Youth Forum

Winter Grazing at 13,000 Feet: Improving Forages for Subsistence Agriculture in the Bolivian Altiplano

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From this title, you might envision something like sheep buried in snow. Actually, livestock winter grazing at 13,000 feet and higher is not uncommon on the Andean Altiplano. The Altiplano is a high plain surrounded by majestic mountains extending over 20,000 feet.

The Andean Altiplano.

The Altiplano itself gets very little snow and, in fact, is a cold desert for about 8 months of the year. During the growing season (December–April), the majority of the annual precipitation is received in the form of rain. This results in lush forage availability from remnant perennial grasses and ephemeral weeds. Animals grazing these lands are in a positive nutritional cycle through this period and into fall as crop aftermath from barley, quinoa, and legumes become available as supplemental feed.

By late fall the natural rangeland forages are gone and the aftermath depleted. Animals at this point begin to burn fat and muscle tissue to sustain themselves on very limited quantities of low-quality forage. This is a critical time as animals are in gestation and many are still suckling young. The bottom line is a very low-efficiency livestock production system with low levels of fecundity and long periods from birth to marketability. The Bolivian Altiplano is typical of the Andean situation. The landlocked status of Bolivia increases its dependence on subsistence agriculture on the high plain.

Through the Benson Institute at BYU, a project was established to evaluate alternative forage species and strategies for the winter forage bottleneck. This project was to determine if forages grown in other cold desert environments of the world could be grown on the Bolivian Altiplano. The idea was to find species that could be used to create forage banks of a mixture of grasses to provide energy and palatable shrubs to supply late-season protein.

Author assisting in forage production evaluation.

While rangeland forage is plentiful during the growing season, animals graze on communal lands. As the season progresses and feed is depleted, animals are supplemented with crop aftermath back on individually owned small plots. The forage banks would also be individually grown and controlled on private areas. Using the forage bank strategy, late in the dry season animals would be allowed to forage as best they could during the day and then be allowed to graze in the forage banks for a short period each evening prior to being locked away for the night. The brief nightly exposure to high-quality forage would hopefully improve animal health during the harshest part of the year.

This scenario formed the hypothesis from which forage adaptability trials were initiated. Six grasses were seeded, including timothy, orchardgrass, crested wheatgrass, pubescent wheatgrass, smooth brome, and weeping lovegrass. Additionally, 6 shrub species were grown in greenhouses and transplanted into evaluation plots, including forage kochia, 4-wing saltbrush, bitterbrush, birchleaf mountain mahogany, black sage, and seabuckthorn. These plots were established at several locations across a rainfall gradient and replicated 3 times at each site. Establishment and production has been followed on these species over the past 3 growing seasons.

I went to Bolivia to participate in data collection for the 2004 field season, along with Rachel Fugal (an MS student assigned to the project), other BYU students, and supervising faculty Dr Val Anderson and Dr Bruce Roundy.

The timing was early August, which was early winter there. We found that while all grasses were established, highest production was achieved by weeping lovegrass, pubescent wheatgrass, and orchardgrass. The shrubs that established best were forage kochia and 4-wing saltbrush.

Production, however, was only half the equation. Camelids (llamas and alpacas) were the target livestock species for this study and we needed to evaluate their acceptance of these new forages.

Author with friendly llama.

I developed new skills in llama "rassling" and spit avoidance as we marked several llamas with different colored ribbons and collected bite-count data and scan sampling to determine forage preference.

Evaluating llama forage preference.

Llama bites were relatively easy to count because of the typical bite and rip action of their heads. Much to the dismay of project leaders, the llamas would not touch the shrubs—they ate dried weeds between and under shrubs and, when gone, they seemed to prefer dirt and rocks to the shrubs!

The grasses, on the other hand, were all utilized to some extent, but by far the greatest preference was for timothy, and least preferred was weeping lovegrass. By covering the timothy we were able to evaluate the other grasses and found pubescent wheatgrass was favored, with the others being utilized to a lesser extent.

Camelid grazing on the Altiplano in winter is a bleak reality. Improving late-season nutrition using forage banks is a viable option that needs further work and refinement. However, with these forage banks being introduced, there is a light at the end of the tunnel that could lead to a better life for the animals and the livestock producers that endure life in the enchanted but harsh environment of the Andean high plain. ◆