Range Management and Beef Production on a Commune in Inner Mongolia

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The ability of the Chinese people to produce ample food for nearly one-half of the world's population (almost 1 billion people) on an area of the world only about 25% larger than the United States is impressive. This challenge is even greater in that only 11% of China is arable. The task has been achieved through knowledge and application of time-tried agricultural practices. The Chinese are good farmers and show great impatience to draw level with the western world in the use of modern techniques in agriculture.

The Chinese government wants to increase beef production in northeastern China (mostly Heilongjiang and Jilin provinces and the Autonomous Region of Inner Mongolia). This region has extensive areas of rangelands in which the climate and topography have many similarities to the Alberta foothills and southern interior British Columbia. The Chinese Government is concerned about the deterioration of these rangelands from overgrazing as this is resulting in lower pasture production, erosion, and desertification in some of the drier parts (Fig. 1).

My assignment was to study the beef production, range management and fodder production on natural pastures and rangelands, in order to determine the constraints and make recommendations which would lead to increased forage production and rangeland improvement.

All this was to be done on two brigades and an experimental station on a commune in Inner Mongolia (Kundu). Therefore the following observations relate strictly to the area studied and cannot be taken as general observations about the livestock and forage industries in any other part of China. Also, the study serves to illustrate the problems inherent in transferring technology from one part of the world to another, especially to those parts that are relatively remote. It serves as an introduction to at least one part of the rangelands of China.

The Commune

The commune of Kundu is part of the Alukeerxin Banner of the Zhaowuda League. It covers 1530 sq km (590 sq. mi.) and has a population of 10,600 people. It lies in northeastern Inner Mongolia in the foothills of the Greater Khingan Range and west of the Manchurian Central Plain, about 600 km (370 mi.) northeast of Beijing (Peking). It lies at about the same latitude as Eugene, Oregon (44°).

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Fig. 1. *Heavily grazed range on Kundu Commune.*

The region was traditionally sparsely populated and left in the hands of nomadic Mongolian herdsmen because of the harsh, dry climate. More recently, the pressure of Chinese over-population and the building of a railway has brought an influx of settlers and the construction of many permanent villages (Fig. 2).

It should be mentioned that there is a labour shortage in the region during the summer because of the heavy demand for and the high proportion of hand labour involved in most enterprises. As a result, the Chinese would like to use more machinery for such tasks as hay making.

The region is characterized by a continental-type climate with cold winters and hot summers. Annual average temperatures are about 6.4° C (44° F) with a summer average of about 20° C (68° F) and maximum of 40° C (104° F). Winter temperatures average about -10° C (14° F) with a minimum of -31° C (-24° F). Annual sunshine averages more than 3000 hours and potential evaporation is in excess of 2000 mm (80 in.) per year. The frost-free period extends from mid-April to mid-September or about 120 days.

Precipitation averages about 350 mm (14 in.) per year and falls within a 2-month period. Approximately 80% of the precipitation falls during June, July and August. Winter and spring are very dry. Only about 14 days of snow (24 mm) (1 in.) can be expected during the winter. The average relative humidity is 46%.

The prevailing wind blows from the north and northwest with an average speed of 3.3 m/sec. (7 mi/hv) and maximum of 30/sec. (67 mi/hr). Wind is a significant factor in producing

Fig. 2. *A village in Kundu Commune. Part of the overgrazing problem has resulted from settlement of villages such as this with livestock being moved out for grazing daily.*

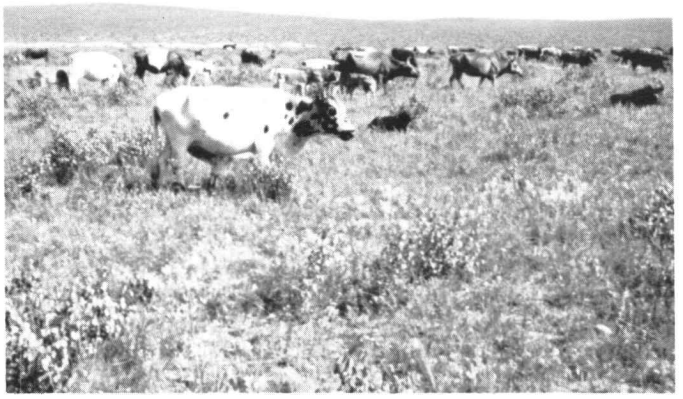

Fig. 4. *Cattle grazing on a shrub steppe plant community. The shrub is wild apricot. Cattle are a mixture of Chinese reds, Chinese yellow, shorthorn, and some Russian breeds.*

harsh winter conditions, in drying the soil, and in causing wind erosion on disturbed or overgrazed areas. Shelterbelts and woodlands, mostly of poplar, are being planted with increasing frequency. Soils are mostly aeolian or alluvial and subject to erosion.

The topography consists of gently rolling hills with large flat areas, some of which are cultivated for household crops (Fig. 3). The native vegetation is mostly grassland alternating with a low-shrub steppe on the slopes and tall-grass meadows on the level portions.

The grassland steppe consists mostly of short-growing grasses notably *Stipa grandis* and *Aneurolepidium dragnonella*. Most of this is heavily grazed and in a deteriorated state.

The "meadow" steppe covers the relatively flat areas below the rolling slopes. Most of these lands are arable with medium to heavy-textured soil. They are reasonably productive either cultivated for household crops or cut for hay or given range improvement cultural treatment. Many forbs characterize this type. The main species are *Aneurolepidium chinense, Stipa grandis, Stipa baicalensis, Filifolium sibericum, Cleistogenes squarrosa* and *Artemisia frigida*.

The low-shrub steppe occurs mostly on the uplands or rolling topography (Fig. 4). The vegetation cover is thinner and shorter than on adjacent flat areas. Scattered shrubs, mostly of *Prunus sibericus* and *Artemisia frigida* dot the landscape. Other common species are *Aneurolepidium dasystachys, Stipa baicalensis* and *Cleistogenes squarrosa*.

Range and Fodder Situation

The nomadic Mongols practised their own form of grazing rotation, families moving from area to area during the grazing season, coming back only in the fall to their winter village. As immigrants moved in to settle the region, the livestock husbandry changed to the grazing of small groups of cattle, sheep and goats which are taken daily by herdsmen to areas offering feed opportunities (Fig. 5). Horses, however, generally move about uncontrolled. The night may be spent back at the production team headquarters or, occasionally, at a temporarily occupied summer camp nearby. The grazing season does not start until late May or early June and continues through the winter except during storms. There are some privately owned (i.e. by the production team) animals, which are grazed separately from the commune animals. There is strong competition for grazing and less evidence of collective management as compared with the cropping segment.

The quantity of range forage has apparently decreased as a result of heavy grazing. Also, a significant part of the more productive areas, formerly cut for hay and winter grazed, have been cultivated and fenced for annual crop production. Most of the hay put up is harvested from native grasslands which are meadow-like in character. These fields are renovated every few years by cultivating with a shallow plow or

Fig. 3. *Cultivated fields fenced off to prevent cattle use. Posts are of quarried granite. The fence is 2-strand barbed wire, tied to the posts, since hammering staples is difficult but rotting is minimal. Note young shelter belt poplar trees.*

Fig. 5. *Cattle, horses, sheep and goats gather together at midday along a canal. Note the foothill mountains to the west.*

cultivator. Since most of the rain falls during the summer, nearly all hay is harvested in September and October and is low in protein and high in fibre. There appeared to be no hay reserves.

During the winter, livestock graze the residual forage on the range and are supplemented with hay only under emergency conditions. It was said that calves receive hay at will and cows average about 1 kg (2 lb.) per day. During severe winter weather the cattle and horses, and to a lesser extent sheep and goats, are housed in corrals and shelters in the villages. Cows may lose considerable body weight over winter. Cows give birth from late winter to May. Green feed is not available at this time so lactation is poor. Also lactating cows are usually milked and calves kept separate most of the time.

Cows are bred at 4 years of age, at which time they have reached about 270 kg (600 lb) in weight. They bear a calf every other year until about age 14, when they are retired. Nearly all breeding is done by artificial insemination, producing about a 60% calf crop. Pickup bulls are not used. Most of the animal health problems appear to be nutritionally caused. Local breeds have survived over long periods under these conditions. Slaughter weights are reached at 3 1/2 years for sheep and 4 1/2 years for cattle. The Chinese recognize that the first priority is to increase the forage production and then improve the livestock.

The cattle are of reasonably good quality. They are a mixture of Chinese Red, Chinese Yellow, Shorthorns, and some Russian influence (Fig. 4). Limosen is popular, especially in the artificial insemination program.

Problems and Possible Solutions

The most obvious problem is low quality forage and insufficient quantity to support the present livestock production. It is unacceptable to the commune to reduce the livestock production. The alternative then, is to produce more pasture, hay, or silage. Pasture rest-rotations should be implemented and the range restored. This is difficult as large areas are needed because the range is not highly productive. Grazing animals have to be controlled in order to carry out a rotation. Fencing is costly. Wooden posts are not available locally and transportation costs are high. Steel posts are very expensive, therefore, granite posts are quarried during the winter when there is a labour surplus (Fig. 3). In the near future, most fencing probably will be done to protect cultivated areas which produce human food, hay, or silage. Some improvement in yield can be expected from the seeding of depleted ranges to grasses and legumes. This will be ineffective, however, until the overgrazing problem is resolved. Since most livestock are herded in small groups, an alternative to fencing might be possible by marking off the fields with a plow and grazing under the supervision of herdsmen according to a seasonal plan. In some cases, the custom of the herdsmen to return to the village every evening may have to be abandoned.

Hay yields are low; 4000 to 5000 kg/ha (3600 to 4500 lb/acre) can be expected. Alfalfa might be grown to good advantage, but the phosphorus levels in the soil should be checked and rows spaced about one-half meter (20 inches) apart to encourage taller, higher-yielding plants. The quality of hay will remain poor because of summer rains during harvest.

Silage, of course, is the most obvious answer. It could be grass-alfalfa or dryland corn. Higher yields of better quality feed could be produced. There does not appear to be sufficient area in the commune to produce enough pasture and/or silage under dryland conditions to handle the present animal population. The next step then, is irrigation. Kundu commune has potential water sources from the Heihar River and other small streams and from both deep and shallow wells. There is often a salinity problem associated with the latter. The Chinese were very interested in sprinkler irrigation. Silage corn would be an important crop. There is concern about decreasing organic matter content in the soil under continuous cropping, which reduce water percolation rates. The addition of manure would be obvious except that it is used for fuel. Crop residues could be considered except that the cereal straw and corn stubble is pulled up for building materials and fuel. A green manure crop in a rotation would help, except that it was stated that the crop would be removed for feed.

The problems in range and forage production are many. There are segments of agriculture such as range management, relatively unfamiliar to most Chinese. We can help them a great deal by sharing our technology in range management. Their conditions are sufficiently different that any transfer has to be done with a great deal of care to be successful. However, their scientists, technicians, and workers have a will to work, eagerness to learn, and desire to accomplish, that many of us might envy.

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Did you know that the rangelands of Central and Northern Great plains of the U.S. are very much like those of Inner Mongolia in China? Just recently some 200 collections of grass species similar to U.S. species have been made and are under study for special uses in the western U.S.