

## Improving Small Ruminant Production

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# Improving Small Ruminant Production

## A Pathway to Better Livelihoods in Three Test Valleys in Pakistan

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*Livestock production is a key livelihood strategy and a way of life for most small-holders in the Hindukush. Depending on ethnicity, access to land, labor force, and ecological conditions, small to large herds of goats, sheep, cattle and buffalo serve as a primary or secondary source of livelihood. Ongoing deterioration of environmental conditions—frequently due to overgrazing—and the depletion of timber and firewood resources—often linked to demographic and economic pressure both in the highlands and the lowlands—increasingly worsen living conditions. Alternative livelihood strate-*

*gies and pathways to more sustainable natural resource use are needed. A combined research and development project, based on long-standing local research and participatory development efforts, launched in the North-Western Frontier Province of Pakistan (NWFP), aims to better assess and compare the situations in 3 different valleys, and to test concrete options for improving livestock output. Standard de-worming practices are being combined with a novel method of supplementing locally produced, season-specific, critically deficient nutrients for the animals, based on local environmental needs.*

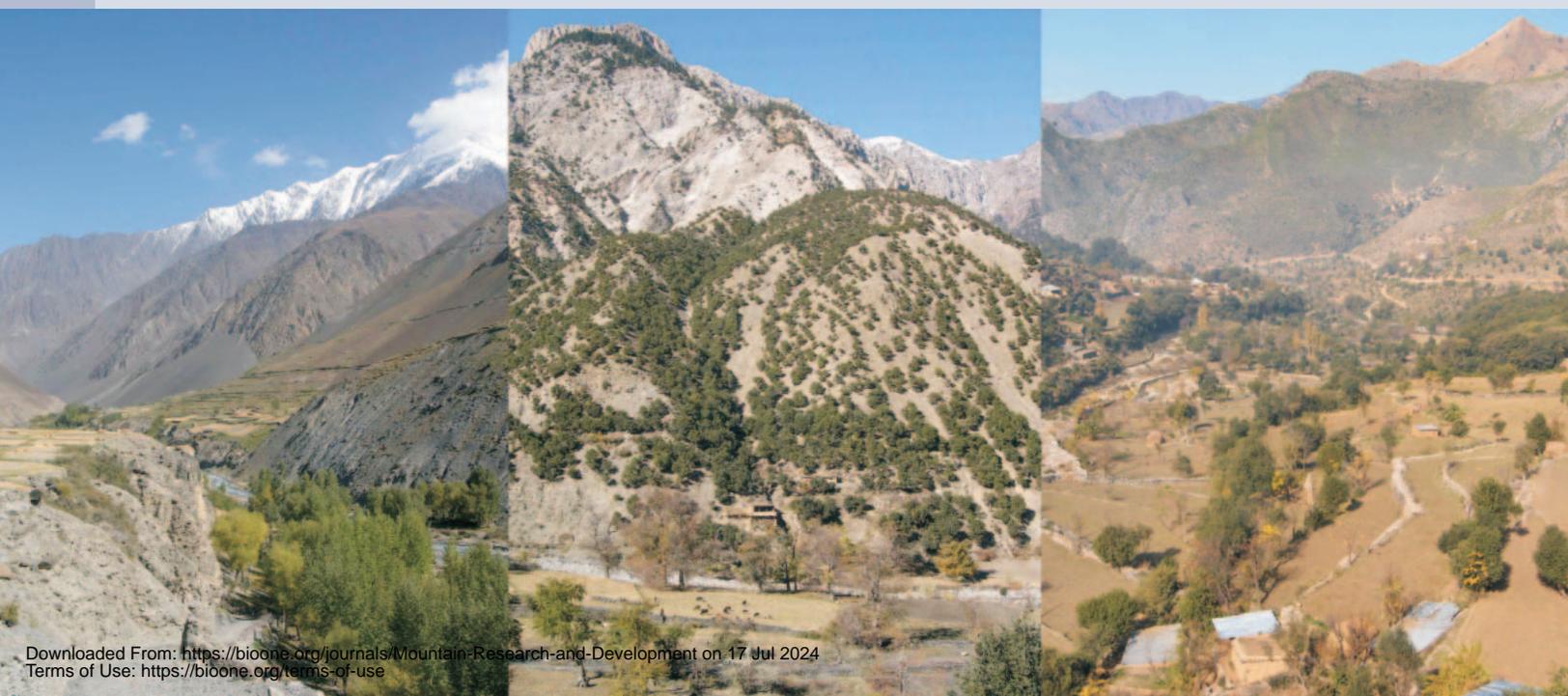
### Increased pressure on pastures and natural resources

The project area, closely studied by one of the authors for the past 13 years, comprises 3 test valleys characterized by different ecological and social settings: Arkari, Kalash, and Chagharzai (Figure 1). All are based on subsistence farming systems, but they differ in terms of religious, cultural and climatic aspects. Traditional institutional mechanisms regulate the use of natural resources, in particular grazing land including forests. Different social groups have developed cropping patterns and herd composition according to the availability of and access to natural resources. A variety of ecological niches are being used to produce a wide range of products

at different altitudes, both for subsistence and barter.

Today there are 3 times as many households in these valleys as there were 3 decades ago, and the number of animals is much higher even though single herds used to be larger. The growing pressure on already scarce natural resources is dramatic. In the Chagharzai valley, for example, any piece of land with some soil suited for terraces is cultivated. Grassland and browsing land are intermingled with cropland. Less favorable sites are managed as grassland, while steep, stony or sandy soils are left for open grazing (Figure 2). Forest has been limited to non-accessible steep terrain, while water resources that depend on forest cover have disappeared.

**FIGURE 1** The 3 test valleys in NWFP. From left to right: Arkari (Oveer valley), with a regularly flooded valley floor and irrigated terraces higher up; Kalash (Birir valley), with characteristic pastures in holly oak forests; Chagharzai, with mostly rainfed terraced agriculture. (Photos left and middle by Eva Syfrig; photo right by Inam-ur-Rahim, 2004)



**FIGURE 2** Browsing is a frequent technique used to overcome fodder shortages in semi-arid mountain areas, particularly during winter and periods of drought; the more depleted the resources, the more distant, dangerous and inaccessible the locations for such browsing become. (Water color by Serge Lebrun†, Schwanden/Kalash valleys, 2005)



In all 3 areas dependence on livestock for subsistence is greater than on cropping. Landholdings per household are typically small and barely exceed 3 ha, including private grazing land. However, most of the grazing land is common land and different utilization systems are practiced.

### Changing livelihood conditions

Livestock output has been reduced, owing to degraded natural resources, as less and less fodder is available per capita. As a consequence, earlier production systems based on self-sufficiency are more and more threatened, and the importance of off-farm employment and remittances is growing.

### Decreasing livestock production

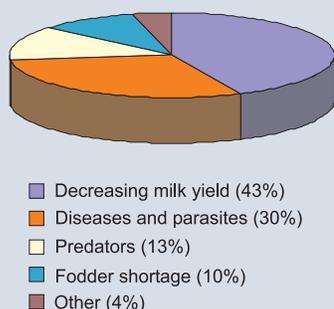
The herds are increasingly affected by health problems. Nutrient deficiencies as

### Livestock composition based on socioeconomic differences

Livestock preferences vary heavily from area to area. While goats are very common in Kalash and of great value, especially for rituals, feasts, and sacrifices, in Chagharzai buffaloes are the most popular ruminants, although they cost a small fortune. A rich family in Kalash possesses on average 121 goats, 11 sheep, and 3 cows—while a poor household has only 14 goats, 1 sheep and possibly 1 to 2 cows. In Chagharzai a well-off family has 4 buffaloes, 10 goats, 1 sheep, and 3 cows, while a poor household has to manage with 1 buffalo, 11 goats, 3 sheep, and 3 cows on average.

Results of a baseline study by Eva Syfrig, September–December 2004.

*“Before, there was more forest and therefore more rain. Now it is dry and we can’t produce enough fodder and crops anymore.” (A 50-year-old female farmer in Naranjkalay, Chagharzai, 26 Nov 2004.)*



**FIGURE 3** Main problems identified in animal husbandry. (Field survey carried out by Syfrig, 2004)

*Other villagers value the change more positively: “Nowadays we have more arable land and the crops get enough sunlight; moreover there is less snow-fall in winter and it is warmer.” (A 27-year-old farmer in Inzermaira, Chagharzai, 29 Nov 2004.)*

well as parasitic infestations and contagious infections that cause serious health problems are 2 major factors responsible for decreased livestock output. This decrease is measurable in milk, meat, and wool production, and in reproduction and mortality rates. Household interviews revealed that 43% of the smallholders consider decreased milk yield, especially in winter, to be the main problem (Figure 3). Thirty percent named diseases and different kinds of parasites, while 13% had the most trouble from predators, eg wolves and jackals. Ten percent mentioned the shortage of fodder in winter, and the remaining 4% had other problems such as accidents or theft. The decreased milk yield was connected with diseases and parasites as well as with fodder shortage.

Fifty-eight percent of the herders do not have access to veterinary services. Among those who have, many consider it of little use, due to the lack of (effective) drugs or the absence of veterinarians. In Chagharzai, for example, two-thirds of the households interviewed never de-worm their goats, while the rest administer a de-worming agent from 1 to 7 times annually. All farmers offer their livestock common salt at various intervals—from daily to once a year. The reason for such poor management may be the ignorance of many farmers about the effect of the remedies, or their unawareness of the need for such treatment. Awareness-raising campaigns and targeted training are needed.

#### The role and impact of remittances

It is usually younger males—the more skilled, motivated, and better-educated part of the population—who migrate temporarily or permanently to more urbanized areas at lower altitudes, making the region vulnerable to a loss of the resources that could re-establish its vitality. Land is increasingly viewed as a saleable commodity or a construction venue for shops and residences. More than 90% of the family farms now consist of less than 0.4 ha of increasingly fragmented land.

Remittances are becoming more and more important for livelihoods. While in the Kalash valley only 1 of the 27 households has a person (usually male) earning remittances, in Chagharzai 11 out of 27

families draw on resources from the ‘outside world.’ They usually have between 1 and 5 sons working in larger cities like Karachi. In Chagharzai land that is unused as a result of outmigration is leased to tenants. The migration rate for Arkari lies between the rates for the other 2 valleys, with migration limited mainly to Karachi.

In general, remittances have a strong impact on land ownership. Previously poor and landless tenants are increasingly obliged to earn remittances, spending the money they earn on land, preferably the land under their tenancy. Traditional landowners were previously confined to the valley floor, but now land ownership is also being reduced there. Landowners spend the money they earn from land sales on construction, or send their children to areas with a high potential for earning remittances, usually abroad. The logical result is that all social groups want more male children in order to have a greater potential to earn remittances in future. Remittances also allow for a rapid, positive change in social status, which in turn is expressed in concrete buildings. By contrast with more traditional (and sustainable) architecture, these tend to occupy the most fertile croplands, as cropping moves from a primary to a secondary or even tertiary livelihood strategy. Construction also requires more timber and furniture, thus leading to increased deforestation. In Kalash and Arkari, existing irrigated land is being increasingly fragmented and used for construction, as a result of the population explosion and the impact of remittances. In Chagharzai valley, new terraces are increasingly encroaching on grasslands and forests as a result of rainfed cropping.

#### Impact on women

Group interviews revealed that women’s diets are mainly vegetarian, due to the lack of sufficient animal products. In the northern part of Arkari, women consume meat only every second month, and they only rarely get milk products. Usually the little milk available is kept for male household members or guests. In Arkari valley, women reside with the livestock in pastures, with alternating visits from 1–2 males from different families, to follow the goat and sheep herds to remote pas-

tures (Figure 4). In Chagharzai, except for hay harvesting from communal lands, all activities pertaining to livestock are carried out by females. With increasing migration, the women in these families are generally becoming overburdened as well as empowered in decision-making.

In all 3 valleys women play an important role in activities concerned with livestock, especially preparing secondary animal products. If the output of small ruminants can be improved, women will have a better chance to produce more high-quality and protein-rich food for the whole family, and to earn monetary income through the sale of handicrafts (eg from wool).

### Breaking the vicious cycle

As livestock production is still a central part of livelihoods, a novel option to mitigate problems locally was designed jointly with support from the National Centre of Competence in Research (NCCR) North–South. The idea was to start by de-worming animals at appropriate times of the year, and compensate nutritional deficiencies through artificial site-specific administration of missing minerals and trace elements during summer and winter, a methodology developed by one of the co-authors. Since inherent deficiencies of individual trace elements in soils in specific areas have already been identified, correction could make spectacular improvement in the productivity of grazing livestock—one option for improving livestock output in general. This should eventually help to reduce pressure on natural resources and improve livelihood conditions (Figure 5). A pilot project will test this hypothesis and the scientific knowledge acquired over many years of intensive fieldwork in collaboration with selected local smallholders. Local NGOs and various official administrative entities are also being included.

#### Project approach and methodology

The project is being implemented by Holistic Understanding for Justified Research and Action (HujurA), a local NGO based in NWFP, and is being coordinated by the Centre for Development and Environment (CDE, IP2, Switzerland). Additional critical support is provided by

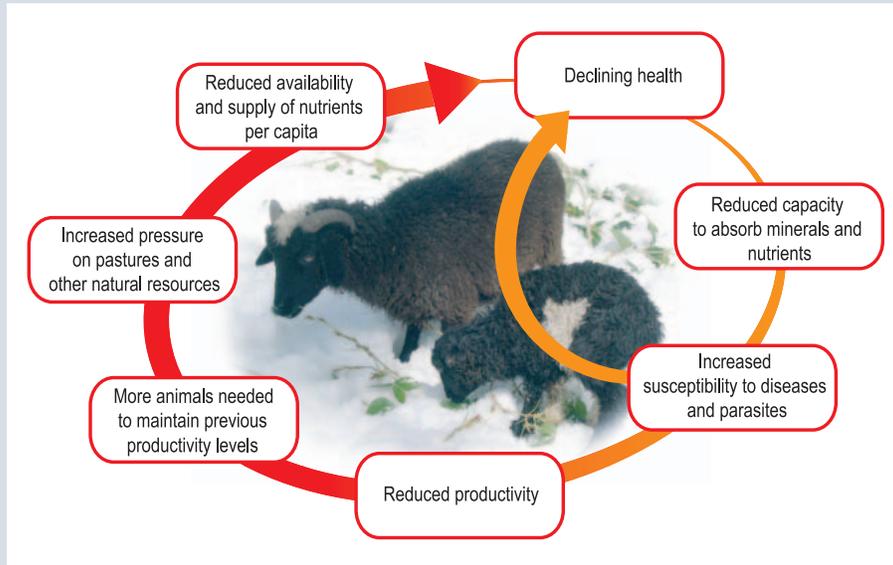


the Swiss Tropical Institute (STI, IP4) for veterinary aspects, and the Institute of Geography, University of Zurich (GIUZ, IP6), for livelihoods. The objectives of the project include:

1. Assessing different site-specific nutrient conditions determined by parent rock, soil, and vegetation conditions;
2. Providing a specific nutrient supply formula for the test valleys and producing doses to complement nutrient deficiencies for the selected test herds;
3. Providing de-worming for the selected test herds;
4. Involving smallholders in applying, testing and monitoring the effects of administering site-specific complementary nutrient doses, contributing to capacity building and awareness-rising among the local population;
5. Disseminating acquired knowledge on mineral supplementation;

**FIGURE 4** Girl shepherd with sheep (local breed) in Oveer, northern Arkari. While small herds (household animals) are tended by female shepherds in this region, men look after larger herds consisting of animals from the whole village. (Photo by Eva Syfrig, 2004)

**FIGURE 5** Vicious cycle(s) affecting small ruminants in the Hindukush mountain range. Here: a ewe and her lamb in Rabat, Arkari, October 2004. (Sketch by Daniel Maselli and Eva Syfrig, 2005)



6. Training local smallholders to produce specific nutrient doses through cooperatives on their own; and
7. Involving local actors in providing feedback and contributing to wider application of the approach in future.

In order to verify the quantitative output, selected herds will be marked and continuously monitored. To separate the impact of mineral supplementation and de-worming, 3 different groups will be differentiated. Each group will consist of several complete small herds in each test valley. Group A and B animals will receive mineral supplements with and without de-worming, while group C will serve as a control group for one year. During

testing, milk production from all herds (groups A, B and C) will be assessed on a weekly basis. Live-weight and wool quality and quantity will be assessed seasonally, while reproductive performance will be continuously monitored. Preliminary fecal examination for parasitic load will be carried out, and a suitable de-wormer prescribed.

### The way forward

From the preliminary results of the MSc baseline study, the potential for improved output in animal production appears to be considerable in all 3 test valleys. While the supply of remedies and mineral mixtures, tailored to local needs, is an important aspect of the project, specialized training in livestock and pasture management for all concerned and interested smallholders, combined with public statement of the research results, would be an ideal complement. Once the direct and indirect economic benefits are acknowledged, both by herders and the concerned administrative entities, special efforts will be made to empower the local inhabitants to produce the requested nutrient doses themselves. Consequently, and in order to increase livestock output and contribute to more sustainable use of natural resources, multi-level, multi-stakeholder negotiations on the number and seasonal distribution of animals in the pasture area will have to be held. Only then can the expected positive impact be achieved.

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As this article was going to press, artist Serge Lebrun (see Figure 2) died unexpectedly. The authors wish to acknowledge his rich visual documentation of life in the Kalash, which he generously wished to make available to the public.