A patch of green

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uring the dry season the two predominant colors in the landscape of the Libertador Ramon Castilla Community Agricultural Society (SAIS) are the yellow of the prairie and the blue of the sky. Bare rocks or rural hamlets occasionally appear as dark patches in the scene. Not far from two of these hamlets in the Sierra, the Central Peruvian mountain range, the visual monotony is broken by a green field. Such a bright green at an altitude of 4000 metres and in summer is hard to explain. It is the result of an "injection of technology" following an agreement between two Peruvian institutions — the SAIS and La Molina Agrarian University.

The *puna*, the dry bleak plateau in the high Andes, from 3000 metres up, has little agricultural value except for its natural pastures. Used for grazing, these pastures are of poor quality because they lack water and nutrients. The Peruvian Sierra encompasses about 20 million hectares on which most of the country's sheep, cattle and camelids (Ilamas) are raised. Sheep and camelids adapt best to the altitude, the climate and poor nutrition. Cattle, raised to a lesser extent, do not compete for the same food.

Centuries of overgrazing, water shortages, and severe lack of soil nutrients limit the potential of the Andean highlands for livestock raising. Nevertheless, a large proportion of Peru's rural population depends on livestock for its livelihood, as this region offers no other means of subsistence.

The SAIS (Sociedad Agricola de Interes Social) is a special creation of the Peruvian land reform program. As part of that program, the SAIS Libertador Ramon Castilla — named in honor of Major-General Ramon Castilla, the famous liberator of the slaves in Peru — was established in August 1972. Seven farms were assigned to the rural communities of Tarmatambo and Pomacancha, and to the José Olaya Ltda. Cooperative Association No. 265, made up of former farm workers. These three groups formed a partnership whose lands cover more than 29 000 hectares, 22 000 of which are natural grasslands. More than 700 families live here — approximately 3600 people — making this particular SAIS one of the most densely populated.

During 1978-1979, the sheep population reached 23 687: there were also 1000 cows, 1200 *cuyes* (a breed of guinea pig), and 70 horses. The SAIS general manager, Justo M. Egoavil notes that "the area is not suitable for farming, and the only reason we plant is to provide work for members ... farming simply is not profitable in this environment." However, potatoes, barley, quinoa, oats, and vegetables are grown on a small scale.

As established by the Peruvian land reform program, the SAIS is governed by a delegate assembly that appoints two councils in charge of administration and supervision. There may also be other specialized councils. Production and general management are the responsibility of the administrative council. The nature and structure of the SAIS make Sheep grazing the altiplano. "Farming simply is not profitable in this environment."



possible the participation of the rural people involved. They are not individual land owners, nor do they hold deeds to the land. They receive salaries for their work, but also participate in the running of the society through their delegates. Profits or surpluses go to the participating communities and the cooperative association to improve schools, transportation, and other community services.

Although progress has been made in sheep raising — SAIS' main source of income — members are well aware of the limitations resulting from the lack of water and the deterioration of the grasslands. The technical assistance proposed by the University was very well received, therefore.

This then explains the enthusiasm with which La Molina and SAIS staff have undertaken the project, financially supported by IDRC. According to Mr Arturo Carrasco, director of the Animal Sciences program at the University and project leader, the project aims to improve the socioeconomic conditions of the inhabitants through livestock raising. This goal is pursued primarily through the improvement of animal nutrition. "Improvement starts in the stomach," states Carrasco, and he adds that by improving nutrition, there is a 90 percent possibility of raising the level of production. It was soon found that there was a need to form an interdisciplinary team with specialists from La Molina University in soils, livestock raising, veterinary medicine, economics, and sociology.

sais Ramon Castilla, representative of this type of association in the Sierra, was chosen for the project because of its members' receptivity, and good access from Lima. Similar experiments are being conducted in Puno, in the South of Peru, under the guidance of a New Zealand team. Information is exchanged between these two groups, and the ultimate aim is to disseminate the projects' results throughout the high Andean region.

The specific objectives of the project are to improve native pasture management techniques in the high Andes; introduce and evaluate new grass and legume forage species; introduce nutritional supplements and feed production systems during drought periods; and train personnel.

The project has two approaches: technology transfer and applied and demonstrative research. Under the agreement SAIS provides the land, animals, machinery, manpower, and lodgings for the University staff. For its part, the University directs research and its application, and finances the inputs, equipment, technical personnel, transportation, and the analysis and publication of results.

One starting point for the project involved a survey of the grasses and soils of the terrain using satellite photographs and 400 soil samples. Soils were then identified as being suitable for forestry, agriculture, or livestock raising; they were also identified in terms of their response to irrigation. At the same time, a comprehensive socioeconomic analysis of the SAIS that covered 50 to 60 percent of the region was done in order to analyze the two economic systems coexisting in the Society: the managerial one and the family one. The family economy is based on the huaccha -- the raising of the rural dweller's own livestock, which in fact is very inferior in quality, on SAIS land. Mr Carrasco states that this type of livestock raising is still practiced nationally and is increasing, sometimes supplanting cooperative types of organizations. This phenomenon has also been observed in agriculture, and it represents a reversion to forms of family economy that predate the land reform program. The socioeconomic survey of the SAIS will make it possible to measure improvements resulting from the management methods introduced and to evaluate project results generally.

According to several researchers, one way to improve native pastures in the high Andes is to plant nitrogen-fixing legumes. However, this presents difficulties if attempted on a large scale. Fertilizing is another, albeit costly, possibility. Another alternative is to leave the pastureland fallow. Much research has been done on this question in England, Canada, the United States, and Brazil. Soil is compacted by constant trampling, which makes it impossible for roots to find nitrogen, consequently the roots only grow superficially and absorb little water and nutrients. The most economical way to restore the grasslands is to leave them inactive for a year or two. These ideas are currently being experimented with in the project, particularly that of introducing legumes.

One promising possibility is to plant exotic forage species that can survive in the high Andes. Some of them



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had already been selected by the University in previous studies. Twenty hectares of the Paccha production unit were planted with English and Italian ryegrass and red and white clover in order to fatten 3000 sheep a year. This number represents about 40 percent of the annual surplus of rams. The mapping of the SAIS made it possible to detect 200 potentially irrigable hectares; an enormous potential that will totally change the course of the SAIS economy and will increase its profits severalfold. Of these, twenty centrally located hectares were chosen to serve as the starting and focal point. To obtain water, part of a canal dating from the Incaperiod was restored. Planting was done in January-February 1979 during the rainy season. According to many people, it is now the best pasture in the high Andes. Alfonso Briceno Ortega, the recently elected president of the SAIS administrative council, says that the initial effect of this assistance - the green pasture and the irrigation



ditches — was like a gift from heaven. Villagers from surrounding areas come to visit it and ask how it came to be. Some surreptitiously carry handfuls of green grass away with them at night for their *cuyes*.

Initially, surplus rams will graze on the twenty hectares, to be fattened 150 grams a day per animal. As a rule, such surpluses were sold during the dry season. The pasture currently under cultivation will later be enlarged for dairy farming: 200 hectares could sustain 1000 cows whose milk,

Alfonso Briceno Ortega

about ten litres a day per cow, would be processed locally. Two workers from the SAIS will be trained at La Molina University in making cheese for export. Twenty-five head of livestock can be grazed on each hectare of cultivated pasture, which contrasts with the one head per hectare on natural pastures. Thus, natural pastures will be given a rest, and the SAIS livestock capital will increase. Another important aspect is that the cultivated pastures require manpower: for every 25 hectares, 3 to 4 people are needed to irrigate, fertilize, fence, and care for the animals.

At present, the survival, growth, and persistence rates, as well as the production of dry matter and nutrients, are being evaluated for the Paccha pasture, as is the animal response to different loads and fertilization systems. Work is also being carried out to evaluate the improvement in animal nutrition through food supplements. One experiment used protein, vitamin, and mineral supplements with ewes bred for the first time. The effects, indicated by the weight and vigour of newborn lambs, are promising. The same type of nitrogen supplement experiment was begun using urea as a source', but toxicity problems have made it necessary to temporarily suspend this work.

Work is also being done on animal health, including the diagnosis of health problems and the evaluation of the sanitary controls employed by the SAIS. The work being done in this area is of great importance because it can substantitate the results of the nutrition work.

In the longer term, once technical and financial assistance have ended, the SAIS will no doubt continue certain operations that have required investments, particularly the pastures and the livestock. These will require technical inputs that the enterprise must obtain directly. In this connection, the project is also helping to bridge the gap between technical and professional personnel and the rural producers, a gap that widened during the first years of the land reform program.

The National Agrarian University has established branches in the Sierra, on the coast, and in the jungle. With the establishment of a farm in Huancavelica, it will be possible to do work in the high Andean grasslands. This would be another way to spread the results of the pasture improvement project, adding a touch of vital green to more of the landscape.