Finding new ways to improve fodder

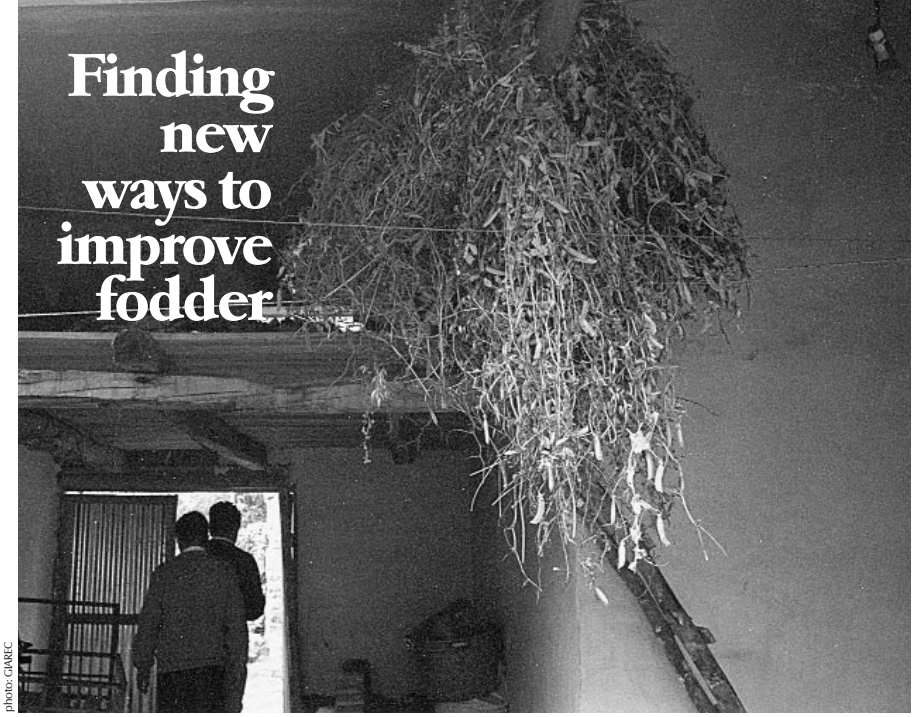

photo: GIAREC

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Farming is not only an economic activity in rural communities, it is also a lifestyle. Over the years, small-scale farmers have established and adapted production systems to sustain their families. They developed techniques by managing the natural resources available and by adjusting them to constantly changing weather conditions. Andean farmers also organised themselves and planned, controlled and regulated land use collectively. This process gave rise to such practices as fallowing, crop rotation and crop associations, creating biological diversity, utilising by-products and agricultural residues, livestock breeding complementarity, the use of plants for animal health and the management of microclimates.

Peasant expertise and formal science

The small-scale livestock breeders in the peasant communities of Miravalle, Quilcas and San Juan de Jarpa - joint participants in the ILEIA project - identified the lack of pastures during the dry season as one of the main problems they faced in their production systems and in maintaining their lifestyle. The Veterinary Institute of Tropical and Highland Research (IVITA), a member of GIAREC and mandated to provide advice to producers on matters concerning animal health and animal feed, assisted the farmers in finding solutions through a participatory process of innovation.

Lack of forage during dry seasons

In the Mantaro valley, livestock are bred at altitudes that range from 3200m in the flat valleys to 3800m on the steep slopes of intermediate areas and at 4200m on the high plains and plateaux. Farmers have adapted to these varying geographical conditions and established livestock production systems that are compatible with the various forms of land tenancy such as large-scale enterprises (SAIS), community associations and family farming units.

The tendency of peasant communities to breed more animals than the pastures can bear often result in overgrazing. To make matters worse, to meet the demands of a growing population, food crops are taking over pastures. Comparing the National Agricultural Censuses of 1972 and 1994 reveals that the area of pasture has decreased by 33% in the last 22 years and that farmland has increased by 52.5%. This means that there is less forage available for an increased number of livestock.

Sharing experiences

The application of PTD within the framework of GIAREC to tackle the problem of pastures helped establish a creative interaction between small-scale farmers in peasant communities and the NGOs and agricultural research centres promoting the process. In the process, the cause and effect of the major livestock feeding problems were identified and analysed. The next step was a session that exposed farmers to the techniques developed by IVITA. This made it possible to identify together possible solutions and to plan experiments. Consideration was given to the resources available to the producers. In this way local capacity to carry out experiments on the bases of peasant know-how and expertise and formal science were improved.

Advantage of harvest residues, producing and preserving pastures and forage material and improving the management of native pastures were among the alternative ways of overcoming fodder shortage discussed.

The technologies developed by IVITA and passed on to farmers included the use as feed of cereal straw (barley, wheat and oats) whose protein content had been increased by adding small quantities of green grass or by urea treatment. Cereal straw in the Central Highlands is seldom used for animal feed, mainly because ruminants cannot digest it because of its low protein content. A second option was the production of cultivated pastures and forage material by combining grasses with leguminous fodder. The production and management of oats is limited to the rainy season due to a lack of irrigation facilities in peasant communities. Cultivated pastures, on the other hand, are mainly adopted by intensive dairy-farming systems in intermediate valleys, under a rotational grazing system. The most common association consists of English ryegrass, Italian ryegrass, tangled grass, white clover and red clover.

Incorporation of improved leguminous plants in native meadows is another option and has been used with much success in the Southern Highlands. These crops should be employed in rotational grazing systems with short grazing periods thus preventing a heavy burden on the soil. Under this system between three and nine times more dry material is produced in native meadows.

The technique of sowing cereals alongside annual leguminous crops is based on the fact that in the Central Highlands it is common to find wild plants such as the annual leguminous Medicago species flourishing in fallow land and along the edges of the roads and irrigation canals. This is a high quality fodder similar to alfalfa. Cereals are combined with leguminous plants to produce a haystack that can be used as fodder once the cereals have been harvested. One of the problems with this technique, however, is the limited availability of seeds of these wild species.

The last option presented to farmers was the conservation of forage material. Storing the hay of upgraded feed oats is a simple process and is already used by a growing number of farmers. In order to produce the hay, the oats is cut when the grain is milky. It is allowed to dry outdoors for two or three weeks before being stored in haystacks or barns. Silos are another way of preserving green grass or improving the digestive properties of harvest residues such as dry fodder (starchy corn stubble) on a small scale. There are various types of silos built with local resources, in which fodder or treated harvest residues are stored ▶

and then covered with black plastic to keep them air-tight in order to prevent the fodder from decomposing.

Farmers' expertise

In most of the peasant communities in which rain-fed farming develops, the conservation of fodder is a strategic alternative to ensure a supply of animal feed. Farmers' animal feed practices centre around the use of harvest residues, the cultivation of fodder crops, the management of native meadows and limited irrigation or use of flooded fields. Dry fodder from harvest residues is a resource that small-scale farmers use exclusively for cattle feed during periods of low water. In order to improve this animal feed, farmers mix the dry fodder with alfalfa, ryegrass or green barley, or dampen it with salt water or urine to make it more palatable and improve its quality. Peasant farmers who have access to water usually sow grass: the most widespread species is Italian grass for cutting.

In many parts of the region, farmers have experience with native meadow improvement. This includes the regulation of the number of animals of each species that a farmer is allowed to put out to pasture in community-owned fields. At the same time communities have continued their ancient rotational grazing traditions, selecting their fields depending on the time of year and the ecological area. During the rainy season, all the farmers move their herds to the higher regions where plenty of pastures and watering places are available. When the dry season starts the animals go down to the lower area where the soil retains its humidy longer. This system gives the meadows time to recover. Farmers also divide grazing areas into sectors and rotate the fields, thus allowing the pastures to remain unchanged.

Some peasant communities have irrigated small areas and these enable them to have enough pasture land for their herds, particularly during periods of drought. Such areas include the so-called *'bofedales'* or flooded fields that provide large expanses of good quality natural pastures. Other communities have designed temporary irrigation facilities for native pastures in order to dampen dry meadows and revive the plants that have dried up due to lack of rain.

Farmers' and scientists' combined expertise

As a result of discussions between researchers, NGO extension workers and farmers after various options had been presented by IVITA, experimental groups decided to try producing fodder. They set out to evaluate the performance and adjustment of different species and associations within their own farming environment. In the three research sites, each group made an effort to clearly define the objective of the experiment:

- Miravalle: to compare how five varieties of grass adapt to three companion crop systems.
- Quilcas: to evaluate the performance of various varieties of grass cultivated at different altitudes.
- San Juan de Jarpa: to compare how different forage crop mixes perform, seeking to improve their year-round production and availability.

A total of 42 farmers participated in this experiment: 13 women and 29 men. Each experimenting farmer drew a sketch of their available land and indicated the layout of the trial.

The evaluation of the experiments was based on criteria formulated by farmers and technicians separately. While researchers put more emphasis on quantifiable production factors, farmers in general focus more on the factors determining the incorporation of different species into their production system. At group meetings, experimenting farmers exchanged their points of view on different aspects of the experiments (germination, growth, resistance to drought) and this led to comparisons being made between the different species of grass tested. This helped farmers form their own opinions about the most promising species. More important still, it encouraged them to continue experimenting and complementing their new skills in the conservation of fodder. Box 1 shows some of the results of the experiments in each zone.

The PTD approach proved to be an appropriate methodology for encouraging farmers to carry out collective action to identify and select the best solutions to the problems they themselves had identified. The exchange of experiences and know-how between farmers increased their self-confidence and encouraged them to organise themselves, discuss their problems and to propose a schedule of local experiments. Discussions between researchers, technicians and farmers enhanced peasant skills and improved the chance of obtaining specialised assistance from research institutions.

The positive results of the experiments created good prospects for new ones, thus triggering a collective local experimentation process. In the three sites, farmers have decided to start experimenting with silage techniques for fodder crops. They feel that growing fodder crops during the rainy season can have a beneficial effect and lead to an improvement in the fodder situation during the dry season when these crops are silaged.

Finally, the participatory and collaborative process that developed within the framework of GIAREC revealed that the interaction between peasant and scientific knowledge encourages rural populations to exchange technological and socio political views in a conscientious and sustainable way.

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Box 1 **Results of experiments**

MIRAVALLE

- Red clover proved to be more resistant to the lack of water, whereas Italian Rye grass was the most productive (10.08 kg/m^2).
- Red clover and Italian Rye grass yielded the most green fodder (9.91 kg/m^2).
- The white clover and English rye grass association required more water.
- Alfalfa was not planted in all farms, its growth was slower and it was the most susceptible to the shortage of water.

QUILCAS

- Red clover and Italian rye grass was the combination that adjusted better to local conditions, although red clover only yielded 3.9 kg/m^2.
- Red clover and Italian rye grass were cut every 45 days.
- Alfalfa was the crop most ridden with weeds and proved well established after the second silage.
- The regrowth capacity during the rainy season was evident in all experiments.

SAN JUAN DE JARPA

- Red clover + Italian Rye grass proved to be the most well adjusted and productive combination.
- Red clover + Italian Rye grass proved to be resistant to diseases and tolerant to drought.
- Red clover + Dactylo was the slowest growing combination.
- Alfalfa grew slowly and was affected by aphid and stained leaves.
- The germination of the seeds used ranged from 50% to 90%.
- Soil acidity was a limiting factor which affected the yield. The higher the altitude, the greater the acidity of the soil.

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