Chapter 13

Livestock Based Livelihoods in Tibet, China, and Sustainability Concerns

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Introduction

The Tibetan plateau, known as the roof of the world, occupies more than a third of the Hindu-Kush Himalayan region and an eighth of the entire territory of China. Tibet Autonomous Region covers an area of 1.2 million sq.km and is a major part of the plateau. More than 2.3 million Tibetans are currently settled in this sub-region. The average altitude is about 4,000 masl. Cropping and forestry are limited to a few areas because of the short growing season and pastoral farming is common. For most of the highlanders of Tibet, livestock are the only means of sustaining their food security and livelihoods. This paper provides an analysis of the trends, issues, and options of livestock development and livestock-based food security in the Tibetan highlands.

Changing trends in livestock development in Tibetan highlands

Accepting livestock as the basis of food security and livelihoods

Livestock are the predominant economic sector in Tibet accounting for more than 50% of the total gross production value of agriculture (Table 13.1). Tibet has a total usable rangeland area of 55 million ha, about 45% of the total usable land area. Nearly one million Tibetan farmers live in 14 counties and over 200 townships that are in purely pastoral areas depend entirely on livestock farming for their livelihood. For the nomads of the Tibetan plateau, livestock are the only way of ensuring food and livelihood security. Even in the lower valleys where cropping and forestry

Table 13.1: **The production value of crop, livestock, forestry, and fishing as a percentage of the total value of agricultural production (%)**

Year	Livestock	Crops	Forestry	Fishing	Sideline industry
1959-1969	65	33	0.1	0.01	2.3
1970-1979	62	34	0.3	0.02	3.3
1980-1984	48	40	1.6	0.03	9.9
1985-1989	52	37	1.5	0.04	9.9
1990-1996	51	45	2.0	0.04	2.2

Source: Tibet Statistical Yearbook 1998

farming are possible, livestock farming is still the main activity and major means of sustaining livelihoods and food security. This means that nearly half of the population of Tibet is deriving some livelihood from farm animals and nearly 30% depend almost entirely on livestock. Animal products from rangeland areas meet more than 50% of the people's food and agricultural needs. The government of the Tibetan Autonomous Region considers livestock to be the predominant sector for economic development and is giving top priority to promoting fast but sustainable growth of the livestock economy in order to ensure sustainable food security in the sub-region.

Proportion of livestock in total agricultural production

Historically, livestock formed the predominant sector and backbone of economic development in Tibet. The contribution of livestock and other sectors to total agricultural production value over the last 40 years is shown in Table 13.1, and the values for crops and livestock are illustrated in Figure 13.1. Prior to the 1970s, livestock contributed more than 65% of the total agricultural production value and crops only 33%. Since then the proportional contribution of livestock has gone down

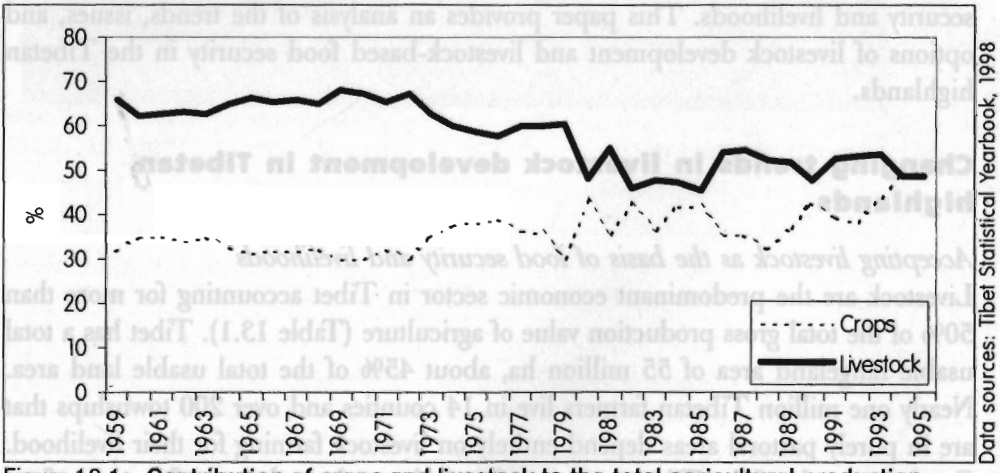


Figure 13.1: **Contribution of crops and livestock to the total agricultural production value**

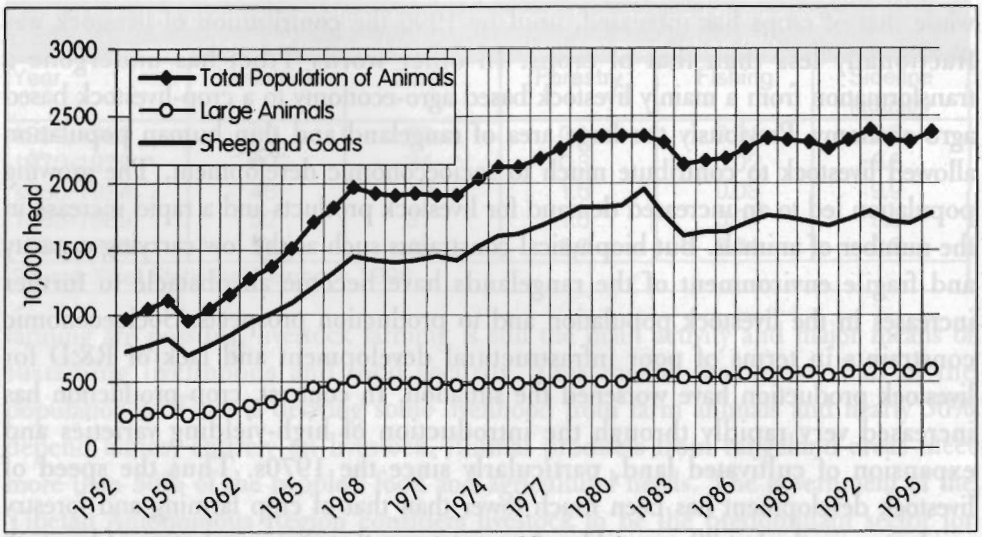
while that of crops has increased, until by 1996 the contribution of livestock was fractionally less than that of crops. In other words Tibet has undergone a transformation from a mainly livestock based agro-economy to a crop-livestock based agro-economy. Previously the large area of rangeland and thin human population allowed livestock to contribute much to socioeconomic development. The growing population led to an increased demand for livestock products and a rapid increase in the number of animals. But biophysical constraints such as the low carrying capacity and fragile environment of the rangelands have become an obstacle to further increases in the livestock population and to production prospects. Socioeconomic constraints in terms of poor infrastructural development and lack of R&D for livestock production have worsened the situation. In contrast, crop production has increased very rapidly through the introduction of high-yielding varieties and expansion of cultivated land, particularly since the 1970s. Thus the speed of livestock development has been much lower than that of crop farming and forestry production in the last 30 years. This does not mean that the contribution of livestock farming to ensuring food security in the Tibetan highlands is becoming less important. In contrast, boosting livestock development will help local Tibetans to improve their livelihoods through both food gains and income generation. However, in the past, development of livestock has been largely neglected in Tibet compared to crop farming.

Growth of the livestock population

The rangelands of the Tibetan highlands have a low carrying capacity. On average one sheep unit of animal needs two ha of rangeland, for example, five times more than in the USA. This is a limiting factor to growth in the livestock population. The changes since 1952 in the total population of livestock and in the populations of large animals and sheep and goats are shown in Figure 13.2, and the percentage changes over time summarised in Table 13.3.

The livestock population grew by nearly 10% annually in the 1960s, much more slowly in the 1970s, and barely at all between 1981 and 1996. The total population actually decreased in the early 80s and then recovered slowly. The changes in population are not distributed evenly across the region. Figure 13.3 shows the average annual growth rate from 1985-1987 in each county, in some counties in east and west Tibet the animal population is still decreasing.

The change in growth rates indicates that the total population of livestock has reached a threshold, particularly in northern Tibet. Any further increase in the livestock population could lead to overgrazing and degradation of the rangelands. In order to increase meat and milk production, it is necessary to increase the per unit productivity of both animals and rangelands. In recent years, many studies have



Source: Tibet Statistical Yearbook 1998

Figure 13. 2: **Changes in the total population of livestock**

Table 13. 2: **Average annual growth rates of the livestock population (%)**

Period	All animals	Large animals	Sheep and goats	Pigs
1960-1967	9.5	9.7	9.4	13.0
1968-1980	1.4	-0.1	1.8	5.2
1981-1996	0.1	1.1	-0.1	0.2

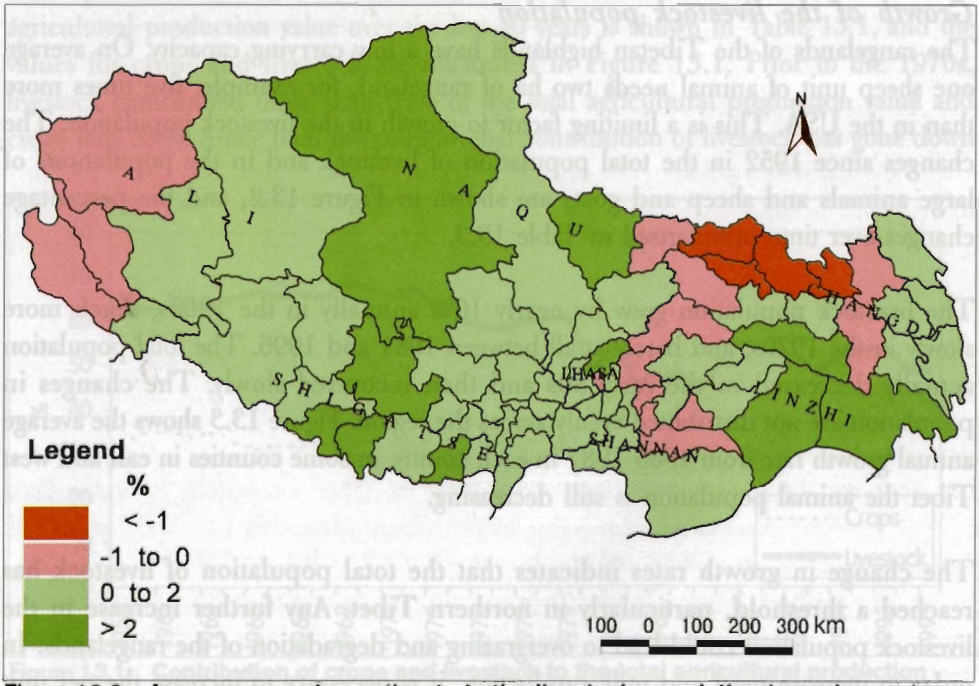


Figure 13.3: **Average annual growth rate in the livestock population in each county between 1985 and 1997**

shown that livestock production can be increased by integrating livestock in crop-animal farming systems. Crops such as barley, wheat, and peas provide a range of fibrous residues and by-products that can be used by both ruminants and non-ruminants. In some crop-dominated areas, over 70% of the feed for animals in winter is derived from crop residues. Currently only 30% of the crop residues in Tibet are used as feed for livestock, so there is a great potential for increasing the number of livestock and improving productivity through better promotion of crop-livestock interactions. Various initiatives have been started in this direction. They include processing feed from crop residues, fodder and forage production through multiple cropping, and introduction of improved grasslands. Through these kinds of initiatives, the total population of livestock, especially the number of cattle in crop-dominated areas in central Tibet, has increased in recent years. The promotion of crop-livestock farming systems will be a key driving force in the further development of livestock, and thus meat and milk production, in the region.

Meat and milk production

Although the population of livestock in Tibet has currently stabilised at around 24 million, the total production of meat, if not milk, is still increasing. The trends are shown in Figure 13.4, and the average annual growth rates as a percentage of total production in Table 13.3. There has been a steady increase in meat production since 1978, although the percentage growth rate has slowed down as the total amount has increased. In contrast, the total production of milk has remained more or less stable since 1988. At the rates current in 1996, the prediction was that in 1999 total meat production would be around 125,000 tonnes and milk production around 140,000 tonnes (Figure 13.4). This is equivalent to a projected per capita mount of 52 kg meat and 58 kg milk per year.

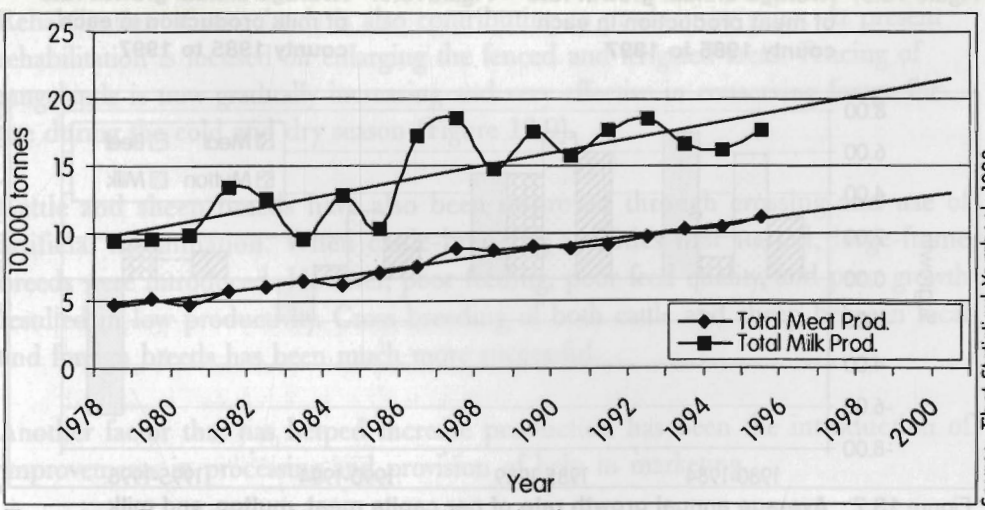


Figure 13.4: **Trends in total meat and milk production**

Table 13.3: **Trends in meat and milk production**

Year	Average annual growth rate of population	Average annual growth rate of meat				Average annual growth rate of milk	
		Total	Pork	Beef	Mutton	Total	Yak & Cow
1980-1984	1.51	4.4	6.5	7.5	2.5	8.5	12.7
1985-1989	2.00	8.0	11.8	9.0	6.9	7.3	6.5
1990-1994	1.56	3.6	8.6	4.7	1.9	-0.3	-0.2
1995-1996	1.57	2.9	17.9	1.8	2.7	-5.6	-4.2

These changes in production growth rates have not been distributed evenly, however. The average annual growth rate of meat and milk production between 1985 and 1997 in the different counties is shown in Figures 13.5 and 13.6. Total meat production actually decreased in a few counties, and the total milk production decreased in most of the northern and central counties. Moreover milk production has not kept pace with the population increase, and meat production only just (Figure 13.7); after 1990 the growth rate of meat available per capita slowed down considerably and the amount of milk available per capita went down.

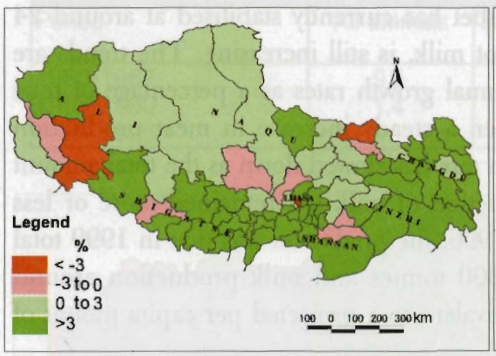


Figure 13.5: **Average annual growth rate of meat production in each county 1985 to 1997**

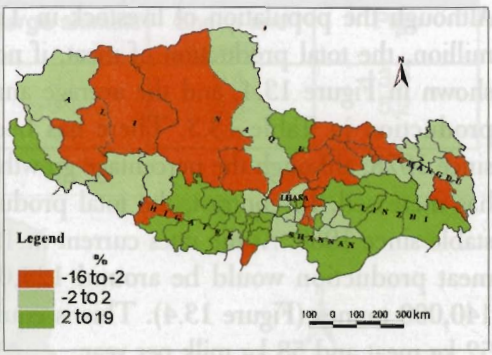
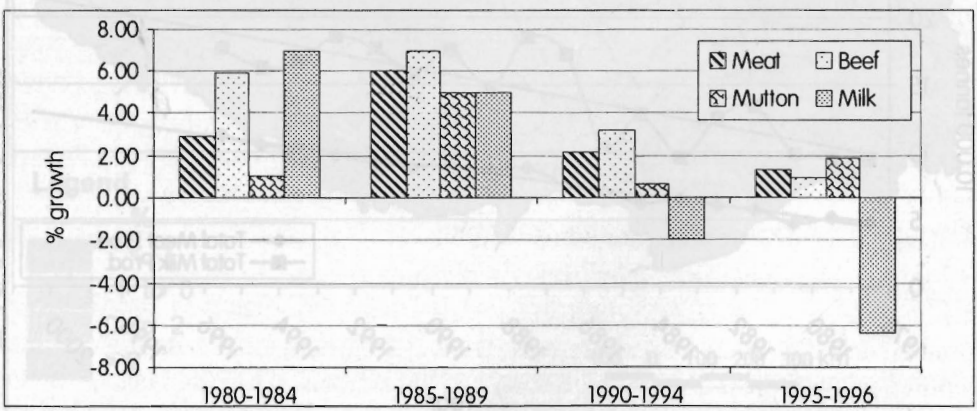


Figure13.6: **Average annual growth rate of milk production in each county 1985 to 1997**



Data source: Tibet Statistical Yearbook 1998

Figure 13.7: **Average annual growth rate of per capita meat, mutton, and milk production from 1980 to 1996 (%)**

Several factors have contributed to the increase in production that has taken place. In the past several decades, the number of non-meat and milk producing animals, such as horses and donkeys, has decreased significantly, so that the actual number of meat producing animals has increased. Stable growth and the development of a household-based poultry industry in urban and crop-dominated areas have helped to increase the total meat production and meet the poultry demands of city dwellers. Beef and cattle industries have gradually developed near to cities and along the lower river valleys. There has been a gradual increase in the culling rate for different livestock to about 20% for sheep and goats, 12% for cattle and yak, and 56% for pigs — much higher than in the 1970s (Figure13.8).

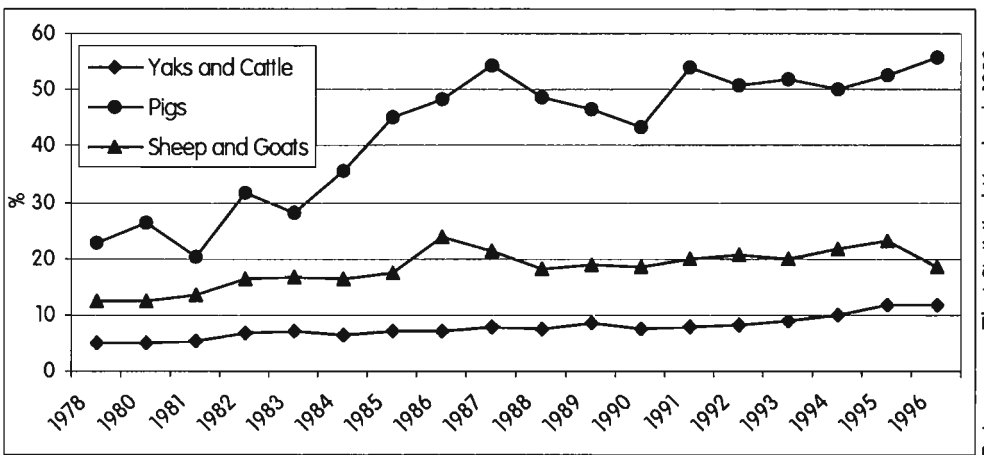
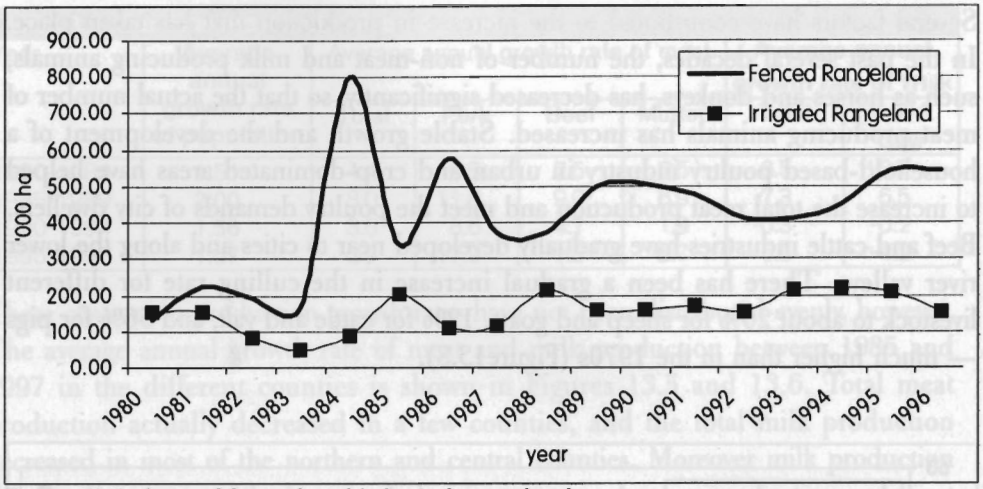


Figure 13.8: **Off-take rate (slaughtered and sold) of livestock (%)**

Rehabilitation of rangelands is also contributing to productivity gains. At present rehabilitation is focused on enlarging the fenced and irrigated areas. Fencing of rangelands is now gradually increasing and very effective in conserving forage for use during the cold and dry season (Figure 13.9).

Cattle and sheep breeds have also been improved through crossing and use of artificial insemination. When cattle-breeding activities first started, large-frame breeds were introduced. However, poor feeding, poor feed quality, and poor growth resulted in low productivity. Cross breeding of both cattle and sheep between local and foreign breeds has been much more successful.

Another factor that has helped increase production has been the introduction of improvements in processing and provision of help in marketing.



Data source: Tibet Statistical Yearbook 1998

Figure 13.9: **Area of fenced and irrigated rangeland**

Lessons for Developing Livestock Based Food Security in Tibet

Food security, and in a narrow sense food self-sufficiency, has been one of the crucial concerns of agricultural development policy in Tibet throughout its history. No matter at what stage and what kind of measures were taken for the development of agriculture, the main focus was always to achieve food security, especially self-sufficiency in meat and milk. In 1994, the Government of the Tibetan Autonomous Region adopted a food self-sufficiency policy. This set the goals for achieving self-sufficiency in grain, meat, and milk ('three dimensional self-sufficiency'). The goal was to produce an annual per capita amount of 400 kg of grain, 50 kg of meat, and 100 kg milk. It is only recently that Tibet has recorded a surplus in food-grain production. Food from livestock such as meat, milk, and butter is still in short supply. The situation is worsening as a result of population growth and the increased expectations and living standards of people. In 1996 there was a big shortfall in locally produced milk in central Tibet, where the majority of the population is concentrated, and in some counties a shortfall of meat (Figures 13.10 and 13.11).Large amounts of meat and milk are imported from other parts of China to meet the demand.

Thus, at present, Tibet has an insufficient supply of livestock-based food products. The supply-demand gap in livestock products is increasing year by year, especially in regions where population is concentrated. The transportation costs for meat, milk, and butter imported from other parts of China are high, thus there is considerable financial pressure to increase local production. Large parts of the rangelands have already been overgrazed, and it is difficult to increase livestock production further. The situation is being aggravated by the increased frequency of natural disasters like snowstorms.

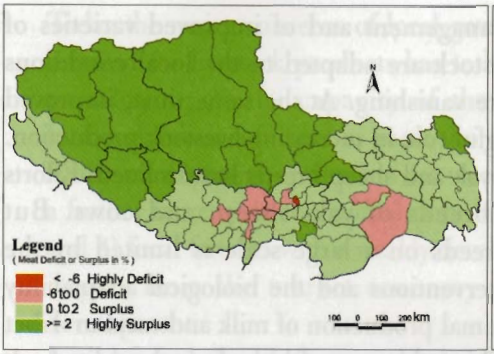


Figure 13.10: **Surplus or deficit of meat in each county (1996)**

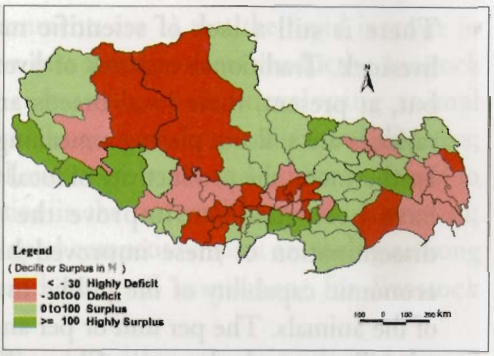


Figure 13.11: **Surplus or deficit of milk in each county (1996)**

The following lessons have been learned from the development of pastoral-based livestock production over the last few decades.

- Conservation and rehabilitation of rangelands have been largely ignored. At the same time improvement and development of artificial grassland have made little progress. Currently the total area of rehabilitated rangelands – re-seeded, irrigated, fenced, or artificial grassland – is only 0.02% of the total rangeland area in Tibet.
- Degradation of the rangelands, and the resultant decline in the ability of farmers to withstand the shocks of natural disasters, remains an important problem in pastoral areas. Over 20% of the rangelands in Naqu and 19% in Shannan are seriously degraded. Few efforts are being made to develop fencing and irrigation systems, to control diseases or damage from mice, to eradicate poisonous plants, or to replant and fertilise the grasslands. The area of pasture available for grass cutting and winter grazing is decreasing year by year. The production of grass from the rangelands has decreased by 60% since 1960, while the proportion of poisonous plants has increased from 15 to 45%.
- There is no tradition of setting up reserves of forage such as stored hay, and there is still no move to develop such a system. Thus management strategies are needed to reduce livestock loss during storms and to maintain the body weight of animals during winter. In the pastoral system, flocks usually have a high proportion of young and old animals and low proportion of productive animals. In Tibet, the average proportion of productive animals in the livestock population is about 23%. One reason for this is the high death rate of animals during winter, which compels herders to keep more livestock as security for the next year and means that the culling rate cannot be increased. The whole livestock production system thus displays a vicious cycle of 'high death rate→practice of keeping more livestock over the winter→less culling→ less economic benefit→poor livelihood gains of the herders'.

- There is still a lack of scientific management and of improved varieties of livestock. Traditional varieties of livestock are adapted to the local conditions but, at present, these local breeds are vanishing. At the same time, improved varieties are still not playing a meaningful role in increasing livestock production. Furthermore, the productivity of local yak and sheep breeds has declined. Efforts have been made to improve the breeds of yak, sheep, and cows. But dissemination of these improved breeds on a large scale is limited by the economic capability of the public interventions and the biological adaptability of the animals. The per unit or per animal production of milk and meat in Tibet are still among the lowest in China. This is because of lack of good quality feed, particularly during the winter, lack of proper veterinary services, and poor feeding strategies. To cater for the growth in the human population and ensure the livelihood of nomads, the production of livestock products needs to be increased considerably. But if the productivity of animals declines this can only be achieved by increasing the number of livestock – which leads to overgrazing.
- The contradictions between ownership of livestock and ownership of rangelands remain unresolved. In 1980-1981, the commune system ended in rural Tibet and the responsibility system for agricultural and livestock management began. Each person was allocated a fixed number of animals so that everyone had equal assets. But the rangelands were not allocated to individual herders and still belong to the government. When livestock are private property and the rangelands public property, herders have no incentive to use the rangelands sustainably. This is also leading to overgrazing and degradation of the rangelands.
- The concept of marketing livestock products has not yet been promoted and thus the commodity rate for livestock production is still very low. In a nomadic society wealth is measured in terms of the number of livestock one has, and this attitude has not yet changed. The average culling rate for sheep and goats in Tibet is still only around 20%, for yak and cattle it is even lower. More than 50% of culled animals are consumed by the herders themselves; few livestock products are sold outside the nomadic community.
- In the present situation of overstocking combined with a fragile rangeland ecosystem, parts of the pastoral area of Tibet are trapped in a vicious cycle of "weight increase in summer→fattening in autumn→loss of weight in winter→ death in the spring". Because of the lack of supplementary feed for animals during the winter and spring, most herders suffer a huge loss of animals when there are natural disasters. In the snow disaster in late 1997 and early 1998, for example, herders in northern Tibet lost 50-80% of their animals. Many nomads are plunged into severe poverty (Xiao 1999). It is very difficult now for these nomads to ensure their food security without external support, particularly government support, to help them raise their livestock herds.

- Today the major concerns of local governments are 1) that the rapid increase in demand for livestock products has to be met through a less productive livestock population; 2) the capacity of the infrastructure for developing animal husbandry is insufficient to meet the challenge from frequent natural disasters; 3) the rapid growth of demand for wool, cashmere wool, and leather may lead to a further increase in the animal population in the marginal rangeland ecosystem; and 4) local farmers with a weakly developed competitive spirit are facing a strong impact from the market economy and external investment for livestock development.
- In order to deal with these problems, the provincial government adopted the so-called 'new revolution' in 1992. This approach focuses on capacity building in the whole system with the objective of leading Tibet towards self-sufficiency in meat and dairy products. All three of the traditional livestock farming systems: 'pastoralism', 'transhumance', and 'mixed crop-livestock farming', are facing the change towards commercialised livestock production that is emerging through both state and private investment. More attention is being given to the development of crop-based livestock production systems in lower regions of Tibet; the focus in pure pastoral production systems will be more on rangeland rehabilitation. Thus overall livestock farming is in transition from a rangelands based or pure animal husbandry system to a crop-livestock based mixed farming system, i.e., from the extensive traditional system to an intensified system.

The following development approach is suggested for the promotion of crop-livestock production systems.

- Sustainable increase in food grain production through extension of improved crop varieties, particularly in agro-pastoral areas; improving marginal croplands; and improving water use and irrigation systems – including promotion of water-harvesting and efficient-use technologies in rain-fed areas. The croplands should also provide more opportunities for livestock development through processing of feed from agricultural by-products and production of more forage and hay. The crop-livestock farming system cannot progress unless a productive crop farming system is established. Ensuring sufficient food grain means developing a potential supply of concentrated feed with a high quality grain base. Increasing the productivity of major cropland also means that more marginal areas can be devoted to developing artificial grassland and cultivating perennial forage integrated with crops.
- Sustainable development of livestock farming in crop dominated areas, made possible by giving priority to the production of animal feed and the development of markets for livestock products, and reinforced by the introduction of new technologies. In order to increase the production of feed, it is very important to

improve the forage production technologies associated with cropland. It is also necessary to expand the use of forage crops such as oats, peas, alfalfa, and other local and introduced plant species. Developing multiple cropping systems for forage production and using barley and wheat straw for livestock feed are the most promising options.

- The focus should be on optimising the agricultural production structure, achieving sustainable increases in productivity, improving the quality of agro-products, promoting the income-generating capability of agricultural production, and conserving the environment.

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