



University of Kentucky  
UKnowledge

---

International Grassland Congress Proceedings

XXI International Grassland Congress / VIII  
International Rangeland Congress

---

## Forage Quality in Some Species of Mountainous Rangelands (Iran)

Mohsen Maleki  
*Islamic Azad University, Iran*

H. Arzani  
*Islamic Azad University, Iran*

Marzieh Mosayyebi  
*Islamic Azad University, Iran*

Follow this and additional works at: <https://uknowledge.uky.edu/igc>

This document is available at <https://uknowledge.uky.edu/igc/21/15-2/25>

The XXI International Grassland Congress / VIII International Rangeland Congress took place in Hohhot, China from June 29 through July 5, 2008.

Proceedings edited by Organizing Committee of 2008 IGC/IRC Conference

Published by Guangdong People's Publishing House

---

This Event is brought to you for free and open access by the Plant and Soil Sciences at UKnowledge. It has been accepted for inclusion in International Grassland Congress Proceedings by an authorized administrator of UKnowledge. For more information, please contact [UKnowledge@lsv.uky.edu](mailto:UKnowledge@lsv.uky.edu).

## Forage quality in some species of mountainous rangelands (Iran)

Mohsen Maleki<sup>1</sup>, H. Arzani<sup>2</sup>, M. Mosayyebi<sup>3</sup>

<sup>1</sup> member of scientific board of Islamic Azad University Khalkhal Branch, <sup>2</sup> Natural resources, Tehran University, <sup>3</sup> member of scientific board of Islamic Azad University Ardabil Branch. E-mail: Mosen\_mlki@yahoo.com

**Key words** forage quality, phenological stages, species, vegetative, maturing

**Introduction** Forages are mainly used by livestock as a source of nutrition; forage quality is defined as an expression of the characteristics that affect consumption, nutritive value, and the resulting animal performance. Many factors influence forage quality. The most important are forage species, and, stage of maturity at harvest. Secondary factors include soil fertility and fertilization, temperatures during forage growth, and variety. Among several factors, determinations of crude protein, digestible dry matter and metabolizable energy were considered more appropriate for evaluating range forage quality (Minson, 1987; Garza and Fulbright, 1988; Rhodes and Sharrow, 1990).

**Materials and methods** The study took place in Taleghan rangelands (50°34'30" to 50°44'18"E and 36°10'4" to 36°16'58"N) with the area of 1325 km<sup>2</sup> and average rainfall of 500mm. Five samples for each species were gathered in the vegetative and mature stages. For each sample ten individual plants were randomly selected and clipped from 1cm above ground. So in each phenological stage 50 individual plants for each species were clipped. Samples were dried at 60°C for 24 hours, then ground and analyzed. Forage quality was determined based on Crude protein percentage (CP), Acid Detergent Fiber percentage (ADF), Dry Matter Digestibility (DMD), and Metabolizable energy (ME). Nitrogen was measured by the micro kjeldehal technique (ADAC, 1980) using a kjeltec system. CP determined by the formula CP=N\*6.25. ADF measured using method introduced by van Soest (1982) with a fibertec system. DMD estimated using the formula  $DMD\% = 83.58 - 0.82ADF\% + 2.262N\%$  as suggested by Oddy et al. (1983). ME predicted using the equation  $M/D = 0.17 DMD\% - 2.0$  described by the standing committee on agriculture (1990) where M/D in mega joules (MJ) per kg of feed DM, applicable at the maintenance level of feeding.

**Results** The results of forage quality analysis show that *Lotus goebelia* had high metabolizable energy (10.42 MJ/kg DM) in vegetative stage and *Dactylis glomerata* contained lowest rate of metabolizable energy (6.27 MJ/kg DM) in mature stage. In all species advancement of plant growth caused reduction in CP, DMD and ME content of forage and an increase of ADF percentage (Table 1).

**Table 1** Forage quality and of species at vegetative and maturity stages.

| Species                      | Phonological stage | CP%   |      | ADF%  |      | DMD%  |      | ME MJ/kg DM |      |
|------------------------------|--------------------|-------|------|-------|------|-------|------|-------------|------|
|                              |                    | Mean  | Std  | Mean  | Std  | Mean  | Std  | Mean        | Std  |
| <i>Agropyron trichoforum</i> | Vegetative         | 13.60 | 0.28 | 38.20 | 0.92 | 57.82 | 0.87 | 7.83        | 0.15 |
|                              | Maturity           | 7.34  | 0.17 | 45.07 | 0.28 | 49.52 | 0.30 | 6.42        | 0.05 |
| <i>Dactylis glomerata</i>    | Vegetative         | 14.22 | 1.27 | 33.58 | 0.52 | 61.88 | 0.82 | 8.52        | 0.14 |
|                              | Maturity           | 4.61  | 0.13 | 44.72 | 1.05 | 48.67 | 0.92 | 6.27        | 0.16 |
| <i>Hordeum bulbosum</i>      | Vegetative         | 13.60 | 0.35 | 31.84 | 1.45 | 63.06 | 1.06 | 8.72        | 0.18 |
|                              | Maturity           | 5.69  | 0.18 | 44.57 | 0.53 | 49.25 | 0.51 | 6.37        | 0.09 |
| <i>lotus goebelia</i>        | Vegetative         | 17.61 | 0.38 | 21.74 | 0.33 | 73.07 | 0.41 | 10.42       | 0.07 |
|                              | Maturity           | 12.45 | 0.15 | 30.11 | 1.41 | 64.00 | 1.21 | 8.88        | 0.21 |
| <i>Astragalus aegobromus</i> | Vegetative         | 16.90 | 0.42 | 30.29 | 1.56 | 65.73 | 1.42 | 9.17        | 0.24 |
|                              | Maturity           | 12.25 | 0.14 | 45.21 | 0.53 | 51.47 | 0.39 | 6.75        | 0.07 |

The effect of phenological stages on CP, ADF and ME was significant ( $p < 0.01$ ) in 2 stages (Table 2).

A cluster analysis was carried out to determine the similarity of forage quality among the species. *Astragalus aegobromus* and *Agropyron trichoforum* were categorized in one cluster and *Dactylis glomerata*, *Hordeum bulbosum* and *lotus goebelia* were categorized in another cluster.

**Conclusions** Determining forage quality available to grazing animals assists in achieving their most timely utilization, help predicts nutrient deficiencies, and suggests supplementation needs. The stage of growth greatly affects forage quality. However in the mature stage, forage quality sharply decreases and dietary deficiencies may result.

### References

- CSIRO 1990: Feeding standards for Australian livestock: ruminants. *Standing Committee on Agriculture and Resource Management. Ruminants sub-committee*. Melbourne, CSIRO Publications 266p.
- Oddy, V.H., Robards, G.E. and Low, S.G., 1983. Prediction of In vivo Matter Digestibility from the Fiber Nitrogen Content of a Feed, In *Feed Information and Animal Production*, eds. G.E. Robards, and R.G. Pakham Commonwealth Agricultural Bureaux, Australia. pp. 395-398.

**Table 2** Comparison of forage quality.

|                  | Source of variation | Degree of freedom | Sum squarely | Mean of squares | F values | P-value |
|------------------|---------------------|-------------------|--------------|-----------------|----------|---------|
| <b>Phenology</b> | CP                  | 1                 | 564.547      | 564.547         | 76.755   | 0.00    |
|                  | ADF                 | 1                 | 1459.729     | 1459.729        | 42.704   | 0.00    |
|                  | ME                  | 1                 | 49.681       | 49.681          | 54.672   | 0.00    |
| <b>Error</b>     | CP                  | 48                | 353.047      | 7.355           |          |         |
|                  | ADF                 | 48                | 1640.743     | 34.182          |          |         |
|                  | ME                  | 48                | 43.618       | 0.909           |          |         |
| <b>Total</b>     | CP                  | 49                | 917.595      |                 |          |         |
|                  | ADF                 | 49                | 3100.472     |                 |          |         |
|                  | ME                  | 49                | 93.298       |                 |          |         |