of Bypass Protein Production Units) :

उच्च दुग्ध उत्पादन करणाऱ्या दुधाळ गायी म्हशींच्या पोषणासाठी उत्तम दर्जाचे खाद्य घटक वापरून या खाद्याचे पोषणमूल्य वाढविण्याबरोबरच ते गुरांच्या आहारासाठी पुरेपुर उपयोगात आणणे, हा या कार्यक्रमाचा उद्देश आहे. या कार्यक्रमांतर्गत दुध महासंघ, खाजगी उद्योजक यांना प्रती दिन ५० मेट्रीक टन उत्पादन क्षमतेचे, बायपास प्रोटीन उत्पादन केंद्राची स्थापना करण्यासाठी केंद्र शासनाचे अर्थसहाय्य अनुदेय आहे. सदर युनीटची स्थापना करण्यासाठी लागणारी संयंत्रे व यंत्रसामुग्री यांच्या खरेदीसाठी रू. २०० लक्ष किंवा प्रत्यक्ष खरेदी खर्चाच्या २५ टक्के यापैकी जी रक्कम कमी असेल, त्या मर्यादेत केंद्र शासनाचे अनुदान अनुज्ञेय राहील. संस्था/उद्योजकाला प्रकल्प उभारणीसाठीचा उर्वरित खर्च बँकेच्या कर्जाद्वारे उपलब्ध करावा लागेल. या कार्यक्रमाखाली संस्था/उद्योजकांचे राष्ट्रीयकृत/व्यापारी बँक/नाबार्ड यांचेकडून प्रकत्पाच्या आर्थिक व्यवहार्यतेबाबत आणि वर्धनक्षमतेबाबत प्रमाणित केलेले विचारात घेतले जातात.

९. **क्षेत्रनिहाय विवक्षित भागात क्षार मिश्रण, पशुखाद्य कांडी व पशुखाद्य निर्मिती केंद्राच्या स्थापनेकरीता अर्थसहाय्य** (Assistance for Establishment of Area specific Mineral Mixture/Feed Pelleting. Feed Manufacturing Unit):

पशुखाद्य व विवक्षित भागातील क्षारांच्या कमतरतेनुसार, त्या भागात आवश्यक घटक द्रव्यांसह क्षार मिश्रणाची उपलब्धता वाढवून त्याद्वारे पशुधनाच्या आरोग्यात सुधारणाव उत्पादन क्षमतेत वाढ करणे, हा या कार्यक्रमाचा उद्देश आहे. या कार्यक्रमाखाली, सार्वजनिक उपक्रम, खाजगी उद्योजक यांना क्षार मिश्रण, पशुखाद्य कांडी व पशुखाद्य निर्मिती केंद्रांच्या स्थापनेकरीता अर्थसहाय्य देय आहे. या अंतर्गत केंद्र शासनाचे २५% अनुदान प्रति केंद्र रू. २००.०० लक्ष किंवा प्रत्यक्ष संयंत्र उभारणीच्या खर्चाच्या २५% रक्कम, या दोन्ही पैकी जी रक्कम कमी असेल, त्या मर्यादेत देय राहील. या कार्यक्रमाखाली संस्था/उद्योजकांना केंद्रीय अर्थसहाय्याचा लाभ घेण्यासाठी उर्वरीत रक्कम बँकेचे कर्ज घेवून उभारावी लागेल. तसेच राष्ट्रीयकृत बँक/नाबार्ड यांचेकडून प्रकल्पाच्या आर्थिक व्यवहार्यतेबाबत आणि वर्धनक्षमतेबाबत प्रमाणित केलेले प्रस्ताव विचारात घेतले जातात. या कार्यक्रमाखाली लघु उत्पादन क्षमतेचे प्रकल्प प्रस्ताव देखील विचारात घेतले जातील.

३. योजनेत्तर योजना

जिल्हा परिषदेमार्फत १०० टक्के अनुदानावर वैरण पिकांच्या सुधारित जातीच्या वैरण बियाण्याचे व ठोंबाचे वाटप करण्यात येते. सदर योजना खालील मार्गदर्शक सुचनांनुसार राबविण्यात येते.

१) योजनेमध्ये लाभार्थींची निवड करताना योजनेच्या उद्देशाप्रमाणे लाभार्थींची निवड करण्यात येते उदा. सर्व साधारण आदिवासी क्षेत्रासाठी योजना असेल तर आदिवासी क्षेत्रातीलच आदिवासी शेतकऱ्यांची निवड करावी. आदिवासी क्षेत्राबाहेरील परंतु आदिवासी करीता योजना असेल तर त्या प्रमाणे आदिवासीची निवड करावी सर्वसाधारण शेतकऱ्यांसाठी योजना असेल तर त्या मध्ये अल्प अत्यल्प जमीनधारक शेतकऱ्यांचाही समावेश करण्यात येतो.

२) ज्या लाभार्थीकडे स्वत:ची जनावरे आहेत अशाच लाभार्थींची निवड केली जाते. लाभार्थींच्या जनावरामध्ये एकातरी दुभत्या गायीचा समावेश असल्यास अशा लाभार्थीस प्राधान्य दिले जाते.

३) योजनेसाठी वैरण बियाणाचे वाटप करताना लाभार्थ्यांकडे वैरण उत्पादनासाठी स्वत:ची शेत जमिन असणे आवश्यक आहे. सिंचन सुविधा उपलब्ध असणाऱ्या लाभार्थी शेतकऱ्यांना एनबी-२१, बरसीम, ल्युसर्न, यशवंत, जयवंत इत्यादी बागायती पिकांचे बियाणे/ठोंबाचा प्राधान्याने पुरवठा करण्यात येतो.

४) यशवंत गवताची लागवड ३ x ३ फुट (९० x ९० सें.मी.) अंतरावर कर. याकरिता हेक्टरी २५००० ठोंबाची आवश्यकता असते, तर प्रति एकरी १०,००० ठोंबे पुरेशी होतात. यशवंत गवताची ठोंबे, संशोधन अधिकारी, गवत संशोधन योजना, व विभागप्रमुख, पशुसंवर्धन व दुग्धव्यवसाय विभाग, महात्मा फुले कृषि विद्यापीठ राहूरी जिल्हा अहमदनगर तसेच कृषि संशोधन केंद्र पालघर जिल्हा ठाणे यांचेकडे प्रतिनग रूपये

१/- या दराने उपलब्ध आहेत. यशवंत गवतापासून प्रति हेक्टरी २०० ते २५० टन हिरव्या चाऱ्याचे उत्पादन मिळते. यामध्ये १०.५७ टक्के प्रथिनाचे प्रमाण असून ते गजराज (९.४ टक्के) पेक्षा जास्त आहे. यशवंत गवताच्या चाऱ्यांची पचनीयता ६३.६५ टक्के आहे.

५) फुले जयवंत गवताची लागवड ३ x २फुट (९० x ६० सें.मी.) अंतरावर करण्यात येते. याकरिता हेक्टरी ३७००० ठोंबाची आवश्यकता असते, तर प्रति एकरी १४,८०० ठोंबे पुरेशी होतात. फुले जयवंत गवताची ठोंबे, कृषि संशोधन केंद्र पालघर, जिल्हा ठाणे (कोकण कृषि विद्यापीठ, दापोली अंतर्गत) व गो संशोधन व विकास प्रकल्प, महात्मा फुले कृषि विद्यापीठ राहूरी जिल्हा अहमदनगर येथे प्रति नग रूपये १/- या दराने उपलब्ध आहेत. फुले जयवंत गवतापासून प्रति हेक्टरी २५० ते ३०० टप हिरव्या चाऱ्याचे उत्पादन मिळते. यात १०.३५ टक्के प्रथिनाचे प्रमाण असून ते गजराज (९.४ टक्के) पेक्षा जास्त आहे. फुले जयवंत गवताच्या चाऱ्याची पचनियता ६१.८ टक्के आहे.

६) पिकाकरिता आवश्यक खते जिवाणू संवर्धने लाभार्थीने स्वत:च्या खर्चाने घेणे अपेक्षित आहे.

७) प्रत्येक लाभार्थींना ०.१० ते ०.४० हेक्टर क्षेत्र मर्यादेत वैरण बियाणे/ठोंबे प्रती एकर रूपये ६००/- च्या मर्यादेपर्यंत १०० टक्के अनुदानावर वस्तूरूपात पुरवठा करण्यात येतो.

८) वर्षात एका लाभार्थींला एकदाच अनुदानाचा लाभ देण्यात येतो.

९) प्रादेशिक पशुसंवर्धन सहआयुक्त यांचे कार्यालयातील वैरण विकास अधिकारी यांचे मार्गदर्शन घेवून योजना राबविण्यात येते.