

Optimising livestock strategies in Bolivian mixed farming systems

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Most smallholders in rural Bolivian communities have developed mixed systems, in which the production of crops and the rearing of animals are combined with income-generating off-farm activities. The strategies vary a great deal from one family to another, and also within a family, depending on the time of the year, the age of the family members, or external circumstances. It has been calculated that 90% of rural families in central and south Bolivia earn more than 50% of their income through non-agrarian activities. (Jimenez Sardon, 1984)

Principle of diversification

The strategy used by rural families to counteract risks and optimise opportunities under changing and adverse circumstances is to diversify their activities. (Valdivia and Jetté, 1996). This principle of diversification also forms the basis of family-level livestock keeping in Bolivia, as in most parts of Latin America.

Each family has control over a couple of small plots of land, which are often on different ecological floors and from which they produce a variety of crops, thus minimising the considerable weather-related risks, and guaranteeing self-sufficiency for the family. The animals reared are poultry, guinea pigs, sheep, goats, pigs, cows, donkeys, llamas, alpacas and rabbits, and sometimes, depending on ecological circumstances, carp and bees. Women bear most of the responsibilities in animal care. Animals are an important part of the agricultural system and the culture of peasant families. Animal raising is embedded in Andean cultural values, such as solidarity and reciprocity, community organisation, and respect for *Pachamama* – or Mother Earth. Rural families perform, therefore, numerous rituals and festivals related to livestock throughout the agricultural cycle. The subject of livestock rearing by families is also closely connected to those of biodiversity, environment, gender, poverty and migration.

Livestock research and education

Despite massive investment in livestock research, the benefits to marginalised communities, where livestock is especially important to livelihoods has been very poor. In Latin America, as elsewhere, technologies were developed mainly for intensive and industrialised livestock production systems, assuming that the same technologies could be used to improve all livestock systems. This assumption turned out to be invalid. In fact, most modern technologies do not fit the reality of the low-input livestock system, while they have also enabled commercial producers to displace the smaller and less specialised producers.

Animal science as taught in Latin American universities and farming schools does not take into account the complexity of the context in which rural families rear livestock. Rather, attention is focused on reaching the maximum productivity per animal, limited to animal species used in industrialised livestock keeping, especially cattle, pigs and chicken. The absence of essential elements of family-level livestock keeping in the curriculum is reflected in the frequent failures of livestock projects.



Also for pigeons, there is a place on diversified Andean farms.

Photo: Katrien van 't Hooft

Failure of livestock projects

Stimulating livestock keeping at family level is an objective of many livestock projects. It is at this level, though, that failures are most frequent and have harsh consequences. An analysis (Blackburn et al, 1992) of different livestock projects revealed that many were inadequately adapted to the social, economical and cultural reality of the families belonging to the target population. The projects intend to change the people's system of production, usually from a diversified low-input system to a specialised one, directed to a monetary market, without consideration of the social implications and risks that these actions pose to rural families. Many of these projects have not been preceded by a thorough analysis of the reality of the families, like their ways of seeing the world (or cosmovision), their survival strategies, the rationale behind their different productive systems, the role of animals within this reality and the way the families perceive projects. Moreover, a lot of information on the outcome of projects is shelved as work reviews, poorly accessible to students and other interested people. Thus, the same mistakes are repeated.

Two basic strategies

A wide array of livestock keeping strategies can be observed among rural families. Basic elements of these strategies are the use of various animal species, the flexibility to change from one species to the other, and the low-external-input nature of the management system. Most families base their livestock keeping on *diversified* husbandry practices: poultry and pigs scavenge around and do not require major labour or capital input, and *cuy* (guinea pig) are kept in the kitchen, fed on leftovers. Though there is high mortality amongst these animals, their output is produced against very low cost. In addition, one species, like for example milk cattle, may be managed under a more *specialised* system, requiring relatively high levels of capital and labour input, and depending on market sales. The logic behind this more 'specialised' livestock system is quite different to that of the 'diversified' livestock system.

Though all divisions are artificial and never reflect reality in all its complexity, we can use this division in the main strategies of family-level livestock keeping: diversified and more specialised management of animals (Table, next page). They have to be considered as the two extremes of a continuum, with many variations in between. It is helpful, however, to understand the basic idea and logic behind each of these livestock keeping systems, in order to find ways to optimise each of them.

Different ways for optimising

In general terms, under the conditions of diversified livestock keeping, it is not possible to increase profits by reducing the costs of production, because these costs are minimal. It is also not possible to aim for a major increase of productivity per animal, as that would require a large investment of cash and labour, which goes against the basic principle of this strategy. The

Table 1: Characteristics of the two basic livestock keeping strategies

CHARACTERISTICS	DIVERSIFIED LIVESTOCK KEEPING	SPECIALISED LIVESTOCK KEEPING
LABOUR	Mainly women and children - combined with migration	Usually the whole family, including men
RISK FOR FAMILY	Low, because of the different species used	High, dependence on (external) conditions related to one species
FUNCTION OF THE ANIMALS	Multiple: to be consumed by the family, to be sold, as a way of saving and reducing risks, to produce organic fertiliser and medicines, for cultural and spiritual reasons	Mainly for income generation
PRINCIPLES	The number of animals most important. Reduced investment and low output of traditional products (meat, milk, eggs, wool, fur), combined with the use of other products, like manure, bones, horns, blood, bladder.	Main focus on production level per animal. Large investment of money and labour to sell traditional products. Specialised keeping of one species is often combined with diversified keeping of other species.
MANAGEMENT	The animals are kept in many different ways. Temporary food shortages and disease risks are part of the system.	The animals are kept in a relatively uniform way, directed at optimal conditions throughout the year.
TYPE OF HEALTH CARE	Based on local practices and medicine (ethnoveterinary medicine), sometimes complemented with selected 'modern' practices. Veterinary care includes rituals and local practitioners.	Based on 'modern western' practices by field workers and veterinarians, complemented with selected ethnoveterinary practices of the owners. Limited consultation of local practitioners
FLEXIBILITY	High, it is easy so shift from one species to another	Low, due to high individual value of the animal and the specialised knowledge and network required

best way of optimising diversified livestock keeping, without veering away from its principles, is to *reduce the mortality rate* of the animals. Under normal circumstances, the mortality rate in diversified livestock keeping can vary from 40% to 80%. This is due to a variety of reasons, such as infectious diseases; theft, accidents and predators; food and water shortages; lack of shelter; internal and external parasites; lack of care during special moments such as parturition and disease; and inbreeding. The relative importance of each of these variables differs according to the animal species and the circumstances.

In more specialised livestock keeping the mortality rates are generally much lower than in diversified keeping, because of the extra attention given to feeding and care of the animals. The way to optimise specialised livestock keeping is by *reducing the costs of production* and *increasing the profit margin per animal*. This may imply, for example, improving feeding strategies throughout the year, or cross-breeding with exotic breeds. As this is also the basis of industrialised livestock keeping, plenty of documentation about these technologies is available. Stimulating the cooperation and organisation amongst families that produce a specific species can be a major starting point, to improve marketing and infrastructure, for example.

Niche for poverty alleviation

The measures taken to reduce the mortality rate in diversified livestock keeping should be based on the strategies, the practices



Diversifying their livestock activities, a strategy used by rural families to counteract risks and optimise opportunities under changing and adverse circumstances. Photo: Katrien van 't Hooft

and the knowledge of rural families, especially of women. These measures should be cheap and require little additional labour; the income earned in the short term as a result of these measures should be greater than the costs necessary to implement the change. Under these conditions, the measures can combine traditional practices with strategies of modern veterinary medicine, and include the training of community-based animal health workers.

Various projects have shown that it is indeed possible to reduce mortality rates under these circumstances, i.e. low-cost vaccinations against specific diseases such as Newcastle disease in chicken or hog cholera in pigs; protection of chicks from predators by confining them during the first 2-3 weeks of their lives; strategic parasite control in llamas and alpacas; selection and exchange of stock of indigenous breeds; and specific actions to counteract the worst effects of food shortages, such as supplying mineral salts and supporting traditional forms of feed supplements during the critical periods. Special attention and simple infrastructure during and after parturition, can drastically reduce the number of piglets crushed to death by the sow.

There is, however, a lack of knowledge generation, extension materials, research and education in this field, as most livestock development initiatives have aimed at changing the diversified systems into more specialised ones. Optimising the diversified system of family level livestock keeping within its own context, and without changing the logic it is based on, is an under-utilised niche for poverty reduction. It implies a major challenge for projects, as well as for research and education in the livestock field.

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More information in "*Gracias a los animales: la crianza pecuaria familiar en América latina con estudios de caso de los valles y el Altiplano de Bolivia*". Edited by Agruco, Cochabamba, Bolivia. Forthcoming. Katrien van 't Hooft, editor.

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