

“Impact Assessment and Evaluation of Fodder Seed Production and Sale activities under National Dairy Plan I- Andhra Pradesh”



Funded by PMU NDDB



Agro-Economic Research Centre
(Ministry of Agriculture & Farmers Welfare, GOI)
H. M. Patel Institute of Rural Development
Sardar Patel University,
Vallabh Vidyanagar 388120, Dist. Anand, Gujarat.
Ph. +91-2692-230106/230799; Fax- +91-2692-233106

© NDDDB, Anand.

AERC Report No. 184

Prepared by: Agro-Economic Research Centre, Sardar Patel University, Vallabh Vidyanagar, Anand.

Dr. S. S. Kalamkar, *Director and Professor, AERC*

Dr. Kinjal Ahir, *Deputy Director (Hon), AERC*

Dr. S. R. Bhaiya, *Field Officer, CCS, AERC*

Dr. H. Sharma, *Research Officer, AERC*

Dr. M. Swain, *Former Research Officer, AERC*

State Partners

Karnataka	Agricultural Development and Rural Transformation Centre, Institute for Social and Economic Change, Nagarbhavi, Bangalore, India
Andhra Pradesh	Assistant Professor, Centre for Economic and Social Studies, Nizamiah Observatory Campus, Begumpet, Hyderabad- 500016, Telangana
Uttar Pradesh	Hon. Director and Professor, Agro-Economic Research Centre, Monirba Campus, Chaitam Line, University of Allahabad, Allahabad-211 002, Uttar Pradesh.
Rajasthan	Officer In-charge, Cost of Cultivation Scheme, Maharana Pratap University of Agriculture & Technology, Udaipur 313 001, Rajasthan
Bihar	Director, Agro-Economic Research Centre, T M Bhagalpur University, Bhagalpur – 812 007, Bihar
Maharashtra	Professor, Department of Economics, Shivaji University, Kolhapur 416 004, Maharashtra
Gujarat	Director & Professor, AERC, Sardar Patel University, Vallabh Vidyanagar, Anand
Punjab	Principal Scientist and Head, Division of Dairy Economics, Statistics & Management, National Dairy Research Institute, Karnal (Haryana), INDIA 132001

Published by

The Director

Agro-Economic Research Centre

(Ministry of Agriculture & Farmers Welfare, Govt. of India)

Sardar Patel University, Vallabh Vidyanagar, Anand, Gujarat.

Ph. No. +91-2692-230106, 230799, 292865 (direct)

Fax- +91-2692-233106

Email: director.aerc@gmail.com; director.aercgujarat@gmail.com

Printing and Circulation In-charge:

Shri Deep K. Patel

Draft Report submitted in May 2019

Final Report submitted in August 2019

Citation: Kalamkar, S. S.; Ahir Kinjal; Bhaiya S. R.; Sharma H. and Swain M. (2019). **“Impact Assessment and Evaluation of Fodder Seed Production and Sale activities under National Dairy Plan I- Andhra Pradesh”**, AERC Report No. 184, Agro-Economic Research Centre, Sardar Patel University, Vallabh Vidyanagar, Anand, Gujarat.

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 marginal and small 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.

Agro-Economic Research Centre
For the states of Gujarat and Rajasthan
(Ministry of Agriculture and Farmers Welfare,
Govt. of India)

Sardar Patel University,
Vallabh Vidyanagar 388120

(Dr. S.S. Kalamkar)
Director & Professor

Acknowledgements

The study on “Impact Assessment and Evaluation of Fodder Seed Production and Sale activities under National Dairy Plan I” has been carried out at the Agro-Economic Research Centre, Sardar Patel University, Vallabh Vidyanagar, Anand, Gujarat, as supported by National Dairy Development Board, Anand, Gujarat.

We have benefited immensely from various scholars and officials from different government departments while carrying out this study. At the outset, we would like to thank **Prof. Shirish Kulkarni**, Vice Chancellor of our University and Chairman, AERC Governing Body for his constant encouragement and support for undertaking such research activity at the Centre.

We are deeply grateful to our Honorary Advisor Prof. **Mahesh Pathak** for his constant support and guidance in undertaking and completion of this project work.

We are grateful to **Dr. Dilip Rath**, Chairman, National Dairy Development Board (NDDB) for giving us an opportunity to undertake this study. We also thank the officers of NDDB, Shri O. P. Sachan (GH, Purchase), Shri Meenesh C Shah (GH, CMC), Shri Chokallngam (GH, SA&S), Shri V. Sridhar (GH, AN), Dr. Jignesh Shah (Sr. Manager), Shri S. Y. Krishna (Sr. Manager Purchase), Shri Arvind Kumar (Sr. Manager, CMC), Dr. Anil Patel and Shri V. Bhattacharya for their support and help during the study.

We are thankful to **Dr. Digvijay Singh**, Senior Manager (AN), NDDB, Anand for his constant support during the execution of field survey data work.

We thank all the corresponding officers of NDDB in selected States for providing the necessary support in primary data collection. We are grateful to the all the Chairman and Managing Director of selected District Co-operative Milk Producers' Union Ltd as well as Primary Dairy Cooperative Societies of selected villages from all the States for covered under study for providing the necessary data and support in primary data collection.

We are also thankful to all our state partners, viz. Agricultural Development and Rural Transformation Centre, Institute for Social and Economic Change, Bangalore, India; Assistant Professor, Centre for Economic and Social Studies, Nizamiah Observatory Campus, Begumpet, Hyderabad- 500016, _Telangana; Hon. Director and Professor, Agro-Economic Research Centre, Monirba Campus, Chaitam Line, University of Allahabad, Allahabad, Uttar Pradesh; Officer Incharge, Cost of Cultivation Scheme, Maharana Pratap University of Agriculture & Technology, Udaipur, Rajasthan; Director, Agro-Economic Research Centre, T M Bhagalpur University, Bhagalpur, Bihar; Professor, Department of Economics, Shivaji University, Kolhapu, Maharashtra; Principal Scientist and Head, Division of Dairy Economics, Statistics & Management, National Dairy Research Institute, Karnal (Haryana) for their support in primary data collection in respective state.

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.

We have also received support and encouragements from our colleagues in the Centre while carrying out the study. We are thankful to our fieldsmen (for collecting data from the field and government/dairy union offices), accounts and supporting staff for necessary support.

Thanks to Shri Deep Patel (Research and Reference Assistant-Lib) for preparing the cover page of report and making necessary arrangements for printing of the report.

Lastly but not least, we thank the all other AERC staff for their direct and indirect support.

Agro-Economic Research Centre

For the states of Gujarat and Rajasthan
(Ministry of Agriculture, Govt. of India)

Sardar Patel University,

Vallabh Vidyanagar 388120, Anand, Gujarat.

S. S. Kalamkar

Kinjal Ahir

S. R. Bhaiya

Hemant Sharma

Mrutyunjay Swain

Contents

<i>Foreword</i>	<i>iii</i>	
<i>Acknowledgements</i>	<i>v</i>	
<i>List of Tables</i>	<i>x</i>	
<i>List of Figures</i>	<i>xv</i>	
<i>List of Maps</i>	<i>xvi</i>	
<i>List of Boxes</i>	<i>xvi</i>	
<i>List of Annexures</i>	<i>xvi</i>	
<i>List of Abbreviations</i>	<i>xvii</i>	
<i>Glimpses of Field Visits</i>	<i>-</i>	
Chapter I	Introduction	01
1.1	Introduction	
1.2	Dairy Development in India	
1.3	Cooperative Dairy Sector in India	
1.4	Growth and Compositional Changes in Livestock Population	
1.5	Milk Production and Productivity	
1.6	Status of Availability of Feed and Fodder	
1.7	Need for an Inclusive Fodder Development Programme	
1.8	Need of the Study	
1.9	Objectives of the study	
1.10	Data Sources	
1.11	Survey Design	
	1.11.1 Sampling Framework	
	1.11.2 Development of Survey schedule	
	1.11.3 Analytical Framework	
1.12	Limitations of the Study	
1.13	Organization of the Report	
Chapter II	Dairy and Fodder Development in AP	43
2.1	Introduction	
2.2	Role of Dairy Sector in State Economy of AP	
2.3	Composition of Livestock in the State	
2.4	Growth in Milk Production and Productivity	
2.5	Status of Availability of Feed and Fodder	
2.6	State Government Policies for Fodder Development	
2.7	Chapter Summary	

Chapter III	Profile of Selected Area, Milk Union, Villages & PDCS	63
3.1	About Selected Study Area	
3.2	Selected Milk Unions	
3.2.1	Krishna Milk Union	
3.2.2	Sangam Milk Union	
3.2.3	Basic Information of Selected EIAs	
3.2.4	Fodder Seed Multiplication and Distribution	
3.2.5	Fodder Seed Management	
3.2.6	Training Programmes on Fodder Development	
3.2.7	Development Activities	
3.3	About Selected Villages	
3.3.1	Cropping Pattern	
3.3.2	Livestock and Machinery	
3.4	About Selected PDCS	
3.5	Chapter Summary	
Chapter IV	Profile of Selected Fodder Seed and Fodder Growers	83
4.1	Introduction	
4.2	Fodder Growers and Seed Growers	
4.2.1	Profile of Selected Households	
4.2.2	Breedable Animals	
4.2.3	Source-wise Farmers' Income	
4.2.4	Cropping Pattern	
4.3	Chapter Summary	
Chapter V	Fodder Seed Production	95
5.1	Introduction	
5.2	Seed received from Milk Union for Seed Production	
5.3	Changes in Area under Fodder Seed crops	
5.4	Participation in Fodder Seed Production under NDP- I	
5.5	Reasons for Choice for participating in Fodder Seed Production under NDP- I	
5.6	Training on Fodder Development by Milk Union/PDCS	
5.7	Details Cultivation Practices adopted (Seed Production)	
5.8	Cultivation of Fodder Seed and Competitive Crop	
5.9	Production and Sale of Green and Dry Fodder as well as Seed	
5.10	Opportunity Costs of Fodder Seed Cultivation	
5.11	Constraints Faced by the Fodder Seed Growers	
5.12	Chapter Summary	

Chapter VI	Cultivation of Fodder Crops	109
	6.1 Introduction	
	6.2 Seed received from Milk Union	
	6.3 Changes in Area under Fodder Crops	
	6.4 Participation in Fodder Production under NDP- I	
	6.5 Reasons for Choice of Source of Seed for Fodder Production	
	6.6 Training on Fodder Development by Milk Union/PDCS	
	6.7 Details Cultivation Practices adopted	
	6.8 Cultivation of Fodder and Competitive Crop	
	6.9 Opportunity Costs of Fodder Cultivation	
	6.10 Constraints Faced by the Fodder Seed and Fodder Growers	
	6.11 Chapter Summary	
Chapter VII	Milk Production, Use and Sale	119
	7.1 Introduction	
	7.2 Cost of Milk Production& Types of Fodder	
	7.3 Effect of Green Fodder on Milk Productivity	
	7.4 Milk Production, Use and Sale	
	7.5 Chapter Summary	
Chapter VIII	Awareness /Outreach of FDP under NDP-I	125
	8.1 Introduction	
	8.2 Awareness about FDP	
	8.3 Effect of Fodder Seed and Fodder Production Programme	
	8.4 Perception of Non Beneficiary Households	
	8.5 Constraints faced by PDCS and Suggestions	
	8.6 Constraints faced by Milk Unions and Suggestions	
	8.7 Chapter Summary	
Chapter IX	Conclusions and Recommendations	135
	References	159
	Annexures (I-V)	1635

List of Tables

Table No.	Title	Page
1.1	Percentage Contribution of Livestock in Total Agriculture GVA	2
1.2	Value of Output from Livestock Sector (at current prices)	3
1.3	Growth of Dairy Cooperatives Societies in India	5
1.4	Share of Major States in Total Milk Procurement by Cooperative sector	8
1.5	Livestock Population in India by Species (in million numbers) for 1951-2012	9
1.6	Milch Animal Population by States (2012)	10
1.7	Livestock holding pattern among Landowners	11
1.8	Milk Production and Per Capita Availability in India	12
1.9	State-wise Milk Production in India	13
1.10	Milk Yield in India and other Selected Countries (2012 & 2017)	15
1.11	Statewise Estimates of Milk Yield Rates 2013-14& 2017-18	16
1.12	Area under Fodder Cultivation and Permanent Pastures & Other Grazing Lands in India	18
1.13	Forage crops grown and their area and productivity in India	19
1.14	Projected Livestock Population Estimates	21
1.15	Estimates of feed and Fodder in India	22
1.16	Supply and Demand of Green and Dry Fodder	22
1.17	Availability, Requirement & Deficit of Crude Protein (CP) & Total Digestible Nutrients (TDN) including CP & TDN from concentrates	22
1.18	Availability, requirements and deficit of concentrates for livestock	23
1.19	State-wise Production of Dry & Green Fodder('000 tonnes)	23
1.20	State-wise Availability and Requirement of Fodder in India (2008)	25
1.21	Production of Coarse Cereals in India	25
1.22	Region-wise Cattle Feed Production in India	26
1.23	Estimated National Seed Requirement & Status of Breeder Seed Produced	27
1.24	Details regarding dual purpose fodder species Cultivated in different regions	28

1.25	High yielding fodder varieties suggested for Seed production programme	28
1.26	Forage crops and their varieties suitable for waterlogged soil	28
1.27	Fodder Seed Production under NDP I (2016-17)	33
1.28	States and EIAs covered under study	36
1.29	Details regarding Selected Sample Households for the Study	37
2.1	Contribution of Gross Value of Output and Gross Value Added from Agriculture and Livestock Sector to total GSDP at Current Prices of Andhra Pradesh	45
2.2	Value of Output: Agriculture and Livestock in Andhra Pradesh	46
2.3	Growth of the Livestock in Andhra Pradesh and India	47
2.4	Species-wise Livestock Population & its Share in total Livestock	47
2.5	Growth in Livestock Population in AP- 1951 to 2012	48
2.6	District wise Percentage share of Animals in Total Livestock Population	49
2.7	District-wise Livestock and Bovine Density (1992-2012)	50
2.8	Distribution of Cattle Breeds in Andhra Pradesh	51
2.9	Performance of Native Cattle Breeds	51
2.10	Number per 1000 of households reporting owning livestock of different types for each size class of households operational holdings in Andhra Pradesh (Rural) 2003	51
2.11	Year-wise In-milk Bovine Population, Milk Yield and Milk Production	52
2.12	District wise & category wise Percentage share of Milk Production in AP	55
2.13	Year-wise & District-wise Total Milk Production Density	55
2.14	Districtwise Area of Forage and Fodder crops in Andhra Pradesh (2015-16)	56
2.15	Availability, requirement and Surplus/Deficit of Feed nutrient in ANDHRA PRADESH	57
2.16	District-wise Dry Matter Availability, requirement and Balance in AP	57
3.1	Selected Milk Producers' Cooperative Unions in AP	65
3.2	Details of Selected Milk Producers' Cooperative Unions in AP	67
3.3	Details of Milk Purchase, Sale and Fodder Seed by Selected EIAs in AP	68
3.4a	Fodder Seeds Distribution Programme (for fodder production) by Krishna MU to PDCS	69

3.4b	Details on Fodder Seeds Distribution Programme by Sangam MU	69
3.5	Fodder Seed Multiplication & Fodder Production Programme in Krishna Milk Union	69
3.6	Fodder Seed (SEED multiplication programme under NDP- I) by Sangam Milk Union	70
3.7	Fodder Seed (for FODDER production) supplied by the Krishna Milk Union to PDCS	70
3.8	Fodder Seed (for FODDER production) supplied by the Sangam Milk Union to PDCS	71
3.9	Fodder Seed Management (Quantity in qtls) – Krishna Milk Union	71
3.10	Fodder Seed Availability and disbursement (2013-2018)- Fodder Production – Sangam MU	72
3.11	Fodder Seed Availability and Disbursement (2013-2018) by Krishna MU for Fodder Production	72
3.12	Fodder Seed Availability and Disbursement (2013-2018) by Sangam MU for Fodder Production	73
3.13	Training on Fodder Development provided by Krishna and Sangam Milk Union/PDCS	73
3.14	Details of Development Activities undertaken by Surat Milk Union under FDP: NDP-I	74
3.15	Basic details of Selected Villages (2011 Census)	75
3.15	Details on Facilities available in and nearby Selected Villages	75
3.16	Details on Facilities available in and nearby Selected Villages	75
3.17	Cropping Pattern of Selected Households	76
3.18	Details on Livestock and Machinery (Village Census)	76
3.19	General Information of PDCS in Selected Villages	77
3.20	Fodder Seed Multiplication and Fodder production programme	77
3.21	Availability of Some Facilities (% of PDCS with yes)	78
3.22	Fodder Seed (for FODDER production) supplied by the Milk Union to Dairy Cooperative (PDCS)	78
3.23	Concentrates supplied by the Society/Firm during Last One Year	79
3.24	Training arranged/provided by Society during Last One Year	79
3.25	Details of Development Activities undertaken under FDP-NDP-I	79
3.26	Details of Development Programmes/Support	90
3.27	Details of Development Activities undertaken under FDP-NDP-I	91

4.1	Family Profile of Selected Fodder Seed and Fodder Growers Households	84
4.2	Socio-Economic Characteristics of Selected Households	85
4.3	Details on Occupation and Land Holdings Size of Selected Households	86
4.4	Details on Land Holdings by Selected Sample Fodder Growers (ha	87
4.5	Herd Strength of Selected Fodder Growers Households	88
4.6	Cattle Shed and Fodder Storage Selected Fodder Growers Households	89
4.7	Holding of Productive Assets by Selected Fodder Growers Households	89
4.8	Source-wise Farmer's Households Income (Fodder Growers Households)	90
4.9a	Cropping Pattern of Selected Fodder Growers (Rabi)	91
4.9b	Cropping Pattern of Selected Fodder Growers Households (kharif)	91
4.10	Cropping Pattern of Selected Seed Growers Households (Beneficiary Rabi 2017-18)	92
5.1	Seed received from Milk Union by selected households for Seed Production (NDP-I)	98
5.2	Changes in Area under Fodder Seed crops (Rabi 2017-18; Kharif 2018)	99
5.3	Details about Participation in Fodder Seed Production under NDP- I	100
5.4	Details regarding inputs received from Union/Dairy for production of fodder seed	100
5.5	Reasons for Choice for participating in Fodder SEED production under NDP- I	101
5.6	Details of Training Provided by Milk Union/Dairy Society - No training	101
5.7	Details Cultivation Practices adopted (Seed Production)	102
5.8	Cost of Cultivation of Fodder Seed Crop and Competitive crop (Rabi 2017-18)	103
5.9	Cost of Cultivation of Fodder Seed Crop and Competitive crop (Kharifi 2017-18)	103
5.10	Production and Sale of Green Fodder (before SEED production) & seed	104
5.11	Opinion regarding opportunity Costs of Fodder Seed Cultivation	104
5.12	Constraints Faced by the Fodder SEED GROWERS	105

6.1	Seed received from Milk Union for Fodder production (under NDP)	110
6.2	Changes in Area under Fodder crops	110
6.3	Details about Participation in Fodder Production under NDP- I	111
6.4	Reasons for Choice of Source of Seed for Green Fodder production	112
6.5	Details of Training Provided by Milk Union/Dairy Society	113
6.6	Inputs received from Union/Dairy for production of fodder	113
6.7	Details Cultivation Practices adopted for Fodder production	114
6.8	Cost of Cultivation of Fodder Seed Crop and Competitive crop	114
6.9	Production and Sale of Green and Dry Fodder	115
6.10	Opportunity Costs of Fodder Cultivation	115
6.11	Economic Constraints faced by the Fodder growers	116
7.1	Cost of Milk Production (per month per animal (Rabi)	121
7.2	Cost of Milk Production (per month per animal) Kharif 2018	121
7.3	Green and dry Fodder and Prevailing market rate (Rs./Kg) 2017-18	122
7.4a	Green and dry Fodder and Prevailing market rate (Rs./Kg) 2017-18	122
7.4b	Types of Fodder and Prevailing market rate (Rs./Kg) 2017-18- seed grower	123
7.5	Effect of Green Fodder on Milk Productivity 2017-18	123
7.6	Milk Production, Use and Sale (Previous day)	124
8.1	Awareness /Outreach of FDP under NDP- I	126
8.2a	Effect of Fodder Seed & Fodder Production programme under NDP I	127
8.2b	Effect of Fodder Seed & Fodder Production programme under NDP I	128
8.2c	Effect of Fodder Seed & Fodder Production programme under NDP I	129
8.3	Perceptions of non beneficiary households about the FDP	137
8.4	Constraints faced by PDCS	129
8.5	Constraints faced by Milk Union and Suggestions	130

List of Figures

Figure No.	Figure	Page
1.1	State-wise share in total Dairy Cooperative Societies in India (2017-18)	6
1.2	State wise Share in total milk producer members of Cooperative Societies (2017-18)	7
1.3	State wise Share in total milk procurement by Cooperative Societies (2017-18)	7
1.4	Milk Production and Per Capita Availability in India	12
1.5	State wise share in total Milk Production 2017-18 (%)	14
1.6	State-wise Per Capita Milk Availability in India 2017-18 (gm/day)	15
2.1	Contribution of Gross Value of Output from Livestock sector to Agriculture (At current price) in Andhra Pradesh: 2011-12 to 2017-18	46
2.2	Species-wise Share in Total livestock Population in AP (1951-2012)	48
2.3	Districtwise share in total Livestock Population in AP 2012 (%)	49
2.4	Year wise In milk Bovine Population, Milk Yield and Bovine Milk Production	53
2.5	Trends in Milk Production in AP	53
2.6	Species wise Trends in Total Milk Productivity in Andhra Pradesh state (2012) 53 Trends in Total Milk production in AP state (1983-84 to 2017-18)	53
2.7	Districtwise Milk Production in AP (2017-18)	55
2.8	Species-wise Districtwise total Milk Yield (kg/day) 2016-17	56
2.9	Districtwise Milk Production Density and Per Capita Availability of Milk (2012-13)	57
2.10	Districtwise Area under Fodder Crops in AP 2007-08	62
3.1	Milk Procurement by Krishna dairy	66

List of Maps

Map No.	Maps	Page
1.1	Location Map of Selected States for the Study	36
3.1	Agro-Climatic Zones of AP	64
3.2	Location of Selected Milk Unions in AP	65

List of Boxes

Box No.	Maps	Page
1.1	Important Fodder crops with improved varieties under Fodder seed multiplication programme of NDP I	32
1.2	NDP-1 Progress Green Fodder Production & Conservation	33
2.1	Major fodder crops of AP	58
2.2	Community Fodder Farms in AP	63

List of Annexures

Annexure No.	Annexure	Page
A1	Glossary of Seed Concepts	65
A2	Details on Fodder Development Programmes & Seed distributed/Imported	157
A3	Progress under NDP- I	168
A4	Details on Districtwise Fodder Production, Requirement and Consumption in AP	171
A5	Fodder development Activities under various Development Schemes in AP	173

List of Abbreviations

A.H.	- <i>Animal Husbandry</i>
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
ICAR	- Indian Council for Agricultural Research
ICDP	- Intensive Cattle Development Programme
GCA	- Gross Cropped Area
GDP	- Gross Domestic Product
GIA	- Gross Irrigated Area
GNP	- Gross National Product
GOAP	- Government of Andhra Pradesh
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

NIANP	- National Institute of Animal Nutrition and Physiology
NCDFI	- National Cooperative Dairy Federation of India
NDDDB	- 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
TL	- Truthful Seed
VAP	- Village Awareness Programme
Y	- Yield