

Management of Traditional Rangeland and Pastures

In recent years, traditional herding practices have come to the attention of anthropologists originally concerned with land ownership and inheritance. The elaborate traditional rangeland management system responds to animal rearing needs, environmental constraints, and to sociocultural requirements. Certainly, the management of traditional pastures is severely restricted by those same socioeconomic factors which explain pastoral peoples' marginality in the social structure of Andean countries. Limited access to land, and to modern technologies, make herders rely almost exclusively on their rich pastoral lore, which, despite responding to the many needs and constraints of the high Andes, can be improved by introducing appropriate technology.

The characteristic wet and dry seasonal cycles of the Andes set the framework for pastoral activities. During the cold and dry Andean winter, herders take their animals to specially watered pastures (these are usually referred to as *bofedales* and, less commonly, as *ojonales*). These are carefully irrigated by redirecting streams over the plains. These man-made grasslands need time to grow into a *bofedal*. Before a grassland is turned into a *bofedal*, the former grass cover has to rot and new vegetation has to grow in its place. *Bofedal* vegetation is characteristic of highland swamps. This traditional system has made grazing more intensive and less extensive. However, grasslands are watered not just to form a *bofedal*; this could also be done with the exclusive purpose of watering existing pastures in order to increase their productivity. *Bofedales* are preferably not used during the rainy season when grasslands are abundant and productive. Better pastures ensure the well being of animals as well as enhanced productivity in terms of fibre and reproductive rates, increasing overall carrying capacity.

During the rainy season, herders carefully separate males and females. When the natural pastures grow after the monsoon, males, perceived as more active and daring, are taken to the hills and slopes. *Llama* males are taken to areas where coarser grasses thrive.

Males need to be separated from females to avoid their characteristically aggressive behaviour which may result in damage to females and offsprings (which are believed to have a "female odour", thus, attracting males). It has also been noted that if males are kept for too long with females, this tends to make them sexually uninterested in their mates.

Ideally, the flock should be split into three groups, each one attended by one herder, i.e., *llama* and *alpaca* males, *llama* females, and *alpaca* females. More usually, females of both species may pasture together, depending on the availability of good quality moist pastures which are absolutely necessary for the *alpaca*. If these are limited, *llama* females are taken to other pastures of lesser quality. However, juvenile males become sexually attracted by females towards the onset of the rainy season, thus making it necessary to keep them separately, at least until the marking period which takes place at the end of the rainy season.

While grazing, the *alpaca* tends to concentrate and remain in the same place, as opposed to the *llama* which moves around more openly. The herder has to keep a watchful eye over the flock, ensuring that animals do not go astray or invade cultivated plots. He has to carefully watch the animals one by one, observing if they graze properly and if their feeding behaviour is regular. A dedicated herder is capable of identifying potentially sick animals through careful observation.

In accordance with specific property arrangements, rangelands may be rotated. Throughout the Andes, grazing lands could either be privately or communally owned. In some regions, landless herders rent private grasslands. Sometimes the animals are taken alternately to watered *bofedales* and to drier grasslands. Depending on altitude and zonation as well as on population pressure, during the rainy season, an average of five days of grazing should be followed by following the grassland for 25 to 30 days.

Amidst the grasslands there are specific spots without vegetal cover, called *qhospana*, where SACs enjoy rolling and wallowing.

Animals are kept at night in roofless stone corrals. In the early morning, once the herder has confirmed that the early morning dew has evaporated from the pasture leaves, the animals are taken out for grazing. There is a general belief that grazing on pastures covered with dew or frozen grasses causes diarrhoea.

The traditional herder can distinguish the many grass and pasture species of the Andes, carefully identifying by name and properties each variety as well as the more common associations of species. Some of the more common vegetative associations of the Andean grasslands are given in Table 19.

Table 19: Vegetative Associations in the High Andean Zone of Peru

Central Sierra	South Sierra
a) Watered Plains	a) Dry Areas
1) <i>Poa - Festuca - Calamagrostis</i>	1) <i>F. dolichophylla</i> <i>F. fastigiata</i>
b) High Altitude <i>Paramo</i> of Glacial Origin	2) <i>F. rigida</i>
2) <i>Festuca - Carex - Calamagrostis</i>	3) <i>F. ortophylla</i>
3) <i>Festuca - Poa</i>	4) <i>S. obtusa</i>
4) <i>Calamagrostis - Festuca</i>	5) <i>C. amoena</i>
c) Mountain Slopes	6) <i>Scirpus rigidus</i>
5) <i>Calamagrostis - Festuca</i>	b) Wet Areas
6) <i>Stipa - Calamagrostis</i>	7) <i>Distichia muscoides</i>
7) <i>Festuca - Stipa</i>	8) <i>F. dolichophylla -</i> <i>Plantago tubulosa</i>
8) <i>Calamagrostis recta</i>	
d) Heights	
9) <i>Festuca - Azorella</i>	

Source: FIDA 1990.

Carrying capacity evaluations under different highland Andean prairie conditions have been elicited. Tables 20 and 21 offer a perspective on these.

Table 20: Relationship between Animals Demand and Carrying Capacity of Natural Prairies as Assessed in Different Altiplano (upland plateau) Ecoregions

Ecoregion	Carrying Capacity and Condition	Balance	Source
Semi-arid	0.45 O.U. (poor) 3.8 O.U.	-3.35 O.U.	Cardozo y Riera, 1972
Semi-arid	2.00 O.U. (good) 4.8 O.U.	-2.00 O.U.	Bellour, 1980
Arid	0.3 O.U. (poor) 0.48 O.U.	-0.18 LL.U.	Alzérreca e Izco, 1987
High Andean Sub-humid	0.9 AL.U. (regular) 3.06 AL.U.	-2.15 AL.U.	La Fuente et al., 1987

Source: Alzérreca 1988, cited in FIDA 1990.

* Data of Evaluation Studies in Specific Areas

O.U. =Ovine Unity; LL.U. =Llama Unity; AL.U. =Alpaca Unity

Table 21: Condition, Area, and Carrying Capacity of Ranges Used by Camelids Evaluated Until 1990

Condition	Type of Prairie	Range Area Suitable for Grazing		Carrying Capacity of <i>Llamas</i>
		ha	%	
Excellent	2,17	1857	0.8	2.1
Good	2,5,12,13,14,15	73973	33.2	1.6
Regular	6,11	1431	0.6	0.8
Poor	1,3,4,7,8,9,10, 16,18	144295	64.9	0.3
Very Poor	9	1155	0.5	0.1
Total		222714	100.0	

- 1 = *Stipa* spp. rangeland
- 2 = *Festuca dolichophylla* rangeland
- 3 = *Parastrephia tholar*
- 4 = *Frankenia* shrub
- 5 = *Mulenbergia* and *Distichlis*
- 6 = *Parastrephia* and *Mulenbergia*
- 7 = *Parastrephia* shrub
- 8 = *Stipa ichu* rangeland
- 9 = *Tetraglochin* shrub
- 10 = *Festuca ortophylla* rangeland
- 11 = *Bromus uniloides* prairie
- 12 = Prairie under fallow
- 13 = Watered prairie
- 14 = *Festuca ortophylla* and pastures
- 15 = *Calamagrostis* watered grassland
- 16 = *Festuca ort.* and *Parastrephia*
- 17 = High Andean watered grassland
- 18 = *Achiane* grassland