

Nutritional Composition of Desert Bighorn Sheep Forage in the Harquahala Mountains, Arizona

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Abstract

Samples of 32 plant species (24 woody and succulent species, 5 grasses, 3 forbs) used by Desert Bighorn Sheep (*Ovis canadensis mexicana*) in the Harquahala Mountains, Arizona were collected bimonthly in 1982. All samples were analyzed for dry matter, protein, acid detergent fiber, neutral detergent fiber, lignin, cellulose, cell solubles, hemicellulose, ether extract, and ash. Woody and succulent plants had the highest protein levels (\bar{x} = 9.3% in September and October to 11.1% in January and February) followed by forbs and grass, respectively. Nutritional data are presented in tabular form as a reference source for wildlife biologists, range managers and scientists in related fields charged with managing Arizona's rangelands.

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Introduction

Desert Bighorn Sheep diets have been studied in Texas (Hailey, 1968), New Mexico (Howard and DeLorenzo, 1975), Arizona (Halloran and Crandell, 1953, Seegmiller and Ohmart, 1982 Morgart et al. 1986), California (Dunaway 1970, Ginnett and Douglas 1982), Nevada (Barrett 1964, Deming 1964, Yoakum 1966, Brown et al. 1976, Brown et al. 1977), Utah (Hull, 1984), and Mexico (Dominguez 1976). Brown et al. (1976) and Seegmiller and Ohmart (1982) evaluated diets of sheep by age classes and Morgart et al. (1986) described the nutritional composition of selected plants from the Virgin Mountains, Arizona. Hull (1984) related seasonal forages to dietary quality in Utah. Other studies have been more general.

Restrictions to forage quality and quantity limit deer populations in central Arizona (Hanson and McCulloch 1955, Swank 1958) and have been suggested as limiting factors for Desert Bighorn lambs (Seegmiller and Ohmart 1982, DeForge and Scott 1982). Hansen (1960) and Monson (1960) attributed nutritional deficiencies to lamb mortality. Seegmiller and Ohmart (1982) suggested that lamb survival could be maximized by habitat manipulation of sheep ranges for high quality forage. Most of the available literature on mountain sheep diets does not go beyond forage identification and with the exception of the study by Morgart et al. (1986) the nutritional quality of important forages for Desert Bighorn Sheep in Arizona are unknown.

Our study was conducted to determine nutritional parameters of selected Desert Bighorn Sheep forage in the Harquahala Mountains, Arizona. These data are useful to land managers for the improvement of mountain sheep habitat and researchers interested in other herbivores that use the same plants.

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Study Area

The study was conducted in the Harquahala Mountains, La Paz and Maricopa counties. The Harquahala Mountains cover approximately 311 km² and range in elevation from 580 to 1,732 m. Topography ranges from rolling hills to rugged cliffs.

The Harquahala Mountains contain 2 basic vegetative formations: the desert scrub formation between 580 and 1,646 m elevation, and the chaparral formation between 1,036 and 1,732 m elevation. Krausman (1985) identified 11 different vegetation associations in the Harquahala Mountains.

Average annual precipitation was 21.8 cm and average seasonal temperatures range from 10.3° C in

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The Legume Badge

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Indeed, the legend of the founding of the HOUSE OF PLANTAGENET by Geoffrey of Anjou describes the ecological function of earth stabilization as a characteristic of the PLANTA GENËT. Mrs. M. Grieve's *Modern Herbal* (Harcourt, Brace and Co. 1931. Vol. 1: 125) has preserved the story: *As he plucked it from a steep bank which its roots had knit together, he is reputed to have said: "This golden plant, rooted firmly amid rock, yet upholding what is ready to fall, shall be my cognizance. I will maintain it [as a symbol of stability] on the field, in the tourney and in the court of justice."*

Many authors have noted the pioneering role of *Cytisus scoparius* in stabilizing landscapes so that they mature in proper ecological succession. In England and in continental Europe *genêt* is often the first shrub to grow on sand dunes after they have become somewhat consolidated. The very name *genêt* or *genista*, as applied by the ancients to this plant, is the best evidence that ecologists could want that the concept of primary ecological plant succession was understood in ancient times, as the Indo-European language root *gen-* refers to a beginning, birth, origin or genesis in exactly the sense that a first establishment of the *planta genêt* would represent a genesis of vegetation on land that would otherwise be barren. Inherent in the concept of primary ecological plant succession is that such pioneering plants enrich the soil or otherwise alter the environment so that succeeding vegetation characteristic of less open habitats may become established. That *genêt*, by virtue of

its strikingly pioneering aspect, was taken into Celtic languages as the prototype of the concept of "shrub" or "bush" is indicated by the Gaelic use of "*gen*" in the generic sense of "bush." This language transformation was certainly not in the superficial sense of a bush being thought of as a young generating tree, but rather in the true ecological sense of bushes often representing a youthful generating stage in ecological succession eventually leading to heavier vegetation and forestation.

The broom of the Plantagenets indeed swept clean as a new broom is wont to do, but as in the case of *genêt* itself, it swept more in than out, sweeping this new beginning of a dynasty into a reign that would encompass a long succession of fourteen kings. But just as in ecological succession of vegetation, there came an end to the pioneers (Plantagenets) and the establishment of a new order (with the demise of Richard III at Bosworth Field). The Plantagenets as pioneers had prepared the soil and altered the environment to allow germination and development of the thoughts, concepts and actions which helped make the English-speaking world what it is today. The pioneering era of the *planta genêt* gave rise to much of the generic matrix of knowledge and behavior in the English-speaking tradition which yet lies stored in the cortex of civilization to be used when needed. Although the legume badge of the Plantagenets is no longer the "Pulse of the Nation," the *genêt* plant itself remains virtually unchanged from when it inspired the first of the Plantagenets to establish the stability upon which much of great importance was later built.

– F. S. Crosswhite
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