Estimating the carrying capacity for habitat of Urial wild sheep (*Ovis orientalis* in Tandoureh National Park, Iran

Rahimian, M.*; Tabatabaei Yazdi, F.*; Mesdaghi, M.**
*Environment Dept., **Range and Watershed Dept. Ferdowsi University of Mashhad

Keywords: yield estimation; clipping and weighing; comparative method; Bovidae.

Abstract. In an attempt to estimate forage production and carrying capacity of wild ungulates in Tandoureh National Park of Iran, the Babanestan grassland was selected, as the typical habitat of about 200 Urial wild sheep. In order to estimate the carrying capacity of this habitat for foraging of Urial wild sheep, this habitat with an area of 132 hectares was classified as low flat (LF), high flat (HF), north aspect (NA), and south aspect (SA). Then, to estimate forage production, clipping method of comparative yield was used. In each land form, standing crop yield of five reference plots of 1-m^2 were searched, digitally photographed, and ranked from 1 to 5. Finally, three replications of each ranked plots were clipped and weighed. The dependent clipped plots were regressed on the independent reference plots. In each land form, based on the reference plots, 20 additional sample plots were only ranked. The 20 ranked data were corrected for green and dry weights, by using regression analysis. The average dry matter of LF, HF, NA and, SA were 2511 11821, 816, and 555 Kg/ha, respectively. The estimated total dry matter for the study area was 135211 Kg. Thus, the Babanestan may support a population size of 285 Urial wild sheep which only 70 percent of study is under grazing by Urial wild sheep. As a conclusion, management (arrangement and supplying) of the water resources in the Babanestan habitat, as one of the most habitat elements that affecting the distribution and population dynamics, may enhance the population of Urial wild sheep in Tandoureh National Park.

Introduction

Tandoreh National Park (TNP) with an area of 35540 ha is one of the important habitats of Urial wild sheep (*Ovis orientalis* Vignei.). Urial wild sheep (UWS) is consider as vulnerable species by IUCN. Knowledge about the feeding habits of UWS is essential in the terms of ecology and wildlife management, and it may affects the population size and their distributions.

The Babanestan with 200 UWS was selected as the typical habitat of TNP. In this case, the carrying capacity of UWS' habitat is one of the fundamental management actions in TNP. The objective of this research is to estimate habitat carrying capacity of study area (Aghamiri, *et al*., 2006).

Study Site and Methods

Study area

The typical habitat of Babanestan is about 132 hectares with an elevation ranging from 1000 to 1200 m. It has annual precipitation of 250-300 mm and temperature ranges from -20˜C in winter to 30 ˜C in summer. The vegetation of study area is composed of grasses such as *Thinopyron intermedium, Agropyron trichophorum, A. cristatum, Bromus tomenellus, B. persicus, Poa pratenses, P. bulbosa, Dactylis glomerata, Festuca ovina,* and other accompanied plant families. Currently, the study area is under grazing of 200 Urial wild sheep (Aghamire, *et al*., 2006).

Sampling procedure

In order to estimate the carrying capacity of Babanestan habitat for foraging Urial wild sheep, the study area with 132 hectares was classified as low flat (LF=12 hectares), north aspect (NA=55 hectares), south aspect (SA=46 hectares), and high flat (HF=19 hectares). Based on the slopes of four land forms, the Reduction in grazing capacity were 30 percent for NA and SA and 5 percent for LF and HF (Holechek, *et al*., 2011).

In first step, in each land form, standing crop yield of five reference 1-m^2 plots were searched, digitally photographed, and ranked from 1 to 5 (Haydock and Shaw 1975). In second step, three replications of each ranked reference plots were clipped and weighed. In third step, new 20 plots in each land form, ranked based on reference plots. The 15 green clipped plots air dried and weighed. The data of 20 ranked plots were corrected by regression of green weight on 5 ranked reference plots. Then, these data adjected by regression equation of dry weights on green weights. Grazing capacity per hectare for each land form after adjustment for slopes was calculated. Dry matter intake was calculated equal of 2 percent body weight of Urial wild sheep, using formula; see "Results" (Holechek et al., 2011). All the statistical analyses, regressions and sampling procedures including mapping the sample points were done in R software.

Results and Discussion

A typical of Linear regression models of ranked plot in relation to clipped green and dry plot in relation to green weight for low flat land form are shown in Fig. 1.

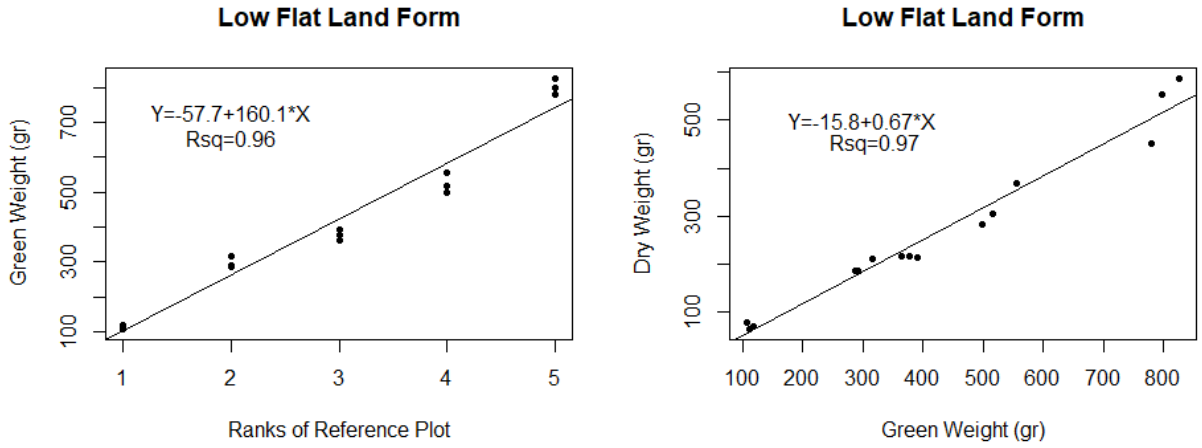

Figure 1. Regression models of ranked vs clipped green plots and green vs dry plots for low flat land form.

Calculation of total usable forage production is shown in Table 1.

Table 1. The estimated of the dry matter for each landform, and in total.

Land form	Area (ha)	DM/ha (kg)	Reduction for slops (%)	Adjusted DM/ha (kg)	Total DM (kg)
Low flat	12	2643.678	5	2511.494	30137.93
High flat	19	1917.132	5	1821.278	34604.24
North aspect	55	1165.184	30	815.6286	44859.57
South aspect	46	792.2484	30	554.5739	25510.40
Total	**132**				**135112.10**

In Calculation of forage demand:

Weight of UWS (kg) × daily dry-matter intake (% 2 of body weight)
× number of days pasture will be grazed (365)
= forage demand per UWS per year of grazing

65 × 0.02 × 365 = 474.5 kg/UWS/360 days

Calculation of stocking rate:
Total usable forage (kg) ÷ forage/UWS/360 days
= number of UWS pasture will carry
135112.10 ÷ 474.5 =284,7463 approximated to **285 total UWS**

Conclusions

Since the number of current UWS is less than the stocking rate, considerable amount of forage was remained unused. In fact, 70 percent of carrying capacity of study area is in use. Although all the habitat elements may affect the distribution and the population dynamics of the wildlife, improving the arrangement and frequency of the water resources in the Babanestan habitat may enhance the population size of UWS.

References

Aghamiri, H., Golestani, H., and Bijani, M. 2006. Tandoureh National Park. Published by: Environment Department of Khorasan Razavi. pp. 62.

Haydock, K. P., and W. K. Shaw. 1975. The comparative yield method for estimating dry matter yield of pasture. *Aust. J. Exp. Agr. Anim. Husb.* 15:663-670.

Holechek, J. L., R. D. Pieper, and C. H. Herbel. 2011. *Range management: Principles and practices.* 6th. Edition. Prentice-Hall, Ins. New Jersey.