

National Dairy Plan Phase I

Guidelines on

Ration Balancing Programme

and

Fodder Development



Project Implementation Plan: Volume V

**Project Management Unit
(located in NDDB)**

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Abbreviations

BMC	:	Bulk Milk Cooler
CEO	:	Chief Executive Officer
CF	:	Crude Fibre
CMR	:	Certificate of Material Receipt
CP	:	Crude Protein
DADF	:	Department of Animal Husbandry, Dairying and Fisheries, New Delhi
DCS	:	Dairy Cooperative Society
DM	:	Dry Matter
EIA	:	End Implementing Agency
FUR	:	Fund Utilization Report
GoI	:	Government of India
ICAR	:	Indian Council of Agricultural Research, New Delhi
IEC	:	Information Education Communication
IGFRI	:	Indian Grassland and Fodder Research Institute, Jhansi
INAPH	:	Information Network for Animal Productivity and Health
Kg a.i./ha	:	Kilogram active ingredient per hectare
LRP	:	Local Resource Person
MAIT	:	Mobile Artificial Insemination Technician
MIS	:	Management Information System
MoU	:	Memorandum of Understanding
MT	:	Metric Tonne
NDDB	:	National Dairy Development Board
NGC	:	New Generation Cooperative
NGO	:	Non Government Organisation
NSC	:	National Seeds Corporation, New Delhi
PCs	:	Producer Companies
PMU	:	Project Management Unit
RBP	:	Ration Balancing Programme
RSFP&D	:	Regional Stations for Forage Production& Demonstration
SC/ST	:	Schedule Caste/ Schedule Tribe
SFCI	:	State Farm Corporation of India
SNF	:	Solids Not Fat
SOP	:	Standard Operating Procedures
SSC	:	State Seed Corporation
TDM	:	Total Digestible Nutrients
TO	:	Technical Officer

Section I: Guidelines on Ration Balancing Programme



Project Management Unit
(located in NDDB)

Foreword

It has been observed that the dairy animals under field conditions are usually fed on one or two types of locally available feed ingredients. Animals on imbalanced diets not only produce less milk but the cost of milk production is also high. To maximize the profitability from dairying, it is essential that the animals are fed desired nutrients to produce milk as per their genetic potential through a least cost balanced ration. Besides improving genetic potential, optimum feeding of animals by advising milk producers through Ration Balancing Programme (RBP) is must. For successful implementation of RBP, it becomes imperative for the manpower to be properly trained in all the skills essential to enable them to implement the programme.

These guidelines have been prepared primarily for End Implementing Agency (EIA) which would be implementing RBP. This would equip the manpower with sufficient technical knowledge to implement RBP in a comprehensive manner. It is expected that the technical and the operational guidelines for RBP will be a useful guide for the programme implementers and other people directly or indirectly associated with the programme.

1. **Introduction: An overview**

- Optimal feeding of dairy animals from available feed resources is important to achieve economic benefits of milk production, since cost of feeding alone accounts for 70% of total cost of milk production. It will not be possible to achieve higher bovine productivity by merely increasing the genetic potential of the dairy animals. It is also important to meet the nutritional needs of growing lactating animals in terms of energy, protein, minerals, vitamins, so that they can produce milk commensurate to their genetic potential and minimize overall cost of milk production.
- Farmers fed available resources to their animals with deficiency and/or excess of one or other nutrients in the ration resulting into inadequate feeding. This leads to imbalanced feeding which adversely affects the health and productivity of animals in various ways and also reduces the net daily income to milk producer from dairying. At times, overfeeding of animals can also raise the cost of milk production. Therefore, educating the farmers on proper use of available feed resources to meet the animal's nutrient requirement at low cost plays a key role to enhance milk production efficiency with better economic returns.
- Estimation of nutrient requirement of an animal depends on factors like animal type, class, age, pregnancy status, body weight, milk yield, milk fat, months of calving etc. Information on nutrients availability from the feeds and fodder being fed is required to assess the nutrients supply. Based on nutrient requirement and availability of feed resources, a least cost animal ration shall be formulated. This formulation is a complex exercise and is

very difficult to work out manually. Therefore, National Dairy Development Board (NDDB) has developed the software, Information Network for Animal Productivity and Health (INAPH), which will formulate least cost balanced ration.

- Providing advices to farmers at their door step on large scale needs a proper delivery system like implementation of Ration Balancing Programme (RBP). These guidelines would help the users in understanding the technical and operational aspects of the programme.

1.1. What is ration?

- 1.1.1. Ration of an animal is the fixed amount of feed for one animal fed for a definite period, usually 24 hours.

1.2. Balanced Ration

- 1.2.1. Balanced ration is the ration that provides all the essential nutrients to the animal in such a proportion and amount that is required for the proper nourishment of animal in 24 hours. A balanced ration would provide protein, energy, minerals and vitamins from dry fodders, green fodders, concentrates, mineral supplements etc, in appropriate quantities to keep the animal in its form to perform best in respect of production and health.

1.3. Ration Balancing

- 1.3.1. Ration balancing is the process to balance the level of various nutrients of an animal, from the available feed resources, to meet its nutrient requirements for growth, body maintenance, pregnancy and milk production.

1.4. Disadvantages of imbalanced ration

1.4.1. Imbalanced ration leads to

- Low milk production, poor growth and reproduction
- Shorter lactation length and increased inter calving period
- More metabolic diseases such as milk fever and ketosis
- Slow growth of young animals delaying the age of first calving
- Low productivity and shorter duration of productive life.
- More methane production per kg of milk yield.

1.5. Ration Balancing Programme

1.5.1. Ration Balancing Programme (RBP) is an advisory programme, to educate the farmers on optimum feeding of animals to optimize milk production by efficient utilization of locally available feed resources at the possible least cost.

1.6. Advantages of Ration Balancing Programme

- Efficient utilisation of available feed resources
- Improves milk production efficiency
- Improvement in milk quality
- Possible reduction in daily feeding cost
- Helps in increasing net daily income to beneficiaries
- Improves general health of animals
- Improves reproduction efficiency of animals

- Better immune response, hence better resistance against diseases
- Improves growth in calves leading to early maturity
- Helps in reducing methane emission

2. Ration Balancing Programme: An Overview

2.1. Objective of RBP

- 2.1.1. The objective of RBP is to create awareness amongst the milk producers on optimization of animal feeding by efficient utilization of locally available feed resources at the possible least cost.

2.2. Area of operation

- 2.2.1. Set of contiguous villages with sizeable population of milk producing cattle and buffaloes would be the focus area of the programme.

2.3. Prerequisites of Ration Balancing Programme

- Selection and training of supervisory officers, trainers, IT officers and local resource persons (LRPs).
- Arrangement of laptop, desktops, netbooks, printers, projectors, video conferencing units and other RBP accessories like ear tags, ear tag applicators, applicator pins, measuring tapes and weighing balances.
- Arrangement of internet connectivity, insurance, repair & maintenance of capital goods.
- Identification of villages and regular supply of good quality mineral mixture and cattle feed in identified villages.

2.4. Snapshot of project activities

2.4.1. Ration balancing of cattle and buffaloes:

2.4.2. Ration of cattle and buffaloes would be balanced using the INAPH software as mentioned below:

- Ear tagged animals would be registered by capturing details of each animal in the software.
- On the basis of the animal's details, nutrients requirement of cattle and buffaloes would be assessed for their growth, body maintenance, pregnancy and milk production.
- Details of current feeding would be captured in the software and nutrients deficit/ surplus status would be assessed.
- By re-adjusting the quantity of locally available feed items, software will formulate least cost balanced ration.
- The balanced ration would be recommended to each cattle and buffalo. Every animal would be revisited after a period of 3 to 4 weeks or whenever there is change in feed resources and fresh ration formulations would be made.

2.4.3. The major activities to be undertaken to implement RBP includes:

- a. Identification of EIAs
- b. Identification/ recruitment of requisite manpower
- c. Arrangement of RBP trainings
- d. Arrangement of capital items and RBP kit/accessories
- e. Implementation of RBP in the villages

3. Implementation arrangements

3.1. Selection of EIAs

- End Implementing Agencies (EIAs) are the agencies responsible for implementation of RBP. EIAs would be District Cooperative Milk Producers Unions / State Cooperative Dairy Federations/ Cooperative form of enterprises such as Producer Companies (PCs). EIAs having following criteria are eligible for funding Ration Balancing under NDP I.

3.1.1. Technical Criteria:

- EIAs must have their own plants for manufacture and supply of quality cattle feed, mineral mixture or have an assured tie up for sourcing these products.
- EIAs must have adequate arrangements for imparting training to all village LRPs as per the specified curriculum.
- Preference will be given to EIAs that already have in place IT based reporting and monitoring mechanisms.

3.1.2. Governance criteria:

- Should have a duly constituted governing body such as Board of Directors / Board of Trustees / Management Committee as applicable to the legal form of the EIA.
- Should have a full time Chief executive/ Managing Director (or equivalent) and adequate number of qualified technical and managerial personnel to ensure transparent and effective implementation, supervision and reporting of the sub-project.

3.1.3. Financial criteria:

- Should not have any over-dues to any financial institution.
- Audit of accounts should be up-to-date and the author's opinion should not contain any adverse opinion or disclaimer.
- Note: in case of newly formed institution, that are otherwise found to be eligible, the above criteria would not apply till they complete their first financial year.

3.2. **Identification/recruitment of requisite manpower**

- Manpower required for implementation of RBP is as follows:

3.2.1. Villages based local resource person

- EIAs would identify or recruit local resource persons (LRPs) to implement the programme in the identified villages. LRP can be a village based person passed at least Class VIII, belongs to an agriculture family, having good communication skills, willing to spend required time to implement the programme. In case of unavailability of LRPs as per the prescribed qualification, EIA may select the LRPs with lower qualification. The EIA may select existing manpower of village level institutions as LRP or LRP may be outsourced. LRP shall be responsible to implement the programme in a village covering sizeable population of cattle and buffaloes.

3.2.2. Supervisory officers

- Supervisory officers are to be identified amongst the existing manpower of the EIA or they may be recruited or

outsourced. Depending on the requirement, supervisory officers at different level of monitoring would be identified or recruited. Supervisory officers would be responsible to impart training, execute and monitor the project implementation in the target villages. EIA would set the targets for each supervisory officer.

- Supervisory officers include Animal Nutritionists and Technical Officers. Animal Nutritionist should preferably be a post graduate in Animal Nutrition with relevant field experience. Technical Officer should be a graduate in veterinary/ animal sciences /dairy husbandry / agriculture with relevant field experience or preferably post graduate in animal nutrition/livestock production & management with computer literacy.

3.2.3. Training faculty

- Training faculty mainly includes trainers; however, animal nutritionists/technical officers may also be involved in imparting RBP trainings. EIA would identify the training faculty amongst its manpower or they may be recruited or outsourced. Responsibility of training faculty would be to impart RBP trainings to the LRPs and supervisors in local language. On the basis of requirement of project implementation, EIA would decide the numbers of training faculty. Training faculty would be a graduate in veterinary/ animal sciences/ agriculture with relevant experience.

3.2.4. IT officers

- Information Technology (IT) officers are to be identified amongst the existing IT manpower of the EIA or they may be recruited or outsourced. IT officers would be

responsible to deploy and maintain the overall functionality of INAPH application/server for RBP implementation. IT Officers should be a graduate in Information Technology /computer application like B. Sc in IT/PGDCA/BCA etc preferably with relevant experience.

On the basis of the requirement of project implementation, the EIA may identify or recruit requisite manpower in addition to the LRPs, supervisory officers, IT officers and training faculty.

3.3. Training of RBP manpower

3.3.1. Training of supervisory officers, IT officers and training faculty

- NDDB would impart Ration Balancing and INAPH training to Animal Nutritionists, Technical Officers, trainers and IT officers only. EIA would arrange RBP trainings for LRPs and supervisors at their level. RBP training for Animal Nutritionists, Technical Officers and trainers would be for five days covering class room sessions on RBP software and different aspects of animal feeding along with field demonstrations. INAPH software training for IT Officers would be for two days. Training templates of supervisory officers and trainers and IT officers are given at **PIP Vol. VII – “Guidelines on training and capacity building for NDP I”**. EIA would need to intimate PMU (located in NDDB) on training needs of Animal Nutritionists, Technical Officers, IT Officers and training faculty well in advance. On mutual convenience, the training schedule would be finalized and would be imparted in batches, with a batch size of 10 - 15 participants. Depending on the requirement, training of 3 to 4 batches may be organized in a month.

3.3.2. Training of LRPs

- EIA would be responsible to arrange the trainings of LRPs in local language through the identified training faculty. LRPs would be trained on RBP for 10 days including 5 days classroom sessions on basic aspects of animal feeding and software handling and 5 days field demonstrations. Training template of LRPs is at **PIP Vol. VII – “Guidelines on training and capacity building for NDP I”**. LRPs training would be done in batches, with a size of 10 to 15 participants. Depending on the requirement, EIA would arrange the trainings of LRPs in 2 to 3 batches in a month. EIA may also arrange the trainings of LRPs in the local training centers. EIA may also utilize the supervisory officers to impart the trainings to LRPs.

3.4. Arrangement of RBP accessories and their specifications

3.4.1. The agencies would be responsible to arrange for the following accessories required to implement RBP;

- Capital items like desktops, laptops, netbooks, INAPH server hardware & software, printers, projectors and video conferencing units.
- RBP kit/ accessories like ear tags, ear tag applicators, applicator pins, measuring tapes, weighing balances (5 and 25 kgs), bags and sample bottles.

3.4.2. EIA would arrange to provide requisite desktops/laptops/netbooks and/or RBP kit to every LRP and supervisory officer. Agencies would also arrange for internet connectivity, insurance, repair and maintenance of capital items.

3.4.3. Computers/laptops/ net books should have the following technical configuration / specifications:

- Processor with Pentium IV and above
- Clock speed with 1.8 GHz and above
- Random Access Memory with 512 MB or above
- Hard Disc Drive with 40 GB or more
- Two Universal Serial Bus ports
- Compact Disk drive with 16x R/W optical drive
- Screen resolution with 1024 x 768 pixels
- Operating system with Windows XP SP – 2 or above

3.4.4. Regional settings in the above hardware to run the software should be as follows:

- English should be of United States.
- Time style should be in the format of “h:mm:ss tt”.
- Short date should be in the format of “M/d/yy”.
- Date separator symbol should be “/”.
- Long date format should be “dddd, MMMM dd, yyyy”.

3.4.5. Specifications of ear tags

- The ear tag is composed of two parts (Male + Female). The male part is a button with a diameter of 27 mm. The male part should have a metal point. The female part is 55 x 65 mm flat surface with a closed head. The tag should be made from Thermoplastic Polyurethane Elastomer material that should be resistant to ultraviolet light, high

and low temperature, impossible to reopen by wrench and should be tamperproof.

- The weight of the ear tag (male + Female) should be 6.5 grams ($\pm 10\%$). Laser printing of number in two rows of digits with equivalent one dimensional bar code on the first row is must. Numbers and bar code should be big and bold covering full size of the female tag and leaving 2 mm margin on all sides. PMU will provide the list of twelve/eight-digit ear tag numbers to be laser printed on ear tags. The colour of the tag should be lemon yellow. The ear tag should be packed in batches of 100 pieces in a good quality polyethylene bags indicating beginning and ending numbers and further packed in a corrugated box containing 500 pieces of ear tags i.e. 5 polyethylene bags each containing 100 pieces of ear tags.

3.4.6. Specifications of ear tag applicators & pins

- Universal ear tag applicators and pins are recommended. An animal ear tag applicator has a jaw with a pivotal pin which can hold the male part of an animal ear tag and opposite side jaw having metal clip to hold female part of ear tag. It should be sturdy and should not be slippery.

3.4.7. Specifications of measuring tape

- Measuring tape should be metal wired, water proof, wear resistant, non-creasing, dual type scale (inch & cm) and minimum of five meter in length.

3.4.8. Specifications of weighing balances

- Weighing balance should be sturdy, accurate, reliable with corrosion protected springs, lightweight, portable and with protected reading scale and should be having 5kg capacity

with 25g graduation and 25 kg capacity with 100g graduation.

Bags and sample bottles should be of good quality and EIA may decide their specifications.

4. Implementation and roll out plan

- Initially EIAs would identify/recruit project coordinator, animal nutritionists/technical officers, trainers, IT officers and LRPs and arrange their trainings.

4.1. Selection of villages, beneficiaries and animals

4.1.1. Selection of villages

- Initially villages with following facilities would be selected for Ration Balancing implementation.
 - Villages with sizeable population of breedable cattle and buffaloes.
 - Villages with good internet connectivity.
 - Villages where mineral mixture supply is regular.
 - Preference to villages where breed improvement programme (s) and other input services are available.

4.1.2. Selection of beneficiaries/ milk producers

- Initially, receptive milk producers willing to follow the advices of LRPs and feed the recommended quantity of balanced ration to their animals would be selected.

4.1.3. Selection of animals

- Even though ration of heifers, adult female cattle and buffaloes could be balanced, in the beginning, it would be

preferred to select in-milk cattle and buffaloes to implement the programme.

4.2. Feed and fodder sample collection

- 4.2.1. Samples of feed and fodder from RBP villages would be collected and sent to NDDB for chemical analysis to monitor quality and for updating district feed library in INAPH.

4.3. ICT arrangements for RBP

- 4.3.1. Arrangement of internet connectivity
- EIAs will facilitate continuous internet connectivity services to the personnel involved in RBP implementation through an arrangement with a service provider for uninterrupted data transfer to the INAPH server.
- 4.3.2. Creation of user profiles and organisation hierarchy in INAPH
- IT Officer will create user profile of LRPs, TOs, Project Coordinator and CEO of the EIAs and organization hierarchy in INAPH.
- 4.3.3. Software installation in net books & laptops
- Trained IT Officer of the EIAs will install INAPH software for RBP in the netbooks and laptops before issuing them to LRPs and supervisory officers.

4.4. Implementation and promotion of RBP

- 4.4.1. Supervisory officers and LRPs would implement RBP in the identified villages as follows;
- a. Concept of balanced ration will be explained to the milk producers by organising a village level meeting, which would be convened by the TO and the trained LRP of the

village. Through such meetings, receptive members interested to implement the programme would be identified.

- b. Cattle and buffaloes to be covered under RBP would be identified and they would be ear tagged.
- c. Animal wise information required to balance the ration of cattle and buffaloes would be recorded.
- d. Cross checking of the information provided by farmers would be done by measuring animal's body girth, milk yield, milk fat % & quantity of feed ingredients fed to animals.
- e. Considering availability of feed ingredients balanced ration would be formulated and recommended.
- f. Re-recording of information of every animal would be done at an interval of every 3-4 weeks or whenever there is change in feed resources.
- g. Proper follow-ups would be done to ensure that every farmer feeds the balanced ration to their animals.
- h. Awareness amongst the milk producers on feeding balanced ration would be created by different RBP promotional/extension activities like pamphlet distribution, farmers meetings, poster distributions, wall paintings etc.
- i. Sale of mineral mixture, cattle feed & other feed supplements / nutraceuticals would be promoted in the villages.

4.5. Disease reporting by RBP personnel

4.5.1. All the personnel working under the project in the field (Supervisory officers, Local resource persons/sahayaks) would report any noticeable animal health event (high mortality, abortions, symptoms of FMD or other similar cases) to the concerned officers.

4.5.2. The disease reporting flow in RBP would be:

- Local Resource Person/sahayaks → Supervisory officers
→ Nearest Veterinary Officer of the Department of Animal Husbandry

4.5.3. Hygiene & Biosecurity

- All the personnel working under the project in the field (Supervisory officers, Local resource persons/sahayaks) would follow hygienic practices and wash their hands thoroughly with soap and water before and after handling each animal.

4.5.4. The visit of field personnel to a village where an outbreak of a disease is on-going should be restricted and be undertaken on the basis of a decision of the Supervisory officer who would also clearly inform the precautions to be followed by the field personnel.

4.5.5. A module on disease reporting, bio-security and hygiene would be included in the training programmes for supervisory personnel, local resource persons and sahayaks.

4.6. Important guidelines for milk producers

4.6.1. The guidelines on animal feeding and management, meant to be explained by LRPs/Sahayaks to milk producers include

- Chaffing of dry and green fodders before feeding.

- Supplement the ration of dairy animals with recommended quantity of mineral mixture.
- Avoid sudden change in feed ingredients.
- Regular de-worming of animals.
- Importance of clean potable drinking water.
- Colostrum feeding & care of new born calf.
- Clean milk production practices etc.

5. RBP software and database management

5.1. An overview of INAPH application

5.1.1. The software, Information Network for Animal Productivity and Health (INAPH), is window based internet linked software. INAPH can be loaded in computers, laptops and netbooks. The data recorded through software would be stored in the centrally located production server of INAPH. INAPH server would be placed at the headquarters of each EIA and/or at NDDB and/or at a common location.

5.1.2. INAPH would be used to record the data of Animal Breeding, Animal Health and Animal Nutrition domains. Main application loaded in laptops/desktops/netbooks would be used for monitoring data recording and formulation of balanced ration. The application would require internet connectivity to operate it.

5.1.3. Major steps involved in balancing the ration in INAPH are given below:

- **Registration of animals:** An ear tagged animal will be registered in the software by recording its details like species, breed, age, pregnancy status, body weight, last calving date, number of calving, milking status etc. The software will validate the entries and register the animal.

Such details will be fetched to calculate nutrients requirement of animals.

- **Assessment of nutrients requirement:** Software has the database of the nutrient requirements of various types of animals based on feeding standards commonly followed in India. Total nutrient requirement is assessed for dry matter, crude protein, total digestible nutrients, calcium and phosphorous. Based on animal details provided, the software will assess the nutrients requirement of animals.
- **Assessment of nutrient supply:** Software contains a database of chemical composition of different feed ingredients such as grains, oil cakes/meals, brans, chunni, agro-industrial by-products, green fodders, grasses, crop residues, tree leaves and mineral supplements available across the country. Based on the quantity of different feed ingredients fed to animals, software will fetch the nutrients supplied to the animals in existing feeding system.
- **Formulation of least cost ration using locally available feed ingredients:** Based on nutrients supplied through available feed resources and in accordance with nutrient requirement, software will calculate the deficit or surplus status of nutrients and computes the least cost ration within the given nutritional and available feed resource constraints.

5.2. Nutrition Masters

- 5.2.1. Nutrition masters comprise of database of the nutrient requirements of various types of animals. Based on the animal type, body weight and production profile, total nutrient requirement is assessed for dry matter (DM), crude protein

(CP), total digestible nutrients (TDN), calcium (Ca) and phosphorous (P).

5.2.2. Ration Types and their Eligibility Criteria for animals

- In this programme, ration provided to the animals would be of four categories. Animal can be eligible for any one or all of them depending upon the animal profile entered.
 - Maintenance Ration: Every animal is eligible for at least maintenance ration depending upon its type, class and body weight.
 - Milk Production Ration: If animal is producing milk, it is eligible for extra ration over maintenance depending upon the quantity of milk and the percentage of fat in the milk.
 - Growth Ration: An animal is eligible for growth ration equivalent to 20% of maintenance ration, if age of animal is less than or equal to 3 years. If age is > 3 years and ≤ 4 years, 10% of maintenance ration is permissible. No growth ration is applicable to adult, if animal crosses 4 years of age. Heifers are not eligible for extra growth requirement over maintenance as growth requirement for heifer has already been included in the maintenance requirement.
 - Pregnancy Ration: An animal is eligible for pregnancy ration if the stage of pregnancy is greater than 7 months. The quantity of pregnancy ration depends upon type, class and body weight of the animal.

5.2.3. Dry matter intake of the animal is very important for feed formulation. The program sets the DM intake range depending

upon the profile of the animal. Criteria used by the software to decide the range of DM intake is as follows.

- For milking animals
 - If calving month of the animal is ≤ 2 , the DM intake limit would be 2.0 – 2.5% of the body weight.
 - If calving month of the animal is > 2 and ≤ 3 , the DM intake range would be 2.0 - 3.0% of the body weight.
 - Otherwise it can be between 2.0 - 4.0% of body weight.
- For Other Animals (Dry/Heifers etc.)
 - Dry matter intake range would be 2.0 – 4.0% of body weight.

5.2.4. Dry Matter Ratio from Concentrates and Forages: Feed items listed in the feed library are divided in 2 groups, Concentrates and Forages. The dry matter in the ration comes out from these two groups of items. Ratio of Dry matter quantity from these 2 groups in the ration is very important and decided as follows.

- For milking animals:
 - Milk production up to 5 Kg/day, dry matter from concentrates should be $\leq 40\%$ of total dry matter in the ration.
 - Milk production >5 to ≤ 10 Kg/day, dry matter from concentrates should be $\leq 50\%$ of total dry matter in the ration.
 - Milk production >10 to ≤ 15 Kg/day, dry matter from concentrates should be $\leq 60\%$ of total dry matter in the ration.

- Milk production >15 to ≤55 Kg/day, dry matter from concentrates should be ≤ 70% of total dry matter in the ration.
- Other Animals (Dry/Heifers etc.)
 - Dry matter from concentrates should be ≤ 40% of total dry matter in the ration.
 - In case, dry matter from concentrates > 60% of total dry matter in the ration, Buffers @ 50-75 g/day should be added along with ration.

5.3. Feed library

- 5.3.1. Feed library consist of different categories of feed ingredients along with its chemical composition used for livestock feeding in the country. The feed library was created to assist users in finding feed ingredient options for use in their RBP operations. The data shown in the library are the average values obtained from chemical analysis of representative samples collected from various parts of the country. Library may not include all available feed ingredient options available to livestock producers. Any new feed ingredients available locally can be included in the library after its chemical analysis. A chemical and/or physical analysis of a specific ingredient(s) is always recommended before its entry into software. A brief description of two main classes of feeds is mentioned below.
- 5.3.2. Concentrates: In general, feeds having crude fibre (CF) less than 18 per cent while TDN is over 60 per cent on dry matter basis. Usually contain one or more nutrients in a concentrated form. Feed sub-classes under concentrate include brans, chunnis, grains/seeds, oil cakes/meals, compound cattle feed, mineral mixtures etc.

- 5.3.3. Roughages: Any feed item high in crude fibre (over 18 per cent) and low in TDN (60 per cent) on dry matter basis. Feeds in this class are high in fiber, low in digestible carbohydrates and proteins. Sub classes include grasses, green fodders, tree leaves, straw/stovers, silage, hay etc., which provide bulk to animals.

6. Project Design and Management

6.1. Management of RBP

- 6.1.1. The EIA would be responsible for overall management of the programme. EIA would identify one of its existing officers as Project Coordinator, who shall be responsible for overall coordination of project implementation.

6.2. RBP Management Committee

- 6.2.1. The EIA is responsible to execute the programme and achieve the targets set. The programme will be managed, monitored and reviewed by constituting a RBP Management Committee at the EIA level. The Committee comprises:

- CEO of the EIA, who shall be the chair person
- Head (Finance) of the EIA
- MIS Officer of the EIA
- Grievance Redressal Officer (GRO)
- Project Coordinator of the EIA, who shall be the member convener

- 6.2.2. The Committee, if desires, may also call special invitees to attend the meeting. The general superintendence, direction, control and management of the affairs and activities of the Project shall vest in the Committee, which shall include preparing long term strategies, plans, taking policy decisions

related to project implementation including approval of budget, expenditure, re-appropriation, reimbursement and release of advances, entering into contracts with agencies and other organisations etc. The Committee shall ensure the effective implementation of the Project and that the objectives herein mentioned are achieved.

6.3. Project Management Cell

6.3.1. Project Management Cell (PMC) would execute and implement RBP under the supervision, direction and control of the Management Committee. The Cell would be headed by Project Coordinator, who would be responsible for execution of the programme in the identified villages and for achieving the targets set. Project Coordinator would be accountable to the Committee.

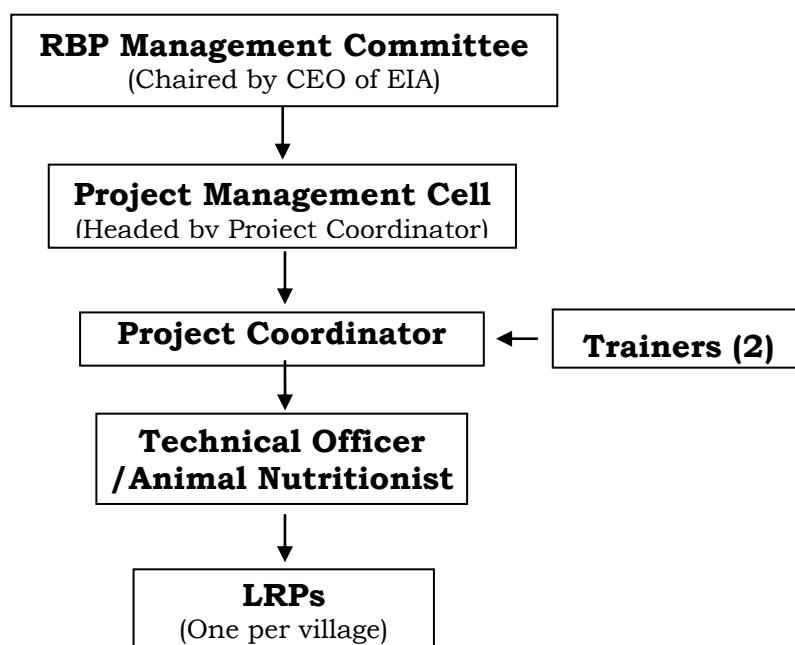
Members of PMC comprise;

- Project Coordinator, be the head of the cell.
- E&S Officer
- Animal Nutritionist/ Technical officer
- Training faculty
- IT Officer

6.4. Structure of RBP Implementation

6.4.1. The proposed Structure is depicted as below:

Figure 6.1: Structure of RBP implementation



6.5. Role and responsibilities of the people involved

6.5.1. Role and responsibilities of Project Coordinator

- a. Ensure execution of grant agreement between the EIA & PMU.
- b. Alliance with PMU in getting RBP software & hardware, fund flow and information sharing.
- c. Identification / recruitment of requisite manpower & arrange their training on RBP.
- d. Provide logistic and other requisite support to Project Implementation Cell.
- e. Ensure regular supply of mineral mixture, cattle feed & nutraceuticals in RBP villages.

- f. Arrangement of desktops, laptops, netbooks, other capital items & RBP kit/ accessories.
- g. Arrange to print requisite formats and extension materials in regional language.
- h. Organize meetings of Management Committee and review of project implementation.

6.5.2. Role and responsibilities of supervisory officers

- a. Identification of villages to implement RBP.
- b. Collection of feed samples and arranging for chemical analysis.
- c. Identification of LRPs & arrange their training on RBP.
- d. Issue RBP kit/accessories to LRPs and maintain their stock records.
- e. Advise LRPs in case of difficulties.
- f. Sensitize the EIA for regular supply of mineral mixture in Ration Balancing implemented villages.
- g. Monitor the programme by making field visits, farmer meetings and review meetings on regular interval.
- h. Data compilation, interpretation & sharing the progress status of Ration Balancing with the stakeholders.
- i. Execute Ration Balancing promotional activities in the identified villages.
- j. Send the requisite information to Project Coordinator.

6.5.3. Role and responsibilities of training faculty

- a. Translate all the training materials into local language.

- b. Impart training to LRPs on Ration Balancing in local language.

6.5.4. Role and responsibilities of LRP

- a. Participate in Ration Balancing training.
- b. Conduct village awareness programme.
- c. Ear tag the identified animals.
- d. Record animal wise information required to balance the ration and recommend the ration.
- e. Re-record information of every animal after every 3-4 weeks interval and re-recommend the balanced ration.
- f. Cross check the information provided by farmers measuring animal's body girth, milk yield, milk fat % & quantity of feed ingredients fed to animals.
- g. Ensure feeding of least cost balanced ration by the farmers.
- h. Sale of mineral mixture, cattle feed & other feed supplements.
- i. Provide requisite information to supervisory officer and follow the guidelines.

6.5.5. Role and responsibilities of IT officers

- a. Maintaining connectivity and availability of servers, if any.
- b. Deployment of INAPH for end users.
- c. Monitoring of INAPH and database server, if any.
- d. Maintaining data backups on regular interval.

- e. Repair and maintenance of RBP related hardware.
- f. Data related support to end user.
- g. Generating Adhoc report for field users and management.
- h. Ensuring synchronization with central server and other IT servers, if applicable.
- i. Arrangement of internet connectivity and insurance, repair and maintenance of capital items.

7. Managing Procurement

Procurement of all goods, works and services for the sub project will be carried out in accordance with the procurement manual provided by the PMU, World Bank's procurement guideline for Goods, Works & Services and the procedures described in the Legal Agreements.

7.1. Manpower selection

- a. Supervisory officers, IT Officers & training faculty would be identified amongst the qualifying employees of the EIA or recruited following standard procedures of recruitment.
- b. Identification of LRPs would be done through a democratic process of selection by the members of village level institutions.

7.2. Procurement of RBP accessories

- a. EIA would arrange for purchase of requisite numbers of capital items and RBP kit/accessories. PMU would provide specification of desktops, laptops, net books, other capital items and RBP kit/ accessories.

7.2.1. Steps to be followed for purchase of goods/equipments

- a. Capital items and other RBP accessories would be purchased as per the procurement manual and the World Bank guidelines.
- b. Project Coordinator would issue these items to respective Project Management Cell and a CMR would be obtained from them.

7.2.2. Maintaining records of procurement

- a. Agencies would maintain the details of the capital items and RBP kit/ accessories purchased in the stock registers.
- b. Stock registers for capital items and RBP kit/accessories would separately be maintained. Each item would be provided with a code and the location to which it has been shipped would also be noted.
- c. A stock statement of capital items would be obtained from each location on a yearly basis.

8. Financial Management

EIA have to refer the PIP Vol. II – “Financial Management Handbook” developed by PMU to understand the eligibility criteria for funding, procedure for availing assistance, responsibilities/ obligations of EIAs in terms of fulfilment of sub project objectives, financial targets and operational benchmarks, project accounting, internal control, financial reporting, capabilities in terms of financial management and audit assurance arrangements.

8.1. Heads of expenditure:

Following are the heads of expenditure;

- a. Capital (desktops, laptops, net books, printers, projectors & video conferencing units)
- b. Revenue
 - Stipend to LRP, salary of supervisory officers and trainers
 - Extension, vehicle hiring, ear tagging, telephone & network charges, RBP kit/accessories, feed sample testing and administrative cost
 - Training

8.2. Financing Ration Balancing project

- a. It is proposed to provide below mentioned revenue expenses of Ration Balancing implementation as component grant in aid to the end implementing agencies for the first two years.
 - Stipend of LRPs on tapering basis (100 % in first year & 50 % in second year).
 - Salary and travel expenses of Animal Nutritionist/ Technical Officers on tapering basis (100 % in first year & 50 % in second year).
 - 100 % of training expenses.
 - 100 % of salary of trainers in first year.
 - 100 % of all other revenue expenses in first year.
- b. The amount required for the purchase of all capital items for RBP envisaged would be grant in aid.

8.3. Fund Flow arrangement

- a. A grant agreement would be signed between PMU and EIA clearly mentioning the SOPs of project implementation and financial terms and conditions for release of funds.
- b. The working capital requirement for a quarter would be submitted to PMU based on the targeted village coverage, animal coverage and RBP trainings for the quarter.
- c. PMU would scrutinize the fund requirement and utilization reports received from the EIA and release the funds as per project outlay. Release of funds for the subsequent year would be based on the independent assessment reports of previous year.
- d. The Management Committee of the Project would have all the powers to sanction, re-appropriate and/or modify the budget within the total outlay of the project in consultation with PMU.
- e. EIAs will have to bear salary of IT officers and other expenses of project implementation which are not covered under the proposed grants. EIAs would agree to continue project implementation after funding on its own.
- f. PMU has the authority to stop/ withdraw the funding in case of unsatisfactory performance of project implementation by EIAs.

8.4. Bank accounts needed/ required for project

- a. A separate current account would required to be opened by the implementing EIA.
- b. All payments/settlements are to be ratified by the Management Committee.

8.5. Accounting Procedures

- 8.5.1. EIA would follow standard accounting procedures and arrange for regular auditing of bills/settlements/FURs. PMU has the right to appoint an auditor to re-audit the bills/FUR/ project records at any time during the project period.
- 8.5.2. Accounts would be audited on a quarterly basis. Any release of money by PMU for the succeeding quarter would be incumbent on receipt of audited statements/FUR for the preceding quarter.

9. Project monitoring, learning and evaluation

All the activities of the Sub Project will be monitored under the project and the Sub Project is expected to generate large-scale data on the nature and course of implementation. Such data will be suitably collated, analysed and evaluated to assess sub project progress, identify weaknesses and provide feedback to various stakeholders *inter alia*, management committee for the sub project, project management cell, field staff, milk producers, PMU located at NDDB etc. including appropriate guidance on course correction. Data analysis will also provide opportunities for learning and spreading good practices both in the Sub Project area and beyond.

9.1. How monitoring and review of RBP would take place

- 9.1.1. Management Committee would review the programme once in a quarter and evaluate the performance and fund utilization of the project. Achievements against targets set for each sub-activities of RBP implementation and promotion/extension would be reviewed. Impact assessment of the programme along with success stories would also be discussed in the quarterly review meetings. The committee would also review the field visit reports of officers, check relevant records and ensure

proper maintenance of records & documents at every level. EIA shall record minutes of review meetings and send it to PMU along with progress reports & success stories in the specified formats.

- 9.1.2. Each supervisory officer would monitor progress of the project through verification of INAPH data and physical verification of field implementation. Supervisory officers would meet the LRPs to discuss the issues and visit the villages along with LRPs as per the requirement. Supervisory officers would monitor the programme by conducting LRPs meeting and farmer meetings on monthly interval. During LRPs meeting, LRP wise performance shall be evaluated and their farmer visit schedule shall be reviewed. In farmer meetings, farmers shall be oriented on new technologies of animal nutrition, health and management. Supervisory officers would also check the advices provided and create awareness amongst farmers on scientific animal feeding. The officers should ensure proper maintenance of records by LRPs. Officers would randomly visit the farmers to check the ration formulations provided by LRPs and check ensure that farmers follow the advices of LRPs. Officers along with LRPs would promote the programme by distribution of pamphlets, posters, wall paintings etc.
- 9.1.3. PMU would also review project implementation on regular interval. PMU would evaluate Project Implementation on its own or hire an independent agency for such purpose. On the basis of evaluation report, necessary modifications would be incorporated in project implementation. EIA shall provide requisite support to PMU in project review.

9.2. Maintenance of Documents and Information

- 9.2.1. Standard software and procedures would be used for maintenance of accounts.

- 9.2.2. A computerized database system would be put in place to record all the information related to RBP.
- 9.2.3. The EIA would maintain a stock record of capital items and RBP kit/accessories indicating item wise receipt, issue and stock balance details.
- 9.2.4. EIA would document reports of physical progress indicating numbers of villages covered, animals covered, and trainings imparted to each category of manpower. PMU would technically assist in specifying the formats of project performance documentation and review.
- 9.2.5. EIA would also document reports of impact of the programme indicating percentage of reduction in cost of feed per kg and percentage of increase in daily milk yield. EIAs would also record success stories of the project on regular intervals. EIA would also maintain grievance redressal records.

9.3. Reporting arrangements

EIA would prepare and send monthly physical progress, quarterly impact reports and success stories of RBP to PMU on regular interval. PMU would provide formats of physical and impact progress reports to the EIA, which is bound to share all the information sought by PMU.

How transparency and accountability would be ensured?

- 9.3.1. Interviews and selection of supervisory officers and training faculty would be done by a panel of experts in the EIAs after proper scrutiny of credentials.
- 9.3.2. In case of new recruitments, advertisements would be published in all popular newspapers calling for the posts.

- 9.3.3. A computerized system would be put in place providing access rights at different levels, so that the reports of activities being carried out can be viewed by any user.
- 9.3.4. Progress of project implementation should be made available to each stake holder.

9.4. Benefits and Programme Sustainability

- 9.4.1. Overall benefits
- 9.4.2. This sub project will make prudent use of feeds and fodders in the operational area of EIAs.
- 9.4.3. It may also help in controlling some of the metabolic disorders.
- 9.4.4. It will contribute to strengthen livelihoods of small holder milk producers that form the majority of producer members of EIAs.
- 9.4.5. Economic benefits
- 9.4.6. Main economic benefits will arise from increased income to milk producers.
- 9.4.7. The sub project will create employment opportunities in the villages by promoting Ration Balancing Advisory Services through Local Resource Persons.
- 9.4.8. Social benefits
- 9.4.9. The sub project would support the development of milk producers with a view to increase the organisational capacity of milk producers and eventually, their more effective participation in cooperative institutions.
- 9.4.10. Local environmental benefits
- 9.4.11. The sub project would contribute to the efforts in reduction in methane emission, which is a Green House Gas (GHG),

through feeding animal specific balanced ration in the sub project area.

9.4.12. Implementation of RBP has the following larger benefits:

- Increase in lactation length of animals
- Increase in milk yield per animal
- Increase in proportion of in-milk animals in village herd

9.5. Project Sustainability

EIA needs to plan the following for sustainability of the project

- 9.5.1. The project needs to be implemented in the areas with sizeable population of high yielding cattle and buffaloes.
- 9.5.2. The costing would have to be reviewed annually and necessary actions should be initiated for efficient utilization of funds.
- 9.5.3. Sustainability of the LRPs would be achieved by providing margin to the LRPs on the proportion of sale of mineral mixture, cattle feed and other feed supplements. EIA would work out such mechanism and implement it in the initial phase of project implementation.

10. Information Disclosure

- 10.1.1. EIAs should have a website containing suo moto disclosures of the sub project related information, details of the activities, area(s) where the activities are being implemented, procurement plan etc. It will also regularly post the progress of the project and the particulars of the person who may be contacted in the EIA for seeking further information.
- 10.1.2. Besides providing information on the website, the EIA will use other means of mass communication for dissemination of information such as:

- Display charts at the village level where the activity is usually undertaken e.g., DCS Office, Milk pooling point / BMC locations, MAIT/LRP offices, Gram Panchayat office, project office etc containing information that describes the nature of service being offered at the village level, in a simple and reader friendly manner
- Display board at the village level where the activity is usually undertaken providing a monthly update of the activities for example, animals covered under RBP, aggregate number of producers benefiting from the activity, success stories etc,

10.2. Grievance Redressal Mechanism (GRM)

10.2.1. “A grievance would usually refer to some form of dissatisfaction by a stakeholder, which needs to be redressed in order to continue smooth implementation of the project”. The project will evolve a system for redressal of grievances that may arise in the course of implementation. The GRM will be structured in a manner so that it can be monitored, as it provides important feedback on the project activities.

10.2.2. The EIA would have a designated officer as ‘Grievance Redressal Officer’ (GRO) to deal with grievances. His contact number/ mailing IDs and address etc would have to be displayed on the web site of the EIA and at other relevant locations such as notice boards.

10.2.3. Each GRO would need to:

- Maintain a computerised database of Grievances (*through a unique identification number*), acknowledgements and information about their disposal.
- Monitor the progress of disposal of the grievances.

- Fix time limit for disposal of the Grievances.
- Deal with each Grievance in a fair manner.
- Determine an appropriate periodicity when internal / external meetings would be held to implement the GRM in an efficient manner.

10.2.4. The procedure to be followed for grievance handling is given at Annex I.

11. Sub Project strategic environment and social assessment

11.1.1. EIAs have to undertake the Environment and Social assessment in the proposed area for interventions to identify relevant issues for the Sub Project.

11.1.2. E&S officer (having experience in the related field) will be In-charge of E&S Cell of the Sub Project. The E&S Cell will be part of Project Management Cell to monitor and review implementation of the Sub Project from the environment and social perspectives from time to time.

11.1.2. EIA may refer PIP Vol I and SESA report available on NDDB's web site for further details.

Glossary of Terms:

Animal Nutrition	:	Animal Nutrition is a branch of science which involves physiological and biochemical phenomenon of ingestion, digestion, absorption of various nutrients to all over the body cells and excretion of waste product of metabolism from animal body.
Animal Registration	:	A written account or entry regarding animal profile and its owner.
Buffer	:	Any substance that can neutralize changes in acid or alkali concentration. In animal ration it is used to maintain a constant rumen pH when more concentrate ingredients are fed to the animal. E.g. sodium bi-carbonate
Chief Project Coordinator	:	An officer of the EIA responsible for execution of the programme in its area of operation.
Crude Fibre (CF)	:	The more fibrous, less digestible portion of feed. Consists primarily of cellulose, hemicelluloses and lignin.
Crude Protein (CP)	:	Crude protein is used to express protein content of feeds (Total Nitrogen x 6.25).
Dry Matter (DM)	:	Water free portion of the feed. This is sum of the crude protein, crude fat, crude fibre, nitrogen free extract and ash.
Feed	:	Feeds are any naturally occurring ingredient or material fed to animals for the purpose of sustaining, growth and development.
Inter calving period	:	Period between two successive calving.
Local Resource Person	:	A village based person identified and trained would implement RBP in one or more villages
Nutrient	:	Any chemical compound having specific functions in the nutritive support of animals

Ration Balancing	:	It is an advisory programme, using the software, educating the farmers on optimum feeding of animals to optimize milk production by efficient utilization of locally available feed resources at the possible least cost.
Ration Balancing kit/accessories	:	RBP kit/ accessories comprises the items like ear tags, ear tag applicators, applicator pins, measuring tapes, weighing balances, sample bottles, measuring jugs and bags to be provided to LRPs for RBP implementation.
Ration Balancing implementation Cell	:	A team of manpower responsible to implement RBP in the selected villages.
Ration Balancing Management Committee	:	The committee formed at the EIA responsible for superintendence, management and review of the programme implementation.
Supervisory Officer	:	An officer identified or recruited exclusively for execution and monitoring of RBP in selected area /villages.
Tag Number	:	8 or 12 digit unique numbers used to identify an animal
TDN	:	Total digestible nutrients, is the unit of measurement of energy. It is used to express available energy of feeds and energy requirements of animals.
Training faculty	:	An officer identified/ recruited to impart training to LRPs.

Annex I: Grievance Redressal Mechanism under NDP I

For addressing grievances arising under NDP I, following grievance redressal mechanism can be adopted.

Appointment of Grievance Redressal Officer

1. The EIA under NDP I shall designate an officer as ‘Grievance Redressal Officer’ (GRO) to deal with all matters relating to grievances.
2. The EIA should display at a prominent place/ notice board the name of GRO with location, contact numbers/ mailing IDs and address along with the specific visiting hours for hearing / receiving the grievances.

Grievance/Complaint Submission:

1. While complaint is made, it can either be made orally or in writing:
 - The name of the individual or organisation, address and telephone number (if any) of the complainant.
 - A brief description of the matter which is the source of the grievance, including copies of any relevant and supporting documents.
 - Relief sought
2. Grievances may also be submitted in the Complaint Box kept at reception of the office of the EIA. The Complaint Box should be opened on daily basis by the GRO. Complaint can also be sent by post.

3. A complaint made through electronic means (e-mail, fax) should also be accepted and replied, if requested, should be sent through e- mail also.
4. In case the complainant is not satisfied with the response at a certain level, he/ she will be free to approach the next level.

Grievance Redressal Procedure:

1. Every application received should be tagged with any kind of reference number. The grievance system should be continuous for the whole year.
2. Every application or petition should be acknowledged through standard acknowledgement slips or a copy of the receipt which should be dispatched to the complainant within 3 days of receipt of complaint or handed over to person at the time of receipt for complaints submitted in person.
3. Every application should carry such a slip for future reference indicating the name, designation and telephone number of the official who is processing the case. The time frame in which a reply will be sent should also be indicated.
4. The complainant should be quickly informed of the action taken by way of redressal within proposed response time.
5. A record of all complaints received and action taken till disposal should be maintained.
6. A reply to any grievance must cover all points raised and not address the grievance partially. If there is any follow- up action, it must be pursued.
7. No grievance is to be rejected without having been independently examined. At a minimum, this means that an officer superior, to the one who delayed taking the original decision or took the

original decision that is cause for grievance, should actually examine the case as well as the reply, intended to be sent to the complainant. If a complaint is rejected, the reasons for such rejection must be made explicit and should be intimated to the complainant within the time frame.

8. Grievance redressal mechanisms will consider the vulnerability of gender, SC/ST and other vulnerable populations.

Section II: Guidelines on Fodder Development



Project Management Unit
(Located in NDDB)

Foreword

Milk is a raw material for the dairy industry. Therefore, feasibility and development potential of a dairy project depend largely on efficient milk production. For this, feed and fodder resources should be in optimum quantity and quality to exploit the genetic potential of the livestock. For successful implementation of the project, it becomes imperative for the project staff to be properly trained in all the skills essential to enable them to run the project effectively.

1. Introduction

1.1. What are the guidelines and why are they needed?

- 1.1.1. The guidelines provide information that is necessary for operating or implementing a particular system, project etc. They are written to give technical assistance to the people so that they can have sound guidance while implementing a project. They basically tell what one is supposed to do, how one should go about it, when and where and by what means one should execute a particular task, with whom and with whose support should one implement a project etc.

1.2. Whom are these guidelines for?

- 1.2.1. These guidelines have been prepared primarily for the agency which would be implementing the fodder development programme and for those who would be directly or indirectly involved in the project. This would help the project staff in acquiring sufficient knowledge to implement the project in a comprehensive manner.

1.2.2 Items focussed/emphasised in the document:

- Adequate availability of feed and fodder to livestock is vital for increasing their productivity and also to sustaining ongoing genetic improvement initiatives. Optimum and efficient utilization of fodder resources holds key for successful commercial livestock production. The green and dry are two component of fodder which would be focused in this document.

1.3. Fodder Development Programme: A Background

- 1.3.1. Fodder is an important component of animal ration and its adequate availability is essential to exploit the genetic potential of the livestock. Despite that green fodder is an economic

source of macro and micro nutrients, its availability is a limiting factor for the growth of dairy industry. The availability of green and dry fodder is constrained due to followings:

- Most of the milk producers are landless, marginal and small farmers and do not have sufficient land for fodder production.
- Farmers are not adopting latest technologies like use of quality fodder seeds, leading low productivity of green fodder.
- 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 and encroachment of land etc.
- Poor awareness of the farmers about various technologies to improve the availability and productivity of fodder.
- Crop residues being main basal diet for dairy cattle play vital role in maintenance of large population of animals. Due to increased use of combine harvesters availability of straws is getting reduced because proper field mowers are not available with the farmers for picking up left out straw. Appropriate range of mowers /reapers and pick up devices are to be introduced.
- Demonstration of biomass stores / bunkers
- Majority of residues have low bulk density & are poor source of nutrients. They need enrichment and densification for reduced storage and transport costs.

Modern straw enrichment and densification plants are to be propagated.

- The efforts to improve production and availability of fodder by the centre and state government are not sufficient to meet the demand of fodder.

1.3.2. In view of above, it is necessary to implement various programmes related to fodder development in a focused way. Under NDP I, fodder development programmes have been formulated with the objectives to enhance the fodder availability for the livestock. Through fodder development programmes, our focus is to improve the availability of green fodder by increasing the green fodder yield of cultivated fodder from the land already under fodder cultivation. This is important particularly in view of that there is very little scope to increase the area under fodder cultivation due to growing demand of human beings for food, fibre and shelter. It is therefore necessary to increase the productivity of cultivated and common grazing land per unit area. The present average green fodder yield of 40 MT/ hectare/year of cultivated land & 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.

1.3.3. Besides enhancing green fodder yield, there is need to improve the efficiency of fodder utilization and minimizing the fodder wastages to increase the overall availability of green as well as dry fodder and to reduce the gap between demand and supply.

1.4. Rationale of the Programme

- a. The Dairy Industry in the country has shown spectacular growth during the last few decades. For an expected production of about 150 million MT of milk by the end of

2016-17, it is estimated that annual requirement of green fodder will be to the tune of 1100 million MT and dry fodder to the tune of 610 million MT.

- b. The current availability of green and dry fodder, however, is estimated at 500 million MT and 380 million MT respectively. Effort to increase livestock productivity / production is constrained by feed / fodder shortages. The shortages tend to be even more serious during natural calamities.
- c. 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 productivity of available forage resources per unit area, improve the efficiency of fodder utilization and minimizing the fodder wastages to increase the availability of fodder and to reduce the gap between demand and supply.

1.5. Advantages of Fodder Development Programme

- Enhance productivity of green fodder from the cultivated land
- Enhance fodder productivity of common grazing land.
- Create awareness among farmers about adoption of various technologies like use of improved seeds, conservation of surplus fodder in the form of silage, use of fodder harvester to recover crop residues from the combine harvested field.
- Enhance production and use of certified/truthfully labeled seeds of improved varieties of fodder crops.

- To organize timely supply of improved seeds of fodder crops at competitive price to the milk producers.
- To enhance income of seed growers by paying a premium over grain for the production of certified/ truthfully labeled seeds.
- To arrange supply of fodder to the land less/ marginal farmers from the common land.
- Enhance livestock productivity through better feeding of green and dry fodder.
- To improve the income of the farmers through improved livestock productivity by better feeding of green & dry fodder.

1.6. Prerequisites of Fodder Development Programme

1.6.1. Fodder development programmes would be implemented through District Cooperative Milk Producer Unions/State Cooperative Dairy Federations/Cooperative form of enterprises such as producer companies etc. The prerequisites of the fodder development programme would be as follow:

- The area for implementation of fodder development programme will be identified considering availability of livestock, green and dry fodder, common grazing land and agro –climatic conditions conducive to production of fodder seeds of specific crops.
- The area identified for implementation of fodder development programme should have any of the above mentioned agencies willing to implement the programme.

- The implementing agency agrees to implement the programme as per norms laid in the technical and operational guidelines of fodder development programme.
- The end implementing agency has sufficient manpower to implement the programme.

1.7. Status of Fodder Development Programme in India

1.7.1. In India, fodder development programmes are not implemented in comprehensive way, leading huge gap between demand and availability. Fodder is the state subject and lying with the department of animal husbandry. However, they are constrained with adequate technical manpower to implement various programme related to fodder development. Some of the programmes promoted/ implemented by various organisations are as follows:

- The National Seed Corporation (NSC) / State Seeds Corporations (SSCs) have taken up production of seeds of certain selected varieties of fodder crops of “National Importance” on a very small scale. The other organisations such as Central Cattle Breeding Farms, Regional Stations for Forage Production & Demonstration, Agricultural Universities and Research Institutions, State Farms Corporation of India (SFCI), Dairy Cooperatives and Private companies are involved in production of fodder seeds. At present, these organisations are producing around 40000 MT fodder seed annually, which covers only 10% land under fodder cultivation against the requirement of around 80000 MT at 20% seed replacement rate. Hence there remains a huge gap between requirement and availability of improved seeds.

- To popularize various fodder promotion technologies many agencies like Dairy cooperatives, State Animal husbandry departments and NGOs are implementing the programmes like use of quality fodder seeds of improved varieties, silage making and use of fodder harvester to recover straw in an insignificant way.
- Few NGOs and Dairy Cooperatives are involved in development of common grazing land for fodder production in a small way.
- In past, NDDDB has supported Dairy cooperatives to implement various fodder development programmes through Operation flood and Perspective plan.
- Department of Animal Husbandry, Dairying & Fisheries (DADF) Government of India is also providing financial support to various agencies for implementing programmes on fodder seeds production, grass land development, use of chaff cutter and silage making under their centrally sponsored scheme.
- DADF, GoI is also distributing about 10 lakh fodder minikits of improved fodder seeds annually under their Central Sector Scheme.
- The efforts of various organisations to increase the availability of green and dry fodder could not significantly reduce the gap between demand and supply of fodder.

1.8. Components of Fodder Development Programmes

- ### **1.8.1. Various components under the Fodder Development programmes are as follow:**

- a. Production and marketing of certified/truthfully labeled fodder seeds of improved high yielding varieties.
- b. Creation of required infrastructure for fodder seed production, storage, processing, treating, packaging and marketing.
- c. Re-vegetation of common grazing land for fodder production.
- d. Create required infrastructure for crop residue enrichment & densification.
- e. Improve technical skill of the manpower through training.
- f. Organize on farm demonstrations of following technologies to popularize among farmers for their adoption.
 - Silage making demonstration to conserve surplus fodder.
 - Demonstration of mowers to recover crop residues.
 - Introduction of biomass store.

1.9. Objectives of the programme

1.9.1. The main objectives of the fodder development programme are:

- a. Enhance green fodder yield of cultivated fodder crops from the land already under fodder production.
- b. Improve efficiency of fodder utilization.
- c. Minimize fodder wastage.
- d. Re-vegetation of common grazing land for fodder production.
- e. Training of technical manpower.

1.9.2. Consistent with the above main objectives, the following activities will be implemented:

a. **Fodder yield of cultivated fodder crops to be enhanced**

- Increase seed production of fodder crops
- Enhance use of quality fodder seeds

b. **Fodder utilization efficiency to be increased**

- Silage making demonstration

c. **Fodder wastage to be reduced**

- Demonstration of fodder mowers and pick up devices
- Demonstration of biomass stores
- Establishment of straw enrichment cum densification plants.

2. Fodder Development Programme: An Overview

2.1. Area of operation

- 2.1.1. The programme would be implemented in areas where the agro-climatic conditions are suitable for fodder development. For silage making, areas where maize, sorghum, pearl millet, oats etc are generally grown would be selected. For straw densification activities, areas having surplus dry fodder would be selected.

2.2. Snapshot of the Project Activities

- 2.2.1. The major activities to be undertaken include:
- a. To establish seven new fodder seed processing and storage units in different parts of the country
 - b. The production of additional 8000 MT quality fodder seeds through existing & new plants.
 - c. To organize 1050 silage making demonstrations in selected villages.
 - d. To demonstrate straw recovery mowers / reapers, tractor or engine operated in selected villages. Over 280 modern, crop mowers and pick up devices to be introduced. Usefulness of combine prevention mowers as well as fodder pick up mowers to be demonstrated effectively so as to ensure replication by other farmers. Training of participating farmers on repair and maintenance to be organized.
 - e. Construction of 35 model biomass stores at strategic locations.
 - f. Establishment of two model straw enrichment and densification plants.

- g. Re-vegetate 700 hectares permanent common grazing land for fodder production. The productivity of such lands can be raised from the present level of 0.75 MT to 5.75 MT / hectare.

2.2.2. For all activities special care to be taken to trigger fall out effect in the milk sheds so as to achieve higher adoption rate by neighboring farmers.

2.3. Contribution of the project to the overall dairying situation in the country

1. The production of 8000 MT improved fodder seeds would cover about 160000 hectares cultivated land leading estimated production of 6.40 million MT additional green fodder.
2. Re-vegetation of 700 hectares common grazing land
3. Considering that 10 kg green produces about 1kg milk, additional green fodder produced would lead production of 0.64 million MT of additional milk by 2016-17.
4. Various demonstration programmes, besides reducing wastage and increasing efficiency will also create awareness about usefulness of latest fodder management technologies.

3. Project Sub activities

3.1. Fodder seed production, processing and marketing programme

3.1.1. Rationale

- Green fodder, an important and economic source of macro and micro nutrients for the livestock, is deficit significantly. Presently, it is estimated that about 8.34 million hectares cultivated land is under fodder production with an average green fodder yield of 40 MT/hectare/year, which is quite low. The low fodder yield is mainly due to huge deficit of quality fodder seeds of improved high yielding varieties/hybrids of various fodder crops. It is expected that by use of improved fodder seeds along with recommended agronomical practices, fodder yield can be enhanced substantially from the present level of 40 MT /hectare/year, considering production potential of improved varieties.
- Despite various efforts at national and state levels, the availability of quality fodder seeds still remains a major constraint in stepping up fodder production matching the demand for milk production. The annual requirement of quality fodder seed is estimated about 80000 MT to sow 20 percent of the land under fodder production.
- The National Seed Corporation (NSC) / State Seeds Corporations (SSCs), Central Cattle Breeding Farms, Regional Stations for Forage Production & Demonstration, Agricultural Universities and Research Institutions, State Farms Corporation of India (SFCI), Dairy Cooperatives and Private companies are involved in production of fodder seeds. At present, these organisations are producing

around 40000 MT fodder seed annually, which covers only 10 % land under fodder cultivation against the requirement of around 80000 MT at 20% seed replacement rate. Hence there remains a huge gap between requirement and availability of improved seeds.

- In view of above, it is proposed to expand their existing Fodder Seed Production and marketing programme to reduce the gap in the demand and supply of quality fodder seeds.
- In the past, NDDB had assisted Dairy Cooperatives in establishing Fodder Seed Production and Marketing units. These units have adequate infrastructure for seed processing, treating, packing and storage along with dedicated technical manpower. Presently, these units are producing around 5000 MT of quality fodder seeds annually through their registered seed growers/ milk producers under buy back arrangement. The seeds so produced are being marketed to the milk producers at a competitive price through dairy cooperative societies after thorough cleaning/processing, treating, packing and testing. NDDB is also organizing supply of breeder seeds of various fodder crops to dairy cooperatives through Indian Council of Agricultural Research/ Agricultural Universities.
- On similar lines, Under NDP I, it is proposed to expand this activity through establishing seven new seeds production units. Each Seed Processing Unit would be in a position to organize seed production for at least 300 MT of fodder seeds of improved high yielding varieties of fodder crops annually.

- Further, to encourage production & sale of improved fodder seeds, it is necessary to supply quality seeds to the farmers at competitive price. However, in case of fodder crops, the seed & fodder yield are inversely correlated. Normally, the improved varieties of fodder crops are characterized by low seed yield, since from the pure objective of breeding; more emphasis is laid on higher biomass production. As a result, fodder seed production is often uneconomical / less remunerative to the seed growers/ producers, especially when high grain yielding varieties /hybrids are available in the same crop species implying greater return in commercial seed production. Therefore, seed growers taking up fodder seed production often demand higher procurement price to match with the total net return from the corresponding grain varieties / hybrids seed production. Moreover, certified/truthfully labeled fodder seeds of improved varieties produced scientifically are always having higher sale price. Many farmers buying fodder seed do not wish to invest in purchasing high quality seeds of higher price due to significant difference in the rate between quality and inferior seeds. Many a time's farmers even use grains as seeds in fodder crops due to its low price. Therefore, appropriate financial support is required at seed production level to the seed growers and at the level of sale/distribution to seed buyers to encourage production and use of certified/truthfully labeled seeds.

3.1.2. Tasks

- Production of 300 MT of fodder seeds by each new plant
- Strengthening existing seed plants to increase seed production
- Procurement and installation for seed processing plants.

- Appointment / posting of manpower as per project.

3.1.3. Technical criteria for Fodder Seed Processing Plant:

- EIAs should have experience of producing/procuring certified/ truthfully labeled fodder seeds.
- EIAs should have the capacity to formulate and implement a sound plan for fodder seed processing and the capacity to strictly adhere to the SOPs for seed procurement and processing.
- Preference will be given to EIAs that already have in place IT based reporting and monitoring systems.

3.1.4. Technical criteria for fodder seed production and marketing support

- EIAs should have experience of production/ procurement/ marketing certified/ truthfully labelled fodder seeds.
- Preference will be given to EIAs that already have in place IT based reporting and monitoring systems.

3.1.5. Sequence of activities

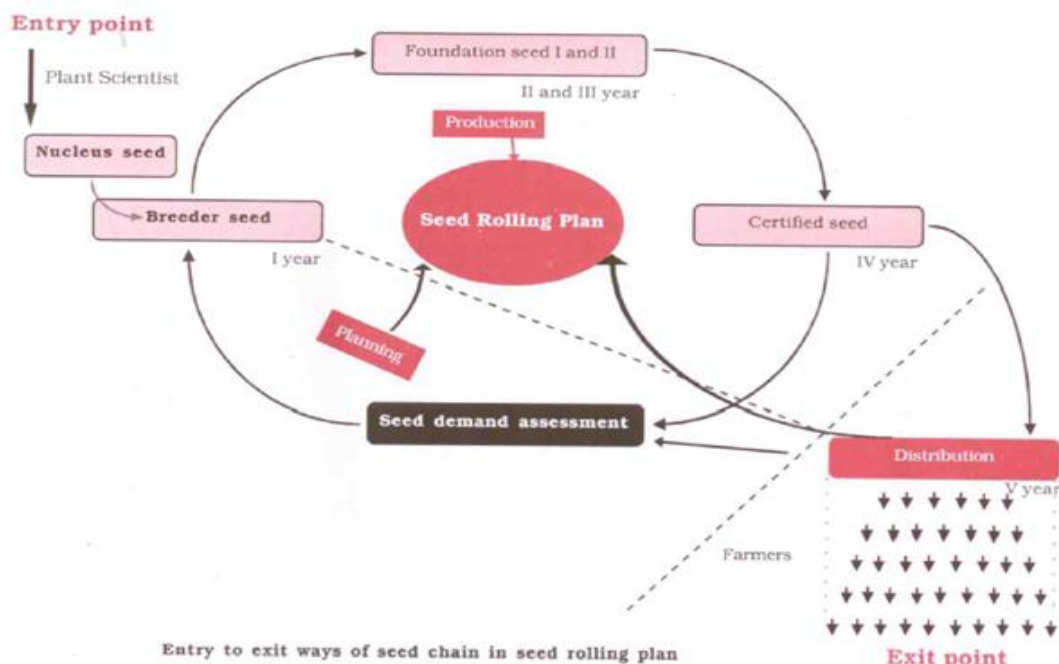
- The implementing agency will work out a proposal of fodder seed production and marketing in consultation with Project Management Unit giving details of crop wise certified/ truthfully labeled fodder seeds to be produced during next five years along with financial details.
- The implementing agency will submit the proposal to PMU (located in NDDB), for appraisal and approval.
- On receipt of approval from PMU, implementing agency will appoint / identify a technical person as Unit In-charge who will be responsible to carry out all activities as per project proposal.

- d. Unit In-charge would place their breeder seed indent of various crops well in advance or as required by PMU (located in NDDB).
- e. NDDB will organize the supply of breeder seeds/parent material to project from GoI, MoA/ ICAR well in time.
- f. Unit In-charge will initiate appointment of other persons as per approved proposal.
- g. Unit In-charge will initiate procedures to construct / procurement of seed processing and storage infrastructure.
- h. Project team will identify seed growers and have agreement with them to produce quality foundation/ certified/ truthfully labeled seeds.
- i. Project team will arrange foundation/ breeder seeds to seeds growers as per agreement well before the onset of season.
- j. Project team will coordinate with State seed certification agency to certify the production of foundation/certified seed.
- k. Project team will guide the seed growers about agronomical practices of the crop and management of seed crop from time to time.
- l. Project team will initiate procurement of raw seeds from the seeds whose crop is meeting minimum field standard and approved by State seeds certification agency.
- m. After procurement of raw seeds, it would be cleaned, graded, treated, tested and packed. The State certification agency will issue their label indicating that package seed is meeting minimum field and lab standard.

- n. For the production of truthfully labeled seeds, the implementing/ production agency will have to ensure that truthfully labeled seeds are meeting minimum standards.
- o. The payment of seed growers will be settled by production agency as per their terms & conditions.
- p. The implementing agency will market the certified/ truthfully labeled seeds to the farmers through milk union/ dairy cooperative societies at a competitive price.
- q. The progress of the project activities will be monitored by a Management Committee.

The detail roll out plan of seed production and marketing is as presented in Figure 3.1.

Figure 3.1: Entry to exit way of seed chain



3.1.6. Pest Management Plan

- Fodder seed production and processing may involve limited usage of pesticides. The concern of the farmers regarding susceptibility of quality fodder seeds to various diseases leads them to use pesticides. NDP I involves production and distribution of quality seeds and hence the usage of pesticides too is anticipated. Common pesticides used in fodder seed production and distribution are given at Annex II.
- In this context, it is imperative that the farmers would be adequately trained in terms of non usage of banned pesticides, storage, transportation handlings and suggested best practices for administering the pesticides.
- Risk factors involved and mitigation measures in usage of pesticides in fodder seed production and distribution are given below:

Table 3.1: Risk factors involved and mitigation measures in usage of pesticides in fodder seed production and distribution

Risks	Rating	Risk Mitigation Measures	Residual Risk Rating
Use of banned Pesticides	M	i. Information Education Communication (IEC) campaign for famers about the use of pesticides approved and recommended as per package of practices	L

Risks	Rating	Risk Mitigation Measures	Residual Risk Rating
Spillage or leakage during storage & transportation of pesticides	M	i. Transporter to follow well defined practices ii. Training to personnel on proper handling of pesticides during transit and storage iii. IEC campaign for farmers	L
Deviation from recommended/ mandatory usage of pesticides	M	i. IEC campaign for farmers about use of pesticides as per package of practices proposed ii. Monitoring through field visit to ensure the use of pesticides as per package of practices	L

3.1.7. Duration of particular activity

1. Identification of Unit In-charge – within a month of getting approval of the project from PMU
2. Creation of infrastructure – Within 12 months
3. Appointment of project team – Within 6 months
4. Initiation of seed production – Within six months
5. Initiation of Marketing of fodder seeds – Within 15 months.

3.1.8. Essential safeguards

1. The Seed Act 1966
2. The Seed rules 1968
3. Weight & measurement rules
4. Electrical safety rules
5. Labour license etc

Project has to ensure implementation of various regulations applicable to the industry within the state

3.1.9. Key performance indicators of the activity

1. Procurement of breeder seeds as per project proposal
2. Production of certified/foundation/ truthfully labeled seeds as per targets
3. Quantity of certified seed marketed
4. Per cent increase in proportion of area under green fodder with certified / truthfully labeled seeds

3.2. Silage making demonstration

3.2.1. Rationale

- In order to ensure supply of fodder to livestock during lean/ deficit period, the fodder conservation of any surplus quantity of green fodder is the best option. Among various technologies available for fodder conservation, silage making (fodder ensiling) is most efficient because large quantity of green fodder can be preserved for longer period during any season without any significant loss of fodder quality and palatability.
- In India, silage making is not popular among farmers and it is necessary to educate the farmers about silage making by organizing demonstration at the village level. Through silage making, wastages of the green fodder produced during flush season (mainly during rainy season) can be minimized thus improving fodder utilization efficiency.

3.2.2. Tasks

- Silage making demonstration at farmers' door steps

3.2.3. Technical criteria for participating in Silage Making Demonstration

Fodder Crops: Maize, Sorghum, Pearl Millet and Oats (refer to Annex I)

- a) EIAs should have a network of village level farmers organisations such as village Dairy Cooperative Societies, Milk Producers' Institutions and Self Help Groups and having experience in conducting demonstrations for technology transfer at field level.
- b) EIAs should have capacity to formulate and implement a sound plan for demonstrations.
- c) Preference will be given to EIAs that have prior experience in this area.

3.2.4. Sequence of Activities

- Identification of village/ farmers
- Selection of appropriate Silo structure as per village conditions
- Design & Construction of silo structure as per soil profile.
- Supply of polythene sheet to the farmers
- Briefing to farmers about harvesting, chaffing and silage making at highest possible speed
- Arrange demonstration to other farmer

3.2.5. Duration

- May - June and October – November each year

3.2.6. Key Performance Indicator

- Number of farmers seen the demonstration of silage making

3.3. **Demonstration of fodder mowers/ pick up devices and biomass storage silo:**

3.3.1. Rationale

- Cereal growers are switching over to jumbo combine harvester which is not a cattle friendly method of crop harvesting. Due to shortage or absence of pick up mowers many farmers are constrained to waste the left out straw right in their fields. For recovery of straw appropriate small mowers, reapers and auto pick up devices are to be demonstrated in selected villages of EIAs. Live demonstration of cattle friendly straw management machines are to be arranged in various agro climatic zones. Both auto pick up type as well as combine prevention type mowers are to demonstrated effectively so as to facilitate mass replication by other farmers & village level agencies. Side by side appropriate biomass stores/bunkers suitable for Indian farm conditions are also to be demonstrated.

3.3.2. Tasks

- Introduction of appropriate mowers in the villages so as to recover maximum possible straw for the cattle owners

3.3.3. Technical criteria for participating in Mower Demonstration

- EIAs should have access to farmers who can collectively make available about 400 hectares of their land which is generally under combined harvesting for securing crop residues.
- EIAs should have capacity to formulate and implement a sound plan for demonstrations.

- Preference will be given to EIAs that have prior experience in this area.

3.3.4. Technical criteria for participating in biomass storage silo

- EIAs should have a network of village level farmers organisations such as village Dairy Cooperative Societies, Milk Producers' Institutions and Self Help Groups and having experience of providing production enhancement services and interested in movement of dry fodder from surplus to deficit areas.
- EIAs should have land (free of encumbrances) for setting up the storage silos.
- EIAs should have the capacity to formulate and implement a sound plan for crop residue enrichment and densification.
- Preference will be given to EIAs that have prior experience in this area.

3.3.5. Sequence of Activities

- Identification of villages/ farmers/EIA
- Selection of appropriate machine as per village conditions
- Procurement of good quality product from competent suppliers as per approved specifications
- Supply of equipment to the end users on rent or lease
- Educating participating farmers on safe operation, key adjustments, minor repairs and maintenance schedules
- Construction of model biomass stores /bunkers
- Arrange demonstration to other farmers

3.3.6. Duration

- Six months after identification of EIA

3.3.7. Key Performance Indicator

- Number of farmers seen the demonstration of Mowers
- Number of farmers seen the demonstration of biomass storage silo

3.4. **Enrichment and densification Plant**

3.4.1. Rationale

- Nutritive value of crop residues is low and these form the bulk of basal diet of ruminants in India. Crop residues are not uniformly available across the country, some areas are surplus and there is severe deficiency in some of the areas. Movement of straw from one district to other is quite common especially when the monsoon is not favourable. If the crop residues are supplemented with low cost feed ingredients like cakes, brans, grains, molasses, hay, minerals and then densified, it is possible to save on storage and transport costs. Also balanced ration in complete or total mixed ration form as per lactation stage of animals can be supplied. Different straw can be enriched and densified, depending on their chemical composition and physical characteristics. Enrichment plant in the capacity range 30 to 40 TPD is more suitable for Indian conditions. It comprises of modern machines like field mowers, pick up devices, choppers, crushers, shredders, grinders, mixers, pellet press and hydraulic press as per need of biomass.

3.4.2. Tasks

- Establishment of 40 TPD Enrichment and Densification Plant comprising of civil, mechanical, electrical and instrumentation works

Procurement of raw materials and running the plant on day to day basis

3.4.3. Technical criteria for establishing a crop residue enrichment and fodder densification plant

- EIAs must have the capacity to formulate and implement a sound plan for crop residue enrichment and densification plant.
- Preference will be given to EIAs that have prior experience in this area.

3.4.4. Sequence of Activities

- Identification of EIA
- Site Selection
- Construction of buildings, roads, infrastructure as per requirement
- Procurement of Plant and machinery
- Erection and commissioning of plant
- Procurement of raw material and operating the plant.
- Educating the EIA on safe operation, key adjustments, minor repairs and maintenance schedules
- Arrange demonstration to other agencies & farmers.

3.4.5. Duration

- 18 months after taking over land by EIA

3.4.6. Key Performance Indicator

- Sale of enriched and densified straw

- Number of farmers adopting the whole fed / enriched straw

3.5. Re-vegetation of common grazing land

3.5.1. Rationale

- India has huge area under forests but they are not within an easy reach of even 10% of the cattle. The other important source of fodder available to land less, small and marginal farmers is Permanent Pasture and other common grazing lands. These lands have degraded due to intensive grazing pressure, unscientific management and lack of adequate institutional structure at village level to manage such lands. In India, about 10.40 million hectares lands have been classified under permanent pasture and other common grazing lands.
- With the increasing demand of feed and fodder for animals and fuel wood and small timber for rural poor, it is necessary to take up integrated approach to re-vegetate with cultivated fodder crops, grasses, trees, shrubs under silvi-pastoral/ horti - silvipasture system to improve overall productivity of such land.
- The re-vegetation of such lands would be carried out by strengthening of village level institution like village panchayat / dairy cooperative societies/ NGOs working in that area and through participation of local community. The whole concept to develop such lands would be based on sound ecological principle and very much nearer to nature.

3.5.2. Tasks

- Re-vegetation of common grazing land for fodder production

3.5.3. Technical criteria

- a. Operational area should have at least 2 hectares grazing land in a village or the EIA/DCS owned land.
- b. The village panchayat is ready to lease common grazing land to implementing agency for fodder production on long term basis.

3.5.4. Sequence of Activities

- Identification of villages
- Transfer of common land on lease to village institution
- Planning a scientific scheme for development as per agro climatic conditions
- Procurement of inputs like seeds, saplings, fertilizers etc
- Initiate development work before onset of rainy season
- Arrange planting of grasses, legumes & trees as per plan
- Arrange demonstration to other farmers at the time of its operation

3.5.5. Duration

- Peak activity season is in the rainy season. Development will continue for 5 years

3.5.6. Key Performance Indicator

- Area brought under development of common grazing land

4. Specifications of activities under Fodder Development

4.1. Green Fodder

Green fodder is an important and economic source of macro and micro nutrients for the livestock. The present availability of green fodder is about 500 million MT and deficit significantly. In India, few important fodder crops and their improved varieties being cultivated are given below along with their pictures.

4.1.1. Cereal fodder crops

The following are the characteristics of the cereal fodder crops.

- Rich in carbohydrates and energy
- Most suitable for silage making
- High seed production capacity

4.1.2. Perennial cultivated grasses

The following are the characteristics of the perennial cultivated grasses

- Rich in carbohydrates and energy
- Most suitable for silage making
- High seed production capacity

Table 4.1: Cereal fodder crops








Sl. No.	Crop	Picture
1	Maize <ul style="list-style-type: none"> • Green fodder yield is 40 – 50 tons per hectare • High yielding varieties – J 1006 and African Tall 	
2	Sorghum <ul style="list-style-type: none"> • Single cut varieties yield is 35 – 50 tons per hectare • High yielding varieties – HC 308 and Pant Chari 5 • Multi-cut varieties yield is 75 – 90 tons per hectare • High yielding multi-cut varieties are SSG – 988, 855, CSH 20 MF 	
3	Pearl millet <ul style="list-style-type: none"> • Green fodder yield is 35 – 45 tons per hectare • High yielding varieties – RBC 2, Rajko 	
4	Oats <ul style="list-style-type: none"> • Green fodder yield is 40 – 55 tons per hectare • High yielding varieties – Kent, UPO 212, JHO 822 	

Table 4.2: Perennial cultivated grasses

Sl. No.	Crop	Picture
1	Hybrid Napier grass <ul style="list-style-type: none"> • High yielding perennial grass (200-400 tons per hectare) • Provide fodder from March to November in 5 to 6 cuttings • Vegetative propagated from rooted slips or stem cuttings • Important varieties are PBN 233, CO 3 & 4, IGFRI 6, 7 & 10 	
2	Guinea grass <ul style="list-style-type: none"> • High yielding with better fodder quality than Hybrid Napier • Tolerate partial shade and therefore, ideal for cultivation in gardens • Propagated by seeds and root stocks • Important varieties are Co-2, Hamil, Macuenni, PGG – 19 & 518 	
3	Para grass <ul style="list-style-type: none"> • High yielding & multi-cut in nature • Suitable for marshy and water logged areas • Can be grown in saline and acidic conditions • Drought tolerate 	

The details of package of practices of cultivating fodder crops are given at Annex III.

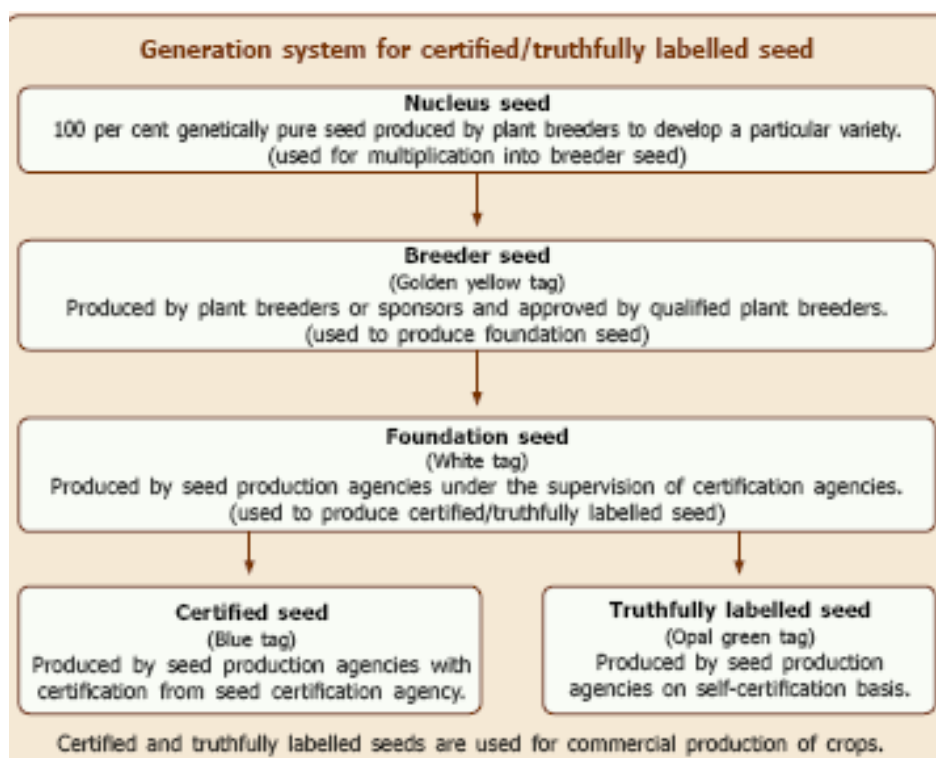
4.2. Certified/truthfully labeled fodder seed

- Seed is the most critical and important input to enhance production potential of all agricultural crops including fodder. The efficacy of other inputs is largely dependent upon availability and timely sowing of quality seeds of improved genetics. Certified/truthfully labelled is a class of seeds which are used for the production of crop. The other class of seeds are only used for seed multiplication only. The production of certified/ truthfully labelled seeds is highly scientific and passes through a generation system.

4.2.1. Generation system of seed multiplication

The generation system of seed production is given below:

Figure 4.1: Generation system of seed production



4.2.2. Involvement of various agencies

Various agencies involved in Seed production & marketing are given below:

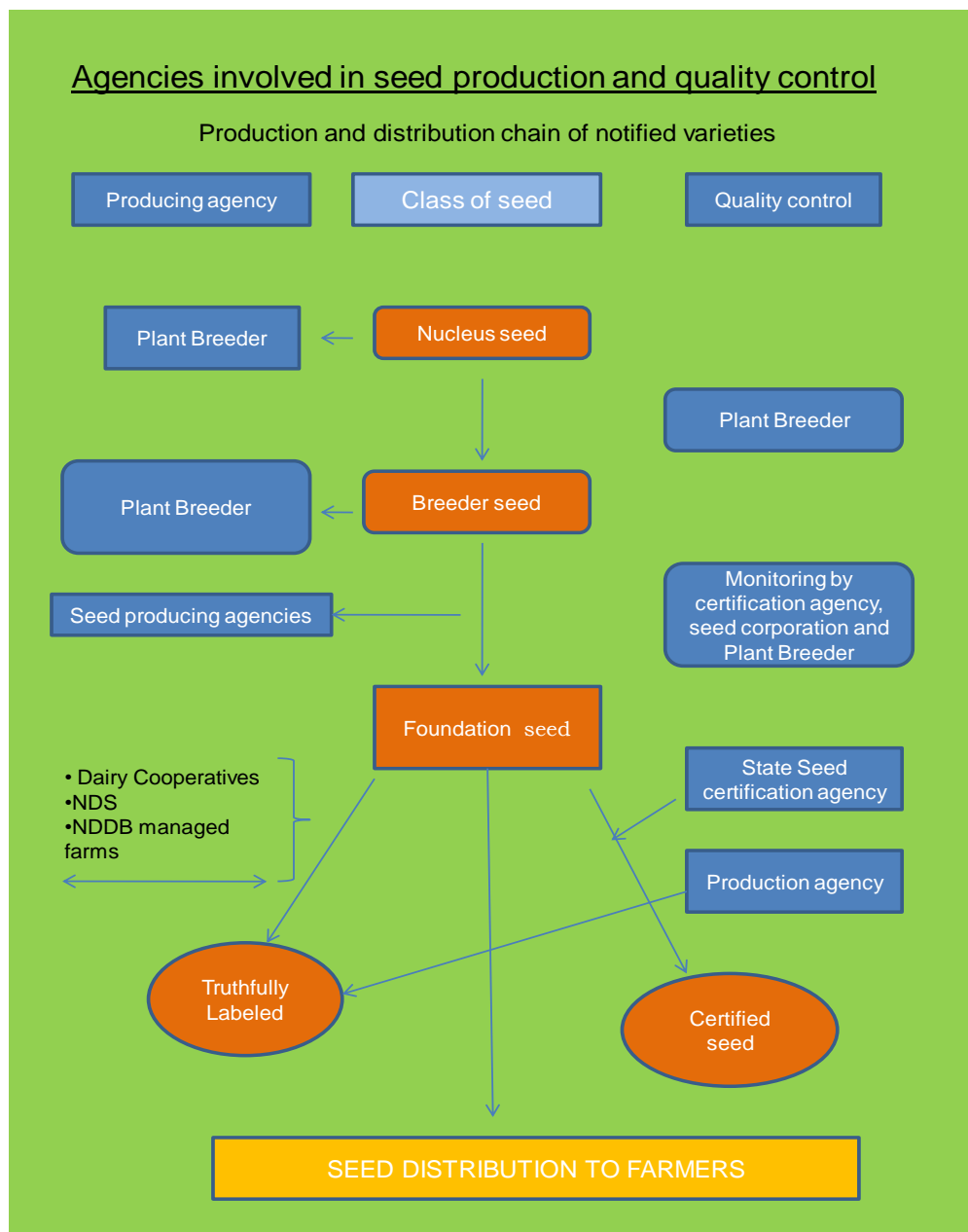
4.2.2.1. Production agency

- Organisations responsible for the production of certified/ truthfully labelled seeds for marketing amongst farmers for the production of green fodder. Production agency carries out following activities:
 - Forecast crop wise / variety wise requirement of certified/ truthfully labelled seeds.
 - On the basis of the requirement of certified / truthfully labelled seeds, they estimate the requirement of breeder seeds.
 - Production agency has to organize procurement of breeder seeds from GoI/ICAR through PMU (located in NDDB)/ State Department of Agriculture. Production agency has to organise their further seed multiplication programmes i.e. breeder seed into foundation seeds and foundation seed into certified/truthfully labelled seed through registered seeds growers under a buy back arrangement.
 - Organise field inspections from technical officers of State seed certification agency and procurement of raw seed.
 - Undertake seed processing, grading, treating, packing, weighing, labelling, certification and storage.
 - Market certified/truthfully labelled seed to milk producers at a reasonable price.

- Seed Growers
 - They are farmers and organised farms registered with production agency having adequate irrigated land and produce quality seeds as per guidance of production agency.
- State Seed Certification Agency
 - They are autonomous bodies of the State Governments responsible to monitor and approve the quality of foundation and certified seeds. They undertake the task at the request of production agency against the receipt of prescribed fees.
- Seed Testing Laboratory
 - There are seed testing laboratories in each state notified by state government for testing of seed samples of all crops and classes of seed for germination, physical purity and other crops seed.
- Indian Council of Agricultural Research / Agricultural universities
 - They are responsible for the production of breeder seeds/ parent material as per the indent of GoI.
- Ministry of Agriculture, Government of India
 - Responsible for collecting indent of breeder seeds/ parent material from all agencies responsible for production of certified/foundation seeds and assign the responsibility for production of breeder / parent seeds to ICAR/ agricultural universities.

- PMU (located in NDDB)
 - Support production agencies by organising supply of breeder seeds from MoA, GoI, arranging funds to create the necessary infrastructure and for training manpower.

Figure 4.2: Agencies involved in seed production and quality control



4.2.3. Quality control

- For the production of foundation and certified seeds quality measures are taken up by State seed Certification agency, an autonomous agency of State Government. The quality control measures of truthfully labelled seeds are taken up by production agency itself. Quality control measures include field inspections and laboratory tests.
- Field inspections are carried out at different stages of the seed crop to ensure genetic purity and maintain the minimum standards of isolation distance, off – type plants / ear head, other inseparable crop plants, objectionable weed plants and plants affected by seed borne diseases.
- The processed/graded seeds are tested in any of the approved seed testing laboratories of state governments to maintain the seed standard of physical purity, other crop seeds and other distinguishable varieties, weed seeds, objectionable weed seeds, germination and moisture.
- Minimum field and laboratory standards (given at Annex IV)

4.2.4. Seed Marketing

- The certified / truthfully labelled seeds meeting all quality standards would be made available to the farmers through Dairy cooperative societies/ registered dealers or any institution available in the villages.

Figure 4.3: Certified / truthfully labelled seeds



4.2.5. Seed legislations

In India, seed production & marketing is regulated by followings legislations:

- a. The seed Act, 1966
- b. The seeds rules, 1968.

Few other legislations like (i) The seed control orders, 1983 and (ii) Essential Commodities Act, 1955 are also applicable to seed industry.

4.2.6. Infrastructure

Seed processing unit comprises of seed cleaning and grading machines. Most of the machines are electrical motor operated. Depending on capacity about 25 to 50 HP power connection is required. Apart from machines the plant must have good quality civil buildings like process hall building, seed stores, small office building, Motor control centre, good internal roads, well protected boundary, misc utility services like water supply, power connection, sewerage disposal etc - details given below:

Table 4.3: Infrastructure details of Fodder Seed Processing Plant

FODDER SEED PROCESSING PLANT - 300 MT/year			
Sl. No.	ITEM	QTY	UNIT
	PLANT & MACHINERY		
1	Seed cleaner cum grader with accessories	1	Sets
2	Gravity Separator	1	No
3	Seed treater	1	Set
4	Material handling & interconnecting equip.	1	No.
5	Weighing & packing equipments	2	Set
6	Miscellaneous items as per need	1	Set
7	Foundation & Misc electrical works	1	Set
	CIVIL WORKS		
1	Procurement yard	200	sq m
2	Seed Godown + seed processing area	400	sq m
3	Office cum seed testing lab	100	sq m

Figure 4.4: Fodder Seed Processing Plant



- Technical Specification
 - The seed processing plants are designed as per physical condition of the seeds to be cleaned. All impurities like chaff, internodes, dust, sand, gravels, stones, broken seeds, hollow seeds, other foreign particles etc are to be removed using appropriate machines. Majority of impurities could be removed by physical screening i.e set of pre cleaners and main cleaners having gentle aspiration at critical spouts, inlets, outlets, free falls etc.
 - When physical shape of impurities is same as seeds being cleaned, gravity separators would be used, because, it ensures seed grading on the basis of density of each grain/particle. Dense, heavy, hollow impurities are graded with high accuracy. Conveying and material handling system for seed plants must ensure zero damage to the tender seed coats so as to maintain highest standard of germination. Proper sun drying of seeds is mandatory so as to ensure moisture content below 12% avoiding any need of mechanical seed dryers. Seed treaters are required to apply accurate dose of chemicals, mainly fungicides on the graded seeds.

The Seed Processing Plant comprises of following main machines:

- a. Crop Threshers ----- -1 to 10 Acres per day
- b. Pre – Cleaners ----- 1 to 2 TPD
- c. Sieve type Seed Cleaners cum Graders --- 1 to 2 TPD
- d. Gravity Separator / Grader ----- 1 to 2 TPD
- e. Seed Treaters----- 1 to 2 TPD

- f. Matching Bucket elevators & holding bins
- g. Seed bagging and packing machines
- h. Motor control centre and electrical works as per need

Figure 4.5: Modular Cleaner cum Grader for Fodder seeds

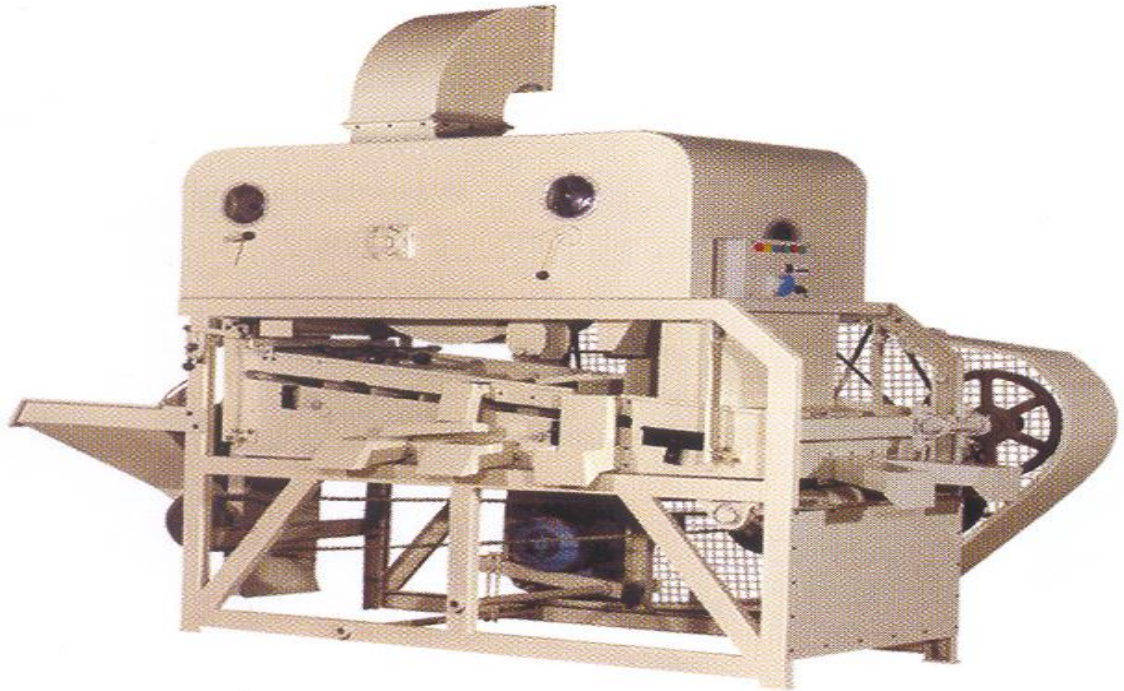
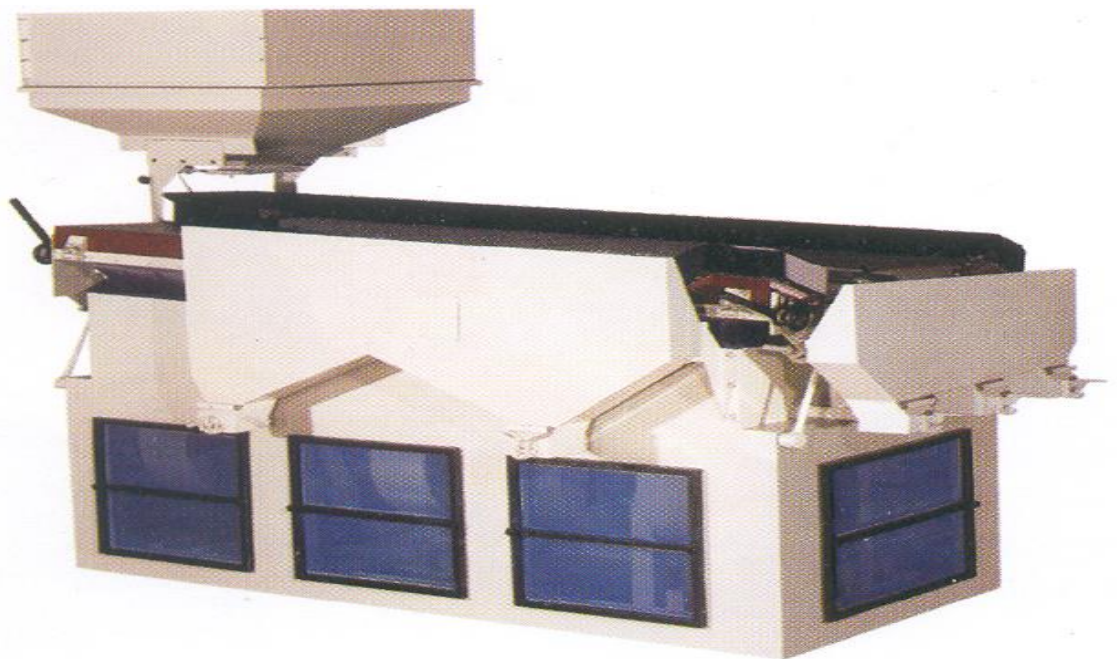


Figure 4.6: Gravity separator for Fodder Seeds



4.3. Silage making demonstration

- Silage is a preserved green fodder having high moisture around 65-70 percent. It is preserved from the fermentation of sugars available in the green fodder in the absence of oxygen (anaerobic fermentation).

4.3.1. Procedure of Silage Making

- Construct a surface/trench Silo (silage storage structure). One cubic meter space / silo can store 500-600 kgs of green fodder.
- Harvest the crop at 30-35 percent dry matter stage.
- Wilt the harvested fodder to bring down DM to 30-35 percent, if required.
- Chop the fodder into small pieces of 2-3 cm size.
- Fill the chopped fodder into the silo.
- Press the chopped fodder in the silo layer by layer of 30-45 cm.
- Filling and pressing should be as fast as possible.
- After filling and pressing, seal the silo with thick polyethylene sheet.
- Put weight through mud layer/ sand Bags/ tires on the sheet to prevent air flow beneath the sheet.
- Open the silo for feeding, minimum after 45 days, as per need.

Figure 4.7: Silage making at small/medium farm



1. Sorghum green crop fodder



2. Chopping of green fodder



3. Manual filling fodder



4. Silo Sealing



5. Silage sample



6. Silage feeding

4.3.2. Advantage of Silage Making

- Minimize wastage of surplus green fodder produced during flush season.
- Ensure round the year fodder supply to the livestock.
- Ensure harvesting of maximum nutrients available in fodder crop.
- Crop can be harvested in almost all weather condition.
- Silage feeding requires minimum adjustments in balancing the ration as it is of almost uniform quality.
- Feeding silage reduces bloat and also an effective tool for the control of parasitic diseases, as the micro-organisms present in the green fodder are destroyed during ensiling.
- Enhance green fodder productivity by improving harvesting intensity.

- Enhance livestock productivity by ensuring fodder supply during deficit.

4.3.3. Crops suitable for silage making

- The fodder crops rich in soluble carbohydrates, such as maize, oats, sorghum, pearl millet, and hybrid Napier are most suitable for ensiling. The silage of other crops can also be made by using suitable additives.

4.3.4. Infrastructure required

- Silo – Surface or trench.
- Farm machinery like fodder harvester & power chaff cutter tractor, trailers etc.

4.3.5. Technical specification

- Progressive farmers are to be encouraged to create rudimentary infrastructure for ensiling. Surface silos in the capacity range 5 to 15 MT to be constructed using locally available building materials like bricks, stones, gravel, sand, cement, steel etc. For manual pressing the brick /stone wall height of 1200 to 1500 mm would be provided. Proper foundation and finished floor levels to be considered as per local village conditions mainly soil, flooding, water table, runoff water etc. General schematic sketch of surface silo for the progressive farmers is given below:

Figure 4.8: Surface silo



4.3.6. Characteristics of good quality silage

- Bright, light green yellow or green brown in colour.
- Lactic acid odor with no butyric acid and ammonia odor.
- Firm texture with softer material not easily rubbed from fiber.
- Moisture is 65-70 percent.
- Lactic acid 3-14 percent.
- Butyric acid less than 0.2 percent.
- Acidic medium with pH 4.0 -4.2.

4.4. Crop residue recovery

- 4.4.1. Due to shortage of labour use of combine harvester is increasing in India. Farmers are jumping from manual harvesting to jumbo combine harvesters. Majority of farmers are not aware of cattle friendly smaller version power reapers for wheat, rice, short height cereals which ensure 100% straw recovery as well as grain at quite reasonable speed and costing.

4.4.2. Many of these power reapers could be used to harvest green fodder also at a speed matching to silage making and hay making. Such cattle friendly reapers /mowers are to be propagated vigorously. This set of reapers /mowers would lead to combine reversal /prevention in many locations in India. Preventing straw wastage is better than recovery after combining, because by appropriate mowers and reapers we get 100% straw. Separate range of mowers & reapers are available for harvesting and picking up left out straw after combining. This set of mowers with pick up devices will also be popularised.

4.4.3. Technical Specification of straw recovery reapers / mowers

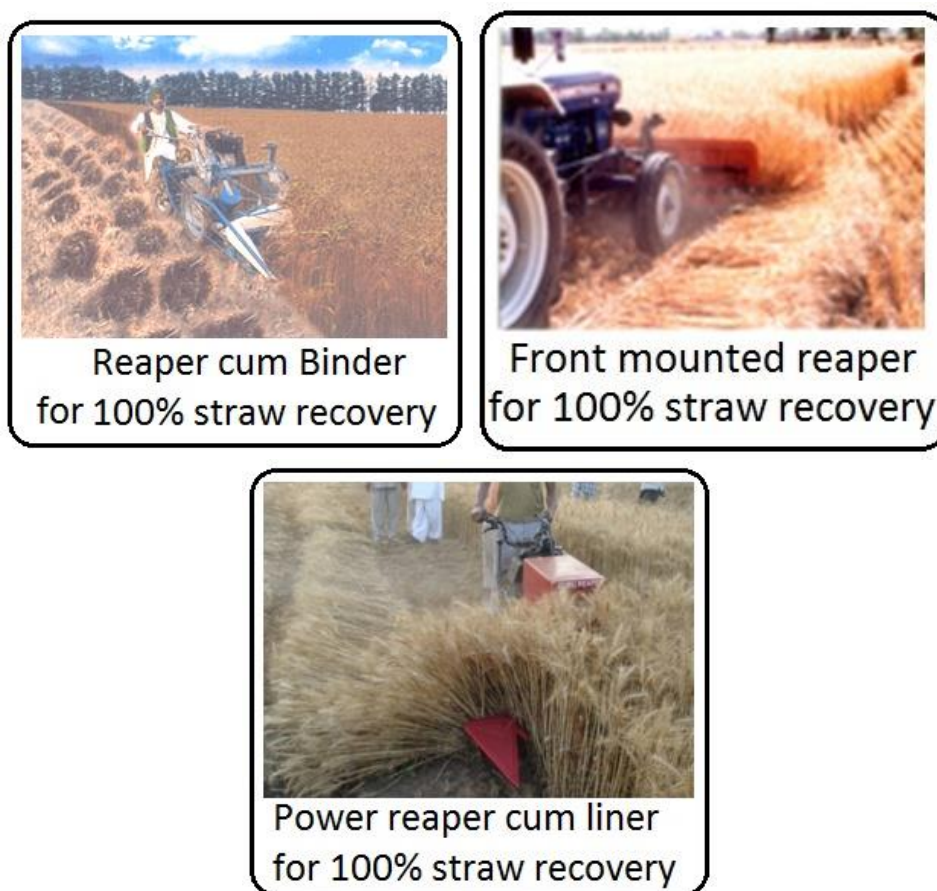
- Depending on local village conditions two approaches /sets of machines are to be propagated for straw management:
- Cattle friendly smaller version power reapers cum liners or power reapers cum binders for wheat, rice, short height cereals. This middle course of mechanization will ensure 100% straw recovery at the time of threshing.

Table 4.4: Specifications of straw recovery reapers

Sl.No	Crop residue recovery machine	Prime mover	Recovery by one machine (MT/yr)	Area covered by one machine (hect/yr)
1	Wheat, rice, oat front mounted reaper cum liner	50 hp tractor	150	150
2	Wheat, rice, oat reaper cum binder self propelled	10-15 hp power tiller	100	100

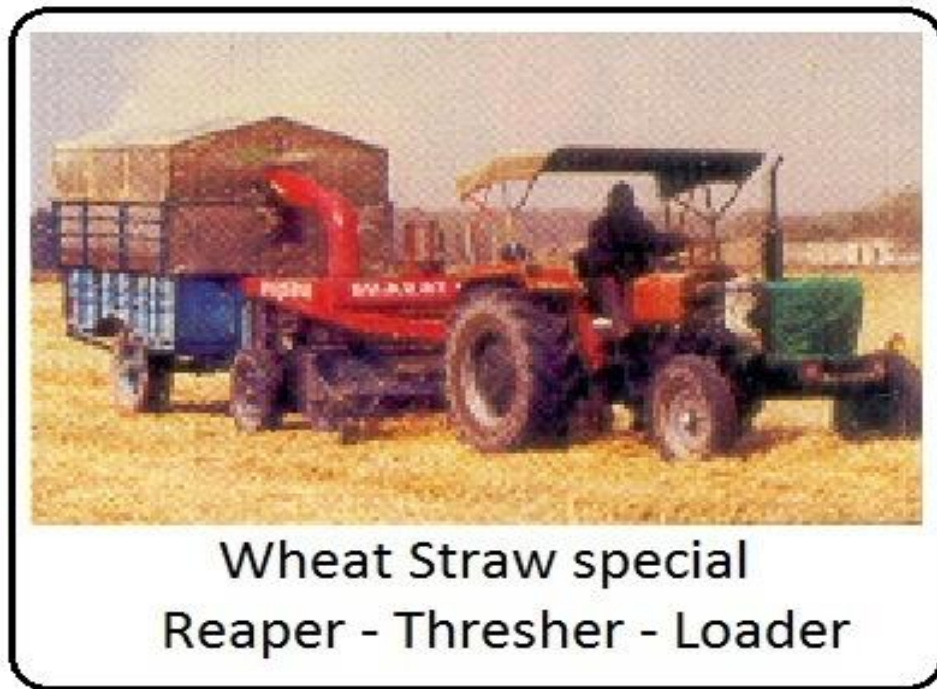
Sl.No .	Crop residue recovery machine	Prime mover	Recovery by one machine (MT/yr)	Area covered by one machine (hect/yr)
3	Wheat, rice, oat reaper cum liner self propelled	3-15 hp power tiller	50	50

Figure 4.9: Crop residue recovery machine under reapers



- Mowers / Reapers after combining
- Harvesting and pick up of wheat straw after combining is very simple, because weather is dry and straw is crisp – easy to crush. Reaper cum thresher cum loader is to be propagated in wheat belts.

Figure 4.10: Wheat Straw Special reaper-thresher -loader



- Managing kharif and summer straw after combining and earhead picking is rather difficult because weather is humid and the straw is like plastic rope – extremely difficult to thrash / chop

Following range of machines is to be propagated under this category.

Sr	Crop residue Recovery Machine	Prime Mover	Recovery by one machine MT / Yr	Area covered by one machine Hect / yr
1	Wheat straw special reaper, thresher with inbuilt loader	50 hp Tractor	150	150
2	All crop side mounted mower without pick up a) Sickle type or slasher - for straw and green fodder b) Disc /drum type - for flexible straw	30 hp 50 hp Tractor	150 200	150 200
3	All crop liner / collector / Swather set	35 hp Tractor	500	500
4	Rice straw /all crop flail mower, chopper with loader	50 hp Tractor	200	200
5	All crop auto pick up baler	50 hp Tractor	500	500

Table 4.5: Specification of Mowers

Sr	Crop residue Recovery Machine	Prime Mover	Recovery by one machine MT / Yr	Area covered by one machine Hect / yr
1	Wheat straw special reaper, thresher with inbuilt loader	50 hp Tractor	150	150
2	All crop side mounted mower without pick up a) Sickle type or slasher - for straw and green fodder b) Disc /drum type - for flexible straw	30 hp 50 hp Tractor	150 200	150 200
3	All crop liner / collector / Swather set	35 hp Tractor	500	500
4	All crop mower, chopper with loader	50 hp to 150 hp	200 to 500	200 to 500
5	All crop auto pick up baler	50 hp Tractor	500	500

Figure 4.11: Crop residue recovery machine under mowers



Rear mounted reaper
or rotary slasher for stubble harvesting



Rotary Straw Slasher



Rear Mounted Liner



Flail Reaper - Chopper - Loader
(Best machine for silage also)



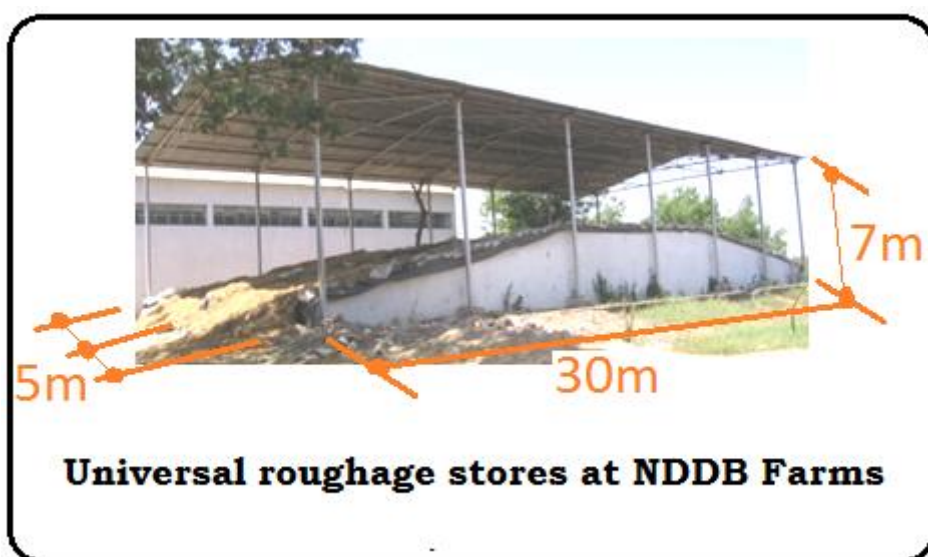
Pick up Baler
After sun drying

- Above machines have cutting width ranging between 1 to 2.2 meters – capacity varying from 50 to 500 MT per year. Selection of Crop residue recovery mowers /reapers will be guided by the following parameters:
 - Type of straw to be harvested.
 - Crop rotation
 - Physical & chemical properties of straw and its age /stage
 - Agro climatic conditions
 - Skill level of man power /operators
 - Preference for silage and hay making
 - Tractor density in the village /district
 - Availability of labour /SHG for manual pick up

4.5. Biomass Store

Infrastructure for straw management and storage has been grossly neglected in India. Capital Investments per cow on cattle feed projects exceeds Rs 5000 while on biomass management is negligible. It is high time that we create infrastructure for biomass harvesting, pick up and storage. Proposed schematic design for universal bunker / store for straw/silage is given below:

Figure 4.12: Universal bunker/store for straw/silage



Depending on rain fall in the village, side walls could be provided.

4.6. Crop residue enrichment & densification

- 4.6.1. Nutritive value of crop residues is low and these form the bulk of basal diet of ruminants in India. Crop residues are not uniformly available across the country, some areas are surplus and there is severe deficiency in some of the areas. Movement of straw from one district to other is quite common especially when the monsoon is not favourable. If the crop residues are supplemented with low cost feed ingredients like cakes, brans, grains, molasses, hay, minerals and then densified, it is possible to save on storage and transport costs. Also balanced ration in complete or total mixed ration form as per lactation stage of animals can be supplied. Different straw can be enriched and densified, depending on their chemical composition and physical characteristics. Enrichment plants in capacity range from 15 to 40 TPD have been standardized by many research institutes in India. Wide range of modern and energy efficient machines like field mowers, pick up devices, choppers, crushers, shredders, grinders, mixers, pellet

presses and hydraulic presses are required for appropriate enrichment and densification.

4.6.2. Major benefits of the enrichment and densification are given below:

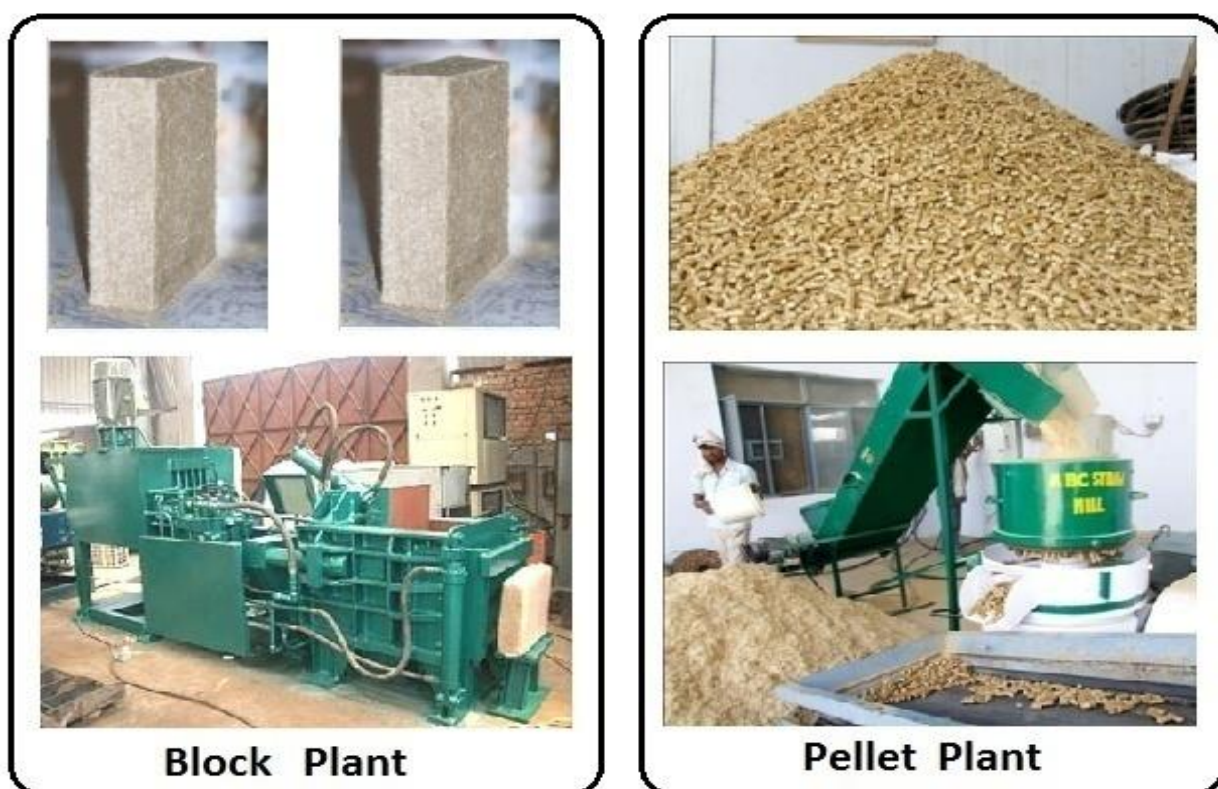
- It is more palatable than raw straw/ crop residues.
- It is fortified with protein, energy & minerals.
- Higher productivity to the extent of 800 gm/day/cow
- Reduced storage and transportation costs
- Reduction in wastage could be as high as 20%
- Least fire hazard
- Increased shelf life
- Buffer stock useful for market intervention
- Buffer stock can save top genetic animals during calamity
- Reduced Global warming

4.7. Details of major items required in the enrichment plant

**Table 4.5: Details of Enrichment and Densification Plant 40 TPD
item wise details**

Sl. No.	Item	Qty	Unit
1.0	PLANT & MACHINERY		
1.1	Straw mowers and pick up devices as per biomass	5	Sets
1.2	Procurement, testing , lab gadgets	1	Set
1.3	Choppers heavy duty for tough biomass	3	Nos
1.4	Conditioner cum loader for crisp biomass	2	No
1.5	Paddle / Cut ribbon Mixers & accessories as per need	2	Nos
1.6	Densification Machine I for flexi fiber	1	Set
1.7	Densification Machine II for crisp / grindable biomass	1	Set
1.8	Proportioning & batchung equipment	1	Set
1.9	Cooling & drying equipment	1	Set
1.10	Services & gadgets as per need of biomss	1	Set
1.11	Interconnecting material handling equipment	2	Set
1.12	Packing equipment	2	Set
1.13	Molasses storage & handling system	1	Set
1.14	Work shop tools and misc gadgets as needed	1	Set
1.15	Miscellaneous items as per need with trials etc	1	Set
1.16	Loader cum grab	1	No
1.17	Tractors for mobile mixers, loaders and machines	2	No
1.18	Feed mixer mobile for long lead biomass	1	No
1.19	Weigh bridge	1	No
1.20	Vehicles for quality control & procurement works	1	Nos
1.21	Office equipment	1	Set
1.22	Foundation & Misc works during project period	1	Set
2.0	CIVIL WORKS		
2.1	Land	10	Acres
2.2	Boundary Works	1000	Meter
2.3	Land development & road works	1500	sq m
2.4	Procurement yard	1000	sq m
2.5	Universal Godowns for storage / banking of raw material		
	DORB, straw,silage,hay,kadab etc- cetralised + different locations	1000	sq m
2.6	Office, misc civil works as needed	200	sq m
3.0	ELECTRICALS		
3.1	Panels, DB's, Cables,switch gears,street lights,misc works etc	1	Set
3.2	Power connection,transformer,statutory deposits,line charges etc	1	Set

Figure 4.13: Block Plant and Pellet Plant



4.8. Re-vegetation of common grazing land

- 4.8.1. The common grazing lands play an important role in the lives of our rural people. They are significantly dependent on common grazing lands for fodder, fuel, drinking water. However, these lands are being continuously degraded due to overgrazing and overexploitation by locals. Therefore, there is a need to re-vegetate these lands by strengthening institutional arrangement at village level for improved governance of natural resources mainly land and water in particular. Production of such lands can be improved substantially by introducing high yielding cultivated fodder crops, grasses and pasture legumes. An integrated approach of growing cultivated crops, grasses, trees and shrubs under silvi-pastural/ horti - silvipasture system will improve overall productivity of such land.
- 4.8.2. The development of such lands would be carried out by strengthening of village level institution like village panchayat

/ dairy cooperative societies/ NGOs working in that area and through participation of local community. The whole concept to develop such lands would be based on sound ecological principle and very much nearer to nature.

5. Management of the Programme

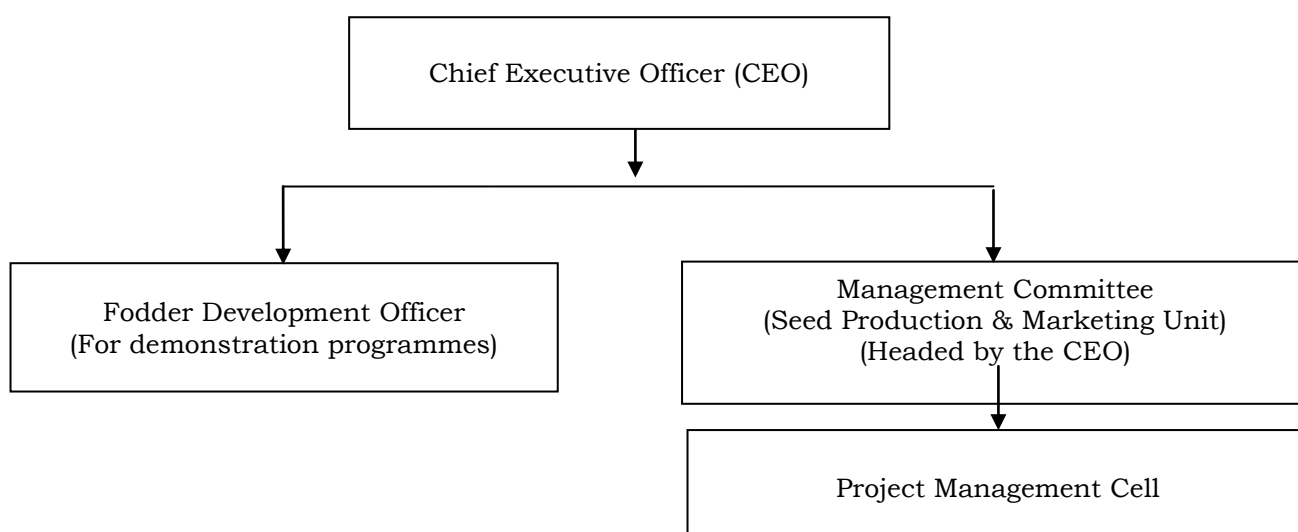
5.1.1. Programme Management

5.1.1.1. End Implementing agency (EIA) will manage the entire fodder development programmes as approved by PMU. To manage fodder seed production and marketing activity, EIA has to deploy dedicated team as per organogram given at **Figure 5.1.**

5.1.1.2. For the remaining programmes which are mainly about popularisation of technologies/ demonstrations, the EIA will deploy technically qualified Fodder Development Officers.

5.1.1.3. The fodder development activities will be implemented through the following structure:

Figure 5.1: Implementation Structure of Fodder Development Activities



5.2. Management Committee

5.2.1. For the management of fodder seed production and marketing unit, end implementing agency has to constitute a management committee as proposed below:

1. Chief Executive Officer/MD (end implementing agency) – Chairman
2. Expert from outside (Agri. Universities/NSC/SSC) – Member
3. Seed growers representative – Member
4. Unit In-charge – Member convener

5.2.2. The Committee, if desires, may also call special invitees as subject matter specialist to attend the meeting. The general superintendence, direction, control and management of the affairs and activities of the project shall vest in the Committee, which shall include preparing long term strategies, plans, taking policy decisions related to sub project implementation including approval of budget, expenditure, reimbursement and release of advances, entering into contracts with agencies and other organizations, etc. The Committee will ensure the effective implementation of the project and that the objectives herein mentioned are achieved.

For other extension activities concerned FDO will prepare yearly action plans for Rabi and Kharif seasons as per PMU guidance.

5.3. Project Management Cell

The project management cell for fodder seed production & marketing unit will be as follow:

1. Unit In-charge
2. Technical supervisor (seed production)
3. Technical supervisor (seed processing & marketing)
4. Accounts cum store assistant
5. Plant operator
6. E&S Officer

5.4. Roles and Responsibilities of the people involved

5.4.1. Chief Executive Officer

- Preparation & submission of a project proposal of fodder seed production & marketing to PMU
- Obtain PMU approval
- Appointment / posting of Project In charge of the project
- Constitution of a Management committee
- Ensure that Management committee decisions are implemented
- Monitoring the progress fodder development activities

5.4.2. Unit In-charge

- Appointment of project team
- Procurement of seed processing machinery/ equipment as per approved proposal
- Construction of seed storage godown cum office
- Ensure production and marketing of seed as per proposal
- Arrangement of funds

- Responsible for the implementation of project

5.4.3. Technical Supervisor (seed production)

- Placing of breeder seeds indent
- Procurement of breeder seed/ foundation seed for further multiplication
- Supply of breeder/foundation seed to the seed growers for further multiplication
- Coordinate with seed growers for the production of foundation / certified/ truthfully labeled seed
- Coordination with State Seed Certification Agency for approving the quality of seeds
- Procurement of raw seeds from the seed growers

5.4.4. Technical Supervisor (Seed Processing & Marketing)

- Organize cleaning/ grading of raw seeds produced by seed growers
- Coordinate with State seed Certification Agency for the quality control
- Packaging of seeds
- Dispatches of seeds for selling to farmers

5.4.5. Accounts cum store assistant

- Keeping records of seeds procured and dispatches
- Making payment to seed growers, employees and suppliers
- Arrangement of funds
- Coordination with banks

5.4.6. Plant operator

- Operation and maintenance of seed processing plant and other miscellaneous equipments

5.4.7. Fodder Development Officer (FDO)

FDO of the EIA will be responsible for smooth implementation of all extension/demo activities.

- Preparation & submission of a project proposal to PMU
- Obtain PMU's approval.
- Identify participating farmers/ end users for various Demo programmes – Silage making, common grazing lands etc.
- Implement all activities as per PMU guidance/approval.
- Monitoring of the progress.
- Send quarterly reports to all concerned.

5.5. **Roles and Responsibilities of the Institutions involved**

A host of institutional arrangements are required for successful implementation of the fodder development programme. Various institutions that will play a key role in the implementation of the program are PMU (located in NDDB), Dairy Cooperatives, Government of India, ICAR institutes and Veterinary/Dairy Institutes/Universities, Agricultural Universities, State Seed Certification Agencies, State Seed Testing Laboratories, service providing organisations etc.

5.5.1. Fodder seed production and Marketing

a. End Implementing Agency

The programme would be implemented through District Cooperative Milk Producer Unions/State Cooperative Dairy

Federations/Cooperative form of enterprises such as producer companies, Trusts (NGO's, Section 25 companies), Regional Stations for Forage Production& Demonstration (RSFP&D). The end implementing agency will get their proposal approved from PMU (located in NDDB). Their role and responsibilities are mentioned below:

- Forecast crop wise / variety wise requirement of certified/ truthfully labeled seeds.
- On the basis of the requirement of certified / truthfully labeled seeds, estimate the requirement of breeder seeds.
- Organize procurement of breeder seeds from GoI/ICAR
- Organize seed multiplication programmes i.e. breeder seed into foundation seeds and foundation seed into certified/truthfully labeled seed through registered seeds growers under a buy back arrangement.
- Organize field inspections from technical officers of State seed certification agency and procurement of raw seed.
- Undertake seed processing, grading, treating, packing, weighing, labeling, certification and storage.
- Market certified/truthfully labeled seed to milk producers at a reasonable price.

b. Seed Growers

They are farmers and organised farms registered with production agency having adequate irrigated land and produces quality seeds as per guidance of production agency.

c. State Seed Certification Agency

They are autonomous bodies of the State Governments responsible to monitor and approve the quality of foundation and certified seeds. They undertake the task at the request of production agency against the receipt of prescribed fees.

d. Seed Testing Laboratory

There are seed testing laboratories in each state notified by state government for testing of seed samples of all crops and classes of seed for germination, physical purity and other crops seed.

e. Indian Council of Agricultural Research / Agricultural universities

They are responsible for the production of breeder seeds/ parent material as per the indent of GoI.

f. Government of India, Ministry of Agriculture

Responsible for collecting indent of breeder seeds/ parent material from all agencies responsible for production of certified/foundation seeds and assign the responsibility for production of breeder / parent seeds to ICAR/ agricultural universities.

g. PMU (located in NDDB)

Support production agencies by arranging funds to create the necessary infrastructure and in training manpower.

5.5.2. Silage making demonstration

a. End Implementing Agency:

- The programme would be implemented through District Cooperative Milk Producer Unions/State Cooperative Dairy Federations/Cooperative form of enterprises such as producer companies Trusts (NGO's, Section 25 companies), Regional Stations for Forage Production& Demonstration (RSFP&D). The end implementing agency will get their proposal approved from PMU
- Identify villages/farmers for organizing silage making demonstration as per the selection criteria.
- Organize construction of surface silo at farmers' doorstep as per the drawing
- Train the farmers about chaffing of fodder, silage making and organize demonstration in presence of other farmers.
- Procure and supply polythene sheet to cover and seal the silo.

b. PMU (located in NDDB) :

- PMU will provide necessary funds and technical guidance to implement the programme.

5.5.3. Demonstration of fodder mowers/ pick up devices and bunkers

a. End Implementing Agency:

- The programme would be implemented through District Cooperative Milk Producer Unions/State Cooperative Dairy Federations/Cooperative form of enterprises such as producer companies Trusts (NGO's, Section 25

companies), Regional Stations for Forage Production & Demonstration (RSFP&D). The end implementing agency will get their proposal approved from PMU.

- Identify villages/farmers for mowers & constructing biomass stores as per the selection criteria.
- Organize purchase of mowers & constructing biomass stores at farmers' doorstep/village dairy cooperative society, as per the drawing provided by PMU (located in NDDB)
- Organize procurement of crop residues/straws at the time of harvesting of crops and store it in the biomass stores for sale during lean period on nominal profit basis.

b. PMU (located in NDDB)

- PMU will provide necessary funds and technical guidance to implement the programme.

5.5.4. Enrichment and densification Plant

a. End Implementing Agency

- The programme would be implemented through District Cooperative Milk Producer Unions/State Cooperative Dairy Federations/Cooperative form of enterprises such as producer companies Trusts (NGO's, Section 25 companies), Regional Stations for Forage Production& Demonstration (RSFP&D). The end implementing agency will get their proposal approved from PMU (located in NDDB)
- Identify villages/farmers/contractors for supply of biomass as per need.

- Identify land for establishment of plant.
- Organize purchase of plant and machinery, mowers as per project needs.
- Organize all civil, mechanical, electrical and instrumentation works.
- Commissioning of plant.
- Running of plant on day to day basis. Procurement of crop residues/straws during flush season and store it in the biomass stores for sale during lean period on nominal profit basis.
- Maintain records of productivity enhancement in the EIA

b. PMU (located in NDDB)

- PMU will provide necessary funds and technical guidance for the establishment of enrichment and densification plants.

5.5.5. Re-vegetation of common grazing land

a. End Implementing Agency

- The programme would be implemented District Cooperative Milk Producer Unions/State Cooperative Dairy Federations/Cooperative form of enterprises such as producer companies Trusts (NGO's, Section 25 companies), Regional Stations for Forage Production & Demonstration (RSFP&D). The end implementing agency will get their proposal approved from PMU
- Identify villages for development of permanent pasture and other common grazing land as per the selection criteria.

- Organize transfer of common land on lease basis to any village level institutions like dairy cooperative society.
- Prepare a technical plan to develop that land as per the agro-climatic conditions of the area.
- Execute the technical plan through village level institutions and develop the land for fodder production through silvi-pasture system.
- Ensure that most of the villagers participate in the development of common grazing land.
- Ensure that fodder produced from land is sold to the farmers through village level institution on no profit no loss basis.

b. PMU

PMU (located in NDDB) will provide necessary funds and technical guidance to implement the programme.

6. Managing Procurement

6.1. Procurement arrangements

6.1.1. Procurement management practices to be followed by the EIA are described in the Procurement Manual, Vol. III of PIP.

6.2. Steps to be followed for purchase of goods/equipments

- Listing of items (capital & consumable) for the purchase.
- Finalize time schedule for procurement of each items.
- Prepare detailed specifications for each item.
- Obtain management committee approval for the procurement.
- Arrange required funds from the funding authority.
- Initiate purchase procedure for the procurement of items as per norms of funding authority.
- Purchase the items on competitive basis as per approved specification and approved procedures/norms.
- Release the payment to the party on safe receipt of material in good conditions.
- Organize erection & commissioning at sites.
- Hand over the plant & machinery in working condition to various end users.
- Where ever required short term consultants could be hired as per project needs.

6.3. Maintaining records of procurement

- Store and accounts records will be maintained separately for capital and consumable items in separate registers as per requirements of the funding authority

- All items procured would be entered in stock registers as per audit requirements
- Separate project accounts to be maintained by the EIA

7. Financial Management and Accounting Procedures

7.1. Fund flow Mechanism and financial management

- 7.1.1. Fund flow mechanism and financial management practices to be followed by the EIA is described in the FM Manual, Vol. II of PIP.

8. Project monitoring and evaluation

8.1. How the monitoring of the Project would take place?

The project will be monitored by the Management Committees and also the PMU

8.2. Maintenance of documents and information

All the documents of various activities will be maintained properly.

8.3. Reporting and auditing arrangements

All matters related to project would be reported to management committee.

8.4. How transparency and accountability would be ensured?

All the laid down procedures for stores and accounts would strictly be followed.

8.5. Information Disclosure

The EIA will have a website containing suo moto disclosures of the sub project related information, details of the activities, area(s) where the activities are being implemented,

procurement plan etc,. It will also regularly post the progress of the project and the particulars of the person who may be contacted in the EIA for seeking further information.

Besides providing information on the website, the EIA will use other means of mass communication for dissemination of information such as:

- Display charts at the village level where the activity is usually undertaken e.g., DCS Office, Milk pooling point / BMC locations, MAIT/LRP offices, Gram Panchayat office, project office etc containing information that describes the nature of service being offered at the village level, in a simple and reader friendly manner
- Display board at the village level where the activity is usually undertaken providing a monthly update of the activities for example, aggregate number of producers benefiting from the activity, service charges etc,

8.6. Grievance Redressal Mechanism (GRM)

- 8.6.1. “A grievance would usually refer to some form of dissatisfaction by a stakeholder, which needs to be redressed in order to continue smooth implementation of the project”. The project will evolve a system for redressal of grievances that may arise in the course of implementation. The GRM will be structured in a manner so that it can be monitored, as it provides important feedback on the project activities.
- 8.6.2. The EIA would have a designated officer as ‘Grievance Redressal Officer’ (GRO) to deal with grievances. His contact number/ mailing IDs and address etc would have to be displayed on the web site of the EIA and at other relevant locations such as notice boards.

8.6.3. Each GRO would need to:

- Maintain a computerised database of Grievances (*through a unique identification number*), acknowledgements and information about their disposal.
- Monitor the progress of disposal of the grievances.
- Fix time limit for disposal of the Grievances.
- Deal with each Grievance in a fair manner.
- Determine an appropriate periodicity when internal / external meetings would be held to implement the GRM in an efficient manner.

8.6.4. The procedure to be followed for grievance handling is given at Annex V.

References:

1. New Vistas in Forage Production (1995): Edited by C.R. Hazra and Bimal Misri. All India Co-ordinated Project for Research on Forage Crops. Indian Grassland and Fodder Research Institute, Jhansi
2. Farmers Seeds Guide (2006): National Seeds Corporation Limited, Beej Bhawan, Pusa Complex, New Delhi
3. Forage Production and Utilization (1995): Edited by R.P. Singh. All India Co-ordinated Project for Research on Forage Crops. Indian Grassland and Fodder Research Institute, Jhansi
4. Draft recommendations – 10th Plan (sub-group on fodder production enhancement) by Dr. Panjab Singh, Director, Indian Agricultural Research Institute, New Delhi – 110012
5. 11th plan proposals on feed, fodder and pasture development (A Report of the sub-committee to the Planning Commission) by Dr. N. Balaraman Vice-Chancellor Tamil Nadu Veterinary and Animal Sciences University, Chennai
6. VISION – 2025, IGFR Perspective Plan, Indian Council of Agricultural Research, New Delhi

Annex I Suitable area for production of fodder seeds

Suitable area for seed production of important forage crops in different agro-climatic conditions (States)

Sr.No.	Crop	Suitable states
1	Sorghum	Andhra Pradesh, Karnataka, Maharashtra
2	Maize	Karnataka, Madhya Pradesh, Tamil Nadu, Bihar
3	Bajra	Gujarat, Maharashtra, Andhra Pradesh
4	Berseem	Madhya Pradesh, Punjab, UP, Haryana, Rajasthan
5	Oats	Punjab, Haryana, Madhya Pradesh, Uttar Pradesh, Bihar
6	Lucerne	Gujarat, Maharashtra, Rajasthan
7	Cowpea	Punjab, Haryana, Uttar Pradesh, Bihar, Gujarat

Annex II Common Pesticides used in Fodder Seed Production in India

S.No	Crop	Chemical name	Herbicide /Fungicide /Insecticide	For controlling	Recommended doses	Mandatory /Recommended
1	Maize	Atrazine	Herbicide	Annual grasses and broad leaf weeds	0.75 Kg a.i./ha pre-emergence	Recommended
		Pendimethaline	Herbicide	Annual grasses and broad leaf weeds	1.0 Kg a.i./ha pre-emergence	Recommended
		Thiram 75 % WDP or Carbendazim or Vitavax	Fungicide	Seed Treatment	2.5 gram for kg seed	Mandatory
		Dithane M-45	Fungicide	Foliar Spray to control leaf blight	2-3 Kg/ha	Recommended
		Carbaryl 10 G or Phorate 10 G	Insecticide	Stem borer (Chilo partellus)	1.5 gram / metre row length (seed dressing) or 15 kg per ha	Recommended
2	Sorghum	Atrazine	Herbicide	Annual grasses and broad leaf weeds	0.50 Kg a.i./ha pre-emergence	Recommended
		Pendimethaline	Herbicide	Annual grasses and broad leaf weeds	1.0 Kg a.i./ha pre-emergence	Recommended
		Dithane M-45	Fungicide	Foliar Spray to control leaf diseases such Anthracnose, leaf blight, zonate leaf spot etc.	2-3 Kg/ha	Recommended
		Thiram dust	Fungicide	Seed treatment to control seed borne diseases	2.5 gram/kg of seed	Mandatory
		Imidacloprid WS or Thiomethoxam 25 WSC	Insecticide	Shoot fly	Seed dressing @ 3g/kg seed	Recommended
		Need Seed Kernel Extract (NSKE)	Insecticide	Shoot fly	Seed dressing @ 5 ml/kg seed	Recommended

S.No	Crop	Chemical name	Herbicide /Fungicide /Insecticide	For controlling	Recommended doses	Mandatory /Recommended
		Imidacloprid	Insecticide used as Foliar spray	Shoot fly/Army worm/cut worm/sorghum midge/stem borer	@ 0.3 ml/litre of water	Recommended
3	Pearl Millet	Atrazine	Herbicide	Annual grassy and broad leaf weeds	0.50 Kg a.i./ha pre-emergence	Recommended
		Thiram 75 % WDP or Carbendazim or Vitavax	Fungicide	Seed Treatment	2.5 gram for kg seed	Mandatory
4	Cowpea	Pendimethalin or trifluralin	Herbicide	Annual Broadleaf and grassy weed control	0.75-1.0 KG a.i./ha as pre-emergence	Recommended
		Tricoderma viridae	Bio-fungicide	Root rot diseases	5 gram/kg seed as seed treatment	Recommended
		Carbendazim/ Thiram dust	Fungicide	Seed Treatment to control root/collar rot disease	2.5 gram/kg seed	Mandatory
		Imidacloprid	Insecticide	Leaf eating insects/aphids	0.5 – 1.0 ml /litre of water as foliar spray	Recommended
5	Berseem	Tricoderma viridae	Bio-fungicide	Root/stem rot disease	5 gram per kg seed as seed treatment	Recommended
6	Lucerne	Tricoderma viridae	Bio-fungicide	Root/stem rot disease	5 gram per kg seed as seed treatment	Recommended
		Carbendazim /Thiram 75 % dust	Fungicide	As seed treatment	2.5 gram /kg of seed	Mandatory
		Mancozeb (Dithane M -45)	Fungicide	foliar spray to control fungal diseases	2.5 gram/litre of water	Recommended
		Hexaconazole /Tebuconazol	Fungicide	Foliar fungal diseases such as rust, leaf spots and mosaic diseases	0.5 ml/liter of water	Recommended
		Neem seed kernel extract	Insecticide	Leaf eating insects/sucking pests	5 ml/litre of water	Recommended

S.No .	Crop	Chemical name	Herbicide /Fungicide /Insecticide	For controlling	Recommended doses	Mandatory /Recommended
7	Oats and Barley	Pendimethalin	Herbicide	Annual Broad leaf weeds	1.0 – 1.5 litre /ha	Recommended
		2-4 D	Herbicide	Annual Broad leaf weeds	0.5 kg a.i. /ha	Recommended
		Metsulfuron Methyl	Herbicide	Annual Broad leaf weeds	1 packet (10 gram) per acre	Recommended
		Carfentrazone	Herbicide	Annual Broad leaf weeds	1 packet (4 gram) per acre	Recommended
		Vitavax or Carbendazim or Thiram	Fungicide	Seed borne fungal diseases	2.5 gram per kg of seed	Mandatory
		Propiconazole	Fungicide	foliar diseases such leaf blight, yellow or brown rust and powdery mildew	@ 0.01 % as foliar spray	Recommended

Annex III Packages of Practices of Important Fodder Crops in India

Summer / Kharif crops

Crop	Soil	Varieties	Sowing time	Seed rate (kg/ha)	Spacing	Fertilizer (kg/ha)	No. Of irrigation	Cutting time (days)	No. Of cuts per Crop /year	Green fodder yield (ton/ha)
Sorghum (Single cut)	Sandy Loam to Clay Loam	PC – 6,9 HC – 136,308 Pant Chari 5	June – July (North India) Feb to Nov (South India)	25-30	30-40	N – 60 P- 30	3-4 in summers	80-90 for late varieties and 65-57 for early ones	1	30-50
Sorghum (Multi-cut)	Sandy Loam to Clay Loam	Proagro-855 ProagroX-988 UPMCH-1101 Pant Chari 6	March – July (North India) Feb to Nov (South India)	25-30	30-40	N – 60 P- 30 & N – 30 kg after every cut	5-6	First cut at 50 days and rest at 40 days interval	4-5	50-80
Maize	Sandy Loam to Clay Loam Good drainage	African Tall J-1006	March – August (North India) Feb to Nov (South India)	40-50	30-40	N – 80 P- 40 & N – 30 kg after every cut	3-4	75-90	1	35-55
Pearl Millet	Sandy Loam	AVKB-19 GFB-1	April to July	8-10	30-40	N – 40 P- 20	2-3	60-75	1	25-50
Teosinte	Sandy Loam to Clay Loam	TL – 1	April to July	30-40	40-45	N – 60 P- 30	2-3	60 days interval	2	45-60
Cowpea	Sandy to Loam	UPC 9202 UPC – 8705 CL – 367	March to July	30-35	30-45	N – 30 P- 40	2-3	60 -80	1	30-35
Rice bean	Sandy Loam to Clay Loam	Bidhan 1 KRB – 4	April to August	25-30	30-35	N – 30 P- 40	2-3	70-90	2	20-30

Crop	Soil	Varieties	Sowing time	Seed rate (kg/ha)	Spacing	Fertilizer (kg/ha)	No. Of irrigation	Cutting time (days)	No. Of cuts per Crop /year	Green fodder yield (ton/ha)
Cluster bean	Sandy to Sandy Loam	HFG-156 Guara-80 Bundel Guar – 2,3	April to August	25-30	30-35	N – 30 P- 90	2-3	60-75	1	20-30
Berseem	Loam to Clay Loam	Wardan, JB-1,2,3,4 BL – 1,42	October to November	25	20-25 cms or by spreading	N – 30 P- 80	10-15	First cut at 60 days and rest at 30 days interval	5-6	70-110
Lucerne	Sandy to Loam	Anand – 2 RL – 88 and Anand 3 (Perennial)	October to November	25	20-25 cms or by spreading	N – 30 P- 80	10 (Annual) 15 (Perennial)	First cut at 60 days and rest at 30 days interval	Annual 1 –(5-6) Perennial (7-8 cut)	60-80 (Annual) 80-110 (Perennial)
Oats	Sandy Loam to Loam	Kent UPO 212 Harita (RO19) Bundel Jai 2004	October to November	80-100	20-25 cms	N – 80 P- 40	3-4	First cut at 60 days and second cut at 50 % flowering	1-2	30-45)
Mustard	Sandy Loam to Loam	Chinese Cabbage	September to November	6-8	30-40	N – 60 P- 20 K-20	2-3	AT 50 % flowering	1	25-30
Sugar beet Or Fodder beet	Sandy Loam to Clay Loam	Cauvery LS -6 IISR composite – 1	October to December	3-4 kg	50 X 15	N – 80 P – 40 K – 40 at sowing and N – 40 after 35-40 days after sowing	8-10 irrigation	Harvesting starts after 100 days of sowing	1	90-110

Perennial Grasses/Legumes/Tree legumes

Crop	Soil	Varieties	Sowing time	Seed rate (kg/ha)	Spacing	Fertilizer (kg/ha)	No. Of irrigation	Cutting time (days)	No. Of cuts per Crop /year	Green fodder yield (ton/ha)
Hybrid Napier Bajra Grass	Sandy Loam to Clay Loam	CO 3, 4 PBN – 233	March to October in North India Year Round (South India)	40000 root slips/ stem cuttings	100 x 50	N – 50 P- 80 K – 60 at planting N 40 kg/ha after every cut	Every 15 days interval	I cut at 90 days after planting Rest cut at 45 days interval	7-8	200 to 250
Guinea Grass	Sandy Loam to Clay Loam	CO 2,3 PGG-518, 616 Bundel Guinea – 1	March to August in North India Year Round (South India)	40000 root slips or 3-4 kg per ha	50 x 50	N – 50 P- 80 K – 60 at planting N 40 kg/ha after every cut	Every 15-20days interval	I cut at 75 days after planting Rest cut at 45 days interval	7-9	100 to 150
Dhaman Grass	Sandy to Sandy Loam	Bundel Anjan -1, 3	March to September in South India June-July in North India	5-6 kg /ha	45 x 45	N – 40 P- 30 K –30 at planting	Rainfed	I cut at 60 days after planting Rest cut at 50 % flowering stage	2	10-12
Para Grass	Loam to Clay Loam	-	February to August in North India Year round in South India	5-6 quintals of stem cuttings	50 x 50	FYM – 50 ton N – 25 kg after each cut	Rainfed	I cut at 90 days after planting Rest cut at 45 days interval	6-8 in North India and 8-10 cuts in South India	180-250
Stylo	Loam to Sandy Loam	Verano, Scabra	June-July in North India and March to	4-5	45 x 20	N – 25 P – 60	Rainfed	I cut at 60-70 days after sowing	2	15-35

Perennial Grasses/Legumes/Tree legumes

Crop	Soil	Varieties	Sowing time	Seed rate (kg/ha)	Spacing	Fertilizer (kg/ha)	No. Of irrigation	Cutting time (days)	No. Of cuts per Crop /year	Green fodder yield (ton/ha)
			September in South India					second cut at 45 days interval		
Siratro	Sandy Loam to Clay Loam	-	-July in Noth India and March to September in South India	4-5	45 x 15	N – 25 P – 60	Rainfed	I cut at 70-80 days after sowing second cut at 60 days interval	2	15-25
Hedge Lucerne	Sandy Loam to Clay Loam	-	June-July in Noth India and March to September in South India	2-3	45 x 10	N – 25 P – 60	Rainfed	I cut at 70-80 days after sowing second cut at 45 days interval	4-5	40-70
Gliricidia Spp	Loam to Clay Loam	Sepium	June to August in rainy season	2m x 50cm	4-5 kg/ha Or 10000 stem cutting (7cm thick)	N – 25 P – 60	Rainfed	After 5-6 months of planting lopping of tree branches as per need	2 -3 times	25-30

Annex IV Seed Standards

Seed standards for foundation and certified seed classes and minimum limits of germination and purity for labeling (Standards are in percentage unless indicated otherwise)

Lab standards for fodder Seed crops in India

Crops	Pure Seed (Min.)		Inert matter (Max.)		Other Crop Seeds (Max.)		Total Weed Seeds (Max.)		Objectionable Weeds Seeds (max.)		Germination (min.)		Moisture Ordinary container		(Maximum (Vapour proof Container)		Other Distinguishabl e Varieties	
	FS	CS	FS	CS	FS	CS	FS	CS	FS	CS	FS	CS	FS	CS	FS	CS	FS	CS
Maize-OP	98	98	2	2	5/kg	10/kg	None	None	-	-	90	90	12	12	8	8	-	-
Teosinte	98	98	2	2	5/kg	10/kg	None	None	-	-	80	80	12	12	8	8	-	-
Oats	98	98	2	2	10/kg	20/kg	10/kg	20/kg	2/kg	5/kg	85	85	12	12	8	8	-	-
Bajra	98	98	2	2	10/kg	20/kg	10/kg	20/kg	-	-	75	75	12	12	8	8	-	-
Sorghum – hybrid	98	98	2	2	5/kg	10/kg	5/kg	10/kg	-	-	75	75	12	8	8	10	20/kg	20/ kg
Sorghum-OP	98	98	2	2	5/kg	10/kg	5/kg	10/kg	-	-	75	75	12	12	8	8	10/kg	20/ kg
MP Chari	97	97	3	3	5/kg	10/kg	5/kg	10/kg	-	-	75	75	12	12	8	8	10/kg	20/ kg
Cowpea	98	98	2	2	None	10/kg	None	10/kg	-	-	75	75	9	9	8	8	5/ kg	10/ kg
Guar (Clusterbean)	98	98	2	2	10/kg	20/kg	None	None			70	70	9	9	8	8	10/kg	20/ kg
Berseem	98	98	2	2	10/kg	20/kg	10/kg	20/kg	5/kg	10/kg	80	80	10	10	7	7	-	-
Lucerne	98	98	2	2	10/kg	20/kg	10/kg	20/kg	5/kg	10/kg	80	80	10	10	7	7	-	-

Note: The seed standards for truthfully labeled seeds are same as of certified seed

Specific standards prescribed for certification at field stage for different fodder Seed crops

Crops	Minimum no. of inspections	Isolation distance in metres		Off-type plants/earheads		Inseparable other crop plants		Objectionable weed plants		Plants affected by seed borne diseases		Remarks
		FS	CS	FS	CS	FS	CS	FS	CS	FS	CS	
Maize-OP	2	400	200	1	1	-	-	-	-	-	-	-
Teosinte	3	200	100	0.10	0.50	-	-	-	-	-	-	-
Oats	2	3	3	0.050	0.20	0.010	0.050	0.010	0.020	0.10	0.50	Isolation in case of Loose smut 150 metres for both class of seeds
Bajra	3	400	200	0.050	0.10	-	-	-	-	0.050	0.10	Plant infected by downy mildew/green ear at any one inspection
Sorghum – hybrid (SSG)	3	200	100	0.10	0.20	-	-	-	-	0.050	0.10	Kernel smut or grain smut & head smut, Isolation from Johnson grass and forage sorghum 400 metres in both FS & CS, From other spp. 200 for FS and 100 for CS
Sorghum-OP	3	200	100	0.050	0.10	-	-	-	-	0.050	0.10	Kernel smut & grain smut, Isolation for Johnson grass and forage sorghum 400 metres in both FS & CS
Cowpea	2	10	5	0.10	0.20	-	-	-	-	0.10	0.20	
Guar (Clusterbean)	2	10	5	0.10	0.20	-	-	-	-	0.10	0.20	Disease: Bacterial blight, Anthracnose, Ascochyta blight.
Berseem	2	400	100	0.20	0.10	-	None	0.050	-	-	-	Chicory (Kasni) is an objectionable weed. Isolation from other species 200 & 100 mts for both class
Lucerne	2	400	100	0.20	1.0	-	-	None	0.050	-	-	Dodder (Cuscuta)

Annex V Grievance Redressal Mechanism under NDP I

For addressing grievances arising under NDP I, following grievance redressal mechanism can be adopted.

Appointment of Grievance Redressal Officer

1. The EIA under NDP I shall designate an officer as ‘Grievance Redressal Officer’ (GRO) to deal with all matters relating to grievances.
2. The EIA should display at a prominent place/ notice board the name of GRO with location, contact numbers/ mailing IDs and address along with the specific visiting hours for hearing / receiving the grievances.

Grievance/Complaint Submission:

1. While complaint is made, it can either be made orally or in writing:
 - The name of the individual or organisation, address and telephone number (if any) of the complainant.
 - A brief description of the matter which is the source of the grievance, including copies of any relevant and supporting documents.
 - Relief sought
2. Grievances may also be submitted in the Complaint Box kept at reception of the office of the EIA. The Complaint Box should be opened on daily basis by the GRO. Complaint can also be sent by post.

3. A complaint made through electronic means (e-mail, fax) should also be accepted and replied, if requested, should be sent through e- mail also.
4. In case the complainant is not satisfied with the response at a certain level, he/ she will be free to approach the next level.

Grievance Redressal Procedure:

1. Every application received should be tagged with any kind of reference number. The grievance system should be continuous for the whole year.
2. Every application or petition should be acknowledged through standard acknowledgement slips or a copy of the receipt which should be dispatched to the complainant within 3 days of receipt of complaint or handed over to person at the time of receipt for complaints submitted in person.
3. Every application should carry such a slip for future reference indicating the name, designation and telephone number of the official who is processing the case. The time frame in which a reply will be sent should also be indicated.
4. The complainant should be quickly informed of the action taken by way of redressal within proposed response time.
5. A record of all complaints received and action taken till disposal should be maintained.
6. A reply to any grievance must cover all points raised and not address the grievance partially. If there is any follow- up action, it must be pursued.

7. No grievance is to be rejected without having been independently examined. At a minimum, this means that an officer superior, to the one who delayed taking the original decision or took the original decision that is cause for grievance, should actually examine the case as well as the reply, intended to be sent to the complainant. If a complaint is rejected, the reasons for such rejection must be made explicit and should be intimated to the complainant within the time frame.
8. Grievance redressal mechanisms will consider the vulnerability of gender, SC/ST and other vulnerable populations.