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MANAGEMENT REPORT

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"Rejuvenation of Forests with Fodder Trees and Shrubs to Sustain Goat Production in the Hills of Nepal"

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1. Executive Summary

A questionnaire was answered by twelve of the 78 households at the project's village site at Katteldada. At this village, subsistence farming is practiced by the cultivation of mixed grain crops on terraced hill slopes and rice on low land paddy fields. In addition, goats are raised for meat and buffaloes are maintained for milk products. Cash income is derived from the sale of goats, sale of surplus milk products and grains, and work opportunities in and outside the village Individual households own, on the average, up to a hectare of land, one or two buffaloes and up to six goats. Each household has regulated access to a communal forest and or a degraded forest area, each of which is administrated by an elected village committee. The main animal feed resources, in addition to on-farm crop residues, are from forest foliage and herbage which are gathered from forests but not browsed or grazed. Grazing is restricted to degraded forest and marginal areas. The agricultural production potential of households is limited by their small land holdings and the regulated availability and relatively low nutritive value of the gathered feeds. The aim of the project is to rejuvenate communal forest and grassland areas to provide more fodder for goat production. In addition, legume and grass crops are being introduced into the terraces owned and intensively cultivated by the households. The nutritive value of the fodder tree foliage is being monitored seasonally and the data are being used for selecting tree seedlings for present and future planting. The terraces have been sown with improved forage species and a goat breeding service has been introduced to upgrade the goat flocks in order to improve their production potential. Collaboration between institutions has been complementary in that chemical analyses of foliage samples and system analysis of the questionnaires answered by households have been carried out in both Nepal and Israel.

Section 1: Technical Progress

A) Research Objectives:

The project site is at the Katteldada village near the Gorkha Bazaar municipality in the Gorkha district, within the Mid Hill ecological zone of Nepal. The main aim of the project is to increase animal production at a sustainable level by improving the availability and quality of feed for both goats and buffaloes. This objective will be achieved by:

1. Determining the ease of establishment, development, growth rate and regrowth after harvesting of promising indigenous fodder trees and shrubs. Annual legume crops and grasses will be cultivated between rows to provide fodder and maintain soil fertility
2. Evaluating nutritional value of selected trees, shrubs, legumes and grasses to determine their potential to sustain improved goat production.
3. Planting out species that meet the above criteria in both degraded communal areas and in and around individual farms.
4. Developing a management strategy that will prevent further degradation of existing forests, new plantations and rejuvenated grasslands.
5. Using existing farms as pilot farms, within a hill country village complex, that have access to both partially degraded communal forests and barren dwarf-shrub areas for carrying out the above methodologies and strategies.

The above methods have been modified slightly because of strict government regulations that forbid any cultivation practices within communal forests other than the planting of fodder tree species. Within and between tree row cultivation can only be carried out on privately owned land and/or on village land officially designated as marginal degraded areas unsuitable for reforestation

B) Research Accomplishments

In Nepal

In addition to the regular seasonal monitoring of the chemical composition and energy yield of the foliage of fodder trees from the communal forest at Katteldada, the following activities were or will be initiated, depending on the security situation:

1. Sowing of forage species

Sorghum (*Sorghum bicolor*), pearl millet (*Hordeum vulgare*), teosente (*Hordeum vulgare*) and stylo (*Stylosenthes spp.*) seeds were distributed to project households in Katteldada by our technician working out of the Gorkha District Office of Livestock Development The first three plant species have a relatively high crude protein content (up to 14%) and are thus considered to be valuable for feeding to goats, especially as green forage supplements These three forage species were sown before the summer monsoon rains on dry land terraces and the stylo in

marginal (degraded and non-terraced) areas. Pigeon pea (*Cajanus cajanus)* was also distributed to farmers for winter sowing.

2. Planned planting of the following fodder tree species:

Local Name	Scientific Name	No of saplings distributed
Tanki	*Bauhinia purpurea*	175
Nimaro	*Ficus roxburghii*	150
Rai-Khanyo	*Ficus semicardata*	35
Badahar	*Artocarpus lakoocha*	150
Bakaino	*Melia azedarach*	100
Ipil ipil	*Leucaena leucocephala*	100

These tree species, favored by the farmers for feeding goats and buffaloes, will be planted by the farmers near their households on the edges of non-irrigated terraces. Arrangements have also been made for more saplings to be planted in degraded land and in the communal forest. For this purpose, the Bandipur Goat Research Station has been contracted to supply cuttings, seedlings and seed for the fodder tree nursery that we are establishing at Katteldada. However, due to renewed terrorist activity in the region, most of the forest planting had to be postponed.

3. Upgrading of the goat flocks at Katteldada.

Two crossbred breeding bucks were purchased: one, a local crossed with Jamunapari, the other a local crossed with Barberi. Two farmers were employed to maintain these bucks and for working as a 'Buck Service Center' for the project. They signed a standard government Memorandum of Understanding (MOU) with us and the Raniswara farmers' community (nominal owners), the signings were witnessed by an officer from the Gorkha District Livestock Development Services.

At the 'Buck Service Center', a breeding service register is being kept to record does mated and to prevent inbreeding in project flocks. We have also made arrangements with the farmers to keep records of the kidding performance of their serviced does and kid growth parameters. To date, 110 does have been serviced by the 'Buck Service Center'.

4. Description of present goat feeding systems in Katteldada flocks. We have selected 12 farm households for this purpose and they have been instructed on how to keep two types of records. One is for daily feed recording. The various feeds fed to the animals and their orts will be measured (quantified) which will enable us to determine the composition of the diets consumed by the goats per household during each season. The other is for goat performance recording. Goats in each household flock will be weighed at 15 day intervals. Records will also be kept of the sale of animals, mortality, diseases and slaughter for household consumption. For comparative purposes, both recording systems will be introduced to other villages in the general vicinity of Katteldada.

5. On farm animal studies. It is planned to conduct on-farm kid fattening studies. For this purpose, weaned castrated male kids, 3-4 months of age, will be purchased from the Bandipur Goat Research Station and distributed to selected households. There will be two treatments; a control group will be fed conventional feeds and a test group will be fed green forage supplements (in addition to the conventional feed) from the grasses and legumes sown in the terraces

In Israel

1. *In vitro* digestibility studies. Duplicate fodder tree foliage samples sent from Nepal are being continually monitored for *in vitro* organic matter digestibility and metabolizable energy yield, and for tannin contents. The objective is to detect seasonal changes in their nutritional value for goats as fodder tree foliage constitutes about 80% of the annual feed fed to flocks at Katteldada Results are presently being analyzed and will be collated with the Nepal data.

A graduate student is carrying out a biochemical study of fodder tree and shrub foliage using the advanced Menke Gas Test for determining *in vitro* digestibility and metabolizable energy yield of feeds using rumen fluid from both goats and sheep. He is also using this procedure with local tree and shrub foliage and comparing digestibility results between sheep and goats

2. Farmer questionnaires that were answered from 12 Katteldada households during 2003 are undergoing a full system analysis. This study has been hampered because of missing data that will be collected in the near future from repeated interviews with the farmers concerned. In addition, this data, when complete, will be collated with the farmer recording system that was introduced this year to 12 selected households. For this reason, new questionnaires may have to be prepared for both repeatability and correction purposes.

C) Scientific Impact of Collaboration

There has been a continual interchange of correspondence between the Israeli and Nepalese investigators in order to coordinate activities within and between their respective countries. These activities have been both on the organizational and scientific level and the benefits have been mutual in their impact. To further coordinate activities, Professor Degen and Mr. Benjamin will travel to Nepal for two weeks during February this year. The objectives of their visit are 1) to discuss, together with local project investigators, the project with Nepal Agricultural researchers working in animal and crop husbandry, forestry and soil science; 2) to visit the Katteldada village where the on-site studies are being carried out; 3) to consult with field officers of the Departments of Livestock, Crop and Forestry Services whose district headquarters are at Gorkha Bazaar, and 4) to interview those farmers who are participating in the on-farm goat studies using fodder tree foliage, stored crop byproducts and newly introduced legume and grass crops such as pigeon peas.

D) Project Impact

The Nepal principal investigators are, with the help of the project's field officer, Mr. Nesta Osti, effectively coordinating and carrying out the program with the active colloboration of farmers at Katteldada. A technical officer, Mr. Raj Kumar Jha from Gorkha Bazaar, was appointed to help farmers with their on-going farm activities and to supervise the records being kept by them. The principal project impact has been with the farmer's and their households in that all the project field activities are being carried out by them with inputs provided by the project

E) Strengthening of Development –Country Institutions

The Nepal laboratories and investigators have been helped by the project to re-equip their laboratories and to up-date their recording capabilities. In particular, the project has encouraged them to conduct applied agricultural research and development studies at farm sites with collaborating farmers rather than at research stations with technicians. In this way, there is an immediate transfer of knowledge, training and material benefits from the research institution to the target farmers with subsequent cooperative solving of problems as they occur. The questionnaires helped to clarify and to quantify the agricultural activities of Katteldada households. The methodologies that are being introduced will provide a model for future activities by the Nepal Agricultural Research Council

F) Future Work

Though a cease fire was proclaimed between the Government and the terrorists at the end of January this year, terrorist activities began again in the second half of 2003. This seriously interfered with the implementation of planned activities after July. In particular, planned tree planting in the communal forest had to be delayed until next year. The communication and traveling problems during the period under review became difficult and dangerous due to the continual threat of terrorist attacks in all Nepal and in particular, the Gorkha district. However, this has mainly affected institutional supplies and investigator inputs. The farmers, though threatened, have been able to keep to their farming schedules and project obligations

Section 11: Project Management and Cooperation

A) Managerial Issues

A request was made by the Israeli principal investigator for the purchase of a drying oven to dry foliage samples from Nepal. This request was granted.

B) Special Concerns

None have arisen to date.

C) Collaboration, Travel, Training and Publications

1. Collaboration during this period has been mainly on-going correspondence in which data collected has been interchanged and discussed. The correspondence has involved the activities of the Israelis: Professor Degen (Principal investigator), Mr. Benjamin and Dr Kam (collaborating investigators) and Mr El-Mekawi (PhD student), and the Nepalis: Mr. Panday and Dr Scherchand (Co-principal investigators), Mr Osti (collaborating investigator) and Mr Raj Kumar Jha (Field technician).

2. There has been no between country travel by investigators. Three day training courses for project collaborating farmers were held to instruct them on how to record and quantify their on farm feeding of animals as well as to record animal management and performance. In addition, Mr. Raj Kumar Jha has been supervising the record keeping and addressing farmer concerns with the project's activities.

3. There have been no publications since the previous report.

4. Anticipated activities:

- Continued collaborative and complementary monitoring of the nutritive value of fodder tree foliage and analyses of results.
- Updating and analyses of farmer questionnaires.
- Harvesting of winter crops.
- Preparation of a tree nursery at Katteldada and the planting out of tree saplings.
- Recording of goat performance.
- Visit by Israeli scientists to Nepal in February-March 2004 to review, with their Nepalis counterparts, project plans and their implementation.

D) Requests for CDR Program Actions

Apart from the afore-mentioned Israeli request for a drying oven, no requests were made