Research into Use: Pocket Guide No. 11

Local knowledge plus global science: a winning combination

Research Into Use

Bringing together local knowledge and international research results improves the lives of small-scale farmers by producing practical solutions suited to their needs

Above: The Mid-Hills of Nepal. Tractors and trucks of fertiliser will never reach these steep terraced hillsides. Yet small-scale farmers need to produce more food.

Agricultural research in the developing world has seen some fantastic successes—like the green revolution that transformed Asia. But, it has also seen some bewildering failures, as many new crops and technologies just haven't taken off. This is because research done at research stations often doesn't fit with farmers' complex needs, priorities and values. Plus, the hard-earned knowledge of farmers often isn't taken into account. By combining global science and local knowledge, we can often produce a powerful mix that can be used to improve the lives of small-scale farmers.

Finding fodder for livestock: a big problem for small-scale farmers

Even when they don't really have enough to feed them on, small-scale hill farmers in Nepal keep livestock to produce manure, milk, and meat, and to provide draught power and social and economic security. At the end of the dry season, 90 percent of households say that they are short of animal feed. And it's often scarce at other times of the year too.

Above: Goats prefer tree fodder over cut-grass. Where farmers don't have tree fodder or access to communal grazing, the number of goats is falling.

Traditionally, hill people have gathered fuel and timber, and animal feed and bedding from surrounding forests. But with more people collecting wood, more animals grazing common land, and the trend towards community-managed forests, off-farm fodder is becoming scarcer. Over the last 20 years, farmers with land have begun planting trees to make up for the shortage. But it's much harder for the smallest farmers, with just a few livestock and very little land, to take land away from crops to plant trees. For them, what's needed are new ways to grow crops, grass, legumes and trees for more animal feed.

One solution won't fit all

In the Mid-Hills, between 1,100 and 1,700 metres above sea-level, the population is growing and there is increasing pressure on the area's fragile environment. Community management protects forests and pastures but at the same time stops people from collecting grass, tree leaves and other foliage to feed their animals. Plus, each village within a given area is unique—in one village nearly all animal feed may be gathered from common land but in the next hardly any at all.

Livestock play a key role in the farming system. But small-scale farmers struggle to find enough to feed their animals, especially in the dry season. Top-down solutions to feed shortages don't take into account diverse households, environments, cultures, values or farmers' own knowledge gathered over generations.

Solving the problem: mixing local knowledge and global science

In some parts of Nepal, lessons learned over the years from research projects that aimed to improve livelihoods have turned the once top-down approach to agricultural

research on its head. Now, researchers and farmers combine their knowledge and experience. Together they identify the problems and the most important areas for research. Then there's wide consultation on ways forward—with the farmers themselves, the community, extension workers, NGOs, researchers and local organisations.

Those interested in cooperating make a commitment to work together. They discuss new practices and how they might work—how they fit with current customs, values and circumstances. They learn to set up experiments on farms and to collect basic data. This means that farmers start to question the design of experiments and to suggest alternatives. Thus, they begin to create or adapt their own knowledge to address new challenges. Similarly, researchers learn by observing how farmers rework new methods and technologies to come up with (often unexpected) solutions that suit their needs.

For example, research showed that intercropping velvet bean with maize doubled maize yield—the legume improved fertility by adding nitrogen to the soil. Some farmers tried this but found that trimming the beans to stop them climbing the maize plants was just too much extra work. They didn't just give up, however, because the beans are useful as animal feed, mulch and green manure.

Instead, they stopped planting the beans with maize and planted them on land that they couldn't grow other crops on. This is just one of the many examples that show that farmers will quickly adapt new ideas to suit their own situation.

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At the end of the dry season, **90 percent of households** say that they are **short of animal feed**

Above: Building on local people's knowledge has improved animal feed supplies in hilly areas of Nepal, close to the Himalayas. Photo: W. Richards

Above: Livestock are an integral part of mixed farming systems in the Mid-Hills of eastern Nepal. Photo: W. Richards

More and better fodder

It's best to avoid giving farmers ready-made 'solutions' for more and better fodder that might not work. Before putting together 'technology packages', find out their needs and circumstances.

Not doing this can lead to wasted effort. For example, one home-nursery programme supplied farmers with a package of grass plants, trees and saplings (3.5 million in all) to improve fodder supplies. Less than half survived. The area was very dry and farmers expected more support. Fodder trees were low on their list of priorities and so were planted on the worst land. Animals let loose to graze damaged and ate the new plantings. As a result, the 'package' failed. Now, rather than bringing in another ready-made solution, this programme encourages farmers to use their own initiative and experiment with new species and practices.

Four basic types of fodder

Farmers feed their livestock a combination of four basic types of fodder. In the rainy season, animals are mostly fed cut-grass and taken out to graze, but in the dry season they are mostly fed tree fodder and crop residues. The combination depends on many factors, such as what's available on- and off-farm, the season, the number and type of animals (goats, pigs, cattle, oxen, buffalo, yak), and the time and labour involved (family, children, paid labourers). There's a lot of variation between farmers and from village to village. But the overall quality of feed is low, especially where livestock are raised for milk and meat. The aim is to raise both the quality and quantity of the feed used.

1. Grazing

Most grazing tends to be off-farm on communal land. In some cases, new policies on community forest and grazing management prevent common grazing. This means farmers can't keep so many livestock and incomes fall.

2. Crop residues

Most crop residues—rice, millet and wheat straw,

maize stover, cob sheaths—are produced on-farm, but some farmers buy extra off-farm.

3. Cut grass

Cattle and buffalo prefer grass to tree fodder. It's nutritious and can be harvested quickly. About half is collected on-farm, the rest from forests, paths and other communal land.

4. Tree fodder

On-farm. Quick-growing leguminous trees planted on terrace risers don't take up space on crop land. Also, farmers find that tree fodder is easy to harvest and lasts further into the dry season. But, trees take much longer to grow than grass. Most tree fodder has more than 200 grams of crude protein per kilogram, so it makes a useful supplement to the low-protein crop residues (20-30 grams of crude protein per kilogram) which make up most livestock diets in the dry season.

Off-farm. Farmers may collect quite a large part of their tree fodder from communal forests. But, where there aren't any communal forests much more tree fodder tends to be grown on farm.

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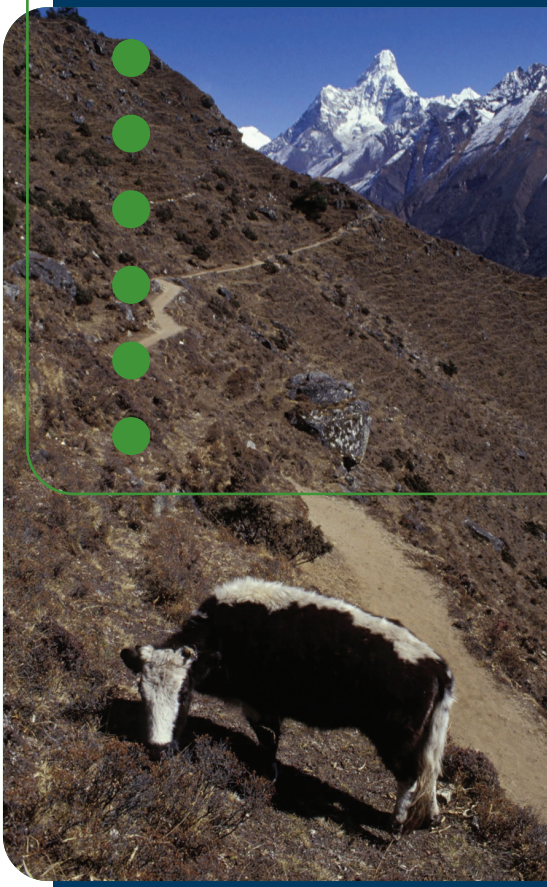
Farmers feed their livestock a combination of **four basic types of fodder**



Five steps to more and better fodder

1. Drum up village support

All villagers need to be involved. Otherwise, new forage crops may be damaged if some don't control their animals. Reluctant villagers can be won over by visiting communities that have already been successful in growing more fodder. Women's groups found that by producing fodder for sale—as individuals or collectively—they could become self-financing, more independent and even bring about changes such as protecting newly planted fodders and controlling grazing on cultivated fields.

2. Find out what farmers want

Find out from the farmers themselves what kinds of feed they need and at what times feed is scarce.

Farmers in Nepal know a lot about local trees—like which are good for milk production, and which cause diarrhoea or satisfy hunger. They have their own systems to grade food value (*posilopan*) and palatability (*obanopan*). Researchers found that laboratory analyses showed the farmers were right—*posilo* feed has more protein and obano feed is less digestible. Farmers say that animals fed the fodder that they classify as *posilo* (which means 'nutritious' in Nepali) produce more milk with a higher butterfat content, gain weight more quickly and are healthier. But they often offer animals the less nutritious *obano* feed instead, as they either want to produce dung for fertilising crops or to fill them up to keep them quiet in their stalls.

This means that you can't assume that farmers will feed their livestock a new diet even if it's 'better' or more nutritious. So, the suggestions that extension workers make need to take account of what farmers actually want from the animals.

Faced with less communal grazing, farmers in four out of five villages in eastern Nepal switched from cattle to buffalo because buffalo milk is higher in butterfat and fetches a higher price. But, in the fifth village, the motive for keeping cattle rather than buffalo is religious—most farmers are Hindu. This means that new practices also need to take ethnic and religious preferences into account.

Above: Restrictions on grazing common land mean that more and more cattle have to have fodder brought to them. Photo: W. Richards

3. Encourage learning

Farmers, their families and other villagers will need to learn many new skills, for example how to make the best use of the fodders available to them, how to set up and manage nurseries, how to produce grass and tree seed, how to grow seedlings and cuttings, and how to manage community forests and grazing. Visits to farmers growing new species or using new practices work well. Women should be included

at all stages, as they are often responsible for finding or producing fodder. Choose enthusiastic people and train them to train others. Find NGOs to help.

4. Encourage sharing

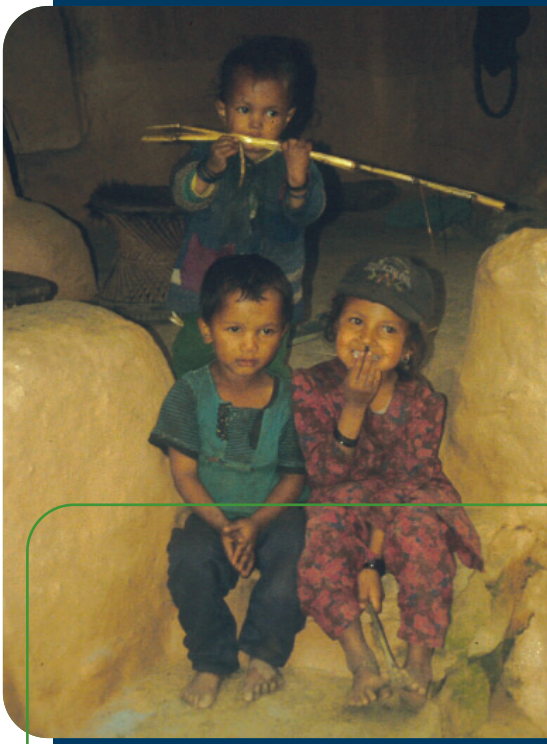
Nepalese culture encourages sharing. Seed-sharing schemes are popular. Milk producers are also keen for others to grow more forage so that the minimum amount of milk can be produced to justify a local milk collection centre. These centres boost milk production and local incomes.

Nepal is also a strongly oral society. Most farmers, many of whom are women, cannot read. Arranging 'cross-farm' visits gives them the chance to meet, share experiences and seek answers to specific fears and concerns.

5. Encourage experimentation

On-farm trials mean more to farmers than research-station trials. They see for themselves which species survive, compare growth rates and adjust plantings to copy previous successes.

Farmers also take up simple technologies more successfully than complex technologies. For example, hybrid Napier grass was introduced in one area as a new technology to improve fodder and boost milk production. But farmers didn't have much success with the new grass because they didn't know how to harvest it or that they needed to replant it every 2-3 years. In fact, the new technology needed to be backed up by frequent demonstrations on how to grow and manage the hybrid. It was just too complex. But farmers then experimented with mixed plantings of a native grass and local fodder tree. These were easy to grow, did not compete with crops and provided a good combination of fodder, fuel and timber.



Above, right: Children like these in a typical village near Pakhribas in eastern Nepal are among those who will benefit from more milk being available when more and better fodder is produced for the livestock that their families rely on. Photo: W. Richards

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How can I find out more?

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Also see the website **www.lpp.uk**

About this series

Research into Use Pocket Guides showcase new technologies that have been tried and tested, and have proven successful in the field. They were produced to demonstrate the importance of high-quality scientific communication.

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