WILDLIFE PRODUCTION SYSTEMS

Economic utilisation of wild ungulates

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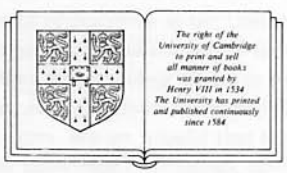

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SECTION D

Herding

L. M. BASKIN

In the vast expanses of tundra, dry steppes, deserts, and mountains, range livestock husbandry is the only realistic means of developing agricultural potential. Although pastoralism is a widespread production mode for domestic animals, it is less common for semi-domestic and wild species. Except for experimental attempts to integrate oryx (*Oryx beisa*) into traditional pastoralist systems in East Africa (King *et al.*, 1977), herding is largely limited to reindeer (*Rangifer tarandus*) as described in the following chapters. The purpose of this introduction is to establish the basic ethological principles of herd control.

The most important behavioural characteristics governing biocenotic relationships (interactions of animal populations with plant cover) in extensive herding systems relate to *ethological* and *spatial* population structure. The former comprises such characteristics as group composition, hierarchy, leaders, distances between animals, and the phenomenon of territoriality. The latter reflects the use of home range and seasonal pastures, each including several home ranges and migration routes.

Ethological structure

Herd control is based largely on the defensive behaviour of animals, but other forms of activity are used. Responses in which one urge predominates contrast with those operating when several urges are combined. In the former case, the animal responds in a much more automatic 'need–stimulus–action' sequence (Craig, 1981). The range of possible reactions is predictably narrowed by properly streamlining behaviour. For example, a quietly grazing herd will not follow an artificial leader – they must be disturbed so they gather into a compact mass.

In order of decreasing magnitude, motivations form the following hierar-

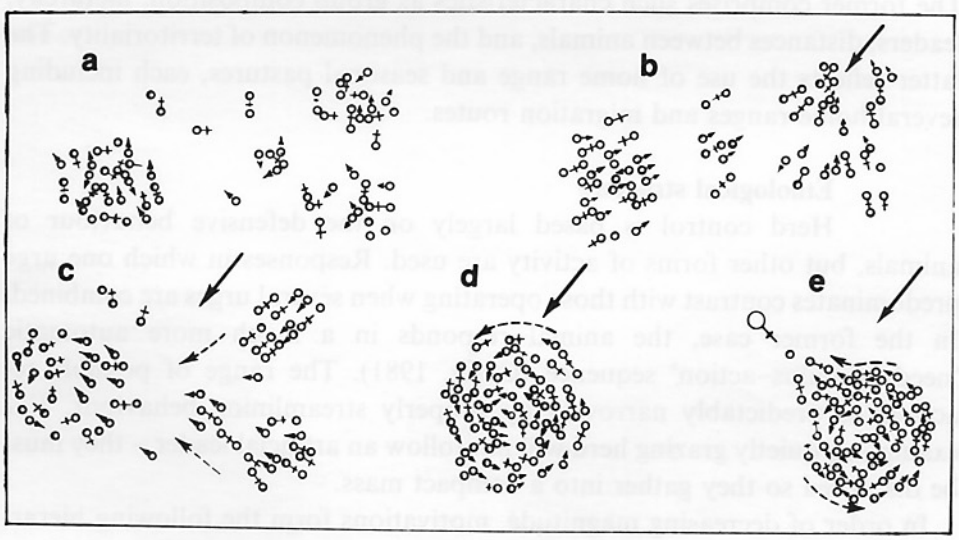
chy: defensive–sexual–maternal–feeding–comfort. A given motivation is easier to replace by a stronger motivation than a weaker one, although exceptions occur. For example, sexual excitement and associated aggressiveness often eliminate shyness of people. Feeding dominance in reindeer during spring attenuates responses to calls and threatening gestures. At that time, only setting a dog makes it possible to group the herd. Changes in the activity and attenuation of reactivity also can be accomplished by driving animals to moderate exhaustion.

Leaders

The tendency of herds to follow the first animal to leave the herd (leader) makes it possible to control movement by leading an artificial leader in front of the herd. Goats, asses, a dog, or the herdsman can serve as artificial leaders in sheep flocks; and riding deer serve a similar function in herds of domestic reindeer.

Many herd members are potential leaders and it is possible to determine which ones (Fig. D.1). The propensity of certain individuals (leaders) to leave the herd in a dangerous situation is related to their sensitivity to the stimulus

Fig. D.1. Selection of leader in a reindeer herd: a, reindeer are grazing quietly; b, orientation reactions to sudden danger; c, gathering into a compact group (knot); d, movement of deer on the spot; e, the leader is found and the herd is following it. Solid arrow, direction of danger; dashed arrow, direction of movement of deer; circle, calf.



which may arise from general shyness and/or specific experience. Their propensity to leave the herd also is determined by herd size. In a large herd, animals feel safer and are better protected from blood-sucking insects.

Although any animal may leave the herd, its subsequent behaviour is labile. Young and, to some degree, adults are governed by natural reactions formed via imprinting, operant learning, and imitation. A natural reaction to danger is the tendency to escape upwind or upslope, which enhances perception of olfactory cues and visibility, respectively. Also typical is movement along visible landmarks: ravines, river beds, or even foot-tracks and the urge to return to the previous feeding site. Of course, these responses are species-specific.

It is almost impossible to manage a herd without a leader. But in some situations, herds simply may not have potential leaders. Such is the case in northern reindeer husbandry when animals are driven from herd to herd, to butchering points, etc. Some herds, such as those composed of calves or young alone, move only in a definite direction when frightened by man (upwind, upslope, to a definite place). If a single female or several riding males are added to the herd, or an adult male is led in front of the herd, the herd becomes manageable.

Experienced herdsmen understand the necessity and have the ability to identify leaders enabling them to control the herd even in unfavourable situations. Under insect attack on hot summer days, reindeer gather in a compact mass, which continually mills in a circle. At that time they are difficult to handle, and generally can only be moved upwind. However, by identifying and directing potential leaders, the herdsmen can often succeed in moving the herd downhill. The complexity of the situation is that both male and female potential leaders are normally within the herd, while the young rotate in a circle in the outer rows. Herdsmen attempt to move potential leaders to the forage, whereupon they are driven in the needed direction (Fig. D.2).

Rigid and flexible management

Rigid herd management is applied in capturing wild or domestic ungulates. Saigas can be captured by the *bound circle* method, in which a vehicle circles the herd to gather animals in a compact mass, permitting a man to approach within 12–20 m. Horses, sheep, and yaks are captured by gathering the herd into a compact mass, in which the defensive distance is small. Reindeer are more shy and they are captured using their urge to associate with a larger herd.

Rigid management is often used when animals must be counted. Use is

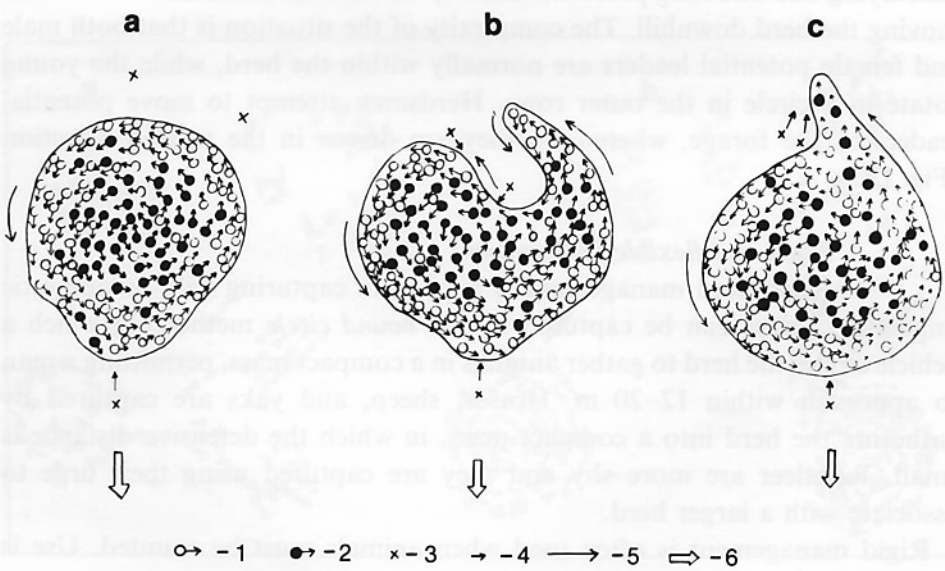
made of their urge to run from where they are harassed to join their companions standing quietly aside. In reindeer, several riding deer are leashed aside from the herd. When the herd is harassed, the animals make a short cut to the tethered deer, passing through a gap where they can be easily counted.

Flexible herd management is applied in a quiet situation when different forms of activity are combined. Without ceasing grazing, animals strive to keep a safe distance from the herdsmen, responding to changes in the direction of the herd movement, etc. The relationship of different forms of activity changes continually. With satiation, food reactions of the animals are inhibited, and their defensive behaviour varies with the action of the herdsman.

Using different techniques, the herdsman may affect the relationship of activity elements, enhancing some and inhibiting others. A good herdsman achieves an equilibrium of defensive and feeding reactions. With an inexperienced or inattentive herdsman, the herd either scatters freely over the pasture using areas different from those planned, or badly frightened, discontinues grazing to gather into a compact mass (Baskin, 1974).

Flexible management is very important in rotating herds which are grazing on the move. In reindeer herds, the rear and front parts of the herd differ in the number of potential leaders. Hence, the front part of the herd, more

Fig. D.2. Movement of reindeer herd by herdsmen from the rotation site during the activity of blood-sucking insects: 1, reindeer; 2, potential leader; 3, herdsman; 4, direction of driving by herdsman; 5, direction of herd rotation; 6, wind direction.



excitable and less definite in its actions, tends to rotate quite readily. The rear portion is quieter and more docile. To rotate the herd, one herdsman puts pressure on the rear portion of the herd from the side, while the other holds back the front deer causing the herd to reverse its direction. At the end of the manoeuvre, the front-line deer (normally young and leaders without calves) pass through the herd to the front rows again.

Spatial distributions

Ethological distances

Several ethological distances are relevant to herd control (McBride, 1971; Syme & Syme, 1979). *Individual distance* is two or three lengths. At this distance, signal postures are demonstrated and vocal signals are exchanged between a male and female or a dominant and a subdominant. *Herding distance* is one at which herd members coordinate their behaviour. Also at this distance, they communicate and receive signals with regard to the ambient environment and follow leaders. *Species-specific distance* is the

Table D.1. *Distance (metres) between animals during grazing and resting.*

Species	Grazing		Resting	
	Individuals	Herds	Individuals	Other species
Asiatic wild ass (*Equus hemionus*)	7.1 ± 0.9[a]	45 ± 17	—	—
Domestic horses (*Equus caballus*)	5.1 ± 0.4	50 ± 11	9.5	500
Arabian camel (*Camelus dromedarius*)	7.7 ± 2.0	130 ± 45	—	3000
Reindeer (*Rangifer tarandus*)	3.0 ± —	25	—	500
Yak (*Bos grunniens*)	7.6 ± 1.3	—	—	—
Saiga (*Saiga tatarica*)	5.0 ± 1.4	—	2.7 ± 0.5	600
Argalis (*Ovis vignei*)	2.6 ± 0.3	—	2.5 ± 0.3	1200
Domestic sheep (*Ovis aries*)	1.7 ± 0.3	25	1.2 ± 0.3	200

[a]Means ± standard errors.

distance at which conspecifics are distinguished and mating partners are sought. There is considerable interspecific variation in these measures (Table D.1).

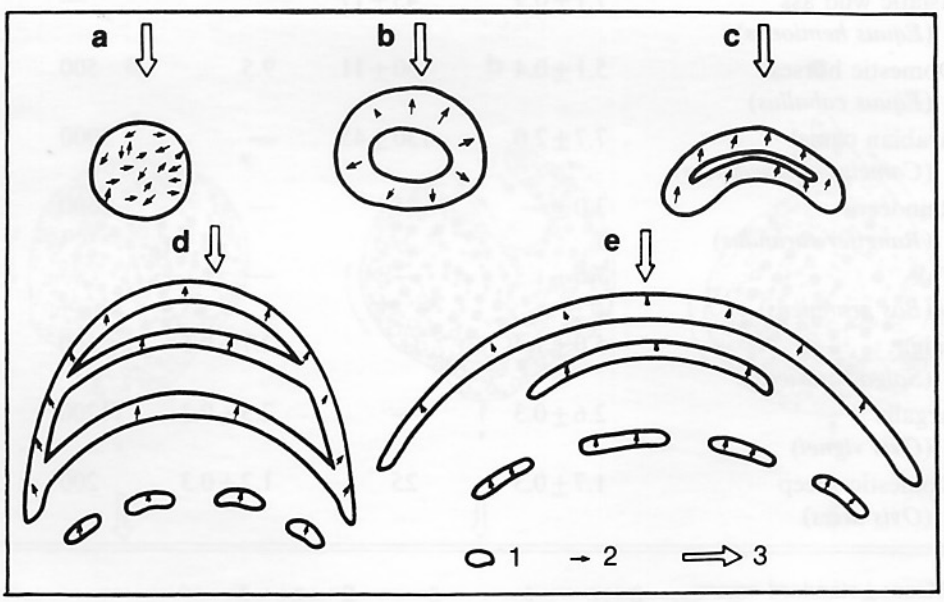
Herding patterns of domestic sheep, argalis, and horses are influenced by individual distances (Fig. D.3). The scattering of animals is discontinued when the space between the neighbours on the right and on the left reaches the individual distance. However, familial and personal relationships somewhat complicate the pattern and one can often see that the arc is formed not by individual animals but by groups. Among horses, a compact mass is split up in an arc pattern into individual harems (Fig. D.4).

At the herding distance, animals best react to the manoeuvres of the man – the movements of his hands on his lasso. The species distance determines the possibility of herds (*kazakhs*) of horses and camels approaching one another without male aggression, particularly during the rutting period (Baskin, 1982).

Predicting movements

Siting corrals and searching for lost animals requires the ability to forecast behaviour. Long-term (weeks and months) forecasts are possible if the seasonal pastures of the population, major routes, and probable dates of migration are known in relation to prevailing weather conditions.

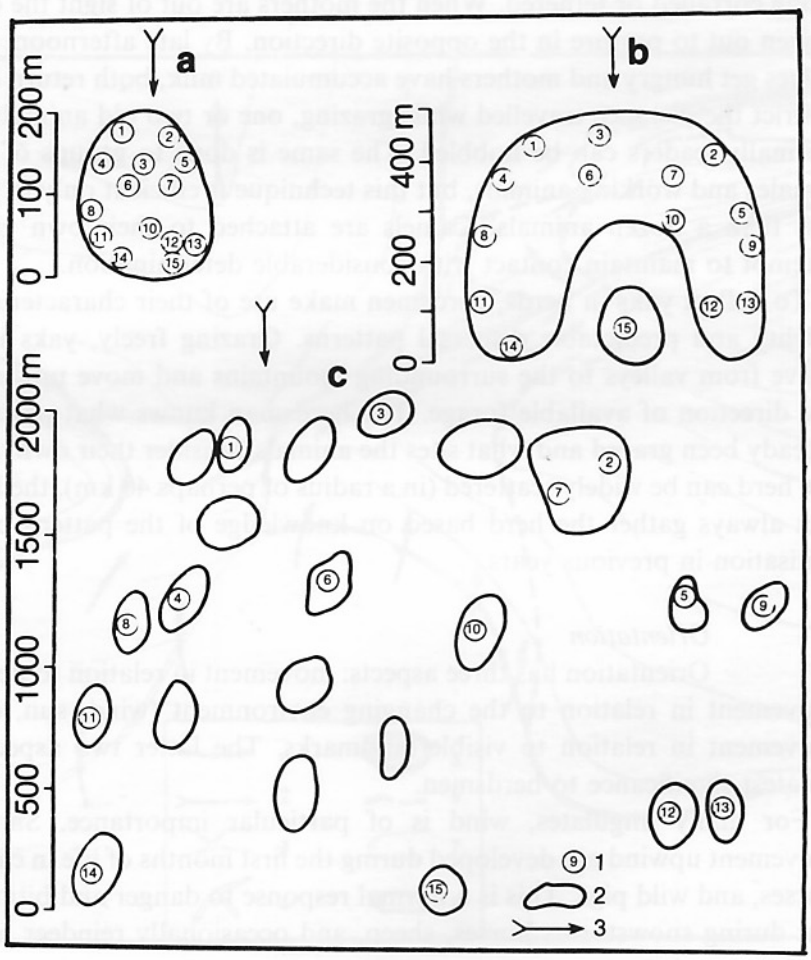
Fig. D.3. Movement of the herd in an arc pattern: a–e, sequence stages; 1, shape of the herd; 2, direction of the movement; 3, wind direction.



The diet of all domestic and wild ungulates of temperate and high latitudes is characterised by sharp seasonal differences in nutritional value (Kilgour & Dalton, 1984). In autumn and snow periods, they normally consume feeds which are rich in carbohydrates but poor in proteins and minerals. The growth of animals and restoration of skeletal and muscular tissues are only possible by consuming green plants. Hence, the season of feeding on green plants, particularly new growth, should be as long as possible.

In temperate and high latitudes where seasonal changes vary with latitude, altitude, or distance to the coast, the duration of green plant consumption can be extended through migration. Domestic reindeer herds start their migration northward to the coast or mountains roughly 20 days after the

Fig. D.4. Dispersal of a taboon during grazing in summer. 1, numbers of stallions; 2, outlines of definite groups; 3, the wind direction.



snow has melted. On summer ranges, the vegetation develops 15–20 days later than on winter ranges. In autumn, the herds return to use ranges where wilting of vegetation is delayed. The capacity for remembering habitat features and responding with migration is best developed in horses, camels, and yaks, so that when pasture is allotted correctly the herds hardly need to be tended. Domestic sheep are less likely to return on their own to the sheep-cote where they spend the night or to watering points.

Patterns of range use can be reinforced by herdsmen. In camel husbandry, a number of techniques are used to encourage animals to return on their own. It is not difficult during the watering season when natural waterbodies dry up and the camels come to the well on their own at one or two-day intervals. In spring, when the green plants contain much moisture and there are occasional ponds, camels drink only rarely. To make them return each day for milking, the females are driven out to pasture after the sucklings are fed, the calves being corralled or tethered. When the mothers are out of sight the calves are driven out to pasture in the opposite direction. By late afternoon, when the calves get hungry and mothers have accumulated milk, both return home. To restrict the distance travelled while grazing, one or two old animals who are normally leaders can be hobbled. The same is done to groups of pregnant females and working animals, but this technique is efficient only in groups of less than a dozen animals. Camels are attached to their own group and attempt to maintain contact with considerable determination.

To collect yaks in herds, herdsmen make use of their characteristic range fidelity and predictable dispersal patterns. Grazing freely, yaks invariably move from valleys to the surrounding mountains and move upwind and in the direction of available forage. The herdsman knows what pastures have already been grazed and what sites the animals consider their own. Although the herd can be widely scattered (in a radius of perhaps 40 km), the herdsman can always gather the herd based on knowledge of the pattern of pasture utilisation in previous years.

Orientation

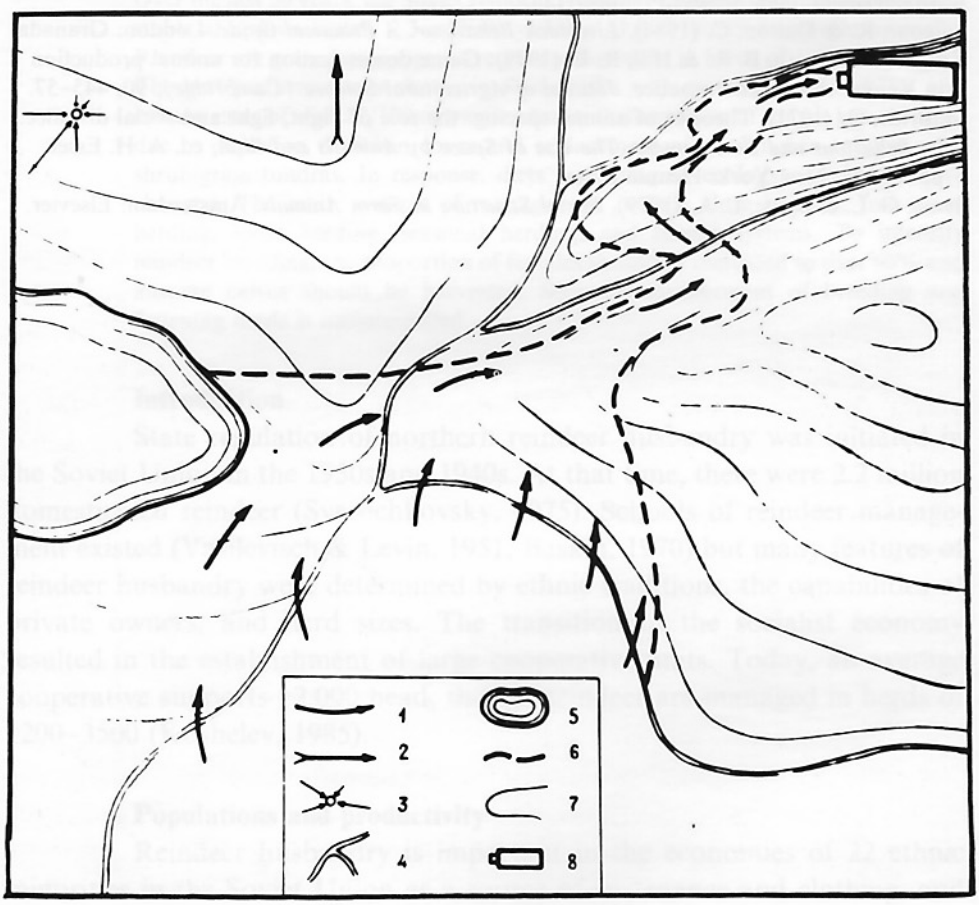
Orientation has three aspects: movement in relation to neighbours, movement in relation to the changing environment (wind, sun, etc.), and movement in relation to visible landmarks. The latter two aspects are of greatest significance to herdsmen.

For many ungulates, wind is of particular importance. Sniffing and movement upwind are developed during the first months of life in cattle, deer, horses, and wild pigs. This is a normal response to danger and biting insects, but during snowstorms horses, sheep, and occasionally reindeer may move

downwind. At lower latitudes animals may turn their backs to the sun when it becomes hot. Therefore, herdsmen often graze sheep and cows early in the morning in a southerly direction, so later, when the sun rises high, the herd will willingly turn home.

Relief, and above all slope, is of great importance. The possibility of improving observation by rising to an elevation is used by many animals – mountain sheep, goats, reindeer, camels, and many antelopes. Reactions of ungulates to visible landmarks have been long known and widely used by both herdsmen and hunters. Other things being equal, they move along river

Fig. D.5. Location of corrals based on terrain features. 1, direction of movement of deer; 2, general direction of migration; 3, 'rose of winds'; 4, rivers; 5, lakes; 6, walls of corral; 7, horizontal contours; 8, butchering.



beds, forest edges, along paths or following tracks. Animals can be directed, by fences or, in open country, piles of sod, stones, or scarecrows.

Reactions of animals to visible landmarks also determine the siting of corrals (Fig. D.5). Corrals for handling reindeer should be oriented with their mouth downslope or downstream since a herd is always easier to drive upwind and uphill.

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