

## **Abstract**

Rangeland health is main indicator of vegetation and soil health that is in balance with the ecological processes of the rangeland ecosystem. The aim of this study was to find the appropriate method to evaluate the health (the condition) of rangelands of Germe city, Ardabil province, northeastern Iran. Two sites including enclosure (control) and evaluation (grazing) were chosen on the rangelands of the study area with three replications. The three methods of determining the health of rangeland, including ecological indexes, four-factors and six-factors were evaluated and compared. With the evaluation of ecologic indexes method, the deviation degree of 17 health indexes in the evaluation site to the control region were evaluated. In the four-factor method, the vegetation percent, species composition, freshness and vigor of plants and in the six-factor method, soil conservation, quantity of litter mass, species composition, and vegetal production were evaluated according to the standard tables in each of the two sites. Man-Whitney's non-parametric test was used to compare the control site with the evaluation site. The Kruskal-Wallis test was also used to compare the three methods of rangeland health evaluation within each site. The appropriate method was selected to determine the health of rangelands of the region with determining the accuracy and precision of each method. Based on the six-factor method, the final level of rangeland condition (the health) was high and poor in enclosure and evaluation site, respectively. The health of enclosure site was different from the health of grazing site by the six-factor method. Mean rank of the enclosure (23) and grazed (8) site had significant difference. According to the four-factor method, the final level of the condition (the health) of rangelands was high and poor, in enclosure and evaluation sites, respectively. The condition (the health) of enclosure area was different from the health of the evaluation (under grazing) site, using the four-factor method. The mean rank of enclosure (23) and grazed (8) site had significant difference. Results of the comparison between the three methods of determining the rangeland health, showed the higher rank of the ecological index method (33.5) compared to the rank of four-factor (27) and six-factor (8) methods in enclosure area. Also, the rank of four-factor (31.43) and six-factor (29.5) methods in the evaluation site was higher than that in the ecologic indexes method (8). The ecological indexes method is considered to be the most appropriate method for determining health of the rangeland of Germe city because of its higher accuracy and precision and less error value.

**Keywords:** Rangeland condition, Ecologic indexes, Four-factor method, Six-factor method, Germe city



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**The Thesis submitted for the Degree of M.Sc ( in the field of  
Range Management)**

**A comparison of various methods for  
assessing rangeland health (*case study:  
rangelands of Gremi*)**

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February 2014