



HAL
open science

Social and sexual spatial segregation of polygamous ungulates: proximate factors.

Richard Bon

► **To cite this version:**

Richard Bon. Social and sexual spatial segregation of polygamous ungulates: proximate factors.. Ongulés/Ungulates 1991, 1992. <hal-04716007>

HAL Id: hal-04716007

<https://hal.science/hal-04716007v1>

Submitted on 1 Oct 2024

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



HAL Authorization

In Ongulés/Ungulates 1991 (Spitz F., Janeau G., Gonzales G., & Aulagnier S. editors).
Proceedings of the International Symposium Ongulés/Ungulates 1991 : 195-198. Société
Française pour l'Etude et la Protection des Mammifères—Paris, and Institute de Recherche
sur les Grands Mammifères—Toulouse, France

Social and sexual spatial segregation of polygamous ungulates: proximate factors.

Social and sexual spatial segregation is common among many polygamous dimorphic ungulates living under temperate or mountain climates (Gonzalez, 1984; Bon, 1989, 1991; Main & Coblentz, 1990). The most relevant hypotheses proposed to explain sexual segregation are the following ones:

(1) In order to maximize their reproductive success, males avoid feeding competition with their potential offsprings and dams (Geist, 1971 ; Geist & Petocz, 1977). According to Geist (1971), Watson & Staines (1978) and Boyd (1981), the sexual spatial segregation is a male altruistic behaviour allowing females to maximize both energy intake and avoidance of competition for high quality forage.

(2) Morgantini & Hudson (1981) rebut the first hypothesis. They propose that in separating from females, males avoid costly fights outside the rut and therefore increase their individual fitness (see also Shank, 1985).

(3) In order to recover from the rut energetic expenses, Watson & Staines (1978) hypothesize that red deer bucks look for other mesic conditions (shelter, free-wind areas, ...) in winter. After the rut, only those males which retained their fat reserves are able to feed on gross forage, outside female ranges (Geist, 1982).

(4) The female remoteness would allow males to reduce the predation to which they could be submitted because of their horns or antlers and of their bad physical condition after the rut (Geist & Bromely, 1978).

(5) Shank (in Morgantini & Hudson, 1981) has suggested that the sexual ecological separation could depend on difference in body size. This argument have already been proposed by Geist & Petocz (1977) to explain partly the winter habitat use; sheep of small body size have more difficulty than those of large body size for walking in deep frozen snow coat. Seip & Bunnell (1985) show that bighorns in winter do not use areas where snow tops 30 cm and that might explain why female and young males use more the cliffs than mature rams. Nethertheless,

Morgantini & Hudson (1981) and Gonzalez (1984) found different results in winter: large rams avoid snowy biotopes which are frequently used by ewes and lambs.

(6) Clutton-Brock et al. (1979) proposed that in so far as a large body size may be an adaptative feature to intraspecific fights and to maximize their reproductive success, males have to look for rich and abundant forage during summer when the body growth is maximum (see also Geist, 1982 and Staines et al., 1982).

(7) Females, mostly lactating ones, would have higher water (Desert Bighorn, Leslie & Douglas, 1979 ; Mule deer, Bowyer, 1984) or energetic requirements (Clutton-Brock et al., 1982a,b). Clutton-Brock et al. (1982b) also note a spatial segregation with a diet differentiation between lactating and non-lactating hinds. These latter have intermediate habitat choice between lactating hinds and bucks.

Shank (1982), Staines et al. (1982), Bowyer (1984) and Krausman et al. (1989) discard the hypothesis that differential feeding preferences determine sexual spatial separation. Bowyer (1984) suggests that the higher water dependence of lactating hinds could be responsible of such a phenomenon. For their part, Staines et al. (1982) suppose that the inability to forage enough digestible material compels bucks to ingest poorer foods. That might be enhanced when they use poorer pastures, looking for shelters, and because of some unknown social causes.

(8) Bowyer (1984) observes that if female mule deer exploit areas richer in water and in forage quality, they live in higher local deer density. Consequently, feeding availabilities become similar for males and females. Clutton-Brock et al. (1982) report that the extent to which red deer socially and spatially segregate depends upon ecological conditions: it is less pronounced when feeding areas are improved. They conclude that males avoid areas supporting low forage biomass, and are passively excluded by females (Clutton-Brock et al., 1987).

(9) More recently, Verme (1988) suggests that male cervids segregate into habitats where the risks of damaging their antlers is reduced and that enable them to establish hierarchical dominance. Such a social hypothesis has been already proposed. According to Shank (1985), male repartition is a compromise between feeding resources and isolation reflecting the social intolerance of old billies. Ordway & Krausman (1986) think that diversity and complexity of habitat in male mule deer would better result from social factors.

Indeed in sexual segregation, two processes are often mixed up: social and spatial segregation. Few studies consider the ontogeny of male and female separation. However, Geist

(1971) and Bon & Campan (1989) show that it is a gradual process. We suggest to consider male and female sociogeny as the main set of causal factors for segregation.

After the isolation following the parturition, whose duration is varying according to the species, the dam and its offspring(s) incorporate within a nursery group, providing to the young opportunities to interact with social partners. Although it is possible to record affiliative interactions with adults in some species, nurseries of young are commonly observed few weeks after births, sometimes supervised by one or few adults. Precociously, young develop a preferential social network between peers. Through their agonistic behaviour towards neonates, the adults often play an active role in limiting young's affiliative network.

Early in life, sexual behavioural differences arise. Male offsprings are more often engaged in sexual and contact plays than females, which better exhibit locomotor activities. Adult and offspring females avoid physical solicitations by offspring males which better interact with other young males. Further, it has been shown that young males interact more often with non-familiar conspecifics than females which limit their relationships to familiar animals. Young males exhibit a higher social independence.

Later on the mother-young bond weakens progressively mostly because maternal behaviour is vanishing. This leads to conflicts in which the young, during a regressive period, try to resist to separation. Weaning is a gradual process during which offsprings shift their attachment to peers. During the rut, breeding males may precipitate mother-young separation, especially if the young is a male. Peer groups are often observed during the breeding period. The extent to which a mother and her young reassociate later on seems depending on various factors such as the sex of the young, its social status, the social context, etc...

The period of birth is a second critical period during which mother and young are separated again when they still live together. While yearling females stay in the maternal home-range or in its vicinity, young males often disperse, alone or in peer groups. They sometimes gather in bachelor groups while yearling females live in nursery groups.

Yearling social preferences are prepared during their social ontogeny, through the construction of a specific network between peers. Further, specific affinities develop based on sex and social experience (among them, familiarity and kinship). This gradual social sexual segregation increases with aging. While young males are more or less grouped with adult females, the oldest males join them only during the breeding period.

Superimposed to that social process, adult males and females are also often spatially separated. Hypothesis presented above are so far unconfirmed. The most convincing ones are based on feeding behaviour and differential feeding requirements between both sexes. A different investment in the offspring caring might explain the higher dependence of females on nitrogenous digestible forage and the choice of safe areas during rearing period. However, in

dimorphic species, males grow relatively late and horns or antlers growth entails certainly higher energetic needs in spring and summer. Some evidences allow to discard that differential feeding preferences cause sexual spatial separation. Indeed it has been shown that at low density or when feeding availabilities improve, males segregate less from females. In some species, mixed groups are observed outside the rut and in other ones male and female ranges overlap.

Some works show a positive correlation between density and intensity of sexual spatial segregation. When density of animals increases, males would move apart voluntarily, may be because of passive competition, from areas elected by females. We also might hypothesize that males have a different space use from females. While females are very philopatric and faithful to their home range, males use a higher diversity of ranges and types of habitats. They seem less attached to a home range than females except during the rut.

In an alternative way, females around the parturition withdraw in more safe areas, often compromising foraging opportunities used by non-lactating females or males.

In presenting separately the social and spatial segregation, we do not pretend that these two processes are independent. Indeed, sexual segregation results certainly from complex relationships between animals, their habitats and their social interactions. We may conceive that social and/or spatial sexual segregation vary according to age and sex of animals, to season, to biotic and abiotic factors. Indeed what we observe in a population at a particular moment is the integration of the complex relationships of animals with their own environment.

References

- Bon, R. 1991. *Trajectoires sociales chez le Mouflon de Corse: rôle des processus d'attachement dans la sociogenèse*. Thèse 3^{ème} cycle, Université Paul Sabatier, Toulouse.
- Bon, R. & Campan, R. 1989. Social tendencies of the Corsican mouflon *Ovis ammon musimon* in the Caroux-Espinouse (South of France). *Behav. Process.*, 19: 57-78.
- Boyd, I.L. 1981. Population changes and the distribution of a herd of feral goat (*Capra* sp.) on Rhum, Inner Hebrides, 1960-78. *J. Zool., Lond.* 193 : 287-304.
- Bowyer, R.T. 1984. Sexual segregation in southern mule deer. *J. Mamm.* 65 : 410-417.
- Clutton-Brock, T.H., Guinness, F.E. & Albon, S.D. 1982a. *Red Deer. Behavior and ecology of two sexes*. Edimburgh University Press, Edimburgh.
- Clutton-Brock, T.H., Iason, G.R., Albon, S.D. & Guinness, F.E. 1982b. Effects of lactation on feeding behaviour and habitat use in wild Red deer hinds. *J. Zool., Lond.* 198 : 227-236.
- Clutton-Brock, T.H., Iason, G.R. & Guinness, F.E. 1987. Sexual segregation and density-related changes in habitat use in male and female red deer (*Cervus elaphus*). *J. Zool., Lond.*, 211: 275-289.

- Geist, V. 1971. *Mountain sheep : a Study in Behavior and Evolution*. University Chicago Press, Chicago.
- Geist, V. 1974. On the relationship of social evolution and ecology in ungulates. *Amer. Zool.* 14 : 205-220.
- Geist, V. 1982. Adaptive behavioural strategies. In *Elk of North America* (Thomas, J.W. & Toweill, D.E., eds.). Stackpole Books, Harrisburg, P. A., pp. 219-77.
- Geist, V. & Petocz, R.G. 1977. Bighorn sheep in winter : do rams maximize reproductive fitness by spatial and habitat segregation from ewes? *Can. J. Zool.* 55 : 1802-1810.
- Geist, V. & Bromeley, P.T. 1978. Why deer shed antlers. *Z. Säugetierk.*, 43: 223-231.
- Gonzalez, G. 1984. *Ecoéthologie du Mouflon et de l'Isard dans le massif du Carlit (Pyrénées Orientales)*. Thèse de 3^{ème} cycle, Univ. Paul Sabatier, Toulouse.
- Krausman, P.R., Leopold, B.D., Seegmiller, R.F. & Torres, S.G. 1989. Relationships between desert bighorn sheep and habitat in western Arizona. *Wildl. Monogr.* 102 : 1-66.
- Leslie, D.M. & Douglas, C.L. 1979. Desert Bighorn sheep on the River Mountains, Nevada. *Wildl. Monogr.* 66 : 1-56.
- Main, M.B. & Coblentz, B.E. 1990. Sexual segregation among ungulates: a critique. *Wildl. Soc. Bull.* 18: 204-210.
- Morgantini, L.E. & Hudson, R.J. 1981. Sex differential in use of the physical environment by bighorn sheep (*Ovis canadensis*). *Can. Field-Nat.* 95 : 68-74.
- Ordway, L.L. & Krausman, P.R. 1986. Habitat use by mule deer. *J. Wildl. Manage.* 50 : 677-683.
- Staines, B.W., Crisp, J.M. & Parish, T. 1982. Differences in the quality of food eaten by red deer (*Cervus elaphus*) stags and hinds in winter. *J. Appl. Ecol.* 19 : 65-77.
- Verme, L.J. 1988. Niche selection by male white-tailed deer: an alternative hypothesis. *Wildl. Soc. Bull.*, 16: 448-451.
- Watson, A. & Staines, B.W. 1978. Differences in the quality of wintering areas used by male and female red deer (*Cervus elaphus*) in Aberdeenshire. *J. Zool, Lond.* 286 : 544-550.