Briefing Paper 097 – Agro-forestry and fodder grass plantation, recommendations for BDC

1. BACKGROUND

83% of the total population of Nepal lives in rural areas and their principal means of livelihood is agriculture and livestock. Livestock plays an important role in human food and nutritional security, livelihood, rural poverty alleviation[1] and contributes approximately 11% to Nepal's Gross Domestic Product[2].

RAP3 CONNECT has been working in partnership with Belpata Dairy Cooperative (BDC), Dailekh and encouraging farmers in BDC's supply chain to shift to shift from subsistence farming to commercial agriculture.

CONNECT has worked directly with BDC to build management capacity, establish trade hubs and smoothen transportation models. Together CONNECT and BDC have supported farmers with long-term purchase agreements, access to subsidised insurance claims and training to improve farming practices via a network of Yuva Vayus[3]. BDC has increased total collection and there has been an increase in the average lacto content of milk collected. To further support the shift to commercialisation and increase BDC's total collection CONNECT facilitated loans for farmers' in the supply chain for the purchase of buffaloes.

During the course of our programme implementing period we have identified that farmers in the supply chain are facing the shortage of suitable fodder, particularly during the dry winter period.

2. FODDER SHORTAGE

"Green fodder plays a major role in feeding of dairy animals, thereby providing required nutrients for health, productive and reproductive efficiencies of dairy animals."[4] Access to sufficient quantities of improved fodder would enhance productivity and further support farmers' shift to commercialisation. Farmers in the supply chain report shortage of fodder as a factor in low levels of lacto content in collected milk and in shorter lactation periods of cattle. CONNECT has observed that here is minimal practice of growing fodder trees on farm land and cultivation of forage crops amongst farmers in BDC's supply chain.

Agroforestry (especially on-farm agroforestry – practice of growing fodder trees on the farm land) and plantation of fodder grass on slopes and fallow land could meet the present and future requirements of farmers.

3. ON-FARM AGROFORESTRY OPTIONS

There are a variety of tree and grass species that would both meet the fodder requirement of supply chain and have the dual benefit of improving soil fertility and conservation.

[1] Pradhanang, U.B.; Pradhanang, S.M.; Sthapit, A.; Krakauer, N.Y.; Jha, A.; Lakhankar, T. (2015). National Livestock Policy of Nepal: Needs and Opportunities.page 103-131.
[2] MoLD. (2017). Livestock Statistics of Nepal.
[3] Yuva Vayus are CONNECT's alternative to the traditional social mobilers – see BP079
[4] SA Hossain, PL Sherasia, BT Phondba, FK Pathan and MR Garg. Effect of feeding green fodder based diet in lactating buffaloes: Milk production, economics and methane emission

A) Fodder Tree Species of Nepal

Table 1: Major Fodder Species of Low Hills, Mid Hills and High Hills of Nepal[5].

Zone	Local Name	Scientific Name	Major Source	Lopping Period
Low Hills	Badahar	*Artocarpus lakoocha*	Farm	Oct - Mar
	Tanki	Bauhinia purpurea	Farm	Nov-Mar
	Koiralo	Bauhinia variegata	Farm	Nov-Mar
	Bakaino	Melia azedarach	Farm	May – Jul
	Dabdabe	Garuga pinnata	Farm	Oct - May
	Pakhuri	Ficus gaberima	Farm	Dec - Apr
Mid Hills	Phaledo	Erythrina arborescens	Farm	Oct – Dec
	Kutmero	Litsea monopetala	Farm	Dec - Mar
	Seto Chuletro	Brassaiopsis hainla	Farm	May – Jun
	Bhimsenpati	Buddlejaasiatica	Farm	May – Jun
	Berulo	F. clavata	Farm	Year round.
	Painyu	Prunus cerasoides	Farm	Feb – Jul
	Gogan	Saurauia neapulensis	Farm	Dec – Mar
	Nimaro	Ficus auriculata	Farm	Nov – Jan
	Rai Khanyo	Ficus semicordata	Farm	Dec – Feb
	Dudhilo	Ficus nerifolia	Farm	Oct – May
	Bhimal	Grewia optiva	Farm	Oct – Mar
	Kaulo	Machilus odoratissima	Farm	Jan - Mar
High Hills	Khimbu	Morus alba	Farm	Jan –Oct
	Bhote pipal	Populas spp	Farm	Jun – Sep
	Bains	Salix spp	Farm	Year round.

[5] http://www.fao.org/docrep/004/T0706E/T0706E07.htm

B) Exotic Fodder Species

1) Ipil Ipil (Leucaena diversifolia)

It is a multipurpose exotic fodder species that can be grown form Terai Belt to 1300 meter above sea level (masl).

It is a cold- tolerant species of leucaena and is psyllid resistant. This species shows good yield in Terai and hilly areas of Nepal[6].

2) Gajuma (Gauzuma ulmitolica)

It is a fodder shrub species that grows up to 5m high. Gajuma is an exotic species that was introduced in Nepal by the Forestry Research Institute in 1985. It is drought tolerant and survives well in short water logging conditions. This species is suitable to grow in all areas of Nepal up to 1500 masl.

It is grown at the edge of terraces, gives 3-4 cutting a year and produces reasonable quantity of fodder[7].

C) Grass species:

1) Stylo (Stylosanthes spp.) and Dinanath (Penisetum spp.) Molasses

Stylo and molasses can be grown at the altitude up to 2000 masl. These species aid in soil conservation in addition to being a good forage crops. Stylo, is a leguminous crop, fixes nitrogen and improves the fertility of soil. Stylo gives good yield even in unfertile soil and afforestation areas. It is a perennial crop that thrives once it is established[8].

2) Napier grass NB21 (Penisetum purpureaum)

NB-21 grass is a cross between Napier (Pennisetum purpureum) and Bajra (Pennisetum typhoides L.). It is a perennial grass which can be harvested for more than 3 – 4 years. The grass shows good yield on the moist soils of mid-hills. Green fodder can be produced throughout the year, except in drought conditions. This species is resistant to pests and disease. This grass can be grown in under-utilized farm areas like in terrace risers and bund area[9].

Other grass species recommended for the hilly areas are oats, Desmodium green leaf, Berseem, Teosinte, Vetch and Pea[10]. Bamboo also serves as a good fodder species for upper tropical, subtropical and river bank areas.

4. RECOMMENDATIONS

On the basis of altitudinal gradient, Dailekh district can be divided into 4 different climatic zones that is upper tropical (300 m – 1000 m), subtropical (1000 m – 2000 m), temperate (2000 m – 3000 m) and alpine (3000 m – 5500 m). All farmers in BDC's supply chain are within either tropical or subtropical zones.

[6] http://atoz-nepal.blogspot.com/2007/03/fodder-trees-of-nepal.html
[7] http://atoz-nepal.blogspot.com/2007/03/fodder-trees-of-nepal.html
[8] http://rameshwarsinghpande.blogspot.com/2011/02/9-forage-and-pasture-development-and.html
[9] http://www.nzdl.org/gsdlmod?e=d-00000-00---off-0cdl--00-0----0-10-0---0---0direct-10---4-------0-1l--11-en-50---20-about---00-0-1-00-0--4----0-0-11-10-0utfZz-8-00&cl=CL2.18&d=HASHb56d01ced7d6c0ecb3b0be.9.8&gt=1
[10] http://www.fao.org/docrep/004/T0706E/T0706E07.htm

At upper tropical zone, farmers are recommended to plant species like Badahar, Tanki, Koiralo, Bakaino, Pakhuri, Kutmero, Phaledo, Ipil Ipil, Gajuma, Stylo, Molasses, Napier grass NB21, and Amriso.

Species including Koiralo, Pakhuri, Seto Chuletro, Bhimsenpati, Berulo, Painyu, Gogan, Nimaro, Raikhanyo, Dudhilo, Bhimal, Kaulo, Kimbu, Ipil Ipil, Gajuma, Stylo, Molasses, Napier grass NB21, oats, Desmodium, Berseem, Teosinte, Vetch, Pea and Amriso are recommended for the farmers residing in subtropical zone.

Bamboo also serves as a good forage species that could be grown from upper tropical zone, river bank to subtropical zone.

In the future, BDC can raise awareness of agro-forestry, fodder tree species, grass species and how it can help address the issue of fodder shortage, using their network of Yuva Vayus to disseminate the information to farmers.

With encouragement and access to high quality seeds Yuva Vayus can lead by example and initiate cultivation. Depending upon the species, the price of seeds ranges from Rs 20/ seedling to Rs 50/ seedling for tree species and from Rs 20/kg to Rs 400/kg for grass seed species.

BDC is recommended to facilitate purchase of high quality seeds and offer them for sale on credit against milk collection again utilising the Yuva Vayu network to distribute seeds to farmers in their communities.