Food habits and dietary overlap among livestock and saigas in Mongolia

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There are increasing concerns worldwide concerning the effects of livestock on wild ungulates through competition for forage and access to water. This is particularly the case in Mongolia because the country has a long history of livestock grazing as well as harbouring wild ungulates such as the Mongolian gazelle (*Procapra gutturosa*), the kulan or wild ass (*Equus hemionus*), argali sheep (*Ovis ammon*), and Mongolian saiga (*Saiga borealis*). The Mongolian saiga occurs in the western Mongolian Gobi steppe-desert with an estimated population of 5,000-7,000 individuals. Although the saigas are relatively safe from poaching due to enhanced protection, overgrazing by livestock is an imminent threat in Mongolia. As result of the privatization of livestock in the 1990s, livestock numbers have increased rapidly and livestock biomass in the saiga range currently exceeds that of saiga by a ratio of nearly 50:1. Recent increases in livestock numbers have potentially reduced the capacity of habitats to sustain saigas because of forage or interference competition. Since livestock husbandry is one of the most important industries for Mongolia, sustainable use of the grassland by good livestock management is needed to minimise their negative impacts on the ecosystem, including the saiga. This is the first study on the food habits and dietary overlap between Mongolian saigas and livestock.

We studied the potential for forage competition between saigas and domestic livestock in Sharga Nature Reserve (SNR), western Mongolia (Fig. 1). Fresh pellets of saigas and livestock (goats, sheep, horses, and camels) were collected and used for the analysis of plant fragments. To ease plant identification, reference samples were made using leaves of representative food plants. The faecal analysis was done with the aid of a digital microscope. The degree of overlap in food composition was calculated using Pianka's overlap index (OI). A value of 0 means no overlap, and 1 means complete overlap.

During the summer of 2010, 36 newborn calves (1- to 3days old) from 35 females were captured and fitted with 70-g expandable VHF radio-collars to help understand survival, movement, and habitat selection (Fig. 2). Animal handling methods were approved by the University of Massachusetts Amherst Institutional Animal Care and Use Committee. All radio-collared calves were monitored via telemetry 3–4 times weekly. During Jun 10–Aug 20, 2010, 105 plots were established where marked saiga antelopes had been observed within and beyond SNR, in order to understand habitat selection by saiga calves (Fig. 1). Each plot was subdivided into 5 adjacent 1-m^2quadrats and the plants within were surveyed (n = 525 quadrats). The frequency and percentage of occurrence were calculated for each plant species recorded in the plots.

Twenty-five plant species were recorded in the vegetation plots, with .5 shrub species, 6 grasses, and 14 forbs. Onions (*Allium polyrrhizum* and *A. mongolicum*) were the most frequently occurring species (in 432 of 525 plots). Among the 5 most abundant species (those with percentage of occurrence >40%), there were 3 species of forbs (*Anabasis brevifolia, Allium polyrrhizum* and *A. mongolicum*), one grass (*Stipa gobica*) and one shrub (*Artemisia sp.*).

The faecal composition of camels was different from that of the other ungulates (Table 1). Camels predominantly fed on shrubs, with 49% of the faeces comprising shrub species. *Allium* appeared in greater proportions than other plants in saiga, goat, and sheep

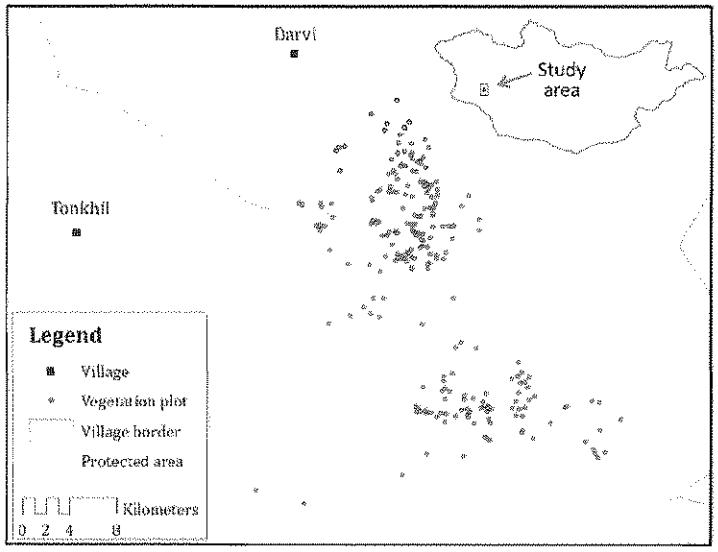

Figure 1.
A map of the study area and vegetation sampling points in western Mongolia.

Table 1.
Pianka's indices of among-animal food overlap in western Mongolia

	saiga	sheep	goat	horse	camel
saiga	--				
sheep	0.96	--			
goat	0.95	0.98	--		
horse	0.88	0.92	0.96	--	
camel	0.73	0.78	0.71	0.78	--

faeces (19-27%), *Stipa* grasses were dominant in the faeces of horses (32%). Although *Anabasis brevifolia* was the third most frequently observed species in the vegetation plots after *Allium spp.* and *Stipa gobica* (Table 1), it was found only in the faeces of saigas and camels, accounting for about 10% and 12%, respectively. The food habits of the Mongolian saiga in SNR were quite similar to those of sheep (OI = 0.96), and goats (OI = 0.95) but were different from those of horses (OI = 0.88), and camels (OI = 0.73; Table 1). The least food overlap was observed between goat and camels (OI = 0.71), while the overlap index was the greatest between goat and sheep (OI = 0.98; Table 1).

Photo by Gunderevombaat Gunbat

Grazing herds of saiga antelopes in western Mongolia.

The results suggest that saigas have a preference for feeding on high quality plants such as *Allium spp.* and *Anabaisis brevifolia*, although vegetation availability and diversity is low in comparison in study areas in other parts of the country. Further, the food habits of Mongolian saigas were quite similar to sheep and goats but different from horses and camels, indicating that competition for food resources between saigas and some livestock species during food-limited periods is potentially high. Similar research on Mongolian gazelles and argali sheep in Omnogobi and Dornogobi showed they also have potentially competitive interactions with livestock, particularly goat and sheep. Thus, from the viewpoint of pasture management and conservation of the endangered saiga antelope, grazing by goats and sheep should be avoided in key saiga areas during the autumn. This will help to lessen food competition and guarantee adequate food resources for the saigas to survive harsh winters.

Photo by Gundensambuu Gunbat

Conducting the vegetation survey in locations where marked saiga antelopes were observed.

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