

declining demand for meats took a frightful toll. Even financially conservative sheep producers became devastated when interest rates jumped to 17 percent or higher. Additionally, a rapidly expanding dairy industry in southern Idaho kept alfalfa prices relatively high. Heavy liquidation and conversion to cattle caused stock sheep numbers to drop 40 percent from 1981 to January 1, 1985. Record cold and early snows in the winters of 1983-84, '84-85 and the early part of '85-86 added to the existing burdens.

Grim as it may sound, there is a brighter side. In the past three years lamb prices have increased some 20 cents per pound. An increasing number of southern Idaho producers, especially those with the longest winter feeding period are sending flocks south for the winter to California or Arizona.

The ewes are lambed on the warm southern alfalfa fields in November or December and then trucked back to Idaho for lamb finishing on ranges in April or May.

A new approach to national lamb promotion by the American Sheep Producers Council combined with improved marketing efforts by some progressive meat packers appear to be strengthening the demand for a fine product. The market value of breeding ewes has almost doubled in the past two years. The few remaining range sheep producers in Idaho, if their debt levels are low, are earning limited profits for the first time in many years. The tough, adaptable, optimists which make up the Idaho sheep industry are today breathing easier than most others involved in agricultural production.



Rangeland Management and Livestock Production in Northeastern China

Dillard H. Gates

This paper is based on observations made during seven trips to Beijing and the northeastern part of the Peoples Republic of China while serving as technical consultant to the International Fund for Agricultural Development and the United Nations Development Fund. Field observations were made during several trips to Heilongjiang Province, Hebei Province, and Inner Mongolia Autonomous Region. The seven trips were made during August and September 1981, September 1982, April 1983, August to October 1983, and September and October 1984.

During the course of these trips, I had the opportunity to work with and discuss problems with a broad range of people in China. This included representatives of the Bureau of Animal Husbandry of the Ministry of Agriculture, Provincial officials, League, County, and Banner officials, Commune, Brigade officials, and members of Brigades, individual stockmen and herdsmen involved with agriculture and livestock production both before and during the social and economic changes that are taking place in China.

China is a large, diverse and dynamic country. I consider myself fortunate to have the opportunity to work with the Chinese in a technical subject matter field in which I have spent my professional life. There is no intent to pose as a "China expert" or to imply that my observations and interpretations are representative of China. They are merely my observations and interpretations.

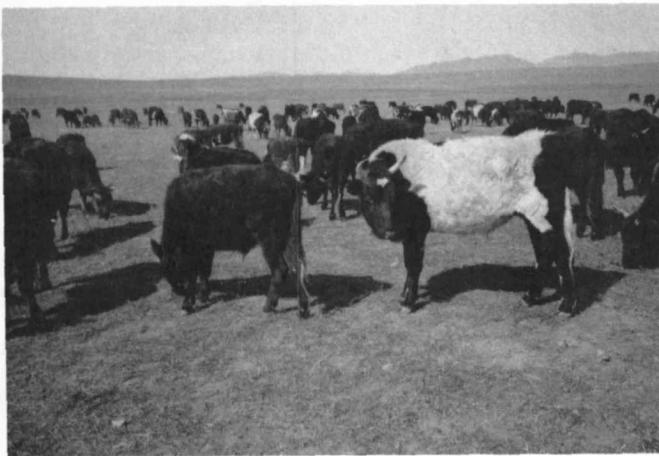


Map of Peoples Republic of China showing areas visited by author (shaded area upper right hand corner).

Livestock Production in Semiarid Lands of Northeastern China

The production of livestock in northeast China is oriented toward cattle with less emphasis on sheep and goats. Cattle are raised principally for milk production but also for meat and traction. Regardless of initial use, all are subject to slaughter when their original purpose of productivity ends. Sheep are raised mostly for wool but also for meat. Goats are raised primarily for meat.

There are two main kinds of cattle, the native yellow cattle and the exotic black and white. The native yellow cattle are relatively small and can be any color. They are adapted to the environmental conditions of northeastern China, which are similar to the north central plains of the United States. They are considered to be dual purpose cattle though their productivity is not particularly high in either milk or meat. The native cattle are being crossed with imported European breeds in an attempt to increase production while retaining adaptability to the area.



Native cattle on heavily utilized rangeland, Inner Mongolia, Peoples Republic of China.

The black and white cattle which make up the bulk of the milking herds originated in Holland. They tend to be of good quality, but productivity is variable and is, of course, a function of both genetics and environment. As is the case with livestock everywhere, there is a close relationship between quality and quantity of feed and animal performance.

Year-around Feed Supply For Grazing Animals

Forage crops provide the feed base for livestock production; however, some livestock are also fed silages, root crops, and grain. Forages are produced on native grasslands, improved pastures, haylands, and croplands. The productivity of grazing lands, the amounts of forages and other feed stuffs produced varies considerably in the areas which I visited.

The areas visited in Heilongjiang Province were on a broad, flat plain with generally fine textured soils and poor drainage. The native grasses which provide the bulk of the grazing season forages and hay are salt tolerant and palatable to grazing livestock. Most improved pastures are seeded to the native alkaline grass. The native grasslands and improved pastures are utilized for grazing and where production is sufficient for hay. Corn for silage, alfalfa, and root



Native hay being hauled to farmstead, Inner Mongolia, Peoples Republic of China.

crops are also grown on the better drained and more productive lands.

During the grazing season, depending upon class of animal and management objectives, the black and white cattle which make up the vast majority of cattle in this province either graze pastures or grasslands or are fed fresh cut green grass and hay in barns and dry lots. Milking cows are also provided grains or other concentrates to supplement the forage diet.

During the late summer or fall, corn is cut and ensiled in pit or bunker silos. This corn silage along with hay, some root crops, and concentrate supplements provide the bulk of the winter diet. Feeding programs and rations vary with management objectives. That is, rations vary for milking cows, replacement heifers, growing cattle, etc.

Forage quality is a serious problem. Native grasses have relatively good nutritive value when properly utilized but are frequently utilized at other than optimum times. Hay is often cut late and sometimes left on the ground too long following cutting resulting in low quality. It appeared to me that corn being cut for silage was being cut too early and before adequate development of the grain. This lowered the nutritive value of the silage. Problems related to forage quality appeared to be a function of management, that is, timeliness of operation and utilization of labor and machinery resources.

The areas which I visited in Hebei Province were on an upland plateau and mountain foothills. Grazing lands varied from open grasslands on sandy soils to semi-open and woodland grazing on foothills and slopes. Grazing lands are often interspersed with croplands. Grazing lands generally are heavily utilized and both wind and water erosion are serious in some areas. Some improved pastures and hay producing lands are on steep slopes where machinery can be used only with difficulty or not at all. In these cases seeding and harvesting is done by hand labor. In Hebei Province more emphasis is placed on hand labor for pasture improvement and hay production than in Heilongjiang Province or Inner Mongolia Autonomous Region. However, human labor appears to exceed mechanization in all three areas. Corn silage is also produced in Hebei Province but to a lesser relative extent than in Heilongjiang. Some cereal grains and root crops are also produced for livestock feed.

Milk production is the primary purpose for growing cattle

in Hebei Province. However, there is relatively less dependence on black and white cattle and more on the native breed, and milk production is lower per cow than in Heilongjiang.

During the grazing season, milking cattle utilize the grasslands with diets supplemented as necessary with grain and concentrates. Non-milking cattle, sheep, and goats may be grazed year around with occasional supplement of hay and or grain. Forage quality and quantity is a serious problem resulting in generally low livestock performance. Overall there is greater reliance on grazing and less on preserved forages in Hebei than in Heilongjiang.

The areas of Inner Mongolia Autonomous Region on which my observations are based are located in broad grassland valleys surrounded by hills or low mountains. Soils tend to be sandy and well drained. Generally, the grazing lands are very heavily utilized and severe wind and water erosion are common. I saw many areas where wind erosion is critical and formerly productive grasslands are now occupied by sand dunes.

More sheep and goats are grown here than in the other two regions. Even so, primary emphasis is on cattle production. There are few black and white cattle in this area and emphasis is on milk production utilizing native cattle.

Native grasslands provide the base for livestock production in this area though there is a considerable amount of pasture land improvement under way. The high production native pastures and improved pastures are utilized to produce hay for winter feed. Generally, livestock are grazed year long supplemented by hay, grain, and concentrates as required depending on production objectives. Forage resources, though vast in extent, are heavily utilized, with low production and forage quality. Livestock performance, whether for meat or milk, is low.

Livestock Management

My observations in the areas visited lead me to believe that the Chinese stockmen are better animal husbandrymen than they are forage managers. There are many reasons for this including the relative amount of control and responsibility they have for the animals as compared to the land.

In all areas milk producing animals were confined for at least a part of each 24-hour period. There is relatively less confinement of animals in Inner Mongolia than in Heilongji-

ang. In Inner Mongolia stock may be confined only at night while in Heilongjiang some producing herds are under continuous confinement. In Heilongjiang, where management of livestock is more intense and milk production very important, calves are removed from their mothers at birth or shortly thereafter. This may also be the case in Inner Mongolia, but sometimes the calf shares the milk with the milker for what is a relatively short milk production period.

The Chinese stockmen understand the relationship between forage quality, forage quantity, and animal performance, and within their "sphere of control" probably do a reasonable job. However, forage quality and quantity limitations normally restrict productivity sometime during the course of each year. It appeared that few if any livestock were provided sufficient feed resources to allow them to approach their genetic production potential. In most cases, animals slaughtered for meat are old by western standards.

There is a concerted effort underway in all project areas to improve livestock quality. All milk cows are bred by artificial insemination (AI). Semen from improved bulls is provided by the government from central AI stations. Some of the native cattle are bred naturally, but most are artificially inseminated from improved bulls. The artificial insemination is carried out by technicians at the commune or production unit level.

Breeding techniques for sheep are varied. However, many are bred artificially utilizing fresh semen from improved rams. According to information provided, conception rates for both sheep and cattle are high.

In the past livestock health care was provided by the commune or local production unit. However, under the new individual responsibility system, more individual stockmen are making animal health decisions. Health services include both modern techniques and traditional Chinese medicines and herbs. In many instances, I saw large amounts of traditional herbs in sacks and packages in livestock handling sheds.

There is considerable emphasis in all areas on increasing both livestock numbers and quality. However, the relative emphasis appears to be on increasing numbers. There is essentially no culling of females from the breeding herd. All female calves are retained for breeding purposes. Since most breeding is by AI, males are castrated, grown, and used for traction oxen or sold for beef, usually at three to four years of age.

Land Tenure and Individual Incentives

Since the land reform which occurred subsequent to the revolution, land ownership has been vested in the state. Agriculture communes were organized to manage the land and production quotas set by the state. Communes were further subdivided into production brigades or production teams with responsibilities for operating the land and agricultural enterprises and meeting production quotas.

Under the commune system individual compensation was through a share of the returns to the accounting unit to which the individual was attached. Proportionate shares were determined through a system of work points earned by the individual for his work. The ideological thrust of the system was that the individual worked for the common good. There was little incentive for the extra effort from the individual worker as he did not benefit directly from the effort.

The system of communal effort was less than successful



Stockman and Mongolian pony, Inner Mongolia, Peoples Republic of China.

and agriculture production suffered. Production on small plots allocated to individuals or families for their own use far exceeded that of the communes. This resulted from the individual incentive to do extra work if he or his family would benefit directly from the extra work.

The incentive idea is now being expanded to virtually all aspects of communal agriculture production. The new movement is known as the "Individual Responsibility System" or "The Household Responsibility System." In this system various units of production, that is, land, livestock, machinery, etc., are made available to the individual or family by his (their) production unit. A quota or rate of repayment is established. Production in excess of the quota accrues to the individual or family to do with as they please. Based upon my observations and discussions with farmers and stockmen, it appears that quotas are fair and not excessive. The incentive to work is there as the worker and his family benefit directly from their efforts.



Deteriorated rangeland, Inner Mongolia, Peoples Republic of China.

Units of production are made available to individuals or families in various ways. For example:

1. A plot of land may be allocated to an individual or family and a production quota set. There apparently are still unresolved issues, but we are told that, in some cases at least, while individuals or families do not own the land, the use of the land may be handed down "from father to son." This is further incentive to treat the land properly and improve its productivity.

2. A given number of communally owned animals may be assigned to an individual or family with the agreement that a certain number of animals will be returned to the production unit each year. Animals produced in excess of the quota belong to the producer to keep or dispose of as he chooses.

3. An individual may borrow money from a production unit and purchase livestock. He contracts to repay the loan in a given period of time in cash or in kind. Production in excess of that required to repay the loan belongs to the producer. When the loan has been repaid, he is the owner of a herd of livestock.

When livestock are produced under the Individual or Household Responsibility system, a certain amount of communal land is allocated per animal unit. The commune or brigade establishes the rules or regulations for management

and use of the communal lands whether used by communal livestock or assigned to individuals or households or owned by stock producers. Individuals or families owning livestock pay a modest fee to the production unit for use of the grazing land.

The number of animals assigned or distributed to an individual or family under the Responsibility system is relatively small. It may vary from one cow to a small herd of cows or a small flock of sheep or goats. However, in many cases individuals have now increased their herds substantially. I observed herds of 50-75 cattle and flocks of sheep in excess of 150 ewes in several instances. In many cases, the relatively small numbers of animals owned by individuals or families are grouped together for more efficient management. The group herd is then placed under the care of a hired herder who is paid in cash or kind by those directly responsible for the animals. The animals are grouped together and graze in common during the day but are separated and returned to the individual household for confinement each night.

As indicated earlier, communal land is allocated for livestock grazing. In addition, crop land may be allocated for production of grain. Grassland for production of hay may also be allocated or other arrangements made between the individual and the production unit.

It should be pointed out that the driving force behind the incentive system is to increase agriculture production. While this is a worthy objective, it appears that efforts for its achievement are resulting in increased animal numbers. There is less apparent concern for increasing individual animal productivity or for improving and managing grazing lands for increased sustained production.

Rangeland Conditions

Observations in northeast China indicate that, in general, grazing lands are heavily utilized. Plant cover has deteriorated; production is low; soil erosion is virtually universal and in some cases critical. There is a concern for the degraded grazing lands, and limited efforts are underway to rehabilitate badly deteriorated grazing lands. However, the programs of rangeland rehabilitation place little emphasis on management of rehabilitated lands or other presently deteriorating rangelands. It appears that the process of deterioration continues at a much faster pace than rehabilitation.

An Approach To A Solution

The productivity of grazing livestock in northeast China is dependent upon the productivity of grazing land. These lands must be improved and managed for optimum sustained yields. Historically, communal grazing, in China and other parts of the world, has contributed to degradation of rangelands and loss of productivity.

If land degradation is to be prevented and livestock production increased, it seems essential that the individual responsibility system for livestock production must include responsibility for the land base upon which the livestock are produced. This responsibility must include recognition of the relationship between land and animals and require a program of management that balances forage production and animal numbers.

Such a program could be developed by allowing individuals or families a sufficient number of animals for an economic unit and the allocation of sufficient amounts of specific land to support the animals. The individual would be

responsible for both the land and the animals. Land management standards and criteria for evaluating management and land use could be established by the commune. Such standards would of necessity take into consideration the inherent production capacity of the land. The allocated land would remain under the control of the individual, with the right to hand it down, so long as it was managed within the established standards.

An alternative program could be established in cases where the commune continued to assign or allot smaller number of animals to individuals. Individuals or families could band together into a type of cooperative and manage

their livestock as a single unit. Land would be allocated to the coop on a basis similar to that described above.

Regardless of the program or system devised, the relationship between land and animals must be recognized at all levels from the Central government to the individual. This relationship must establish a balance of land and livestock and the responsibility to assure that balance is maintained. Without such a balance animal production will decline and land deterioration will continue. The awful truth of "Tragedy of the Commons" will be manifested in yet another part of the world.

Exporting Range Extension

Robert D. Kirmse, Alex Dickie, Neal E. Artz, and Val Jo Anderson

Transmitting research findings to producers is the basic mission of Extension, and in the United States methods for accomplishing this have evolved over 70 years to fit the American way of life. The process involves the transfer of useful agricultural information through oral and written media or by demonstrations. Extension as it is known in the United States has generally not been productive in developing countries, and an appropriate model for extension to the diverse cultures of the Third World is not well established. This paper identifies obstacles and explores potentially suitable approaches to successful extension of range management principles in developing countries.

Differences in the Extension Setting

The United States style of agricultural Extension has proven difficult to implement in developing countries, and range management Extension has been no exception to the rule. Four areas which limit the dissemination of range management principles in the developing world are discussed here: physical and biological resource bases, social environment, land tenure, and range management principles.

Physical and Biological Resource Bases

Range management uses principles of physical, biological, and social sciences to synthesize workable management plans for range ecosystems. Stoddart et al. (1975) point out that this synthesis requires a special "feel" for the resources. While the principles of any management science should be universal, the three to four-week assignments typical in many consulting contracts are generally not long enough to permit acquisition of the detailed insights necessary for

refined decision making. The ability to synthesize a workable plan in an unfamiliar environment requires in-depth preparation.

In many instances, extensive resource inventories are available to range Extension personnel, but the long-term cause and effect studies required for optimal management decisions are rare. Host country counterparts constitute a valuable knowledge source, but they typically lack the understanding of Extension education needed to effectively communicate their ecological knowledge. Acquiring the "feel" for grazing resources in foreign lands remains a problem for many Extension specialists.

Social Environment

A successful range manager must be able to apply diverse knowledge to solve social problems as well as preserve natural resources (Stoddart et al. 1975). The differences in social settings between the U.S. and the developing world, however, place increased demands on Extension specialists. The general mandate of range management Extension is to maintain or improve the ecological condition of range resources and to increase their productivity. With these goals in mind, Extension specialists adhere to Extension principles by identifying and prioritizing audiences, identifying their specific needs in view of these goals, and devising activities to address those needs.

In the U.S. this process is fairly clear since the concept of Extension is relatively well understood and accepted by government personnel, producers, and society as a whole. Extension specialists are generally familiar with the production systems with which they work, and the conservation ethic, if not always accepted, is at least widely understood. Furthermore, the concept of range management is assumed to be widely known in our society. When these assumptions are correct, Extension specialists function in a well-established role and their efforts are free to focus on the producer's

Authors are senior agroforester/range scientist, International Resource Group (IRG), Las Cruces, New Mexico, and graduate research assistants, Department of Range Science, Utah State University, Logan. At the time of writing the senior author was also a research assistant with USU.

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