

**COLLECTIVE MANAGEMENT OF IMPROVED FORAGE IN ZHONGDIAN COUNTY,
DEQIN, TIBETAN AUTONOMOUS PREFECTURE,
NORTHWEST YUNNAN, P.R. CHINA**

Xie Hongyan¹, Camille Richard², Xu Jianchu¹, Wang Jianhua¹

¹Kunming Institute of Botany, Chinese Academy of Science

Kunming 650204, Yunnan, P.R. China

²International Centre for Integrated Mountain Development (ICIMOD), Kathmandu, Nepal

SUMMARY

Deqin Tibetan Autonomous Prefecture is located in the upper reaches of the Yangtze River in Yunnan Province. Due to the implementation of the logging ban in this area, the industry structure of Deqin has changed, with a growing interest and income in tourism, animal husbandry, biological resources and hydro-electricity. Animal husbandry has a long history locally and is the major livelihood base in Deqin Tibetan Autonomous Prefecture; therefore, the logging ban provides a good opportunity for its further development. At present there are problems in improving animal husbandry. One of the most serious problems is the lack of forage to support increasing herd numbers and the subsequent degradation of grasslands due to over-grazing, especially winter pastures near settlements. Being located in the southern part of the Tibetan Plateau with an average altitude of 3,380 masl, the natural climatic condition is very severe and the lack of fodder in winter is problematic. In order to solve these constraints, the Zhongdian Animal Husbandry Bureau allocated winter hay fields to individual families, and introduced exotic forage species in select communities in Zhongdian County in 1990, which is slowly transforming the traditional transhumant grazing and farmland practices of old. During the past decade of pasture improvement, the Tibetan communities of Zhongdian have gained experience and knowledge regarding the use and management of these exotic species, but they also have faced many difficulties with their maintenance. The farmers are aware that the introduced forage species are unsuitable given the local physical conditions and have begun to devise their own management schemes which include collective management of individually allocated hay fields and experimentation with native forage species for their hay seed mixes. Based on one year's intensive field surveys in pilot communities of Zhongdian County of Deqin Prefecture, the present situation and associated issues relating to the use of artificial grasslands are discussed. Some suggestions on local animal husbandry are also presented.

Keywords: forage management, exotic forage species, native forage species, timber ban.

INTRODUCTION

Deqin Tibetan Autonomous Prefecture is located in the northwest of Yunnan Province, on the southeastern edge of the Qinghai-Tibetan Plateau and at the center of the Hengduan mountain range. It is located in between 98°37'-100°23'E and 26°57'- 29°12'N. The total area is 23,870 km². It includes Zhongdian, Deqin Weixi, and Lisu Minority Autonomous Counties. Deqin lies in the upper reaches of the Yangtze and Mekong Rivers. The elevation ranges from 1,530m to 5,545 m, and the average altitude is 3,380 m. Greater than 90% of the land is mountainous. The annual mean temperature is 5.5°C. The average rainfall is 700 mm.

The total population of Deqin Prefecture is approximately 334,000, 85% of whom are minority nationalities, including 34.8% Tibetan and 29% Lisu.

Deqin is located in a transitional zone in terms of geology, physiognomy and climatic conditions. The area has high mountains and deep valleys. The Lancang (Mekong River) and the Jinsha (upper reaches of the Yangtze River) run southward side by side with the Hengduan Mountains, which form

the famous gorges of the area. The range of altitudes in the Hengduan mountain range produces a rich diversity of highland plants. It is the richest area of plants in China with more than 5,000 in the highlands alone. The vegetation types can be divided into sub-tropical dry and semi-dry types in the lower river valleys, open bush lands, evergreen broad-leaved forests and evergreen conifer forests of the temperate and sub-alpine zones, and alpine scrub and meadows, alpine screes and periglacial vegetation in the frigid zone.

There are approximately 335,000 ha of rangelands in Zhongdian, which make the development of livestock in Zhongdian a viable option. However, there are many physical and social factors that inhibit the development of livestock. Growing season is short, at best six months, due to the frigid and sometimes arid nature of the natural environment, the remaining time during which plants lie dormant. In addition, livestock numbers have significantly increased in the past few decades and villages have increased the area of land under cultivation. The increased stocking rate on smaller and more marginal pasturage areas has led to overgrazing and significant invasion of weeds, as witnessed elsewhere in China (Ma and Zu 1997; Tu and Luo 1992; Wang 1997; Wang *et al.* 1996; Wang and Li 1999; Zhang *et al.* 1998). As a result of these complex inter-related factors, fodder scarcity is very serious in the winter and spring seasons. Thus animals suffer significant weight loss and even die in the winter months, depending on fodder availability in particular years.

RESEARCH METHODS

As part of a comprehensive study on livestock and natural resource use in Zhongdian County, we interviewed key people from relevant government departments such as the Grassland Station of Zhongdian Animal Husbandry Bureau (ZAHB) and Zhongdian Forestry Bureau. We concentrated our community interviews in the village of Tuo Munan in Xiao Zhongdian township.

Both Rapid Rural Appraisal (RRA) and Participatory Rural Appraisal (PRA) tools were used to initiate dialogue with local farmers regarding livestock and natural resource trends, the PRA tools used for joint analysis and planning for future activities. These tools include the following:

- Semi-structured interviewing with key informants and with focal groups was the primary tool used to gather information, using the visual tools below to stimulate questions and answers.
- Time line: A time line was used to document the history of the village in relation to natural resource use.
- Trend line: A trend line was used to visually illustrate the local perception regarding trends in various natural resources such as forests, pasture, livestock numbers, agricultural production, and overall quality of life from 1953 to the present.
- Community maps: Maps were made by the farmers to show the location of the village, forests, the natural grasslands, artificial grasslands, the routes they take for moving their animals, and marketing of livestock products.
- Ranking: Livestock types, products, and livelihoods were ranked by gender disaggregated groups.
- Rapid ecological assessment: The characteristics of native pastures and hay fields (condition and plant species) in Tuo Munan village were surveyed by the research team.

The information presented in this paper is primarily related to the management of improved hay fields in the grassland areas adjacent to villages. The comprehensive study report will highlight the broader context of natural resource management and will be published at a later date.

RESULTS AND DISCUSSION

Background of Tuo Munan village

Tuo Munan belongs to the He Pin Administrative Village of Xiao Zhongdian Township and is located in the south of Zhongdian County. The annual mean temperature is about 5.8°C. The annual mean rainfall is 849.8 mm.

Yak, nondescript local cattle¹, yak/cattle hybrids, horses, pigs, sheep and mules are raised. The farmers only cultivate their fields once a year, plant in early spring (from March to April) and harvest in late autumn (October). Barley (bare and husked varieties), buckwheat (bitter and sweet varieties), potato and *Brassica rapa* L. and other vegetables comprise the bulk of the year's yield.

Tuo Munan village has 33 ha of natural grassland used for both winter and summer grazing, and it shares these pastures with another village, Zhi Ti. The farmers in Tuo Munan village began to plant improved hay fields adjacent to their villages in 1992, with the assistance of the Zhongdian Animal Husbandry Bureau, and currently cultivate eight hectares of artificial grassland.

Indigenous management of grasslands in Zhongdian

Tibetan herders in Zhongdian classify their natural forage resources into broad types: summer high altitude grassland (locally called *ri gong*), winter pasture (*ge gong*) and natural hay fields that are fenced adjacent to their agricultural fields and harvested in the fall for winter feed. These fenced areas include drying racks for fodder and barley. Some public grazing land adjacent to the village is used year-round. Only those families that have large enough herds of yak and hybrids, relatively few in number, engage in transhumant migration to the high alpine pastures. Most families remain in the village throughout the year tending their fields and sharing responsibility for collectively herding their cattle, sheep and pigs. In Tuo Munan, only 7 out of 33 households in 2000 were taking their yak and hybrids to the high pastures.

Those who do migrate to the high pastures have in the past taken measures to manage their alpine pasture resources. Over time, sub-alpine and alpine meadows used for grazing become invaded with shrubs such as *Quercus* spp. and *Rhodendron* spp. Traditionally, the herders dig a buffer zone and then burn the shrubs within the allocated area. Burning also helps eliminate unwanted weeds such as *Stellera* spp. The ash from the burning has the added benefit of fertilising the soil. However, the burning of alpine and forest land was banned by the Deqin Prefecture government. Consequently, this practice of burning has not been widespread for the last twenty years or so. Simultaneously, the Forestry Bureau has cleared large areas of forest in Xiao Zhongdian, opening up new sites for grazing. However, a timber ban was enforced in 1999, which led to a significant reduction in cash earnings for residents of Xiao Zhongdian. The combined affect of lack of burning and regeneration of forest will surely lead to a reduced forage base for transhumant livestock, an obvious conflict between those relying on grazing and those who promote forest conservation in Deqin. This is of concern to local herders who view such government actions as a threat to their livelihood.

Government efforts to develop forage resources

In order to address the above constraints to livestock production in the area, and as a means to improve income, the Zhongdian County Animal Husbandry Bureau started a forage development program in 1990 in Zhongdian County. Since that time they have planted thousands of hectares of artificial grassland in select pilot villages in the Xiao Zhongdian countryside, with varying degrees of success. Winter hay fields have been allocated to individual families and planted with exotic forage species. They chose four species that were thought to be suitable for Zhongdian: *Trifolium repens*, *Trifolium pratense*, *Lolium perenne*, and *Dactylis glomerata*. The average fresh production of these species has been found to range from 15 t/ha to 17 t/ha, 2.3 times that of natural grassland, when well managed. If the forage in hay fields is harvested two times per year, one year's fresh grass production is equal to six years' fresh grass production on natural grasslands (interview with Zhongdian Animal Husbandry Bureau 2000).

Indigenous responses to development interventions: Collective tenure and management of forage resources

The farmers of Tuo Munan have taken the initiative and made the commitment to effectively manage these artificial grasslands, unlike many of the pilot communities that have established improved hay fields. Their experiences and accumulated knowledge pertaining to planting, land tenure, fertilisation, harvesting, grazing, failures and successes are sequentially presented in Table 1.

From 1992 onwards, the villagers of Tuo Munan, especially the leader, were aware of the need for fairness when it came to dividing the hay fields among individual families. When land was

¹ The term *cattle* is used to refer to all species of *Bos*, including yak and hybrids.

allocated, they first inspected the area for planting and delineated it into two grades (good and poor), depending on the productivity and quality of the existing vegetation. The low-lying wetter areas were considered poorer quality due to the coarseness of the vegetation. Individual fields were then divided so that each family member received an equal amount of good and poor grassland; those with more family members received larger plots. Their individual fields were then allocated by lottery. In the case where two households with the same number of people have different livestock holdings, the household with less livestock can exchange their excess hay for livestock products such as butter.

People respect the boundaries between fields and rarely try to encroach on others' allotments, thus eliminating the need for internal fencing, which cuts costs to the individual households. If there are any conflicts between two households regarding boundaries, the village leader will check the division records, then measure the land again to make sure that the boundaries are correct.

Table 1. Sequential forage development activities conducted in Tuo Munan village and indigenous responses.

Year	Activities and experience
1992	The Animal Husbandry Bureau (ZAHB) allocated common winter pasture area to individual households based on number per family (average two hectares per household). They helped the community plant the fields in May but did not provide training on how to manage the new species, as they themselves did not know very much. Thus, the community was not aware that these species would respond differently from native forage species. That summer the local livestock broke through the fence that they established in the spring and ate the new forage. During the autumn they reinforced the fence and dug a trench along the outside border.
1993	The following spring they again ploughed by tractor and hand seeded, however, the seed was planted too deep and the grass did not grow well.
1995	The community again planted their fields with the help of the ZAHB, but this time they used a drill seeding machine and the grass grew much better. They harvested the hay in September, but they allowed all their livestock to graze the remaining forage material after harvest.
1996	They found that the grass did not grow well after being freely grazed during the winter months and realised that exotic hay species can not tolerate post-harvest grazing during the winter like native species can. In order to give the fields a rest and to promote seeding, they did not harvest hay the following fall. In addition, they only allowed sheep to graze for ten days in the late autumn to fertilise the grassland.
1997	The hay fields responded well to the new management regime and produced a good harvest. At this point the community of Tuo Munan decided to maintain the sheep grazing practice for subsequent years, based on this success.
1998	By the seventh year the majority of the exotic species died out of the hay sward. Thus in the spring they again replanted with the assistance of the ZAHB, but continued with the sheep grazing system. By now community rules regarding collective management and conflict resolution were established.
2000	Again many of the exotic species have died out but they decided to wait until 2001 to replant, based on advice by the ZAHB. By now they realised that these species do not persist and the labour and cost for replanting and harvesting are high. They begin collecting native seed from high pasture areas to use in seed production trials in the village.
2001	The local community planted small trial plots for growing native seed near their hay fields. This was done with no external assistance with all labour and materials committed by the community.

All people put their sheep in the field for the ten specified days, which starts approximately 20 days after the barley harvest, regardless of number per household. Their logic is that the sheep manure benefits everyone, regardless that some households have none and some have many, and the forage in turns benefits the sheep. During this time they only allowed sheep in the area for a few hours a day in order to prevent bloating from the residual legume plant material. They said sheep were most suitable for grazing these fields as they are light, while cattle are too heavy, and pigs dig up the land. In addition, they consider sheep manure to be the best quality as pig manure is too rich (high in nitrogen) and cow manure is too fibrous. All other animals are kept out of the fields year round.

Benefits of collective management in forage development

The community of Tuo Munan collectively recognises the benefits of improved forage development. They are ready to invest the time and effort to improve, primarily motivated by their awareness of the steady decline in forage resources in the last few years, and the loss in income from the timber ban in 1999. In addition, they have seen the impacts of the improved forage on their animals. According to the village leader, himself a very dedicated animal husbandry man, one cow must eat 150 kg/day of fresh natural forage to survive the long cold winter. However, with the exotic forage species, especially the legumes, one cow only needs to eat 100 kg/day of fresh forage to exhibit the same response.

This community has also demonstrated that collective action can improve natural resource management, reduce labour and financial costs per household, and maintain harmony among families, despite the government line that individually owned and managed land is the most efficient means to promote sustainable production (Wu and Richard 1999). When asked why the households did not fence and manage their plots individually, the leader responded “to fence would create a larger division between rich and poor because some would be able to fence and others would not. When we work together we strengthen the community.”

It has taken almost a decade to work out a management scheme that appears to work for Tuo Munan. This is in sharp contrast with many communities that the ZAHB has helped, where the improved grasslands lack the local care and have become degraded and overgrazed. Major factors contributing to the success in Tuo Munan are strong local leadership, a good working relationship between the ZAHB and the community, high technical inputs from the ZAHB, and good access to livestock markets.

Difficulties in managing exotic forages

Tuo Munan village has encountered a number of constraints resolved the lack of fodder in winter from 1992 onwards, so that animal numbers have been rising rapidly. However, the farmers believe it is difficult to manage artificial grasslands and more and more farmers are paying attention to the following difficulties:

- ⇒ Higher labour investment: Much time is spent in replanting, maintaining fence, herding livestock, harvesting and storing forage.
- ⇒ Lack of persistence: The exotic species die out after three years on average, depending on conditions, requiring costly replanting that is currently subsidised by the ZAHB.
- ⇒ Grazing intolerance: Other than *Trifolium repens*, the exotic species do not tolerate post-harvest grazing other than sheep during limited periods. This limits use of these forages to cut and carry systems only, rather than for pasturage.
- ⇒ The spread of exotic species: The seeds of exotic species are spread by animal faeces in surrounding crop fields and adjacent village pastures.

Participatory Research

During our field surveys the leader identified native species that would make excellent high quality forage, but were not so common. He also felt that these species would persist longer than

exotic species because they were local and thus less maintenance. As he said, “like us, they can tolerate the cold”. With the help of our study team during a village meeting, they developed a plan to collect and test native forage species to use in hay seed mixes in the future. During the summer months of 2000, herders in the high altitude pastures collected native seed, primarily *Polygonum calostachyum*, *Gentiana algida*, and *Potentilla stenophylla*, which are considered to be the best for yak and hybrids. They planted these species in the spring of 2001, about the time this paper went to publication. KIB and ICIMOD will continue to work with this community to develop options for native seed production and winter grazing.

CONCLUSIONS AND RECOMMENDATIONS

Overall, the high cost of maintaining exotic hay species will not be worth the effort once ZAHB withdraws its subsidies and begins charging for services, which will eventually happen. As yet, most of the livestock products produced in Xiao Zhongdian are still primarily for home consumption and barter and cash flow is reserved for household needs rather than technical services from the government. The local desire to achieve a scale of commercial cattle production that will offset the income lost with the timber ban will only happen once individual households acquire the rights to extensively graze large areas of forest and alpine land. This is a future scenario in sharp contrast to conservation initiatives in the NW Yunnan region.

Currently government initiatives stand in conflict with one another on many levels. The Animal Husbandry Bureau is promoting improved breeds, which invariably will require better forage and more land to plant it. The Bureau of Forestry is promoting reforestation and conservation, which takes existing transhumant pastures out of production. And the local communities highly value yak and hybrids, which require extensive grazing in high altitude pastures. Given these conflicting values, it seems that solutions are not available. However, some regional initiatives, both State and local, are moving in the right direction.

After the logging ban was implemented in 1999, Deqin Prefecture invested 300 million RMB (US\$36 million) to improve rangelands in the upper Yangtze River basin. Deqin Prefecture has one million ha of wild lands in which native forage species could be planted. In addition, Deqin Prefecture began converting farmland back to grassland last year and it is expected that this initiative will continue into the future to promote livestock production. Such initiatives have already been witnessed at the local level e.g. in Tuo Munan, they banned the plowing of new farm land in order to maintain their grassland resource.

The traditional methods for improving alpine and forest pastures have a long history in the area, and practical experience has proven that these methods are feasible. Due to the difficulties in developing animal husbandry in Deqin Prefecture, these methods should be considered under certain conditions, especially for the promotion of yak and hybrids, which require the high altitude pastures for their sustenance. This will require that different government agencies work out their conflicts in mandates between livestock husbandry and forest conservation.

Given that exotic forage species require such high investments, well beyond the means of the average farmer in Xiao Zhongdian, a suitable seed mix is required that exhibits long term persistence, ability to tolerate grazing and relatively high protein content. The authors recommend the introduction of native forage species into existing exotic seed mixes, especially those native species that persist well and provide good quality hay and pasture. These species should also tolerate grazing so that future seed mixes increase management options (both hay and pasture systems) for local livestock owners. The locally adapted species should be expanded gradually, through seed and performance testing at the local level.

As a final note it must be emphasised that only when local communities make a commitment to improving forage resources, such as witnessed in Tuo Munan, will programs such as those initiated by ZAHB work. Local initiatives to experiment and improve their own systems of management indicate this commitment and should be given credence and support by local government line agencies, who in

turn hold the responsibility to share these experiences with policy makers. Only then will policy become responsive to local needs, aspirations and skills.

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