

SECTION 4

The Effects on the Carrying Capacity of Rangeland Pastures

4.1. Introduction

In this section, we investigate the relationship between carcass weight of lambs and climate, in an attempt to estimate the variation in the carrying capacity of Icelandic rangelands. The necessary components of a rangeland model are discussed, but lack of suitable data at present prevents the construction of a model. Thus, it has not been possible to predict the effects of the climatic scenarios outlined in Section 1 of this report, but certain general assumptions are made regarding rangeland carrying capacity by considering extreme years and periods.

4.1.1. Rangeland agriculture and climate

The Icelandic rangelands are characterized by native hardy grasses, mosses and dwarf shrub heaths, types of vegetation resulting from the northerly location of the country and its mountainous terrain. In fact, more than half of the total area of Iceland (103 000 km²) is 400 m or more above sea level (Tölfræðihandbók, 1967). The rangelands can be defined as natural pastures, some of which belong to individual farms in coastal areas and adjacent valleys, while the most extensive ranges are the common grazings of the interior. Thus the rangelands stretch from lowland areas up to the most mountainous and rugged parts of the country. Vegetation growth and consequently the carrying capacity of these pastures is strongly influenced by the climate, particularly temperature, and to a lesser extent by precipitation. Furthermore, the adverse effects on plant growth of any decline in temperature are amplified by high altitude. Such relationships have been demonstrated in a recent study where the growth of sown grasses was compared at two contrasting altitudes, 50 and 640 m a.s.l. (*Figure 4.1*). However,

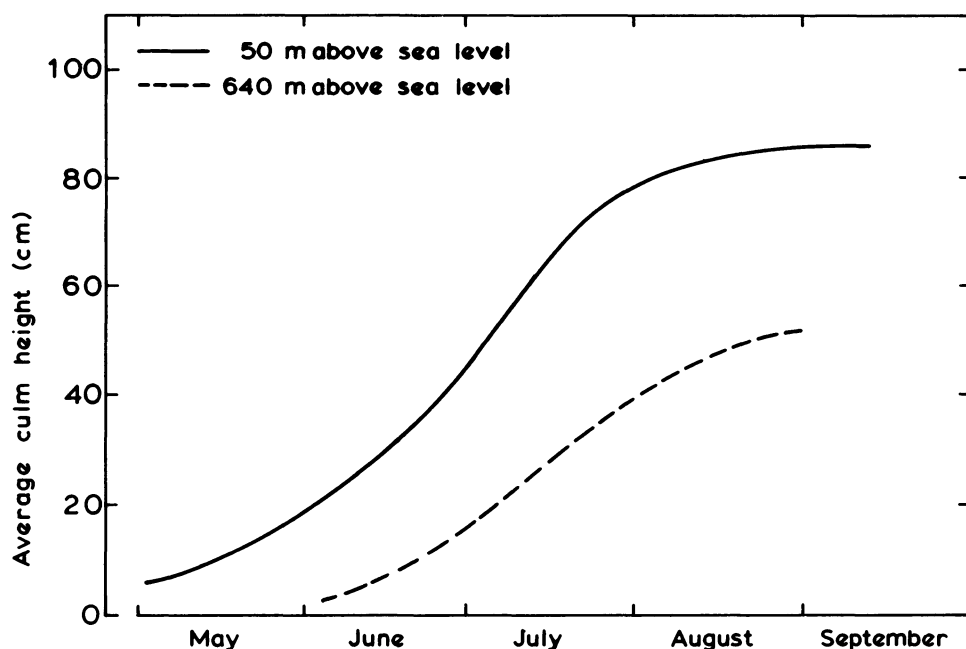


Figure 4.1. Average culm height (cm) of *Deschampsia caespitosa* at two altitudes, 50 meters and 640 meters above sea level. Based on 13 years of data (1969–1981). (From Fridriksson and Sigurdsson, 1983.)

information on variability in the growth of the indigenous range vegetation over a span of several years in relation to climate and altitude is limited. Moreover, many of the ranges, particularly in the highlands, produce very low yields of usable vegetation which cannot be measured accurately (Pálmason, 1982).

There is also a dearth of information on the effects of climate on animal production. In a recent study, however, a positive relationship was established between spring (May and June) temperature and the growth rate of lambs from birth in May to 6–7 weeks of age, presumably the result of differences in grass growth. On the other hand, lamb growth rate was strongly negatively correlated with June rainfall, probably due to the discomfort of exposure to wetness, aggravated by cold (Thorsteinsson *et al.*, 1982). Other evidence also indicates that lamb weight is low in extremely wet years and high in dry years (Ólafsson, 1973). Winter housing of sheep is a general practice in Iceland, and warmer autumns tend to delay the onset of the housing period. Furthermore, winter fodder requirements tend to increase with decreasing mean temperature for the period February–May, reflecting a later onset of the growing season and the need for more extended housing and indoor feeding into the spring (Gudmundsson, 1984). Such findings are clearly of economic importance and are in agreement with general farming experience.