

## Potential Good Practice Note

# Promoting a Productive & Sustainable Fodder Programme: Oats as a Potential High Altitude Winter Fodder Crop

### Introduction

After the harvest of high altitude paddy, farmers in Bhutan traditionally grow wheat/barley on lands that lie fallow for 5 – 6 months for feeding the livestock since fodder becomes scarce during dry winter months. This fodder is mainly cut and stall-fed. Even the yak herders grow wheat and barley in the yak night pens which they preserve as hay for feeding the animals in winter months.

Oats (*Avena sativa*), was introduced in Bhutan (from Japan/India) in the seventies as a potential alternative winter fodder crop. Although, it has been cultivated since then, its adoption rate by farmers is very low as it resembles wild oats (*Avena*



*fatua*) which is a major weed species in winter crops. In comparison to wheat as a fodder crop, Oat is said to be more palatable, provides multiple cuts and its estimated yield is said to be more than double of green wheat. Oats, thus, have the potential to be an important winter fodder crop in Bhutan, while also allowing for important land-use intensification, as oats provide better fodder yield from the same unit of land than the traditionally grown wheat (Gyaltsen, T., 2002).

### The Case of Soeyaksa

The high altitude rangelands cover the northern belts of several districts starting from Haa in the west to Trashigang in the East. They provide fodder for livestock, medicinal and incense plants as well as fuel wood and other edible and non-edible minor produce for sustaining the livelihoods of semi-nomadic pastoral communities living in these areas. In recent years, pastoral farming is becoming socially and economically less attractive for reasons like, lack of adequate services, inadequate infrastructure and degrading quality of pastures due to over grazing both by domestic animals and wildlife.

Yaks have a special place in the lives of most Bhutanese people. They are long associated with the mountains and mountain people. Special efforts need to focus not only on conserving the genetic purity of the yaks but also on supporting the development of yak based products and establishing market linkages for such goods in order to sustain and enhance the economic condition of pastoral communities. Not only do the rangelands of Bhutan offer several opportunities to improve the socio-economic condition of the local people and the nation as a whole, they also have significant regional and global relevance as reserves for biological diversity and mitigating climate change effects through carbon sequestration. It is therefore important for future development and management strategies to take into account these unique geo-political, socio-economic and ecological conditions. However, due to difficult living conditions and minimal development services, members of rangeland communities are increasingly migrating to lowlands, in search of better economic opportunities and employment. Such trends are undesirable and may lead to extinction of yak farming as a livelihood option.

Soeyaksa is a three day walk from the road head. The community consists of nine villages with 19 households. Due to rugged topography and cold temperature, apart from rearing livestock no agriculture activities can be carried out in this region making people completely dependent on livestock. The yak population in the area is around 2,000. In summer, the community migrates to summer grasslands above 4,500 to 5,000 masl (meters above sea level) and in winter, they come to winter settlement areas at an altitude of 3,900 masl, where fodder development activities take place either on privately owned land or on CPRs. Rangeland communities in general are considered to be living in impoverished conditions.

Lack of winter fodder was identified as a major issue by the community during the planning and learning exercise held at Soeyaksa in 2001 organized by Jigmi Dorji National Park. High animal mortality in winter is credited to severe fodder shortage. In order to address this issue, the Dzongkhag Livestock Sector, Paro initiated a large scale program for promoting the cultivation of fodder crops from the year 2001 in Soeyaksa.

### Past Research on Oats<sup>1</sup>

On-farm tests were conducted during 1996 to compare oats with the traditional fodder crop, local wheat. The trial was sown in the first week of November in the rice-based system at elevations of 2,200 masl. The results obtained are presented in Table 1. Also see Figure 1.

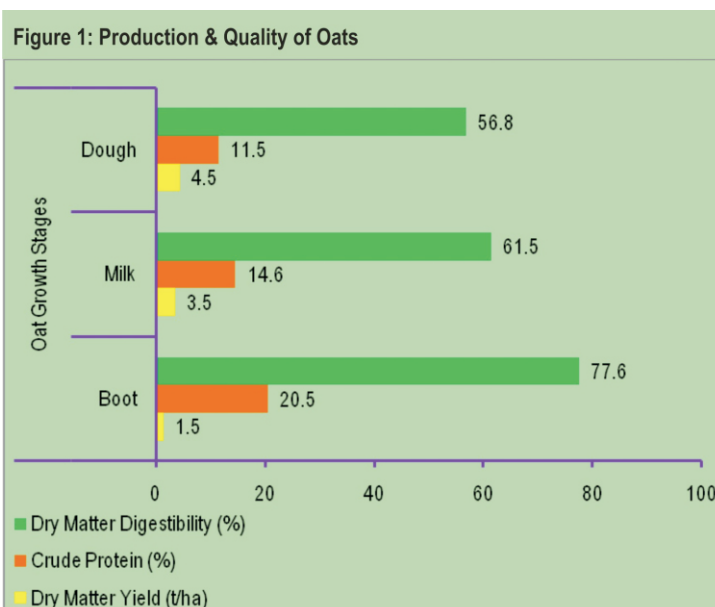
It is clear that line sowing of oats is the best way forward. However, the practice of using urea may not be ecological, besides being un-economical.

Table 1: Fodder Production				
Treatment	FW kg/ha	DM kg/ha	Ht. (cm)	Tiller / Plant
Oat (broadcast)*	9,227.5	1,772.0	46.35	19.55
Oat (line sown)*	10,477.0	1990.0	54.6	19.85
Local Wheat (broadcast)**	5,635.0	1,226.5	37.0	12.10
<i>Management: Surface irrigation was provided to all plots at intervals of 3 weeks. Urea (N fertiliser) at the rate of 20 kg N was applied at the time of sowing and after first harvest.</i>				
<i>*Average of 3 cuts</i>		<i>**Average of 2 cuts</i>		
<i>FW: Fresh Weight</i>		<i>DM: Dry Matter</i>		

<sup>1</sup> Source: EXPERIENCES WITH OATS (Avena sativa) AT TEMPERATE AND HIGH ELEVATIONS OF BHUTAN, Tshering Gyaltsen (Programme Officer, Livestock Sector RNRRC, Yusipang, Bhutan (Paper presented at the 5th Temperate Asia Pasture and Fodder Network Meeting held at RNRRC Bajo, Bhutan from 30 April to 4 May, 2002)

Oats were also tested under relay seeding of forage species in a rice based cropping cycle at Mebari, Chukha (1,820 masl) during 1997-98. Seeds were broadcast into the rice crops a few weeks before rice harvest, with no tillage, and the results were very poor: the green yield recorded was 2.7 t/ha (Roder et al, 2001).

Moreover a study was conducted to evaluate cereals for winter fodder production at Soeyaksa (4,000 masl) during 2001 (May to September). The study aimed to evaluate the performance of various cereal fodder crops in order to find out the most suitable species to address the issue of fodder shortage during the winter season. Seeds were sown in 8 rows of 2.5 m in length each and with a distance of 20 cm between two rows. The trial was



replicated in winter night-pens for Yaks. (See Table 2).

Before the trial was harvested, the herders were asked to assess in terms of the species they would select as the most suitable hay crop in future. The scores given by the herders were based on physical observations and the top three species selected by them in order of their preference were Oats c.v. Stampede, Oats c.v. Naked and Oats c.v. Fodder Oat Bhutan and Triticale c.v. Double Take.

**Table 2: Fresh Yield of Cereal Crops with 3 Replicates (Rep) & 8 Treatments**

Crop Species	Fresh Yield (kg/plot)			Total (T)	Mean
	Rep I	Rep II	Rep III		
Local Wheat	4.40	8.00	5.50	17.90	5.97
Fodder Oat Bhutan	10.00	10.50	11.00	31.50	10.50
Oat "Stampede"	10.80	19.10	18.50	48.40	16.13
Oat "Naked"	20.49	14.20	18.00	52.69	17.56
Rye	10.80	11.20	10.00	32.00	10.67
Triticale 1*	10.70	9.70	11.80	32.20	10.73
Triticale 2	5.30	6.50	11.00	22.80	7.60
Triticale "Double Take"	10.80	15.00	13.60	39.40	13.13

\*Triticale (x *Triticosecale*) is a hybrid of Wheat (*Triticum*) and Rye (*Secale*)

### Programme Participants and Communities Reached

Although the research centre has released some promising/ high yielding fodder species, it has never reached Soeyaksa due to its remoteness. As an effort to address the issue, the Dzongkhag Livestock Sector, Paro initiated a large scale fodder promotional program from the year 2001 in Soeyaksa involving all the farmers with or without land. The variety of oats (*Avena sativa*) widely cultivated by the herders, has originated in Eastern Europe, where it was primarily cultivated for grain. It is a major cereal, ranking 6th in the world cereal production.

Seeds of improved varieties of fodder oat and perennial grass legume mixture were distributed to 5

households for testing its performances in 2001. Before harvest all 19 households got together to observe the comparative difference of total biomass produced between wheat and oat as fodder crops. Oats gave biomass yields of 45,000 mt per acre as compared to 23,000 mt per acre from local wheat. Environmentally, oats can tolerate a wide range of soil conditions but requires adequate soil fertility for good biomass production. The laboratory results indicate high digestibility as compared to other forage species, especially in the early stages of growth.

Through this promotional program, animal mortality rate due to shortage of fodder in the winter months dropped from 10 to 3 animals per year per household. Herders reported that the lactation period increased by a month due to increase in fodder availability and milk yield increased by approximately 0.5 to 1 litre. No change in the number of animals reared was reported as fodder shortage is still a big issue in the region.

The figures on reduction in animal mortality and increase in lactation period and milk yield indicates that cultivation of oats as a fodder crop has a positive role to play in poverty reduction programs which is the key word of the 10th Five Year Plan.

After introducing oat as a fodder crop, collection of local grass from the forest has completely stopped, leading to a reduction in drudgery and saving of time spent on this activity. In the past, a minimum period of one to two months were spent by the herders for collection of grass since getting one load of fodder took 3-4 hours. Presently, due to fodder availability nearer to homes, people are able to utilize the time saved to focus on other income generating or household activities.

### **Overcoming Constraints**

Although presently Oat cultivation as winter fodder is aggressively undertaken by the herding communities in Soeyaksa due to the enormous benefits it has provided in terms of fodder especially during the lean season, some of the constraints faced and how they were resolved are discussed below.

\***Seed Production:** The District Livestock Sector, in collaboration with the Renewable Natural Resource Research Centre (RNR-RC), Yusipang initiated oat seed production trial at Soeyaksa in 2003 to sustain the program and the same trial was continued in 2004 for further monitoring. The results indicated that oat seed production is not possible at an altitude of 3900masl. The seed head development was very poor and the lab test showed that seed germination was below 40%. The trial was terminated in the year 2004. However, to continue the promotional program on oat production as a fodder crop, District Livestock Sector, Paro facilitated in arranging and supplying oat seeds to the herders of alpine communities and lowland farmers from WWMP, RNRRC, Yusipang and ICIMOD since the year 2000. As oat seed production is not possible at the alpine range, through the co-management approach, the ICIMOD, Kathmandu generously contributed to establishing seed money for sustaining oat cultivation in Soeyaksa. The seed money will be handed over to the farmers' group in future after the group is in a position to manage by themselves. Under the same project, potential oat seed growers in the valley will be identified to ensure permanent oat seed outlets.

\***Fencing:** Although, the supply of barbed wire was not part of the government policy, District livestock sector was able to convince policy makers and seek special approval for supply of barbed wire to alpine communities in 2004. The main purpose of supplying barbed wire was to increase the



area for fodder cultivation; which indeed it did, as the area under fodder cultivation increased from 660 square meters to 2,000 square meters per household within a year. (Traditionally Juniper - a valuable native tree species - was used as fencing material, however due to restrictions on its felling imposed by the forest department, the farmers had no other alternative as fencing material and hence had smaller plots for fodder cultivation.)

Traditional Juniper Fencing



Improved Barbed Wire Fencing

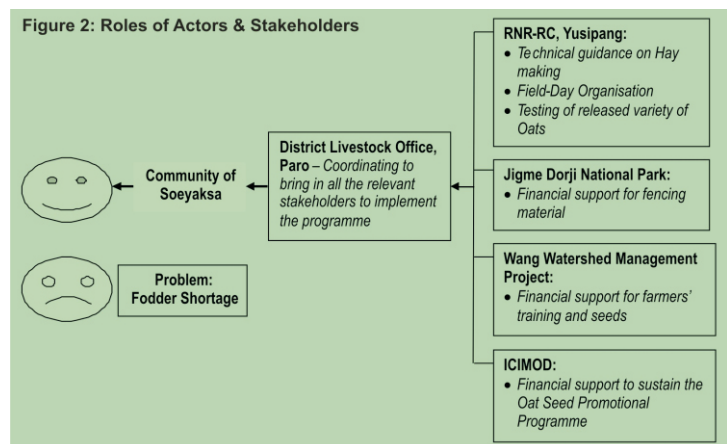


✳️ **Live Fencing:** To sustain fodder development in the area, live fencing with locally available tree species -willow - was tested by planting them between the fencing posts. The survival rate of willow trees was found to be 80%. Farmers were thereafter motivated to follow this practice and currently all farmers of Soeyaksa have planted willow cuttings as fencing material.

✳️ **Fodder Production:** The adoption of oat as winter fodder by the pastoral communities is 100% and this activity is being replicated in other yak rearing pockets.

### Actors & Stakeholders

The Dzongkhag Feed & Fodder focal officer played an important role, right from planning, budgeting and implementation. The problem was raised at the grassroots and initiative to address the problem was taken by the Government. The particular GP was coordinated by Dzongkhag Fodder officer in collaboration with relevant stakeholders like Renewable Natural Research Centres, National Feed and Fodder Development Programme (NFFDP), Wang Watershed Management Project (WWMP), International Centre for integrated Mountain Development (ICIMOD) and Communities (See Figure 2).



## Lessons Learnt

- ✿ Cultivation of improved variety of oat in the alpine region can alleviate fodder shortages for yaks during the lean winter season.
- ✿ It is essential to have Government support, both technical and financial, at the beginning, especially as NGO's are not existent.
- ✿ Farmer to farmer interaction/specific training, technical backstopping are the key elements in up scaling or replication of GP in similar alpine areas.
- ✿ Involving farmers in field trials leads to hands on training and quicker adoption of technology

## Opportunities & Conclusion

Government support for leasing land and assistance for fencing material could address problems related to fodder shortages and thereby enhance the possibility of sustaining yak herds in alpine regions.

The fodder promotional program has immensely benefited alpine communities during seven years of continued efforts and unfailing support. This program should be scaled-up in similar alpine areas of Bhutan. The introduction of winter fodder resulted in less labor demand, reduced animal mortality and increased lactation period. Above all, the adoption of introduced winter fodder saved time for women and they were able to participate in other development activities. However, the sustainability of the fodder programme will depend on annual availability of seeds, for which a seed bank fund ought to be established at the level of the communities.

### Abbreviations

CPRs: Common Property Resources	ICIMOD: International Centre for Integrated Mountain Development
MOA: Ministry of Agriculture	NFFDP: National Feed & Fodder Development Programme
RNR-RC: Renewable Natural Resources-Research Centre	WWMP: Wang Watershed Management Programme

**Authors & Contributors:** Tshering Gyaltzen, Deputy Fodder Officer, Herilal Nerula, Assistant Research Officer, Yonten Dorji, Assistant Research Officer, Gyem Thinley, Assistant Research Officer (RNRRC, Yusipang), Nidup Tshering, Assistant Livestock Officer, Dzongkhag Administration, Paro, Community of Soeyaksa, SAPPLPP Regional Coordination Team

*Photo Credits: Department of Livestock, Bhutan*

**Suggested Citation:** SA PPLPP (2009) Code: BHGP11, "Promoting a Productive & Sustainable Fodder Programme - Oats as a Potential High Altitude Winter Fodder Crop". Potential Good Practice Note, Delhi, India. © SA PPLPP 2009

## SOUTH ASIA Pro Poor Livestock Policy Programme

A joint initiative of NDDB and FAO

Regional Office:

NDDB House (6th Floor) PB 4906, Safdarjang Enclave  
New Delhi - 110029, INDIA

Tel: +91 (0) 11 2619 7851 / 7649 • Fax: +91 (0) 11 2618 9122

E-mail: [sapplpp@sapplpp.org](mailto:sapplpp@sapplpp.org) • Website: [www.sapplpp.org](http://www.sapplpp.org)

### Partnering Institutions

BRAC  
BRAC Centre  
75 Mohakhali, Dhaka 1212  
BANGLADESH  
Tel: +880 2 8824180-7 Extn: 2311  
Fax: +880 2 8823542, 8826448  
E-mail: [saleque@sapplpp.org](mailto:saleque@sapplpp.org)  
[saleque.ma@brac.net](mailto:saleque.ma@brac.net)

Department of Livestock  
Ministry of Agriculture  
Thimpu  
BHUTAN  
Tel: +975 (0) 2 351102  
Fax: +975 (0) 2 322094, 351222  
E-mail: [tshering@sapplpp.org](mailto:tshering@sapplpp.org)  
[naip@druknet.bt](mailto:naip@druknet.bt)

BAIF Development Research  
Foundation  
Dr. Manibhai Desai Nagar, NH 4  
Warje, Pune 411058, INDIA  
Tel: +91 (0) 20 25231661  
Fax: +91 (0) 20 25231662  
E-mail: [sepawar@sapplpp.org](mailto:sepawar@sapplpp.org)  
[sepawar@baif.org.in](mailto:sepawar@baif.org.in)

*For copies of this publication, kindly contact the Regional Office or the Partnering Institutions*