Overview of Fodder Scenario in India and Strategies for Up Scaling Fodder Seed Production & Marketing Programs in Dairy Cooperatives

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Green Fodder

- Traditionally, green fodder is natural feedstuff for dairy animals.

- In todays context, green fodder is highly nutritious, palatable, rich in minerals & vitamins and an economic source of macro & micro nutrients

Cost of nutrients: green fodder vs. concentrate feeds

- Approx. cost of one kg cattle feed: Rs. 17.0 with average dry matter content (90 %), crude protein (CP) 20 % & total digestible nutrients (TDN) 70 %

- Approx. cost of one kg legume green fodder : Rs. 2.0 with average dry matter, CP and TDN (20 %, 18% and 65%, respectively)

Comparative cost of CP & TDN

Particular	Cost of Crude Protein (Rs/Kg)	Cost of TDN (Rs/Kg)
Concentrate Feed	94.44	26.98
Green Fodder legume	55.55	15.38
Net saving (Rs)	38.89	11.60
Saving (%)	**41.18**	**42.99**

It shows that availability of nutrients from green fodder is significantly cheaper than concentrate feed.

Fodder & Feed Scenario

- Several studies indicate deficit of fodder & feed resources in the country. NIANP estimates Hyperlink-1.pptx.
- Availability of concentrate & crop residues are directly linked with agricultural crop production. Compound annual growth rate of agricultural production of last 50 yrs is around 2.2% only.
- Availability of crop residues is further declining due to adoption of high yielding **Dwarf** varieties / hybrids and field wastage due to extensive use of grain picker / mechanical harvester in cereal crops.
- Import of oil meals is increasing & export is decreasing from last 5 years.
- Green Fodder is deficit in the country despite large area under fodder cultivation (9.2 m ha) and permanent pasture & common grazing land (10.2 m ha).
- Low green fodder yield of cultivated fodder & pastures is the main reason of green fodder deficit.

Strong possibilities to enhance the production & availability of green fodder through various technological interventions from the existing land under fodder cultivation & pastures.

Under NDP-1, efforts were made to increase the production & availability of green fodder through various interventions by involving 50 End Implementing Agencies (dairy cooperatives) NDP-1.pptx

Impact of deficit

- Deficit of feed & fodder resources causes **exorbitant** increase in the prices of concentrate & crop residues in many parts of the country.

- Higher cost of feed & fodder leads dairy farming a challenging enterprise for landless, marginal & small dairy farmers and their livelihood is at the stake in rural areas.

- Due to deficit of green fodder, farmers are feeding little quantity of green fodder to livestock affecting their health, breeding and milk yield.

- RBP data of few **productive** animals indicate that average dry matter intake from green fodder in indigenous cattle, buffalo and cross bred are in the range of 23-27 percent while in the developed countries it is about 60 percent including conserved fodder (silage & Hay).

To meet the growing nutrient requirement of dairy animals in an economic way, there is urgent need to focus on green fodder production enhancement programme.

Green Fodder Production Enhancement

Objectives

- Increase production & availability of green fodder through propagating improved technologies.
- Reduce cost of feeding / milk production through increased feeding of green fodder.
- Utilise additional nutrients produced through green fodder enhancement programme in increasing milk production.

Green Fodder Production Enhancement

Constraint & Focus area to increase green fodder production

- Cultivated fodder is main source of green fodder and producing about 70 % of total green fodder.
- Estimated annual green fodder yield of cultivated fodder is around 40 tons/hectare, much below the potential of high yielding newly notified varieties/ hybrids of fodder crops 2.pptx
- **Shortages of quality fodder seeds** of high yielding improved varieties /hybrids is main reason of low green fodder yield.
- At present seed replacement rate in fodder crops is less than 20 percent. Higher seed replacement rate is directly co-related with higher yield.

In view of above, there is huge opportunity to increase green fodder production through enhancing seed replacement rate of quality seed of high yielding varieties

HIGHER SEED REPLACEMENT RATE MEANS HIGHER YIELD

Why Quality fodder seeds?

- Seed is most critical and cheapest input for enhancing agricultural output.
- Production of quality seed is a systematic, highly scientific and long term approach passes through generation system i.e. Breeder, Foundation and certified / truthfully labeled seed. 3.pptx
- Quality assurance at two stages a. **standing crop** b. **seed testing in laboratory after processing.**
- Meet minimum seed standard for genetic & physical purity, germination, disease and pest resistance 4.pptx & 5
- Regulated by The Seeds Acts, 1966, The Seeds Rules, 1972, The Seeds control orders, 1983 and their amendment etc

USE of QUALITY, ROBUST & VIGOROUS SEED
Is the START of A LAVISH & HEALTHY CROP

Demand vs. Availability of fodder seeds

- Annual estimated requirement for 9.2 million hectare land under fodder production would be 4.6 lakh MT.
- Estimated availability of certified / truthfully labeled seeds of high yielding improved varieties is 45000 - 50000 MT.(No authentic data available). Seed replacement rate is less than 20 percent.
- Even with a 20 percent seed replacement rate, estimated annual seed requirement would be 92000 MT.
- MOA & FW, GOI, has kept seed replacement rate for self pollinated crops (33%), cross-pollinated crops (50%) and hybrids (100%) for all crops.

Indicate significant gap between requirement and availability of quality fodder seeds. There is huge opportunity to increase green fodder production & availability through enhancing seed replacement rate.

Reasons of Deficit of fodder seeds

- In absence of reliable data on crop wise area under different fodder crops, it is difficult to estimate crop wise/ variety wise seed requirement.

- Due to lack of priority of fodder development & dedicated trained manpower in the districts AH department, there is no long term vision to focus this activity.

- Fodder seed production is highly un-organized. Large Public sector seed companies are focusing on production of **food crop seeds**, while organized private sector seed companies are focusing on **high value low volume crop like vegetables, hybrids & GM crops.** Few organized private companies are involved in production of Sorghum sudan grass hybrid only.

Considering that dairy farmers are primarily sufferers with deficit of certified fodder seeds of high yielding improved varieties / hybrids, NDDB initiated fodder seed production & marketing programme in Operation Flood-II through dairy cooperatives.

NDDB has supported 15 dairy cooperatives, producing around 4000 tons of fodder seeds annually. Dairy_seed production_2016-17.pptx

Opportunities for Dairy Cooperatives

- Area under green fodder cultivation – 9.2 m ha
- Number of revenue villages in the country : 640867
- Average land under fodder cultivation/ village : 14.35 ha.
- Fodder seed requirement / village: 14.35*50 kgs= 717 kgs.
- Present Availability of improved fodder seeds: 78 kgs/ revenue villages.
- **No. of DCS : 170000 (Functional – 115000)**
- **No of Producer Institutions - 13500**

Considering that by 2024-25

a) **80000 DCS (70% of functional DCS) are involved in supplying fodder seeds & planting material of perennial grasses in 6 +1 hectare, respectively / DCS, the requirement of improved fodder seeds may be up to 24000 Tons plus huge quantity of planting material.**

b) **In addition to above quality seeds / planting material of perennial grasses, legumes & fodder trees will be required to re-vegetate area under permanent pasture & grazing land (10.2 m ha)**

Strengths of Dairy Cooperatives

- Availability of required infrastructure of fodder seed production, processing & storage at 15 locations in different agro-climatic conditions of the country to produce different kind of fodder seeds.
- Identification of seed growers, field inspection of seed crop and procurement of raw seed are easy through DCS in the villages.
- Strong marketing network i.e. availability of 115000 functional DCS & 13500 Producers Institutions in the villages.
- Availability of trained manpower. Under NDP-1, NDDB has trained 300 officers in **"Fodder Production & Conservation"** & 45 officers of seed units of the dairy cooperatives in **"Advanced seed Production technology".**
- NDDB continued support to dairy coops in supplying breeder seeds of newly notified genetics from ICAR/Agricultural Universities through MoA & FW, GoI.
- NDDB, ICAR, Agricultural universities and DADF are willing to support to dairy cooperatives in increasing production of certified seeds of new genetics in fodder crops having higher potential for production of better quality green fodder.

New Fodder Seed Plants (NDP 1)

Krishna Milk Union Seed Plant

Kolar Milk Union Seed Plant

Maize Seed Crop

Seed Grower

Mechanism to Increase sale of fodder seeds

- Milk unions (consumer) need to identify new varieties / hybrids of fodder crops having higher production potential & suitable to their local agro-climatic condition.
- Create awareness among farmers about new varieties through live demonstrations/ village awareness programme/ extension mechanism.
- Project year wise/ crop wise/ variety wise fodder seed requirement for next 5 years with a target that in the 5th year minimum 70% potential functional DCS must sell fodder seeds / planting material for on an average of **6 hectare.**
- Identify source (Dairy cooperatives/ RFS / Public sector seed company/ private sector organised company) to supply **CERTIFIED** fodder seeds as per your requirement.
- Milk unions/federations should sign MOU/ Agreement with the identified source/ supplier to produce & supply CERTIFIED seed at least 2 years in advance.
- The agreement may be on partnership basis i.e. each seed pack should be written **"Produced by ----- Marketed by------"** and follow joint quality control.
- Milk Federations/ unions (consumer) with the help of NDDB can facilitate execution of such agreements with the producer.
- Procure certified seeds in time & supply it to the DCS well before sowing season.
- To push the sale, suitable incentives may be given to DCS/Secretary.

AVOID PURCHASE OF FODDER SEEDS AT LAST MINUTES THROUGH TENDER

Key Areas Need to be focused by Seed Production Unit

Production of newly notified varieties/hybrids seeds

- Production of Fodder seed of old varieties need to be replaced with newly notified varieties/hybrids.

Follow Quality Assurance Norms strictly

- Produce maximum certified seed, avoid production of truthfully labelled seeds.

Strengthen Marketing

- Create strong & popular Brand.
- Explore possibilities to market fodder seeds beyond cooperatives.
- Close coordination with buyers.
- Create small marketing funds.

Promote seed production under partnership

- Execute partnership agreements with other dairy cooperatives to produce seeds for them under joint quality control.
- Under the agreement each seed pack should be written **"Produced by ----- Marketed by------".**

Introduction of new Technology at Seed Processing Plant

- Initiate Seed coating in maize & sorghum seeds.

Strategies – Way Forward

- Commitment from milk union that green fodder production enhancement would be taken up as priority programme (BOD approval may be obtained).
- Deployment of dedicated manpower to promote fodder development (one FDO/MU).
- Production & sale of fodder seeds on partner ship basis (between producer & consumers). NDDB may form a **working group** for smooth coordination.
- MU will procure fodder seed from dairy cooperatives preferentially.
- Focus on production of certified seeds.
- Creation of strong fodder seed brand.
- Preparation of 5 years Fodder Development Plan.
- Creation of dedicated funds by milk unions for fodder development (0.25% of net profit). 25 % for development & 75% as working capital & subsidy

Expected Incremental Milk Production

- By 2024-25, about 560000 hectare land, presently under fodder cultivation may be covered with improved seeds.
- Estimating 50% increase (20 ton/hectare) in green fodder yield with certified seed of improved genetics, additional green fodder production may be around 11 MMT.
- 11 MMT green fodder will be equivalent to 2.8 MMT of dry matter @ 25 % dry matter content.
- With 12% CP & 60% TDN, 2.8 MMT dry matter obtained from additional green fodder may yield 0.34 MMT CP & 1.6 MMT TDN. Additional nutrient produced through this intervention has potential to produce about **1.5 MMT** additional milk annually.

CONCLUSION

EXTENSIVE USE OF CERTIFIED SEEDS OF HIGH YIELDING VARIETIES/HYBRID IN AGRICULTURAL CROPS LEADS INDIA FROM FOOD DEFICIT TO FOOD SURPLUS

NOW IT IS HIGH TIME TO PRIORITISE AND FOCUS ON PRODUCTION AND USE OF FODDER SEED EXTENSIVELY TO OVERCOME GREEN FODDER DEFICIT AND REDUCE COST OF FEEDING/MILK PRODUCTION

Thanks

Estimates on Feed & Fodder in India-

(Gotri Ravi Kiran et.al., **NIANP** 2012 (Million tons/year)

Fodder	Particulars	2015	2020	2025
Dry	*Requirement*	491	530	550
	Availability	387	408	433
	Deficit (%)	**-21**	**-23**	**-21**
Greens	*Requirement*	840	880	1000
	Availability	619	596	600
	Deficit (%)	**-26**	**-32**	**-40**
Concentrates	*Requirement*	87	96	105
	Availability	58	61	65
	Deficit (%)	**-34**	**-36**	**-38**

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NDP-1 Progress
Green Fodder Production & Conservation

- 50 MU/ PC are implementing FDP under NDP-1.
- 9438 MT of quality seeds of high yielding improved varieties produced.
- 22363 MT of improved high yielding fodder seeds were sold.
- 1823 on farm demonstration of silage making organized.
- 172 hectare of common / fallow land developed for cultivating green fodder / grasses. The fodder so produced are sold to the land less / marginal and small dairy farmers.
- 600 mowers / harvesters/ choppers & balers procured & put under operation.
- 5 new fodder seed processing & storage plant established.
- 20 Micro-Training Centre (MTC) established at the progressive dairy farmers premises for speedy dissemination of improved fodder production & conservation technologies.
- Around 40000 farmers were exposed on improved technologies at MTC.

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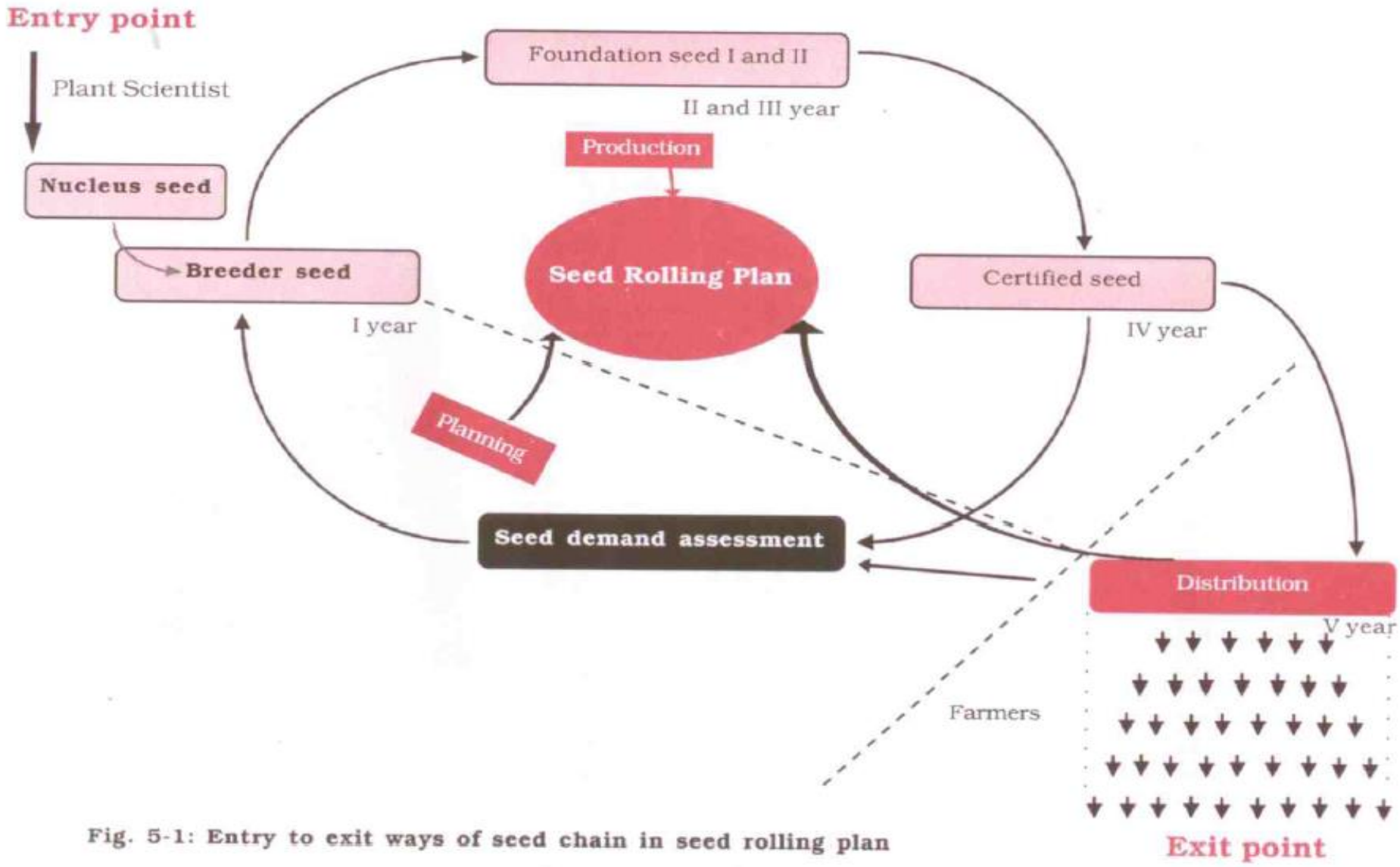

Fig. 5-1: Entry to exit ways of seed chain in seed rolling plan

SEED STANDARDS

Seed standards for foundation and certified seed classes and minimum limits of germination and purity for labeling (Standards are in percent 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 Distinguishable 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	-	-

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

Note: FS= Foundation seed, CS = Certified seed

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)

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Green Fodder Yield Potential

Crop	Variety/Hybrid	Production Potential (MT/Hect/crop)
Perennial Sorghum	Co FS 29	170*
Multi-cut Sorghum	CSH 24 MF	100
Bajra	Baif Bajra 1	55
Maize	African Tall	80
Cowpea	UPC 628	40
Bajra Napier Hybrid	BNH 10	400*
Berseem	JHB 146	80
Oats	RO 19 (Phule Harita)	60
Lucerne	Anand Lucerne 3	95

* Production potential/hectare/year

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Seed production (Tons) 2016-17 under NDP-I & Non NDP-I		
State	Under NDP-I	
Gujarat	Baroda MU	3.27
Maharashtra	Solapur MU	4.75
	ADT KVK, Baramati	1.96
Rajasthan	Kota MU	594.19
U P	Lucknow MU	68.2
Bihar	Shahabad MU	8.7
	Vikramshila/Bhagalpur MU	7.25
	Mithila/Samastipur MU	235
Andhra Pradesh	Guntur MU	14.36
	Krishna MU	49
Karnataka	Kolar MU	0.3
	Bangalore MU	144.57
	Raichur MU	1975.5
	Tumkur MU	47.31
	Hassan MU	76.73
Total		3231.09
State	Non- NDP-I	
Gujarat	SAG Bidaj	31.5
Punjab	Punjab Milk Fed. Bassi Pathana	550
Rajasthan	RCDF Bikaner	32.5
Uttar Pradesh	ABC Salon	1
Uttar Pradesh	PCDF Aligarh	61
Total		676
	GT EXIT	3907.09

	Price (Rs/kg)	DM %	CP %	TDN %
Cattle Feed	17	90	20	70
Nutrients/kg of cattle feed		0.9	0.18	0.63
Cost (Rs/kg)			94.44	26.98
Green Fodder -I (mixture)	1.75	25	12	60
Nutients/kg of fodder		0.25	0.03	0.15
Cost (Rs/kg)			58.33	11.67
Saving			36.11	15.32
% saving			38.24	56.76
Green Fodder -II (legume)	2	20	18	65
Nutients/ kg of fodder		0.2	0.036	0.13
Cost (Rs/kg)			55.6	15.38
Saving			38.89	11.60
% saving			41.18	42.99
Green Fodder -III (non -legume)	1.5	30	7	55
Nutients/ kg of fodder		0.3	0.024	0.165
Cost (Rs/kg)			62.50	9.09
Saving			31.94	17.89
% saving			33.82	66.31

Exit

Species: Cattle	**Breed: HF x ND**
Age: 5 years 2 months	**Body weight: 400 kg**
Milk yield: 12 kg	**Fat % : 4** **Exit**

Ingredients	**Quantity (Kg)**	**Quantity (Kg)**	**Quantity (Kg)**	**Quantity (Kg)**
Ragi Straw	6.00	6.00	6.00	6.00
G. nut meal	0.50	0.50	0.50	0.50
Cattle feed BIS-II	6.11	4.77	3.44	2.11
Mineral Mixture, g	105	89.00	106.00	123.00
Wheat Bran	1.50	1.50	1.50	1.50
Lucerne Fodder (% DM of total ration)	0 (0)	6.00 (10%)	12.00 (20%)	18.00 (30%)
Total DM	12.80	12.78	12.80	12.82
Amount (Rs)	174.01	162.66	152.68	142.70
Reduction in cost (%)	**00**	**6.50**	**12.25**	**18.00**