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Herding Systems in Comparative Perspective

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Comparative Systems of Reindeer Herding

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CIRCUMPOLAR HERDING ECOLOGY: VARIATION AND COMMON DENOMINATORS

The reindeer, *Rangifer tarandus*, inhabiting most of the taiga and tundra zones of the northern hemisphere in a wild state (referred to as "caribou" in the New World) as well as in semidomesticated to tame states, has sustained and continues to nourish sizable hunting and pastoral populations (see Figure 9.1). Not only does *Rangifer tarandus* (the reindeer par excellence and hereafter referred to simply as "reindeer" or "deer") currently provide a large number of people with food, clothing, transport, and cash, but it also continues to be a primary source of livelihood for a remarkably large number of distinct ethnic groups or *peoples*, in the Arctic. In fact, one might argue that the reindeer has been a basic building block on which many of these distinct cultures were founded. Certainly without the broad and bountiful distribution of the reindeer in the north it is doubtful that humans could have inhabited the circumpolar region so early and so successfully.

The flexibility of ways in which the reindeer has served humans is noteworthy. In its feral state it has been the object of the hunt, and it has been tamed as a decoy animal to lure its wild brethren into the hunter's grasp. It has been used as a pack animal over bare ground and as a sled-pulling draft animal in winter; it has even been mounted and ridden. The reindeer has been milked and the milk often made into cheese. Its meat has been a staple of the northern diet, and its hides have provided material for clothing and shelter. Reindeer antler, when mature and hardened, affords a strong material for innumerable uses (e.g., spear points, knife sheaths, spoons, and hand looms). Particularly in its immature, "velvet" state, reindeer antler is prized in Asia for its medicinal powers. Among other things, it is credited with enhancing sexual potency

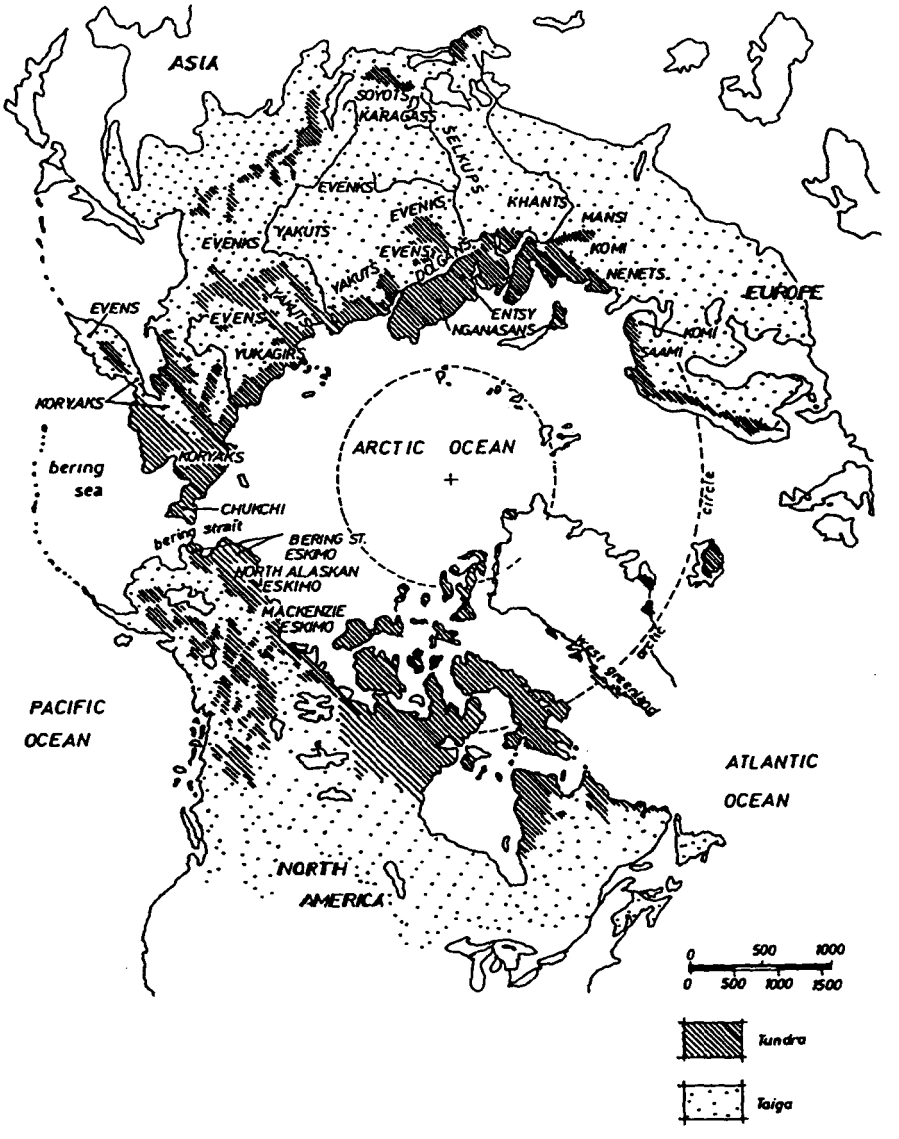

FIGURE 9.1. Reindeer-herding peoples.

and in places has become an important export item. The reindeer is still being used in many of these ways, although its utilization has undergone transformations in different regions.

The multifaceted use of the reindeer and the various types of human-reindeer relationships that have evolved cause the study of reindeer economies

to be of substantial interest to the general, theoretical discussion of livestock utilization and, in particular, pastoralism. The relatively rapid population fluctuations in both wild and domestic reindeer stock (the two can be quite interrelated) constitute natural experiments for the researcher interested in uncovering the possible determinants of various systems of production.

Besides its economic importance and its theoretical implications for the study of pastoralism, the reindeer resource has increasingly become the focus of native rights issues. Because of its distribution in the arctic and subarctic regions of the Northern Hemisphere, the peoples who traditionally have utilized the reindeer find themselves encompassed by some of the mightiest and most industrialized nations on earth (Paine, 1985). Recognizing the immense, multifaceted importance of reindeer and access to grazing lands for their northern indigenous populations, the encompassing nation-states not infrequently devise herding laws with ethnic regulations. The linkage of reindeer rights to native rights issues (with stipulations as to forms of resource ownership) has a significant effect on the practice of pastoralism and other systems of utilization.

Characteristics

Rangifer tarandus is a member of the Ungulata order and the deer family Cervidae. It demonstrates a remarkably broad range of both genotype and phenotype. There is debate as to which variations are genetically encoded, which are due to the influences of the habitat, and even whether *Rangifer tarandus* should be divided into reindeer races or considered an umbrella term for different, related species (Banfield, 1961; Jacobi, 1931; Zeuner, 1963). We can, however, distinguish between Old and New World reindeer and also, with less certainty, between forest and tundra reindeer (Banfield, 1961; Zeuner, 1963: 114). Long association with people is probably also reflected in the genetic makeup of the reindeer—archaeologists claim to be able to distinguish the bones of wild and domesticated reindeer (Ingold, 1980: 131; Zeuner, 1963: 65). While there is indisputable evidence that these differences are genetic, just how much a part nature plays can be difficult to determine.

Reindeer are equipped with large, padded, cloven hooves that carry them well over wet marshlands and also enable them to be quite adept swimmers. Thanks to their broad hooves, deer can attain remarkable speed over snow-covered ground, and, used as a shovel, the hoof gives the deer access to lichens under the snow. A small bone in the back hooves makes a clicking sound when the reindeer moves, and it is thought that this sound helps the deer orient themselves vis-à-vis other deer when there is no visibility.

The sense of smell is well developed in deer, and it is this that enables them to detect lichens meters under the snow and directs their digging activity. Deer are known to move generally against the wind, a trait that causes the Saami to

dub them "wind noses" and that must be taken into consideration when herders attempt to gather them into a corral.

The fur of the reindeer is hollow, providing excellent insulation and also good buoyancy. The fur is shed in the spring and early summer as a new coat fills in, causing deer at this time of the year to have a "scruffy" appearance. This also results in great sensitivity on the part of reindeer to warble flies at this time of the year, for these flies burrow under the skin into the reindeer's back to deposit their eggs. Because of the shifting quality of the hide, the timing of slaughter is carefully considered by those wishing to have clothing with certain characteristics.

The reindeer grows a new rack of antlers each year, and is the only cervid in which both females and males possess antlers, although those of the females are noticeably smaller than those of the males. The bulls shed their antlers in late autumn–early winter after the rut. Castrated, ox deer keep their antlers somewhat longer, and female deer generally keep their antlers throughout the winter, until they have calved. An antler-free bull, who after much effort has dug through the deep snow down to a bed of lichen, can be evicted from his "crater" by the prod of a hungry female deer. The females are pregnant at this time, and it is quite helpful if the males do some of the digging work for them.

Reindeer mature by the third year, although maximum growth comes later, especially in the males. The maximum life span of deer has been estimated to be anywhere from 15 to 30 years. Female deer produce usually one, but on occasion two, calves per year up to the age of 9 or 10. With the onset of the rutting season in mid-September, the antlers of the bulls have hardened and shed their velvet covering. The bulls attain their greatest weight and strength, and with their antlers battle for access to the females.

Reindeer have their own social organization characterized by breeding synchrony, dominance, leadership, and a system of signals (Paine, 1988). Herders sensitive to these aspects of reindeer social life are able to use them to control the deer. Insensitivity to reindeer social organization or the alteration of its normal elements (e.g., skewed age/sex proportions) can lead to poor herd control, with the animals bunched together as a mass of separate entities and driven by force. Traditional herders do force the reindeer if need be, but they often know how to achieve the desired result by utilizing the herd's own propensities and instilling in it the desired behavior pattern. This is herding in the true sense of the word, as opposed to mere animal handling.

Circumpolar Environment

The circumpolar region is characterized by a narrow spectrum of fauna and flora. Seasonal differences in temperature are extreme, and, while the summers can be surprisingly hot, they are also understandably short. Winter, however,

provides the most convenience by way of transportation and travel routes along the many frozen lake chains and rivers. The ground is now covered 8–9 months a year. In the mountains, snow patches can last on into late summer, and in the highest regions glaciers are not uncommon. Vast evergreen forests mix in places with alder, aspen, and birch. Toward the mountains and tundra the birch climbs higher than other tree species. Scrub willow and dwarf birch dominate above the real birch tree line. Diverse configurations of ice and land, the effects of the Gulf Stream, major mountain chains, and rivers integrate with the relative uniformity of circumpolar flora and fauna to produce ecological settings of considerable difference and variable influence on reindeer herding. It would be impossible to do justice to a description of the varying ecological conditions throughout the circumpolar region. Moreover, this would not be the most useful approach. Instead, it will be far more beneficial (following Ingold, 1980: 12ff.) to consider circumpolar environments from the perspective of the major forms of subsistence that they support. This permits a more general approach, one oriented toward human-animal relationships and well suited to the continued discussion of reindeer herding.

Arctic and subarctic subsistence patterns are contained within three major ecological settings—the sea, the tundra, and the forest. Ingold (1980: 12–13) depicts a total of five subsistence cycles: one exclusive to each major ecological zone, one spanning the forest and tundra, and one spanning the tundra and sea. Other combinations can, of course, occur; for example, if the distance between the zones is not great, forest, tundra, and sea subsistence patterns can be orchestrated seasonally into one nomadic subsistence cycle. Changes in altitude will have ecological effects similar to changes in latitude.

Although woodland deer generally spend all year in the forest, they do mix with tundra stock in the winter and might be carried to the tundra with them come spring. The tundra deer commonly migrate between the forests in the winter and the mountains in the summer, and frequently even reach the coast in summer. In many parts of Norway, the deer spend all summer by the coast and may even swim to some of the coastal islands.

Usually it is winter lichen grazing that forms the "bottleneck" of the deers' grazing cycle and sets the limit to its practical carrying capacity. The reindeer's grazing flexibility is able to accommodate both whims of climate and whims of the herder. Should spring arrive early, the deer will migrate toward the mountains or coast early. Should the herder learn that his usual winter grazing land has gone bad—for example, been so crusted by ice that the reindeer cannot penetrate to the lichens below—before he begins the migration, he may cancel the migration altogether and keep his herd year round in the summer land.

The migration cycle that a herder devises for his herd is not at all based merely on climatic factors. Social and economic variables play essential roles. One herder may wish to avoid the possibility of mixing animals with another

nearby herder and therefore choose to migrate at a different time or by an unusual route. He may want to graze an area early in one season because he knows that another herd will reach it later. Should he want to keep his herd all winter in the usual mountain summer land, he may have to give up the possibility of bringing his deer in for slaughter and sale in the lowlands, where roads facilitate slaughterhouse activity, and so he might only postpone the autumn migration to the lowlands, taking the risk of moving there and encountering bad grazing later. With the advent of spring, his deer might be well content to spend another week in the woodlands (although the females are usually anxious to move on); still, the herder drives them all to the highlands with the thought of sparing the limited and fragile lichens for next winter. Nor are reindeer economics and social variables alone in influencing the reindeer grazing and work cycle. Herders move to certain summer pastures not only because they are good for the reindeer, but also because the fishing is good. The autumn separation might be planned so as to free the herders temporarily for the prime moose (European elk)-hunting period.

Predators of the reindeer include the wolf, the wolverine (glutton), the lynx, and, with respect to the reindeer calf, the bear and the eagle. Even ravens are known to attack newborn calves, rendering them helpless by pecking out their eyes. Compared to other herded livestock, reindeer suffer very considerable nonhuman predation, most usually during calving time and during the winter. Naturally, the desire to cut losses is one of the herder's main incentives to intensify the guarding and control of his reindeer. When winter grazing is poor and the reindeer attempt to spread in search of it, the herder may choose to round them all up and supply them with expensive artificial fodder in order to keep them under his watchful eye. There is no end to the factors involved in devising herding strategy.

Origins and Terminology

The use of a captured reindeer as a decoy animal aided the hunters of wild reindeer, and the use of reindeer as transport animals was also of obvious benefit. There is some controversy as to which aspect, decoy or transport, preceded the other as motivation for domestication, and there has also been disagreement as to whether the development of pastoralism grew from domestic stock used for decoy purposes or from stock used for transport. More intense has been the controversy over whether the pastoral system grew from this initial domestic stock at all or instead owes its origins to the taming of entire wild herds. What were the reasons behind the adoption of this radically different so-called pastoral mode of production, and where did it come from? Did it come from one point of origin or many? Unfortunately, the archaeological and historical data needed to answer such questions are largely lacking. Some theories are based on changes in the resource/consumer ratio brought

about by the influences of outside contact. A systems approach to the question holds that the initial spark might have been small—maybe an opportunity rather than a necessity—just enough to start a spiral of positive feedback that need not have started from an experienced general condition of society. One of the most recent and plausible theories to account for the rise of reindeer pastoralism was put forth by Ingold (1980) and takes as its point of departure the transmission of the pastoral social relations of production from other pastoral systems.

Studies of reindeer management have categorized it according to a wide variety of criteria. The criteria used depend on the reason for the classification or the premises of the analyst. One of the most frequently used typologies of reindeer management bases its distinctions on kind of usage. According to this system we have herding forms based on meat production, milk production, antler production, transportation, and decoy purposes. Another common form of herding categorization is by region (e.g., forest as opposed to mountain herding) or even by form of grazing exploitation (the circular year-round forest form as opposed to the long, narrow *vuobme* form of seasonal migrations; Hultblad, 1968). Then there are typologies based on whether the nomadic movement is occasioned mainly with respect to the deer or not—whole nomadism as opposed to half nomadism (Hultblad, 1968: 54; Wiklund, 1918: 270). Management aspects grouped together by historical contingency have frequently been regarded as components of a self-perpetuating "form." The logical arguments linking these components, defining their mutual dependency or range of independence, are often lacking. Thus, in Scandinavia especially, scholars have characterized herding forms as being either *intensive* or *extensive* (see Anderson, 1984; Beach, 1981: 499ff.; Ingold, 1980: 289; Tomasson, 1918). Andrejev (1977) proposes a typology that combines regional and management aspects. Paine's (1972) distinction between *herding* and *husbandry*, both being different components of the superordinated term *reindeer management*, is useful where appropriately related to decision making and performance of reindeer managers. Finally, Ingold bases the modes of production involved in three distinct reindeer economies, hunting, pastoralism, and ranching, on three oppositions: that between predation and protection, that between sharing and accumulation, and that between subsistence and market. Ingold's (1980: 4) tripartite typology of reindeer economies can be immediately recognized by its unique permutations of divided or common human access to the essential resources, animals and land.

Rather than to contribute a thorough discussion of reindeer pastoralism in general, it is my intention here to highlight certain ongoing and major developmental themes with reference to particular cases. Of particular note is the ever-increasing integration of reindeer pastoralism with the cash economy and the wider network of marketing that this entails. The application of cost/profit concepts to herding results in pressures to "rationalize" what is now often considered the "herding industry." The encroachment of extractive industries

on the reindeer grazing lands is another accelerating development that not only affects the herding economy but also draws herding peoples, often specific ethnic groups, into legal battles with nation-states. Encapsulation of native work methods and forms of communication by the various nation-states divorces herding more and more from its sociocultural heritage and molds it into systems dictated by new or "foreign" determinants. Despite such broad, general trends, the case studies also illustrate the great flexibility of reindeer pastoral form, economy, social context, and regional sensitivity.

HERDING DETERMINANTS

In order to understand the normal seasonal reindeer management cycle in any particular area, to grasp the flexibility of adaptation to one set of conditions, to appreciate the variations of place and historically changing conditions, it is necessary to have an acquaintance with basic herding determinants. Some of these have already been introduced, such as the reindeer and the major ecological zones of the circumpolar region. Here will be added a brief discussion of herd size, grazing, predators, natural and artificial boundaries, and climate—not with regard to the evolution of the pastoral adaptation but with respect to possibilities and constraints that these variables apply to the ongoing process of herd management. The factors mentioned here certainly do not comprise an exhaustive list of herding determinants; they are, however, among the most general and important. It is in the active adjustment to and manipulation of these integrated factors (and many more, such as those imposed by government regulation) that one recognizes the extraordinary abilities of the herder as *strategist*.

Herd Size

Herd size is directly related to the types of products that the herder takes from his herd. A milking form of husbandry, for example, usually demands a small herd. Too large a herd is impossible to control within a limited grazing range to the extent necessary for high degree of tameness and milking. Of course, if grazing is particularly concentrated and if the herder can command a large labor force, he might still succeed with milch pastoralism. It appears, however, that, once the herd is over a critical mass, milch pastoralism becomes counterproductive, and it is no longer necessary to maintain the use of the reindeer mainly as a living resource in order to avoid a negative regenerative spiral. The herd can be exploited for meat, and those killed to supply the herding unit with food will be more than replaced with new calves.

A large herd still can be exploited for meat with sales for cash to a market without endangering herd reproduction, whereas a very small herd will not be able to sustain a herding family even as a living resource by milking. In this

case, the herder must seek to combine his herding with other subsistence or cash-economy activities, such as fishing, salaried labor, or agriculture (if such combinations are permitted). Even an economically insignificant number of reindeer from the perspective of the reindeer as *resource* might prove very significant to a herder if, by owning and herding them, he secures for himself rights to hunt and fish in a particular grazing zone (as in Sweden). Naturally, the herder must always weigh his work investment against its benefits, and, where herd size is very small, it is probable that he alone will not be able to afford the commitment necessary to maintain intensivity, a high tameness grade, and good control of his deer. In most countries today, he can find other, part-time employment for cash, or he can engage in other, more profitable subsistence activities. In the past, when opportunities may not have been so great, milch pastoralism might still have been a necessity. Today it is rarely practiced, certainly not where market contacts provide both jobs and cheap alternatives to reindeer milk.

The very small herders today still exploit their reindeer for meat, but supplement both their diet and their income by links to the external market. Because they cannot afford a major herding work investment, they are sometimes referred to as "hobby herders." Should one of their reindeer appear in the corral, presenting itself for marking or slaughter, it is generally thanks to the efforts of the other herders. Then again, a medium-sized herder may find himself forced into doing more work than a far bigger herder. The big herder has so many head that he can be sure of finding enough of his animals for slaughter at the corral. The medium-sized herder, however, cannot be sure, and he may still have committed his labor and income totally to the herding enterprise. Such a herder will find himself compelled to work to gather in as many head as possible to the corral in order to maximize his chances of finding there the number he needs. In doing this work, he is also unavoidably working as well for all the other herders. The big herders, who are not so anxious, can take a more relaxed approach.

Milking not only becomes increasingly unnecessary for the big herder but will usually also be prohibited by the sprawling nature of a big herd. Big herds cannot be maintained conveniently for long periods in a concentrated mass. This does not mean, of course, that the big herder will never milk; rather, his form of herding will become increasingly divorced from the obligation to milk. He may take the opportunity when his animals happen to be gathered in the corral, but he does not gather his herd daily for the main purpose of milking. Throughout the circumpolar area, especially before the more advanced disruptions of colonization and a cash economy, meat consumption (of tame stock) and big herding using the so-called extensive method (reindeer widely spread under loose control) tended to go together, as did milking and small intensive herding (Beach, 1981: 43; Eidlitz, 1971: 178; Ruong, 1968: 295; Ruong, 1975: 81).

To some extent, however, there is an inherent tendency toward the development of big herding beyond the impetus provided by access to a

market economy. The drive for *security* also contributes to this drive for large herds and the concomitant pressures toward extensive herding. The small herder is always in danger of going under the subsistence level in terms of number of reindeer. Through starvation due to a "bad" winter, or through predation, a herd can be severely reduced. Of course, the big herder is equally prone to these calamities, but he is at the same time more secure.

Because of the prestige, wealth, and security factors favoring large herds, many herders chose to combine the husbandry forms of meat and milk consumption even when not strictly necessary. By sustaining himself partially by milking, a large herder could thus cut down on the number of reindeer that he needed to slaughter for food and thereby help his herd increase. To do this, the big herder would sometimes divide his herd into two parts, one kept for milking and therefore intensively herded and the other allowed to roam more extensively. Or he could turn to the milking of goats (also to provide a more balanced diet), keeping the reindeer to herd extensively. The large herder might be able to find other methods to aid the increase of his herd, that is, to cut down his consumption of it. For example, a big herder might loan out his excess of transport castrates or cows for milk to small herders in return for reindeer cheese.

Grazing

One of the most vital factors in the determination of herding form is the reindeer/grazing land ratio. An increase in herd size raises this ratio and brings with it pressure to herd extensively. The greater the ratio, the more the reindeer will be forced to scatter in search of adequate grazing. It is obvious that the ratio can also be raised by a decrease of the grazing variable. As Paine (1971: 168) has pointed out, herd expansion is a basic pastoral value which can lead to overexploitation of reindeer pastures and a rapidly rising reindeer/grazing land ratio which, if unmitigated by other factors, results in a reindeer population crash (cf. Klein, 1968).

Again, one has cause to speculate about the internal dynamics of herding-form evolution from intensive to extensive management practices. For, with the depletion of grazing lands, big herders are no longer as able to keep their animals gathered under tight control. Such a trend toward extensive herding, however, might be, and frequently was, slowed down or halted by homeostatic devices, such as predation by animals and humans, which served to keep reindeer numbers at a wide range of possible steady levels before the other homeostatic mechanisms set in—such as lower birth and calf survival rates (Ingold, 1976: 31–32).

A basic goal of the pastoralist is to maximize his herd size, but each herder is not merely a separate individual, unaffected by his fellows. As the rise in

reindeer population causes a strain on the reindeer/grazing land ratio, "bad years" will become more and more frequent and, because their position is less secure, small herders will be forced from the field. Even under plentiful grazing conditions, the possession of a large herd is a pressure for greater extensive herding. Under poor grazing conditions, it becomes a far more powerful pressure. We can thus distinguish two related factors, individual herd size and total reindeer/grazing land ratio, for all herders in the area. These factors can function separately as herding determinants, but they are also causally linked, and their effect can be escalatory.

The *distribution* of the grazing capacity within a region is also of great importance in influencing seasonal shifts in herding form. Certain types of grazing are only periodically available and more geographically concentrated than others. Some grazing areas can be utilized during a number of different seasons, while others are limited in their usefulness. A herder cannot always afford to allow his herd to utilize pasturage in a certain spot to its fullest extent. Herding form cannot simply be patterned on the existing grazing conditions at any one time and in any one place. The herder must be constantly aware of grazing possibilities for the whole year at once, maybe for even a number of years at once. For example, should a district have ample, summer-grazing possibilities but little autumn and winter pasturage, herders may find it necessary to ration out grazing to their herds along the migration route, sparing winter grazing but also using the autumn lands carefully to ensure that the herds have enough grazing left in strategic spots for the return migration in the spring. Planning of this nature may demand an intensive herding form (or at times an extensive form) beyond what grazing conditions at any specific place and time would seem to call for. Not only do numerous encroachments on grazing territory reduce the bulk of available grazing, but they also alter the old pattern of grazing distribution.

Predators

Nonhuman predators kill thousands of reindeer each year, disrupting herding control and constituting one of the main hindrances to herd expansion and husbandry profits. If he is to protect himself against such losses, the herder must guard his herd carefully, especially in the spring and winter, when the reindeer are most vulnerable. Predation, therefore, applies a very definite pressure to herd intensively.

The strength of this pressure, of course, varies according to region. Besides the topographical considerations that favor or hinder predator success, the number of predators in a given area is an obvious variable. In the past, the number of predators declined steadily with the introduction of firearms, as well as with the added incentive of bounty. As pressures for extensive herding

rise to overpower the intensive pressures, the need to keep down the number of predators effectively becomes all the more crucial. A scattered herd is hard to protect.

As one might imagine, the debate between herders and conservationists over predators can grow very inflamed and is so in Fennoscandia despite compensation payments to herders. There are those who claim that the effects of predation have been overdramatized by the herders; that they suffer from a traditional misevaluation of and hatred for predators; that compensation payments erase the intensive pressures of predation; and that science has proved that the wolf, for example, is good for maintaining the health of the reindeer stock. These points cannot be fully debated here. It should be mentioned, however, that the effects of predation on a tame herd (in which reindeer are already subject to human selection) can be very different from the selective weeding out of inferior individuals in a wild herd. Moreover, the existence of compensation payments does not necessarily mean that they are adequate.

Although for obvious reasons not generally categorized as a predator on the reindeer, the wild reindeer/caribou herds of the Soviet Union and the North American continent nonetheless deserve treatment under this heading. A caribou does not devour a reindeer, but a wild caribou herd certainly does deprive the herder of his tame stock most effectively. Not only do the wild herds compete with tame stock for pasturage, but, during their biannual migrations, which are of enormous proportion, they can also mix with tame reindeer, sweeping away thousands. In fact, only a major natural disaster can compare with the damage that a passing caribou herd can inflict on an Inuit herder. As with predators, the presence of caribou exerts a great intensive pressure on the herder of tame stock.

During the spring and autumn migrations of the Western Arctic caribou herd, Inuit herders of northwest Alaska must keep a constant lookout, often employing airborne scouts. Attempts to stop or turn the caribou have been futile; the herder's best course is to move his stock at a rapid pace far away or to a "defendable" peninsula. Should mixing occur, it is essentially impossible to retrieve one's reindeer. Only if a herder mounted on a snowmobile is immediately on hand to run the mixed herd before him for many miles might some of the tame animals be recovered. The hardier caribou can keep up the fast pace longer and will outdistance the tired reindeer, thereby affording the herder a chance to sweep them back.

Natural and Artificial Hindrances

A herder who wishes to keep tight control of his herd for milking purposes will seek the aid of natural hindrances to prevent his herd from spreading. He may also utilize naturally attractive spots for the reindeer, like mountainsides with large patches of snow in summer to diminish the insect plague. On the

other hand, a herder who can afford to let his herd spread over a large area may release them into a wider natural "pocket" and set up camp in a strategic location at its mouth. Saami herders make a terminological distinction between lands with or those without natural hindrances (Ruong, 1975: 83). A herder may even say that a river or a cliff "tends" the herd.

Of course, the topographical character of the land changes considerably with the seasons. In spring, small streams can flood so as to be almost impassable. In the winter, fences that once hindered reindeer movements can be completely snowed over and be of no effect. Lake chains, which are important barriers between herding groups and grazing territories during the bare-ground period, become major thoroughfares once they have frozen.

Over the past 50 years or so, herders have gained increasing power to add human-made impediments to the natural topography. The availability of wire fencing, along with much easier transportation methods to carry such heavy material in the mountains, has enabled the herders to set up their own hindrances as they see fit for the best herding advantage. Actually, this is a very old practice for herding peoples, but it is only in modern times that it has been necessary or possible to develop this technique to such a great extent. Fencing can be used, for example, to separate the grazing districts of two herding ranges, but it can also be used by one group to separate summer land from autumn and winter land. This may facilitate herd separations, markings, or slaughters.

Some claim that it has been largely on account of fencing (and other modern innovations, such as snowmobiles, helicopters, and walkie-talkies) that herding form has become increasingly extensive. Others say that, with the aid of wire fencing and other innovations, the difficulties encountered by the development of extensive herding methods (to a great extent forced on herders by damage to their grazing land by extractive industries) have been minimized.

Useful migration routes may be blocked by dam construction, or new possibilities of mobility may result which are undesirable from the herding point of view. The more the land is cut up and crisscrossed by railway and road networks, and the more lands are cut up into an uneven patchwork by the timber industry, the more difficult it becomes to stabilize reindeer movements.

During the winter, when the reindeer are in the lowlands, their movements tend to be somewhat confined by deep snow. A herder can leave his herd in one area and, if the grazing is decent, he can be fairly sure of finding them there the next day. The presence of a road, however, presents the reindeer with a cleared path which they are very prone to follow. They will spread along the roads and tracks (especially when grazing is poor), not only causing difficulties for the herder by straying and mixing, but also greatly increasing losses through traffic accidents. Changes in the character of the land are occurring today at an accelerated tempo. Any such change that tends to break the formation of a strong, habitual grazing and migratory pattern for the reindeer contributes to the extensification of herding.

Climate

Climate has already been discussed in relation to many of the preceding factors. One must recognize that seasonal changes affect the reproductive cycle of the reindeer, that bad winters can affect herd size (independently or in conjunction with poor grazing), that grazing quality and type as well as quantity are controlled by the seasons, that loss of reindeer to predators is largely dependent on climatic conditions, that climate determines the severity of the insect plague, and that the character of the landscape changes drastically with the seasons. The seasonal shifts of the arctic and subarctic climate hold the key to the reindeer's life rhythm, the natural cycle in general, and thus the life of the herder. There is hardly a single herding factor that does not in some way alter in response to climatic shifts. Through the loose regularity of the seasons, these variables have become highly orchestrated and interdependent.

It is vital that the herder know the possible range of behavior of the reindeer under different climatic conditions. He must be able to predict reindeer behavior during the shifting interplay of climate, grazing, and landscape, and must adapt both his herding and his husbandry to these conditions. As with the reindeer, the way that the herder can respond to a given situation can vary enormously. Drake (1918: 29) supplies an excellent example of climatic conditions leading to a drastic divergence of herding method in Lapland between big herders and small herders. The small herders, dependent on milk and cheese, could not afford to release their intensive hold on the herd during the time of the worst insect plague. The big herder, however, could forgo milking and live on meat, in order to ensure the well-being of his herd. As Drake mentions, it was not easy for the big herders in the mountains at that time, but, because of the greater flexibility of their forms of husbandry they could meet the weather conditions with a more extensive option. Of course, one should not assume that all the moves of the reindeer nomad reflect a herding motive. The herder may wish to exploit some resource that is in a fixed location and available only at certain seasons. If the exploitation of this resource is compatible with his herding, he may move to combine the two. For example, the lengthy migrations of the Swedish Saami to the Norwegian coast in the past were motivated not only by the desire for good pasturage but also by the attraction of Norwegian trading goods (see Figure 9.2).

During the bare-ground period, the reindeer is a browsing animal, commonly covering much territory. Granted, during the calving time in mid-May the females prefer to keep to their customary calving grounds, a sheltered spot with good visibility (to watch for predators), early bare ground to provide them with the nourishment to produce milk for their calves, and no hazardous waters or cliffs to endanger the newborn. The calving land should be "friendly," and it is a spot to which reindeer return annually, forming the focal point of spring migration.

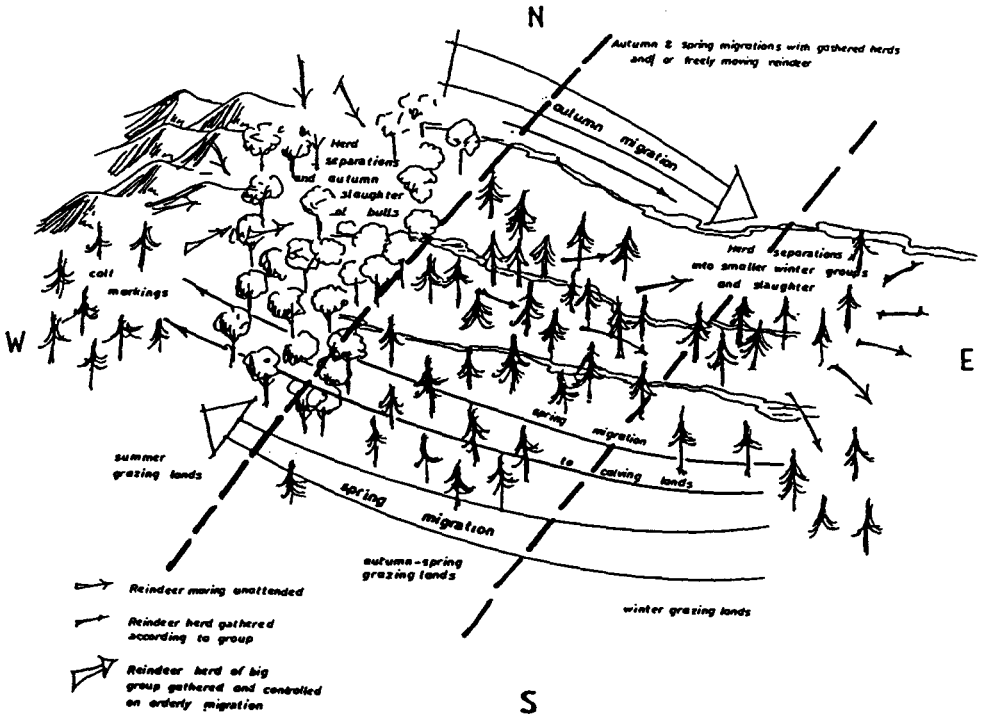

FIGURE 9.2. Typical seasonal herding pattern of a Swedish mountain *Sameby*.

Reindeer eat a wide variety of green plants during this bare-ground period, and their movements are determined not so much by where there is adequate grazing as by where their favorite kind of grazing is, where they can find relief from the bothersome warble fly and nasal bot parasites, and, most important, where they are used to wandering at any particular season.

Besides herbs and grasses, reindeer eat sedges and birch and willow leaves in the summer. In autumn, mushrooms and berries are added to the diet, and in winter reindeer eat mainly lichens. While ground lichens are the deers' winter staple, arboreal lichens, so-called beard moss, are an important alternative and emergency food should the climate render ground lichens unobtainable (Helle, 1966; Skunke, 1969).

Although the nomad's common explanation of his own movements is, "The reindeer decide," this is a truth with modification. There is great flexibility in the decisions that the reindeer can adopt as customary, and the reindeer nomad greatly assists in helping the reindeer make up their minds. Once established for a herd, the seasonal migration routes, calving land, and grazing utilization patterns become habitual for each new generation. In effect,

the reindeer come to decide what the herder (within bounds) has decided for them. Any abrupt alteration imposed by the herder in the place or timing of movement for a herd used to a certain routine will meet initial resistance. In time, it may become the new norm.

During the brief but warm summer months, reindeer are often spotted on snow patches, high on mountain slopes, where they congregate to escape insects. On the cool snow patches, where, it is believed, the scattered light disorients insects that navigate by polarized light, the reindeer find relief from mosquitoes and parasitic flies. Herders commonly refer to the mosquito as their "best helper," for, thanks to the plague of this insect, the deer are already partially gathered on the snow patches, when available, and all the easier to be collected in the corral toward evening, as the temperature cools, for the marking of the new calves.

Unlike the situation prevailing with a number of domesticated species, the human–reindeer relationship, whatever its type, exists in an environment that, if not always native to the reindeer (Klein, 1968), is at least one in which the species can survive without the benefit of human intervention. While human protection and management of pastures can increase the numbers of deer sustained in a given area, people are not usually a necessity for their survival at all. In short, independence in the wild awaits the domesticated deer that evades the herder. The reindeer of many of the Fennoscandian herders today can be described as being semidomesticated and half-tamed. During large parts of the year they wander unattended, and humans assert their claim over them sporadically and tentatively for the completion of a specific task (e.g., marking, castration, separation, and slaughter). While it is true that very tame deer will at times purposely seek out the company of humans, for example, for protection from wolves or for relief from insects near the herders' smoking smudge pots, deer usually try to avoid people.

While reindeer can become so tame as to be practically household pets, entering buildings freely and eating from the hand, such a condition is unusual and difficult to maintain. The degree of tameness that a herder is able to promote in his deer must be upheld by constant effort. In but a short time deer revert to the wild, especially with the modern, so-called "extensive" herding method in which the deer are already left to their own devices for lengthy periods. In short, while it is an easy matter for reindeer herding to become increasingly extensive in method, it is quite difficult to move in the other direction, toward greater "intensivity" or greater control of the deer.

The reindeer is a herd animal, and if left alone may well gather together, moved by the same determinants into a large compact mass. Mothers and their calves stick together, and often even the yearlings will follow their mothers. The wild North American caribou is especially known for its huge herds of many tens of thousands of animals migrating together over vast tundra stretches. Yet reindeer are not constantly together in a gathered herd.

One must be well aware of the different ways in which the word "herd" can be used. It is used to designate a large group of deer assembled and moving together in one mass with so-called "herd cohesion," but it can also be applied to animals forming a single breeding unit, to widely scattered deer that belong to the same owner, or to those that graze the same demarcated area and for that reason will be gathered together at some future date. There is frequently a great deal of seasonal variation in the degree to which a herd is actually assembled. In summer the deer might be allowed to range freely over huge open areas. With the advent of autumn the great mixture of animals in the summer lands may be separated, broken down into smaller herds, and confined to smaller (but still large) grazing areas. In winter, separation tends to break the deer down into their smallest social units (according to individual herding families), and these family winter herds will be kept gathered and closely watched against predators.

The degree to which the deer are gathered is not merely a factor controlled by man. The deer spread naturally in the summer when green grazing is abundant and the insects many. In September the bulls tend to leave the rest of the herd for some time and become "loners," while the rest of the animals "pull" gradually toward the autumn grazing zones. The coming of "mushroom time" is another splintering factor, for the reindeer, who love mushrooms, will scatter in search of them. Good lichen grazing (a factor of snow conditions as much as of the existence of lichens) can be quite spotty, and deer therefore tend to collect in certain areas. In good lichen zones and heavy snow, the deer will usually stay put and can be kept together and more easily guarded. However, if a hard crust forms on the snow, preventing the deer from digging, of if a late rain forms ice lumps on the lichen, grazing is bad, and the reindeer will scatter in search of food. Should the herder have established good control over his gathered herd before the winter grazing deteriorates, he can maintain that control through the use of artificial fodder. The deer, who become totally dependent on him for food, grow amazingly tame, often prodding the herder with their noses at feeding time and entering the feeding corral voluntarily. However, if the herd has not been gathered before grazing goes bad, the deer will spread immediately, and it will be next to impossible to gather them and usually unwise to try.

Sociopolitical Factors

Sociocultural factors are certainly as important in the determination of herding form as are environmental factors. The traditional social patterns of reindeer-herding peoples demonstrate an enormous range, with considerable local variation within each ethnic group. Superimposed on traditional systems are all the pressures and constraints applied by the authorities, commonly external to the society of the herders. Only a few of the most general social determinants

affecting herding form and variations within them are mentioned here. The discussion of specific herding case studies in the following section will also serve to demonstrate the effects of social determinants.

Major social determinants include: the system of herd acquisition—rules of inheritance, gifts of reindeer, payment in reindeer for work as a reindeer hand, purchase of reindeer; the system of reindeer marking—marking system to identify owner, marking system to identify individual reindeer, limitations on numbers of marks, acquisition of marks (inheritance, purchase, composition of new marks, and registration of marks); social consciousness of family/group grazing rights to particular areas; work patterns—acephalous or hierarchical organization, division of labor, herding apprenticeship (the live-in hired hand), family, group, and "big group" membership with seasonal regrouping or confinement to one group per grazing range (ranching), herder as salaried employee of the herding collective (Sweden), the state (Soviet Union) or a multifaceted shareholding corporation (native corporations of Alaska); systems of mutual aid between herders and settlers—exchange of food produce and the care by herders of deer owned by settlers in return for seasonal house room and care of the elderly. This list could go on and on and is meant to give examples rather than to be exhaustive.

New laws have disrupted traditional patterns on a number of counts. For example, Swedish welfare norms require any employer to pay a high tax to cover the social benefits of his employees. So great is this tax that the traditional role of hired reindeer hand has all but disappeared. Herders can no longer afford to hire help. Traditionally hired hands might be paid in reindeer. It was usual for herders to start out this way, learn the ropes, and assemble a herd. The aging herder without active children or a hired hand is nowadays in a rather precarious position. He has no choice but to try to work himself (often beyond his physical limits) or to pay his way to the collective—a method requiring more cash, and hence more reindeer sales.

With the advent of modern transportation facilities, notably airplanes, helicopters, motorboats, and snowmobiles, the reindeer caravan is no longer needed to move the household or the family. In many parts of Lapland, herd movements are now quite separate from family movements. Children must attend school for many months at a fixed location, and their mothers are often no longer able to keep up the same amount of direct contact with the herd as before. Under these circumstances the men must perform most of the herding work, while the women run the family and provide ground service to the men in the field. The men who wish to maintain intensive contact with their animals must often be separated from their families for long periods. Unless herd ownership and work organization are collectivized to the extent that acceptable work-rotation schedules can be established, the more stationary life of the herding family leads to greater extensivity in reindeer herding.

These few examples of the impact of social changes on herding form must suffice as a demonstration of their range and penetrating effect. The section concerning modern trends will further illustrate this point, add concrete cases, and try to pinpoint general directions of change.

HERDING NOTES FROM DIFFERENT AREAS

To report in detail about current herding conditions around the world is hardly possible. Laws change, herds are swept away by caribou, and herders change their strategies at a fast rate. What follows is a summary of what I have compiled from personal experience and recent sources, and, while not totally up to date, illustrates the significant variety in herding contexts and provides a base for further exploration (see Table 9.1).

Certain basic points of comparison for herding in the different areas should be mentioned from the outset. Herding in Fennoscandia and in the Soviet Union, despite the regions' many differences and superordinated government structures, is practiced within a strongly traditional sociocultural context. Herding peoples in the Old World have evolved refined reindeer-herding cultures over hundreds of years. In spite of the variations existing in formulations of native policy and resource access, reindeer herding in the Old World is highly important both to the culture and to the subsistence of the herding peoples. In these countries, the production of reindeer meat has local and even national significance. In Alaska, Canada, and Greenland, on the other

TABLE 9.1. World Distribution of Reindeer Population

	Percentage of world's tame reindeer	Approximate numbers of tame reindeer	Approximate world total of wild reindeer	Approximate world total of *Rangifer* species, tame and wild
Soviet Union	77.4	2,400,000		
Finland	6.4	200,000		
Sweden	8.1	250,000		
Norway	6.4	200,000		
Greenland and Scotland	0.4	12,000		
Canada	0.3	7,000		
Alaska	1.0	29,000		
Total	100	~3,000,000	~1,530,000	~4,520,000

Note. Rangifer numbers and world distributions are based on Andrejev (1977). As the reader will understand, reindeer statistics include huge margins of error; thus, the columns do not "add up" arithmetically.

hand, herding is a relatively recent phenomenon. The cultures into which it has been introduced are refined hunting cultures, and the wild reindeer is still a major game animal. Herding is an unusual occupation, touching only a small sector of the population. Its significance for native rights, cultural maintenance, or subsistence is not at all clear cut or without conflict even among natives. Herding in the New World is often geared more toward antler production than meat production.

Fennoscandia

Interest in Saami reindeer herding in the Fennoscandian countries has been considerable, resulting in a broad spectrum of literature stretching over hundreds of years. What follows is only the briefest sketch of herding administrative structure in Fennoscandia.

Although there are marked environmental and legal differences among the three reindeer-herding nations of northern Fennoscandia—Norway, Sweden, and Finland—there is cause to discuss their herding under a general heading. In all three countries, Saami herders are prominent, being the only traditional reindeer-herding people. Private ownership of reindeer is respected in all these countries. Moreover, reindeer-herding rights enter forcefully into the realm of Saami cultural politics.

A considerable amount of Nordic cooperation is focused on reindeer herding. With the support of the Nordic Council, an organization for cooperation in Saami and reindeer matters was founded in 1965. The Nordic Council of Ministers Nordkalott Committee has started its own work group for reindeer herding. There is also a Nordic Organization for Reindeer Research (NOR), and the Saami from Norway, Sweden, and Finland are members of a Nordic Saami Council (Nordkalottkomiteens Publikasjonsserie, 1981: 11).

Norway

Reindeer herding by the Saami in Norway occurs in the Finnmark, Troms, Nordland, Nord-Trondelag, and Sør-Trondelag plus the northernmost Hedmark regions. The different herding regions are divided into reindeer-grazing districts. Outside these, herding may be practiced by non-Saami. Herding is centrally administered under the Department of Agriculture in Oslo (with a herding secretariat in Alta), and according to the current Reindeer Act of 1978 each of the herding regions is to have its own administration (Finnmark is divided into two local herding administrations). The local herding administrations can bring up matters to the central Herding Board. This Board advises the central herding administration in Alta and is responsible for research. The reindeer-herding Saami are represented in both the local and the central administration (Dunfjeld, 1979: 35).

FIGURE 9.3. Spring migration in Norway over the Finnmark Vidda toward the coast and the calving lands. (Photo: HUGH BEACH)

Herding is the major livelihood of approximately 1,800 Saami (see Figure 9.3). They have their own political organization, the Norwegian Reindeer Herders' Organization based in Troms, with financial support from the Department of Agriculture. In certain areas and at certain times, according to immemorial right, the Norwegian Saami enjoy rights to utilize Swedish grazing (Svonni, 1974: 97).

Sweden

In Sweden today there are only about 900 active reindeer herders, with family members bringing the total of those directly dependent on herding to approximately 2,700 people. Unless a non-Saami marries into the herding group, only someone of Saami ancestry has the right to herd reindeer (if his or her parent or grandparent has had herding as a steady livelihood). Possession of the herding right, however, does not mean that one is automatically able to begin herding. According to the Reindeer Herding Act of 1971, anyone eligible to herd must also belong to one of 51 territorial herding collectives called *Samebys* before he or she is permitted to exercise this herding right. A *Sameby* thus defines a distinct grazing range and also a social entity: those herders with the right to utilize that range for their reindeer.

Although the ultimate ownership rights of the Saami to their herding territories and their immemorial rights to herd, hunt, and fish on their ancestral grounds are still contested, in Swedish herding law the Saami enjoy the right to *use* Crown Lands for their herding as a kind of privilege granted them to help them preserve their unique culture. Saami culture is then narrowly recognized by the government to mean only reindeer herding. To the extent that a Saami strays from this livelihood, to that same extent must he give up his special rights. The Act of 1971 asserts that the *Sameby* may engage in no economic activity other than herding. With the increasing pressures of extractive industries on the land (e.g., modern forestry and hydroelectric power construction), the available grazing land constantly decreases. At the same time, the subsistence minimum in terms of the number of reindeer needed per family continues to increase. Thus, the herders are hit from both ends. According to the law, the herder must keep herding as his major income source or leave the *Sameby*. Furthermore, the *Sameby* as a collective can exercise its special resource *privilege* (no longer recognized as a civil right) only in connection with herding.

It is important to observe here the distinction between reindeer *herder* and reindeer *owner*. Only herders must necessarily be of Saami origin (except for those non-Saami who have married *Sameby* members). Non-Saami are allowed to own reindeer if they are tended by a Saami herder. A nonherder must seek the permission of a *Sameby* to have his deer hosted by the *Sameby*, and the limit set to the number of deer that he might own are left up to the *Sameby*. Such considerations depend to great extent on the current *Sameby* reindeer population and its maximally permitted capacity, fixed by the authorities.

Administratively, herding in Sweden is placed under the National Board of Agriculture—to which is tied an advisory body with Saami representation. On the regional level herding matters are dealt with by the local agricultural committees of the three herding provinces Norrbotten, Västerbotten, and Jämtland. At certain times of the year and under constraints as to which areas and how many reindeer, Swedish Saami also enjoy the use of pasture land in Norway on the basis of immemorial rights.

The *Samebys* are members of the Swedish Saami Parliamentary Organization (SSR) which concerns itself mainly with promoting their herding interests. Much of the state's support for herding comes from the Saami Fund, the income of which derives mainly from the payment of compensation to the Saami for land encroachments.

Finland

In Finland, one does not have to be of Saami ancestry to be able to own and herd reindeer. The only requirement is that one live within the reindeer-herding area. This area encompasses most of the Lapland province and the

northern part of Uleåborgs province and is divided into about 56 herding districts, the so-called *paliskuntas*. The current Finnish Reindeer Act stems from 1948, although it has been revised a number of times since. According to this law, herders must be members of their local herding collective, the *paliskunta*. The *paliskunta* is a type of economic cooperative with a communal treasury to which members pay according to their reindeer holdings; it served as a model for the reorganization of the Swedish *Samebys*. Finnish law does not seek to stop herders from receiving the main part of their income from sources other than herding. The *paliskuntas* are in turn all members of the central organization, the Paliskuntain Yhdistys, based in Rovaniemi and formed in 1948. This body is responsible for reindeer administration and research and the development of reindeer herding. The herders have their own organization, Poro ja Riisto oy, for the distribution of their reindeer products (Svonni, 1974: 96).

Soviet Union

It will be impossible to include here the great variety of herding forms in the Soviet Union. Only the most general characteristics of the *sovkhoz* herding model can be covered. For more specific information about herding methods, I shall rely heavily on my own 1984 visit to Tomponski Sovkhoz in Yakutia (Beach, 1986b).

Before the Russian Revolution, the so-called Small Peoples of the North, many of them reindeer herders, were assessed to be at a "pre-capitalist" stage of socioeconomic development. The aim of the new government was to allow the continuation of their cultural forms, but to foster in them a socialistic content. The capitalist stage of development was to be leapfrogged (Eidlitz, 1979). As with the rest of the soviet economy, the means of production were collectivized, including the reindeer. Private ownership of reindeer has basically been abolished, so the state can promote more rational procedures of production. The *sovkhoz* form, however—where the state owns the reindeer and workers are wage earners paid by the state—was not the first adopted. Reindeer-herding *kolkhozes* were established where the workers themselves owned the means of production collectively, worked collectively on large farms, and shared their produce. Today, most if not all reindeer-herding farms in the Soviet Union have been reorganized under the *sovkhoz* form. Increasingly, the *sovkhozes* have grown to encompass more than one type of production, even if one main form of economic pursuit might be dominant.

At Tomponski Sovkhoz, the entire herding administration was led by a director who had under him three so-called "shop" leaders, corresponding to the three shops into which Tomponski was divided. Each of these shop leaders was a zoological technician, and each had a veterinarian as deputy. These three shops (sometimes called farms) were in turn composed of several work teams, called brigades, and each brigade, composed of specific herders at home in their

brigade area, cared for approximately 5,000–7,000 head of deer. This number swells with spring calving but is soon reduced again by autumn and winter slaughters. The *sovkhoz* as a whole had 18 brigades, and each of these had between 7 and 9 herders, one woman camp worker, one radio operator, and one student trainee. Altogether, about 115 people worked within the Tomponski herding system; of these, 30% were women.

Eighteen herds corresponded to the 18 brigades, but these 18 herds were not all of one kind. One herd was the so-called pedigree herd, consisting of specially selected breeding deer, each supplied with a uniquely numbered ear tag. There were 14 "production herds" and three "fattening herds." The age and sex composition of the herds is closely regulated but varies according to the types of herd in question. Commercial fodder was used regularly for 55 days to fatten all animals chosen for slaughter, usually male yearlings. All the meat and hides were sold to the state's official Milk/Meat Industry. The antlers were used for handicraft work, but not exported as a medical product. Herders were permitted to buy meat back from the state at a considerable reduction.

In summer, all herders were on the job in two 12-hour shifts. At this time a herd might be as close as 90–100 km to the farm's central village or as far away as 700 km. The herd was under observation throughout the year, although in winter this task was easier as the deer would not tend to spread, and the work force could therefore be reduced by half. Herders were aided by their dogs. The use of dogs was not traditional among Tomponski's Even herders, but now each herder owns his own dog. Luckily, the region was spared the presence of wild reindeer that might otherwise mix with the tame stock and carry them off. This is a severe problem in many other Soviet herding areas.

The Even herders ride specially trained reindeer year round, although in winter other types of transportation could be more practical for long distances. The use of deer sleds (each sled pulled by more than one deer) is commonplace in the winter. Snowmobiles and helicopters are in use, but they have not replaced the traditional methods of transportation. Machine transport is used not for actual herding but rather for the delivery of personnel and supplies. The modern machines are expensive to operate, require constant repair, and sacrifice efficiency because of the problematic logistics of fueling. Tomponski herders keep tight control of their herds.

Under Soviet control, herding has been introduced to peoples who have never herded traditionally before. Within the Soviet *sovkhozes* many economic activities are coordinated, even if one economic pursuit is predominant. Thus, there are quite a number of reindeer-herding *sovkhozes* with this as their raison d'être. The state employees of these *sovkhozes* are extremely diverse in ethnic origin. While the population native to a region is usually well represented, to find workers from as many as three "nationalities" is not uncommon (Beach, 1986b; Eidlitz, 1979; Humphrey, 1983; Vdovin, 1973).

Alaska

In the early 1890s, the missionary and general agent of education in Alaska, Sheldon Jackson, began importing reindeer from Siberia across the Bering Sea and unloaded them on the northwest coast of Alaska. It was Jackson's plan to save the Inuit from what he thought was imminent starvation, to Christianize them with the help of the deer (by putting these in the care of missions), and to use the transportation abilities of the deer to open up and develop the territory in general (Beach, 1986a; Jackson, 1890–1906; Ray, 1975).

At first he also imported from Siberia a few Chukchi herders to train the Inuit, but he soon contracted with herders from northern Lapland who he thought were superior. Five Saami herders, most of them with families, were recruited in 1894 and a much larger number, about 65 herders, mainly Saami, in 1898. The herders in the 1898 wave brought with them over 500 domesticated deer from Lapland. However, all these deer were castrated male deer trained as sled deer and not intended as breeding stock. Jackson had plenty of Siberian deer, a type he preferred for their greater size. Although the Saami instructors and their Inuit apprentices succeeded in establishing the foundations of a thriving reindeer economy, it did not last.

Jackson's dream of implanting a large and permanent Saami herding colony in Alaska failed. Most of the Saami herders returned to Lapland with the expiration of their contracts. Some stayed on but devoted themselves to the Alaskan Gold Rush rather than to herding. Those few Saami who stuck to the herding profession as instructors to the Inuit and as private herders in their own employ lost their herding rights with the passage of the Alaskan Reindeer Act of 1937, which limited reindeer ownership to native Alaskans.

Weakened by loss of the professional Saami herding core, the Great Depression, the Second World War, predation, possible overgrazing, and the resulting domestic reindeer population crash (Lantis, 1950), the Alaskan herding enterprise was brought to its knees. Recently, herding has experienced a considerable revival in northwest Alaska (Stern, Arobio, Naylor, & Thomas, 1980) and is even sparking interest elsewhere in the state, largely as a result of new sources of capital and new modes of ownership and grazing rights with the passage of the Alaska Native Claims Settlement Act in 1971.

Just prior to the 1937 legislation barring the "white" American Lomen family and other nonnatives from herding, the Lomen Company, then by far the largest deer owner in Alaska (Lomen, 1954), sold 3,400 head of deer to the Canadian government for delivery at the Mackenzie River Delta (near Inuvik). The deer were delivered after a dramatic trek (often referred to as "The Great Trek") lasting 5 years over uncharted wilderness.

Pursuant to the Alaska Native Claims Settlement Act (ANCSA) of 1971, 12 native landholding Regional Corporations (and many smaller village corporations) were established. In return for 44 million acres of land and $1 billion to be distributed among the new corporations, the aboriginal claims

of native Alaskans were finally to be extinguished (Arnold, 1978: 147). This settlement has had a profound effect on Alaskan natives, including their reindeer-herding operations. In the case of both ANCSA and the Alaskan Reindeer Act of 1937, natives have been granted land rights and reindeer-ownership rights simply because they are natives, not because they are engaged in any particular form of livelihood such as hunting or pastoralism (as is the case, e.g., in Sweden). The new native corporations also qualify for reindeer ownership like private native persons under the Act of 1937.

Furthermore, the native corporations established by ANCSA are not, like the *Samebys* in Sweden, constrained in their economic activities (Case, 1978). Instead, the native corporations of Alaska run mines, oil rigs, and construction firms and even have investments and engage in joint ventures with numerous businesses outside the region. A few of the newly established native corporations, like the NANA Regional Corporation (a name derived from the former Northwest Alaska Native Association) and the Sitnasuak Village Corporation, have tried their hands at reindeer herding. Besides these corporation activities, as of the mid-1980s there were about 12 other private herds operated by native families, also in the northwest district of Alaska. Most of the reindeer herding in Alaska is confined to the Seward Peninsula and its immediate vicinity—the northwest part of Alaska from Norton Sound to Kotzebue Sound. Approximately 75% of all the tame reindeer stock in Alaska inhabits this area. Roads are scarce, transportation is difficult, and herders rely on air support.

Alaskan herders have no trained sled deer, pack deer, or lead deer. They have no skis, cannot throw lassos, and have almost no experience using herding dogs. In the early part of this century, native Alaskan herders, trained by Saami instructors, could be ranked among the best in the world. They used trained deer and dogs, and herded their deer intensively. Epidemics of measles and influenza, however, wiped out a large part of the early native population of herders, and the Great Depression, falling meat prices, and the Second World War put an end to what might be termed the first phase of Alaskan herding (Lantis, 1950).

A large part of the modern reindeer market, and indeed the chief financial support of the Alaskan herding industry today, is the sale of reindeer velvet antler. Antlers are cut from the living deer in the spring and early summer and shipped to Asia, where they enjoy a reputation as an aphrodisiac and general mineral supplement. The ease with which caribou meat can be obtained and the lack of inexpensive transportation and hygienic slaughterhouse facilities have crippled the Alaskan reindeer meat market. In Fennoscandia, by contrast, the meat market is more developed and provides the Saami herders with a good income from their reindeer. In these countries the cutting of antler from living deer is illegal on humanitarian grounds. In Alaska, income from the sale of the herd's antlers often exceeds the income from the meat of the slaughtered stock.

In Alaska, only natives may own reindeer, although the native owners in Alaska may employ nonnative herders as they wish. There is no special status or

resource privilege coupled to this occupation. Administratively, reindeer have been placed under various departments. The U.S. Reindeer Service was formed in 1908 and was to last for many years, surviving several reorganizations. In 1929 reindeer management was assumed by the office of the governor of Alaska, but following the Alaskan Reindeer Act of 1937 and the federal government purchase of all nonnative reindeer stock, administration was transferred to the Alaska Division of the Bureau of Indian Affairs (BIA). In 1967 the Department of the Interior's Bureau of Land Management (BLM) took responsibility for range management, while the BIA retained responsibility for herd management. Meanwhile, in the early 1960s the reindeer owners in northwest Alaska formed their own organization, the Reindeer Herders' Association (RHA), to voice the interests of the owners, consolidate their political position, recommend the use of funds, and coordinate government and university research efforts with the herders (Reindeer Herders' Association, 1979).

With the Western Arctic caribou herd nearby now numbering over 170,000 head and an unrestricted bag limit on caribou, the native well situated to hunt caribou from his camp or home village would never need to buy reindeer meat. But the caribou have not always been so numerous. In 1975 it was estimated that the Western Arctic caribou herd contained only 60,000 head, and wildlife managers were afraid that it might disappear. In fact, this was a prime reason for NANA's entrance into the reindeer-herding business: to help provide the community with a cheap supply of red meat once caribou became scarce (Maniilaq Association, 1982).

Now that the caribou are back, much of the justification for continuing the reindeer business has disappeared, at least in the eyes of the local population. Some villagers fear that reindeer interests will be detrimental to the caribou, their major source of red meat. A concern of both hunters and game managers is that caribou might possibly be diverted in their migrations from reindeer permit lands (Hunter, 1981: 74), lands close to the villages and therefore convenient for hunting. Given these conditions, native corporations are placed in the uncomfortable position of being staunch supporters of traditional subsistence resource utilization, on the one hand, while trying to maintain the threatened reindeer businesses on the other (see Arnold, 1978: 236).

During the explosion of the North American antler market in Asia, speculators became interested in the untended and unharvested reindeer populations on various islands along the Alaskan coast. Some of these deer populations are remnants of herding operations during the Saami, pre-1937 era of herding in Alaska. Some were introduced by whalers, and some were given a second-hand introduction to new areas by natives for use as a game animal. Whatever the original intent of those who introduced them, the deer have been variously treated: herded for meat, hunted for meat, sold by permit to hunters (even sport hunters), left alone to go wild, and, lately, rounded up for dehorning.

All the Alaskan examples of reindeer herding fall more into the category of reindeer ranching than reindeer pastoralism, according to the distinctions

proposed by Ingold (1980). The reindeer are owned privately (by individuals or collectives like the big Alaskan native corporations established in 1971), and the land utilized by the deer is also owned or leased by permit by these same private individuals or collectives, that is, one (individual or collective) owner per one well-defined and legally restricted grazing territory. Only in the early period of reindeer herding was a pastoral system even approached, with the emphasis on utilizing reindeer products for the subsistence needs of the herders and the deer owners. Even here, however, there was much of the ranching context, and it is this that has come to dominate in Alaska today.

Canada

The ony real reindeer-herding operation in Canada today is that of William Nasogaluak in the Mackenzie Delta area, which originated from the introduction of Alaskan deer. This was not the first attempt to introduce reindeer herding to Canada, however. Inspired by Jackson's Alaskan herding efforts, and in an effort to improve the health of Canadian natives, Wilfred Grenfell, a missionary physician of Labrador, organized the purchase of 300 reindeer from Norway in 1908. The reindeer were brought to St. Anthony, Newfoundland, and placed under the management of four Saami herders. This experiment was at first a success and even seeded other herds. However, the initial herd and the others it had seeded later disintegrated largely due to the return of the Saami to Norway and decimation by poachers (Treude, 1968: 15). Another attempt to establish a Canadian reindeer herd by the anthropologist Vilhjalmur Stefansson started with 627 reindeer brought from Norway to Baffin Island, but it too failed. In 1919 the Canadian government founded a Royal Commission to consider the possibilities of reindeer herding and, with the assistance of two Danes, A. E. and R. Porsild, the purchase of reindeer from the Lomens was organized in 1929.

In 1935, the Alaskan herd reached the Mackenzie Delta area where the Canadian government had established a reindeer reserve of 15,500 sq km, built the village of Reindeer Station, and set up a corral near Kittagazuit (Treude, 1968: 16). In a manner similar to that used by Jackson in Alaska, animals from the main Canadian herd were loaned to local natives as seed for new herds, only the original number of reindeer to be returned or passed on in new loan. From 1938 to 1940 two native Inuit families were given reindeer to form herds at Anderson River and Horton River, but the herders died soon afterward in a boating accident. Their herds were merged and new herds seeded from this, but by the early 1960s all these herding projects had failed. Treude lists insufficient herding, overexploitation of the herds, overgrazing near the settlements, and losses through disease, predation, and poaching as

reasons for the failure. Added to these, Treude mentions social factors, that it seemed impossible to make good herders out of traditional Inuit hunters when there was no real need to give up hunting. These same traditional hunters, however, were apparently willing to take on salaried jobs and settlement life after the construction of radar stations (Treude, 1968: 17–18). Settlement life and wages can combine well with sporadic hunting forays (for the purchase of ammunition and gas), whereas intensive herding often demands total commitment and contributes little to the hunting effort.

The government chose to turn over management of the herds to private interests (still maintaining the same amount of government funding). J. Teal and J. Oeming were contracted to take over the operation in 1960, but by 1965 the contract was assumed by a Swede, S. B. Johansson (Treude, 1968: 18). Ultimate control and funding for the Canadian Reindeer Project was under the Federal Department of Indian Affairs and Northern Development (Hill, 1968: 21). However, by 1967, herd numbers had dropped to 2,700 head, and in 1968 the government closed the period of contract managers, putting the operation temporarily in the hands of the Canadian Wildlife Services (Nasogaluak & Billingsley, 1981). In 1974, the reindeer operation was sold to a newly formed company, Canadian Reindeer Ltd., owned by the former chief herder, Silas Kanagegana. In 1977, Kanagegana sold the herd to its present Inuit owner, William Nasogaluak.

Income from herding began to improve with the completion of the Dempster Highway, which opened up the market for reindeer meat in southern Canada by evading the high cost of air freight. As in Alaska, the growth of the Asian market for reindeer antler also brought in new profits and caused a rescheduling of herding and husbandry tasks. By 1980, the herd had increased to 13,000 head. Future plans involved the possibility of providing a tourist attraction, creating a reindeer dairying industry, and seeding more local reindeer enterprises (Nasogaluak & Billingsley, 1981: 89).

In 1984, with the Committee for Original Peoples' Entitlement settlement in northwestern Canada, the Inuvialuit Regional Corporation was established, its land title including a large part of the reindeer grazing reserve. According to Roger Gruben (personal communication, July 1987), an official of the Inuvialuit Regional Corporation, the reindeer-herding enterprise causes conflicts with the local hunters and trappers of Tuktoyaktuk. The new corporation land owner, therefore, has sought to buy out Nasogaluak's herding operation. As he had feared (Nasogaluak & Billingsley, 1981: 91), Nasogaluak has also been asked to pay a grazing fee of $35,000 per year. However, as a native of the region Nasogaluak is also a beneficiary of the land claim and a member of the corporation. The corporation claims that, with an estimated income of $400,000 per year from the reindeer enterprise, this grazing fee is not exorbitant. Nasogaluak has resisted payment, and the issue has been brought to court. The status of reindeer herding in Canada is therefore uncertain.

Greenland

Greenland possesses its own stock of large, wild deer (currently about 30,000 head), but in 1953 attempts were made at herding deer imported from Norway. Today there are approximately 8,500 deer of domestic stock, 7,000 in a collective and the rest held in private ownership. Greenland has just recently joined the Nordic organization for reindeer research. Unfortunately, the tame stock introduced from Norway contained warble flies and nasal bots, reindeer parasites that had apparently not previously existed in Greenland. The idea of importing tame reindeer stock to Greenland goes back to the 1800s, but it was not until Peter Freuchen and others brought the issue to the Danish press that steps were taken to implement this. In the 1940s the wild deer on Greenland had decreased to the point at which natives could not obtain their accustomed supply of meat and hides. Even here Saami influence was not lacking; Jens Rosing, who had studied herding in Norway and who later became a reindeer station leader, and the Saami Anders Stueng inspected the Godthabsfjord area in 1952 for its suitability to host tame stock.

Herding began in the Godthabsfjord area with herds at Itivnera and Kangerklupiluk. There is as yet no settled policy restricting reindeer herding or ownership to native Greenlanders only. In the 1960s Johan Haetta with other Saami from Kautokeino, Norway, herded in Greenland. In 1973, the Greenlander Ole Christiansen, who had been trained by the Saami, started a herding operation near Nunarsuit with 48 head from the Itivnera herd.

In 1974 Anders Triumf, a Saami who had worked with reindeer in Greenland since 1966, took over operations at Itivnera and introduced the system of calf slaughter, with good results. Greenland reindeer meat had been sold in small quantities to Sweden, but by 1977 local markets had improved, and most of the meat was sold to firms and restaurants in Godthab. Greenlanders themselves seem to prefer the taste of wild reindeer (Aastrup, 1978). When Triumf returned to Norway in 1978, management of the Itivnera herd deteriorated. In 1979 this herd was placed under the care of a native corporation.

Christiansen also visited Alaska to inspect the antler-cropping enterprise there, but he decided against such practices for his herd. Instead, his herd is exploited almost solely for meat and in a manner reminiscent of the hunt. The deer graze on a peninsula, cut off from the mainland by a glacier. Controlled herding is hardly practiced. Christiansen also sells hunting permits on his range. In several other areas reindeer have been introduced from the Itivnera herd to run wild, replacing the locally decimated caribou as objects of the hunt.

Cross-Cultural Impact and Further Spread

Analysis of harnessing technique, clothes style, and sled models are highly revealing of the profound impact reindeer-herding peoples have had on each

other. Reindeer herding has also spread widely outside its traditional borders and among traditionally nonherding peoples in relatively modern times. For example, in the early 1950s the Saami herder Michael Utsi, from Vaisaluokta (Sirkas Lappby) and of Karesuando heritage, moved his herd from Sweden to Scotland. The motivation to establish a living meat depot along routine voyage routes was the reason reindeer were transported from Norway to the sub-Antarctic in the early 1900s.

CURRENT MODERN TRENDS

Throughout most of the reindeer-herding area, even where herders themselves still rely on the reindeer directly for subsistence, there is a clear trend toward an increased involvement with and dependency on a cash economy. With reindeer herding, as with many evolving agricultural economies, production rapidly becomes focused on a monocrop, that of meat or of velvet antlers for the Asian market. Single use of the reindeer implies a more concentrated harvest time and therefore the possibility of greater herding extensivity. Herders become less engaged in the active protection of their deer with decreasing contact with them. On the North American continent and in Greenland, where reindeer herding has relatively shallow roots, intensive control of the domestic stock enjoyed at most but a brief period, usually during the initial phase of imported Saami instruction. True reindeer pastoralism as a social and economic complex never really gained much foothold in these areas, and many of its failings must be considered to be the result of the assertion of old determinants rather than modern developments. In Europe and the Soviet Union, however, both with deep and highly successful pastoral traditions, the transition of herding form is more evidently linked to modern experiences.

The problems encountered by the reduced control of the deer are generally met with increased mechanization—the use of snowmobiles, helicopters, and reindeer transport trucks—the cost of which cements the need for reliance on a cash economy. The drive to increase profits suggests so-called rational production methods such as those applied to domestic farm animals whereby the growth intensity of young animals is exploited (reindeer calf slaughter) and costs are cut by large-scale operations. The desire for efficient production from a market perspective leads to the collectivization of production means (corrals, herding cabins, and slaughter facilities, if not the reindeer outright) or, as in the Swedish case, legislated collectivization of the herding work force despite continuation of private ownership of deer.

In effect, reindeer pastoralism is undergoing a marked transition toward reindeer ranching. Most of the domestic reindeer herding today finds itself somewhere in between these two poles: with definite market orientation (but also some essential subsistence use of reindeer) and with human predation on

the herd similar in some ways to that of hunters (but also with efforts at herd protection from nonhuman predators).

Once reindeer herding becomes enmeshed in a market economy—with slaughterhouses, advertising, and distribution firms—other interests besides those of the herders make themselves felt, and it seems unavoidable that strong pressures of "rationalization" will be brought to bear on what becomes termed "the reindeer industry." Of course, many of the methods employed to increase the efficiency and thereby the profitability of reindeer herding prove beneficial to the herders, but this is far from always being the case. Broadly speaking, one can discern two forms of rationalization applied to traditional reindeer herding: so-called structural rationalization and production rationalization. The first refers to herd size and work force, that is, to redesigning the general structure of the labor force and its relation to land and animal property. Not only is it important to arrange the optimally sized herd and the labor force for it, but structural rationalization is also concerned with the type of work organization: collective or private ownership, salaried labor, or unsalaried family business. The second, production rationalization, refers to the actual working methods and husbandry decisions to be made within this operational form to maximize return from the resources, such as slaughter policy, herd age/sex composition, and selective breeding.

The structural rationalization of reindeer herding is naturally subject to the various political ideologies of the controlling nations. Swedish authorities, while admiring the benefits this has brought Soviet herding through matching herd size with appropriate labor force (Renutredningen, 1960: 61), could not simply annul the private reindeer holdings of the Saami to apportion as they saw fit. Instead, the government has attempted to "weaken the connection between reindeer-owner possession and herding entity" (SOU, 1968: 16). In effect, the Swedish state has attempted to collectivize work methods while maintaining private ownership of the deer. In the 51 Swedish herding territories, *Samebys*, regulated under the Reindeer Act of 1971, each herder is supposed to pay the communal *Sameby* treasury a set sum per head of deer he owns, and this money is then to be used to pay the daily wages of those herders sent out by the group to do a certain job according to a rotating work system. In this way, big herders pay more than small, and only those actually needed for a task shoulder it. The traditional system whereby each family with reindeer in a mixed herd contributes to the labor force for each and every herding task is considered antiquated, for it can put a far greater number of herders in the field than necessary to do the job at any one time.

In Alaska, herds are privately owned, but the large native Regional Corporations established pursuant to the Alaska Native Claims Settlement Act of 1971, accepted as juridical persons for herding purposes, can also host a herding enterprise. Corporation herds are thereby owned by a shareholding organization; herders are salaried and generally do not own a single head of their own. The ranges are leased to individual herding enterprises. Although some deer might stray into a "foreign" range, they are not meant to share

rangelands during any season. Herd separations are not on the schedule, and the different herd owners rarely work together.

Some of the highly variable organizational and legal aspects of herding in different countries have been mentioned elsewhere. In the following section attention will focus on the more general issues of rationalization, those related to production rationalization.

Calf Slaughter, Herd Composition, Grazing Rotation, and Selective Breeding: An Outline of Rational Policy

On the whole, within the bounds of practicality, herders have traditionally tried to arrange the slaughter of animals for meat production after the animals have reached their peak weight. The more an animal weighs, the more money will be generated by its sale. Rational principles, however, extend the sphere of economic gain to consideration of grazing as well. Accordingly, per unit consumption of grazing, the maximal meat production will be attained by a system of calf slaughter. Since the mortality of reindeer is extremely variable with age, and since the yearlings are hit very hard, especially during the first spring after their birth, it would be most rational to slaughter them for sale during their first year. The best time for slaughter would be in the autumn (in many herding contexts, just when the deer have reached the lowlands, where the transportation facilities are good), before they have been able to consume much winter grazing. Winter pasturage is commonly the bottleneck of the seasonal grazing cycle, so it is deemed advisable to spare its use for a herd of most regeneratively explosive character (a so-called "stock herd"), that is, one composed basically of females.

The herd's economically optimal composition is defined by both sex and age. Full-grown bulls are dubbed "grazing thieves," and—as their production, measured in kilogram of meat per grazing consumed, is lower than that of reindeer cows and their calves—bulls are regarded as desirable only to the extent that they are necessary to impregnate the reindeer cows. The object is to have the largest stock herd possible within the limits of winter-grazing capacity. This figure is called the *rational reindeer-population figure*, calculated, of course, so as to utilize winter grazing maximally without endangering its regenerative capacity. At the same time, the stock herd should retain a sex/age composition that will produce the most calves without endangering constant regrowth or replacement of the same winter-stock herd. Based on such considerations, a herd of 1,000 animals should include 600 females and about 40 breeding bulls. The remaining animals are those young animals and calves necessary to ensure the supply of adults.

Realization of a proper slaughter system with regard to the sparing of an optimally composed, winter-stock herd requires very complete knowledge of the herd. Along with such intimate herd knowledge, rational principles can be taken even further with the application of *selective breeding*. Not only is it most

advantageous to have a stock herd of proper age and sex composition, but productivity will be further enhanced if these animals are purposely selected for their favorable qualities. Reindeer cows with the best motherhood qualities and with the largest young or bulls that grow most quickly, for example, can be selected before others in hopes of raising the herd's meat production.

Since the size of the stock herd is regulated usually by winter-grazing capacity, it is advisable to permit different areas to recover for 2 years after heavy grazing. Rational principles suggest a division of winter grazing into three areas, with rotation around these zones from year to year. Moreover, as there is usually a relative abundance of bare-ground grazing, it would obviously be of enormous economic value if winter capacity were somehow brought more into line with bare-ground capacity. Unfortunately, in Scandinavia at least, it is precisely in the winter lands that land encroachments have struck hardest. Artificial fodder has been widely used as emergency food during bad winters, but, according to the principles of rationalization, meat production can be substantially increased by the considerable and regular introduction of fodder to raise the size of the winter-stock herd.

Critique of the Ideals of Production Rationalization When Misapplied

Obviously, the factors of calf slaughter, age/sex composition, selective breeding, pasture rotation, and stock herd closely interrelate, with failure in one aspect potentially wiping out gains in others. Moreover, a high degree of collective cooperation is required, usually all at once to be successful. In other words, should one herder ignore the collective slaughter policy, he may negate all the efforts to maintain the rational, winter-stock herd. He may easily make all attempts at selective breeding futile, and his herd may trample and deplete winter-grazing zones spared for later use. Rational husbandry demands unified policies and actions, whereas, traditionally, husbandry decisions were fiercely guarded individual rights. Needless to say, rational principles cannot be applied without a radical effect on the traditional cultures of reindeer-herding peoples. The success of production rationalization depends to a great extent on the success of structural rationalization. In Sweden, the authorities have often frowned on the "out-moded traditionalism" of the Saami and naively attributed the many problems of rationalization to the reluctance of the Saami to try new ideas. It is plain, however, that policies that depend on collective ideals are not willingly accepted by the herders "enlightened" by those policies when the herders operate under a system of private reindeer ownership. The market's perspective of what is rational may not be at all rational to the individual herder.

For example, the most economical utilization of grazing becomes a truly vital consideration only when both a high reindeer/grazing land ratio is achieved (the rational reindeer limit) and competition between herders for grazing is eliminated or greatly reduced. Where there is a low reindeer/

grazing land ratio, conservation of grazing and rationing for maximal meat production are unnecessary. The herder stands to gain much more profit if he can sell his slaughter animals fully grown (see Figure 9.4). By allowing his male calves to grow to peak weight, the herder does not deprive other reindeer of grazing. It makes no difference if the bull's rate of growth is slower than the calf's when there is grazing enough for all. Moreover, when there is competition between herders for grazing, if one herder takes to calf slaughter, thus limiting his grazing consumption, the grazing he saves may simply be consumed by another herder, who profits by allowing his reindeer to grow to full maturity. Rational herd composition and selective breeding stand or fall to a great extent with calf slaughter. In a herding context in which vital variables are not totally controlled by man, gains to be had through refinements such as selective breeding are largely lost. Where predators and bad winters can decimate winter-stock herds drastically in a few months, destroy selected breeding stock, and furthermore throw any efforts at rationalization into imbalance by totally altering the reindeer/grazing land ratio, it seems inefficient to persist with the methods discussed above to increase efficiency. Greater gains are to be made through efforts in other directions, such as

FIGURE 9.4. September in the Swedish mountains: prerut bulls selected for slaughter are pulled from the corral. (Photo: HUGH BEACH)

reducing calf mortality and hunting predators. Hence, the system of grazing conservation and slaughter recommended by herding authorities is rational only under certain circumstances.

Where humans do indeed manage to establish control over pastoral determinants (such as in the controlled environments of the barnyard), steady levels of maximal production under the rational principles outlined above might be realized. However, from the perspective of total ecological adaptation, this too will demand a price in reduced flexibility. For example, selection of reindeer for fastest growth alone may lead to serious problems. The largest calves (of the same age) are usually the first to die during a catastrophic winter. Although the male calves will have been slaughtered earlier in the autumn if rational procedures are followed, the traits for which they have been selected will also characterize the female calves and those saved to refurbish the stock of breeding bulls. There is a danger in breeding a stock of animals for the maximization of traits attractive to human beings if this leads to the weakening of the survival capacity of the reindeer stock. The increased vulnerability of the reindeer population will call for increased control of their environment; the use of artificial fodder, for example, might be demanded, whereas it had not been before. The altered age/sex composition of the herd, which largely eliminates old, nonbreeding bulls or castrates, deprives the herd of an important resource. It is these animals that are most knowledgeable, that often lead the herd, and that are a calming influence in corrals and on migration. Their loss will tie management into methods of control requiring increased mechanization, and a resulting increased need of cash. Herds that are habitually trucked to their grazing lands soon lose the ability to get there on their own.

Despite the counterproductivity of introducing rational policies that are largely ineffectual and incompatible with both private ownership and the traditional cultures of herding peoples, market pressures and government legislation nonetheless frequently promote such policies. It is unfortunate that so many of the mistakes made in the raising of domestic farm animals should be uncritically repeated with reindeer. This is not to say that all rationalization efforts are categorically worthless, only that they must be tailored to the existing conditions of reindeer management in each locality.

Encapsulation by Nation-States

Traditional reindeer pastoral adaptations have been increasingly encapsulated by the economic, legal, and administrative regulation of the nation-states involved. Reindeer-herding societies have traditionally been acephalous, without a strict hierarchical structure of leadership or bodies for the enforcement of decisions. This does not mean, however, that these societies have lacked organization or controls, only that these have frequently been invisible to outside observers such as the majority population encompassing them. What

between Saami herders is a very clear warning against continued grazing encroachment might be construed by the authorities as a simple case of rustling (R. Paine, personal communication).

With increased integration of pastoral economies in the monetary market, and with the spread of political ideologies and territorial claims over the grazing lands of pastoralists, herders have been forced to adopt regulatory methods and modes of communication visible to the authorities. For example, the complex system of reindeer earmarking is now heavily controlled by the Fennoscandian governments. Only certain kinds of cuts can be made, and only in certain numbers; a herder might be allowed to possess only one mark, and all marks must be registered with the authorities. Similarly, governments often require detailed reindeer counts, and these figures can be essential in determining a herder's tax. In Sweden, a new tax reform in 1978 for herders stipulates that they must now reveal all their expenditures as well as their incomes. In order to ensure good meat quality, but also to deter unrecorded private sales, governments might demand that all deer meat be subjected to veterinary inspection before sale. A common method used to induce the herder to sell to official slaughterhouses and to promote calf slaughter is for governments to grant a subsidy to herders paid per reindeer carcass delivered to veterinary inspection. The herder receives the same amount (or maybe even more) in subsidy for a calf as for a full-grown deer, thus compensating in part for the weight loss in slaughtering a smaller animal.

Governments may be quite generous in providing reindeer herders with regular support or aid during catastrophes, but generally are quite specific about management procedures required to qualify for it. Step by step, native codes and routines are being replaced. The authorities generally demand that interaction with them be done on their terms, in their courts of law, or through their administrative bodies. Largely in response to this, herders in many countries are now organized politically. Since reindeer herding is often strictly a native pursuit, these national herding organizations are sometimes linked to international councils that champion the cause of native peoples.

Reindeer-herding rights or reindeer-ownership rights (as previously noted, the two are often quite distinct) have been secured for natives alone in many northern countries on the basis of the immemorial land utilization of natives. As a result, reindeer-herding rights frequently are of significance within the larger context of native minority rights. The Alaskan Reindeer Act of 1937 established indigenous claims to certain resource rights previous to those established by ANCSA. In the face of impending "termination of exclusivity," whereby nonnatives can buy a controlling interest in the Regional Corporations (Beach, 1985), the more such holds natives possess and the more special rights they actively practice, the stronger their position in any legal confrontation.

In the case of the Saami in Sweden and Norway, reindeer-herding rights along with some contested hunting and fishing rights are the only expressions

of special native rights. Here, reindeer herding is of paramount importance in the native struggle for self-determination and at the very foundation of native cultural life. Scandinavian court rulings on native land rights in particular zones depend heavily on evidence concerning past herding practices there and the legal status granted herding by past governments. These are still vital issues today, as recently expressed in the 15-year-long court battle of the Swedish Saami, the Sakttefjäll case, which was concluded by the Swedish Supreme Court in 1981. In Scandinavia, confrontations over reindeer grazing rights between natives and their nation-states and the resulting legislation carry all the weight of native minority settlements in North America. It seems that, on the one hand, advances of industrialization in Scandinavia lead to increasing conflict with herding interests and thereby to issues of native rights, whereas, in the momentous settlements between native groups and their nation-states in North America, herding is a very subordinate issue.

In Sweden, a most significant form of encapsulation of reindeer herding concerns the very foundations of native herding rights. Over the years there has occurred a gradual but definite transition from the recognition that Saami herding, hunting, and fishing are based on *rights* to the view that they are *privileges* granted the Saami by the state (Cramér, 1986). Under this perspective, the Saami are permitted to herd in order to help preserve their unique culture, but if the state sees fit it can terminate or reduce that "privilege" without due process of law. This transition of perspective goes largely unnoticed, for the state might not choose to apply new constraints, but it is all the while documenting its right to do so without question.

Land Encroachment and Industrialization

The ever-increasing encroachments of extractive industries (the timber, mining, hydroelectric power, and even tourist industries) in the North combine to create a serious threat to the reindeer herding of some countries. Unlike the situation in North America, Greenland, and the Soviet Union, herding is spread over a large portion of the Fennoscandian countries, which also have considerable industrial development in these same herding areas. Conflicts are inevitable and focus not only on the loss of total grazing area but also on the loss of strategically important pasturage, natural land formations, and calving lands. The combined resistance of the Saami and conservationists to the construction of the Alta hydroelectric dam in Norway (Paine, 1982) was a significant factor in the fall of the Norwegian government and the institution of Saami Rights Commissions in Norway and Sweden.

Northern industrialization has also brought a flood of nonnative laborers to these areas, fostered new dependencies by the native populations, and reduced their political influence in their own "core" districts. Naturally, one cannot take the position that traditional cultures should be frozen in time and

that all modern developments are poor. It cannot be denied, however, that the northern industrialization of many countries has decreased the ability of reindeer herding to serve as a livelihood. Herding can support fewer active herding families, and rationalization efforts generally favor the survival of large-scale herding enterprises. While some argue that industrialization offers new job opportunities to those who might otherwise have commenced a herding career, thereby luring them away from their traditional livelihood, others argue that these same jobs provide those individuals who would leave the herding livelihood anyway a means to stay within their home districts.

In Fennoscandia, herders themselves often take part-time, nonherding jobs during slumps in the seasonal herding work schedule, and in many ways modern developments aid the herder in his herding work. In Alaska, herding is a part-time job taken by most herders during slumps in the regular cycle of other more traditional subsistence activities. Even among the handful of reindeer-owning herders in Alaska, herding is far from a full-time occupation. The lack of engagement with herding in Alaska, however, is hardly a consequence of industrialization. In fact, it is largely following the sudden economic power of the Alaskan native corporations that herding has enjoyed something of a renaissance.

It could be maintained, however, that reindeer herding in both Fennoscandia and Alaska have come to rely on funding provided by government compensation. Without the billion dollars provided by ANCSA and divided among the native Regional Corporations of Alaska as compensation for lands lost to the government, it is doubtful that herding would have enjoyed its recent renaissance. As the corporation economy grows tighter, herding efforts may well deteriorate. Similarly in Sweden, large amounts of compensation are paid by the government to the *Samebys* for the industrial exploitation of their grazing lands. Compensation money bolsters the collective *Sameby* treasury and funds improved communal herding installations and expensive mechanical equipment. The *Sameby* runs the danger of locking itself into a mode of operation based on an artificial prosperity gained by the sacrifice of its own resources.

In the Soviet Union, conditions are quite different. Although there are trouble spots, the vast wilderness of Siberia has room for both reindeer ranching and heavy industrialization without endangering the very existence of herding. Even here, however, environmental devastation has affected natives, yet herding has not become "overextensive" or overly mechanized. Most significantly, reindeer herding is a matter of great importance to all people in the Soviet North. Reindeer meat represents a valuable source of protein for the entire population, thus aiding rather than hindering industrial advance.

Recruitment Problems

There is, however, at least one trend common to all herding areas: the decline of able herders. Not only has the number of new recruits interested in making

their living from herding declined, but it is difficult for them to obtain the skills of their parents. In Sweden, structural rationalization recommends (and stimulates) a reduction of the labor force by one-third, but no thought is given to how large the herding group must be to regenerate itself. The status of herding as a small, subsidized industry in the path of industrialization does not inspire confidence among youths weighing career options. Herding in Alaska has never enjoyed much popularity among Alaskan natives, for whom it is neither a necessary replacement for subsistence hunting nor an occupation to which they have traditional ties. In the Soviet Union, the herding *sovkhozes* engage in numerous activities other than herding and provide their members with new opportunities and educational choices. The children of herders often choose nontraditional professions that assure them a life of greater comfort. In the Soviet Union, where reindeer herding is of importance to the state, incentives are given to maintain the herding population. Reindeer herders are among the highest paid workers in the Soviet Union, and they enjoy a number of benefits, such as annual paid vacations anywhere in the country. Nonetheless, recruitment is difficult.

The new herding generation in all countries follows a school curriculum in most respects equivalent to that of children elsewhere. There may indeed be special classes in reindeer management, with elements such as training in the repair of snowmobiles or the theory of rational production ideals, but these also demand knowledge that is not specific to herding. As is often the case, exposure to nontraditional knowledge leads to interests in nontraditional occupations. Moreover, actively herding parents often complain that their children, forced to attend many months of school, are unable to learn herding during summer vacation. School-trained herders generally lack the experience of their parents and rely instead on mechanical equipment. Lack of experience and intimate knowledge of reindeer and the land lead to an extensification of herding form. An overuse of mechanical equipment is also likely to promote extensivity of management, i.e., loose control of the reindeer and greater distance between herd and herder for longer periods. The funds needed to bear the cost of mechanization demand that herders spend time in other pursuits with less time for herding, thus cementing the generation of what might be termed "the extensive spiral."

In closing, it is appropriate to mention some of the other current problems besetting reindeer herding which, even if not generally applicable, are nonetheless of major importance in certain areas. As noted, the effect of wild reindeer (caribou) herds on the herding of tame stock can be devastating. In Fennoscandia, isolated small wild herds of mountain deer exist only in Norway. (Finland contains minor numbers of wild forest deer.) Although these wild reindeer may indeed cause some trouble for the herders of tame stock nearby, they do not pose as great a threat there as they do in North America and the Soviet Union. In Alaska, the caribou have been known to destroy entire herding enterprises, and the herding that does continue is seriously crippled by absorption of reindeer by the caribou herds.

The caribou threat is not constant, however, and depends on shifts in their migration routes and grazing patterns, as well as on herd size. Currently, the Western Arctic caribou herd has been penetrating deeply into the Seward Peninsula, the heartland of Alaskan reindeer herding. The Mackenzie Delta herd is currently also hard pressed by caribou, and wild herds in the Soviet Union have apparently swollen and invaded the rangelands of some *sovkhozes*. Soviet herders have had to abandon pastures to the wild reindeer (G. Grachova, personal communication).

Conservation interests have been increasing, and although these are often allied with herding interests against heavy industry, they are not necessarily without negative effects for herders. The creation of large national parks may protect the environment against exploitation by timber, mining, and hydroelectric industries, but park regulations might also hinder herders in their traditional herding pursuits. A general ban on the driving of snowmobiles on park territory, for instance, would be a serious blow to herders. Legislation against hunting or net fishing on park land, if applied without consideration for herders, could also prove devastating. Herders' special rights to resource utilization are frequently ignored, especially once these have been redefined as privileges. Of course, conservationists become perturbed when witnessing reindeer roundups with the use of motorbikes on park territory, and compromises will be necessary. However, because of the pressures toward extensivity and rationalization, herders often have little choice but to employ modern technology. To prohibit the use of such equipment and to force herding to continue only with traditional methods is to cripple the ability of herders to practice their occupation and, as many natives fear, to convert them into living museum objects for tourists.

Alaskan herding has been oriented largely toward the Asian antler market, but there are indications that reliance on this market could prove dangerous. According to the Asian consumer, the antler of *Rangifer tarandus* is not of the best quality compared to antler from other cervids. Already, Alaskan herding interests have had to buy up the entire antler crop of mule deer in China in order to force buyers of this antler to accept reindeer antler as well. Prices have not been stable, and one year's reindeer-antler crop has not been sold before the next has been harvested. Moreover, shrewd Asian businessmen plan to establish new antler-growing-deer (not necessarily *Rangifer tarandus*) farms on Asian soil, thus undercutting the Alaskan market. The antler market is definitely not one to carry the reindeer herding of Alaska or Canada on a permanent basis.

Without sizable external funding, herding enterprises in North America will probably not gain much permanency. Those that exist cannot truly flourish until the caribou have turned to grazing zones that do not impinge on the reindeer's range. However, if expenses are kept low and labor input is held to a minimum, profits can be considerable to a local community. If traditional subsistence resources become scarce, herding of domestic stock might grow in importance.

In Fennoscandia and the Soviet Union reindeer herding will undoubtedly continue to be of major economic and cultural importance. In the Soviet Union

large-scale reindeer ranching already exists, but in Fennoscandia growth toward ranching can be painful for the Saami. They face a difficult dilemma: large market-oriented ranching businesses seem to promise the best economic return (especially in the light of state policies fostering this development), and, with a rapidly rising cost of living, increased profits are most attractive. At the same time, traditional Saami social relations, with private ownership of reindeer (elements intimately tied up with the hard-pressed native minority rights of the Saami), do not support such a move.

It appears that reindeer herding faces its brightest future in the Soviet Union. Here, the traditional expertise of native herders can be employed within a full ranching contest; reindeer herding is of national importance—not a concession for cultural preservation—and herding complements rather than competes with subsistence hunting. Moreover, herding has not become overly extensive and totally dependent on the use of machine transport. The state actively seeks to counter the drop in herder recruitment. Extractive industries encroaching on the land have not pressed the reindeer enterprises to the wall, and legislation (for better or worse) has not linked reindeer herding in a narrow fashion to broader minority rights issues.

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