Project Alpaca

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Intensified alpaca production leads to privatization of key grazing resources in Bolivia.

Summary

Traditional alpaca production in the High Andes has depended on access to irrigated patches of rangeland called bofedales that offer green forage during dry periods. In 1993, Project Alpaca began a participatory program to improve the production and processing of alpaca wool, introducing a technical package that included fencing materials to help indigenous herders better conserve bofedal forage and improve alpaca nutrition. Our evaluation of the impacts of fencing revealed several consequences. Although households with access to fenced bofedales showed reduced rates of mortality for young alpaca, a proliferation of fencing quickly began to privatize what had been a common property resource. This led to conflict and concern that some households could be pushed out of the system. Efforts to intensify livestock production in such environments must consider the social dimensions of resource use to avoid unintended consequences of interventions.

Resumen

La producción tradicional de alpacas en los Andes Altos depende del acceso a áreas pequeñas de praderas irrigadas, llamadas bofedales, las que ofrecen forraje verde durante los periodos secos. En 1993, El Proyecto Alpaca inició un programa participativo para mejorar la producción y procesamiento de la fibra de alpaca, introduciendo un paquete tecnológico que incluye materiales para la construcción de cercos para ayudar a los productores indígenas en la conservación del forraje de los bofedales y de esta manera mejorar la nutrición de las alpacas. Nuestra evaluación de los efectos de la construcción de cercos revela varias consecuencias. A pesar de que los productores que tienen acceso a bofedales cercados mostraron tazas reducidas de mortalidad para alpacas jóvenes, muy pronto, la proliferación de los cercos inició un proceso de privatización de lo que antes fue un recurso de propiedad común. Esta situación resulta en conflictos y preocupaciones de que algunos productores podrían salir fuera del sistema. Los esfuerzos que se hacen para intensificar la producción de ganado en estos medioambientes debe considerar las dimensiones sociales del uso de recursos para evitar consecuencias no previstas de estas intervenciones.

Livestock production on rangelands is often critically dependent on relatively small patches of highly productive bottomlands such as wetlands, riparian zones, and oases that offer green forage during dry periods. Scoones (1991) referred to such sites as "key resources." Changes in access to key resources, whether due to biophysical events or alterations in resource use, can severely compromise the viability of pastoral systems.

An example of such key resources can be found in the arid and semi-arid Bolivian highlands (or altiplano), where llamas and alpacas have been raised by pastoralists as a source of meat and wool for over 7,000 years (Browman 1984). In this environment, characterized by chronic frost and drought, highly specialized management practices have been developed. One ancient practice has been the creation of extensive "cushion peat bogs" (called bofedales) by diverting water from rivers and springs using complex networks of hand-dug canals. Dominated by low-growing mixes of perennial grasses, sedges, and forbs that are adapted to chronic frost, bofedales can be created after only a few years of irrigating dry bunchgrass and shrubland sites. Alpaca, in particular, require the green forage in bofedales to provide them with a high level of nutrition essential for production. Bofedales thus serve as key resources for alpacas, especially during dry seasons and drought.

Recently, development agencies in Bolivia have attempted to widen economic opportunities for Andean pastoralists by focusing on indigenous livestock species such as alpaca. One effort, called Project Alpaca, was initiated in 1993 by the Asociación Integral de Ganaderos en Camélidos de los Andes Altos (AIGACAA), an association of indigenous *Aymara* camelid herders. Its goal was to develop a value-added system of production, processing, and marketing for alpaca wool. Funding was used to construct a modern fiber-processing plant in La Paz, and deliver financial and technical assistance to producers in several locations. A participatory approach was used whereby the producers themselves owned the processing plant and directed project operations. Local interventions included efforts to improve water resources and enhance alpaca health, nutrition, and breeding.

Bofedales were recognized by AIGACAA as a central element in improving alpaca productivity. Alpaca, sheep, and to a lesser extent llama exerted heavy grazing pressure on bofedales, especially in dry periods. Two different strategies were used by AIGACAA to enhance the role of bofedales in alpaca production. Expensive irrigation projects were implemented in a few locations to expand the size of bofedales. Elsewhere, fencing materials were made available to herders to improve forage in bofedales. It was assumed that fencing would allow the vegetation more rest from grazing, and this deferred use would improve forage quantity in the later stages of the dry season. This, in turn, would benefit the diets of pregnant and lactating alpacas as well as those of young animals (called crias). All could have positive consequences for recruitment.

The objectives of our work included the determination of how bofedales

Alpaca mothers and young (called crias) on a bofedal dominated by low-growing vegetation. Forage from bofedales is essential for alpaca to maintain a high plane of nutrition.

were used for livestock production and the impacts of deferred grazing on bofedal vegetation, resource use, and alpaca productivity. We made our observations at the community of Cosapa, one of several locations where Project Alpaca operated. Our focus was on how the provision of fencing fundamentally altered access to key grazing resources in this community.

The Bolivian Landscape

Situated on the western edge of the south-central altiplano, Cosapa is approximately 260 km southwest of the city of La Paz, in one of the most isolated regions of Bolivia. The elevation of Cosapa is 3,900 m (approximately 13,000 feet). The climate is semi-arid with an average annual precipitation of 332 mm. Precipitation occurs primarily as rain in the summer between December and February. Diurnal temperature fluctuations can be very high, ranging from –10 to 20°C. Frost occurs 260 days per year. The people of Cosapa are of the indigenous *Aymara* group and their livelihoods are primarily based on the production of llama, alpaca, and sheep. Llamas and sheep are raised primarily for their meat (both for home consumption and commercial production), while alpacas are raised more for their high value wool. In Cosapa during 1994–6 the average number of alpacas, llamas, and sheep per household was 34, 64, and 43, respectively. Some households with access to hilly terrain produce crops such as potatoes, barley, and *quinoa* (a local cereal crop), but high risks of frost and drought generally preclude cultivation.

The landscape of Cosapa consists of a wide valley surrounded to the East and West by rugged mountains. Settlements are concentrated on or near the valley floor. Bofedales are a common site type of the valley floor, while bunchgrass and shrubland site types more typically dominate well-drained uplands. Bofedales are also associated with water-collecting locations in the mountains. Overall, we estimated that bofedales occupy about 10% of the landscape at Cosapa.

Effects of fencing on the mortality of alpaca crias were determined through a social survey that compared neighboring households with and without access to fenced bofedales. Households were asked to enumerate total cria born and those that died during the research period. General patterns of resource use and aspects of project intervention were determined using a combination of household interviews, personal observations, review of project documents, and attendance at local and regional meetings. Details are available in Buttolph (1998).

Land Tenure And Grazing Systems

Grazing lands at Cosapa were under ownership by groups of households that shared a common hamlet (or estancia). Each household held title to land, but often shared that title with other households. Within this system of communal ownership, however, each household had a designated area where their animals were allowed to graze. Because human out-migration has been relatively low in recent times, local population

Freshly dug irrigation canal in bofedal. A web-like system of canals is used to create and maintain this wetland vegetation type.

growth has increased pressure on grazing lands. Trespassing by livestock was becoming a chronic problem.

Rotation of livestock among different grazing sites throughout the year has been a traditional management strategy. During the wet season, alpaca and sheep, in particular, alternated grazing between upland and bofedal sites on a daily basis to reduce pressure on bofedales. In the dry season, however, alpaca and sheep spent most of their time grazing bofedales. In contrast, because they tolerated drier conditions, llamas were often taken to the mountains to graze. Llamas made more use of bofedales during dry periods.

Effects Of Fencing

Provision of credit and materials led to rapid proliferation of barbed-wire fencing after 1993. Our work indicated, however, that protection from continuous grazing had varied ecological effects. In terms of forage production and standing crop, protection conferred surprisingly few benefits, and plant species diversity even declined inside fenced areas compared to the heavily grazed situations. In cases where herders were able to provide more regular irrigation, some increases in standing crop were observed in protected sites. Overall, bofedal vegetation appeared to be very stable and slow to respond to this intervention despite high levels of soil moisture. We attribute these observations to a plant community that is highly adapted to intensive herbivory and frost, which limit plant growth. Paradoxically, however, provision of fencing was positively associated with a reduction in cria mortality rates of 26%. Survey respondents said that cria could forage in protected sites and achieve a better diet compared to that of continuously grazed sites. If this is correct, it suggests that sufficient forage improvements occurred from protection that were undetected by our field measurements. We concluded that fencing did provide some of the benefits intended by AIGACAA, although more time may be required to observe larger effects of fencing on vegetation.

The appeal of fencing to households, however, came not only from improvements to alpaca recruitment, but also because it provided a new way to establish exclusive rights over productive land otherwise under common access. Population increases led to increased pressure on grazing lands and higher tensions over land use and access. Fencing could thus limit problems of animal trespass and mitigate labor constraints for herding. Reductions in labor availability were becoming more common due to universal schooling (removing children from the labor pool) and greater opportunities for wage labor off-farm.

When Project Alpaca was initiated, only households with relatively small herds of alpaca were given credit to purchase fencing materials. The argument was that the larger herd owners were accruing greater benefits from communally owned land, and fencing would allow smaller operators to build-up their herds. The initial fenced areas were relatively small in size (ranging from 1 to 3 hectares), and were situated on relatively non-controversial sites where grazing rights were uncontested. As time went on, however, others began constructing larger fenced sites, ranging up to 8 hectares in size. Many of the newer fenced sites were annexed by larger operators, and they were placed in the center of the bofedales, thus increasing conflicts. In one estancia about 50% of the formerly communal bofedales were annexed for private use within 2 years.

Annual marking and blessing of yearling and adult alpacas and llamas. This ancient ceremony, called the **K'illpa**, *is practiced by Aymara pastoralists for practical and religious purposes. Colorful ribbons and tassles are used to identify ownership and sex of animal from a distance, while permanent slits cut in the ears identify ownership.*

Thus, rather than reducing pre-existing tensions over land use and access, fencing often exacerbated the problem.

The fencing of bofedales in Cosapa was thus contributing to a breakdown of the traditional norms and social institutions that regulated rights to grazing lands and linked the well-being and decision-making power of individual households. Caro (1992) describes the benefits of communal land tenure on the altiplano, stating that it allows households to redistribute pasture resources according to relative changes in herd sizes and labor pools. Fencing resulted in privatization, and, consequentially, differential access to key resources. Households without exclusive access to bofedales may now face greater risks of livestock mortality, particularly during periods of prolonged drought. A drought in the early 1980s decimated local livestock herds, even when bofedal access was unregulated. The implications of privatization thus include increased risk and vulnerability for those without fencing, greater economic polarization within the community, and a greater likelihood that poorer households will be expelled from the system. The routine ability for producers to react in a flexible and opportunistic manner becomes more limited with privatization of key resources (Scoones 1991).

Fencing Isn't A Long-Term Solution

Fencing serves as one example of the many technical innovations that attempt to release pastoralists from the constraints of low productivity. One problem with the "tech-fix" approach, however, is that changes are imposed on the system without sufficient consideration of the social relations and institutions that may be disrupted as an unintended consequence. Many of these institutions are informal and thus overlooked when implementing development programs, even when using participatory approaches that seem relatively unbiased and transparent. Benefits may accrue to a certain portion of the population, but increase vulnerability for others. Despite some of the short-term benefits of fencing on this production system, the longer-term consequences may be more detrimental as a whole.

The extensive nature of pastoral systems and vital role of key resources requires more careful development approaches. For example, rather than emphasizing increased animal production, development efforts could focus more on increasing farm-gate prices and profits for producers by widening market channels for wool as well as value-added artisan goods such as rugs, knits, and textiles. Full participation of the entire community in any development strategy is critical, along with their definitions of what constitutes "improved welfare." A development assessment, for example, might find that higher incomes through alpaca production may not be the critical variable to improved welfare, or at least not worth the social costs incurred through the process of intensification. Attempts to better manage household risk, diversify the economy, and promote community cohesiveness to deal with ecological or economic shocks may be more appropriate for pastoral peoples than merely undertaking efforts to increase productivity.

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