Range Resources of Iceland

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Highlight

Animal agriculture in Iceland is second only to fisheries. At least half the forage consumed by large herbivorous animals comes from rangelands. During the period June to September most of the sheep and large numbers of unbroken horses graze on mountain ranges where they roam freely in large grazing districts or commons. There is urgent need for land reclamation and range improvement. Only 25% of the country is covered with vegetation, much of which does not provide adequate protection against soil erosion and has low carrying capacity. With increasing population and demands upon rangelands for food production, an aggressive program of rangeland improvement and management, supported by adequate research, is essential.

Iceland is located in the North Atlantic ocean, barely south of the Polar Circle. Its area is 103,000 km^2. The country was settled by Norwegians and their Celtic slaves. The first settlers arrived in 874 A.D. and, with the exception of a few Irish monks, men had not previously inhabited the island. The present population of about 200,000 inhabitants is located in the coastal areas, while the Highlands are uninhabited. About 40% of the population lives in the capital Reykjavík.

The principal industries of the country are fishing, agriculture, and various manufacturing and service industries. At present about 14% of the population is supported by agriculture. There are approximately 5,300 farms in the country, most of which are combined dairy and sheep farms. Grass is the main crop in Iceland as the short growing season limits even the growth of grains such as barley and oats. The present area of cultivated pastures is about 100,000 ha.

Prior to settlement there were probably no such herbivores in Iceland as rodents, large mammals, nor important insects. Geese probably were the only important native herbivores.

The livestock which the settlers brought with them were the first large herbivores in Iceland. The natural rangelands have been the main source of grazing for livestock. For many centuries after settlement possibilities for haymaking were limited. The Lowland ranges were used for grazing yearlong while the Highland rangelands (above 300 to 400 m) were grazed only in the summer.

During recent decades feeding and management of the livestock has greatly improved. Most livestock are now fed indoors for six to seven months during the winter. Dairy cows graze in the summer almost entirely on cultivated pastures, and sheep and horses graze the native rangeland. Due to increased number of sheep, the use of cultivated pastures has not resulted in reduced grazing pressure on the rangelands during the summer, although it is becoming a more common practice that the lambs are fattened on cultivated pastures two to four weeks prior to slaughtering (Pálsson and Sveinsson, 1952; Pálsson and Gunnarsson, 1961). In the period June to September most of the sheep and a great number of the unbroken horses graze on mountain ranges where they roam freely in large grazing districts or commons.

Physical Characteristics

Climate

The climate in Iceland is cold temperate, moist, and occanic and is characterized by frequent and changing winds. The summers are cool and the winters are relatively warm. There are, however, considerable differences regionally. Table 1 shows the mean temperature and precipitation of the growing season (May to September) and the winter for 1940 to 1960 at six Lowland stations and for 1966 to 1969 at one Highland station (see also Fig. 1). The data show that, in particular, the winters are colder in north than south Iceland and that the precipitation is greatest in south Iceland. Although the short and cold summers are the main limiting factors for plant growth in most parts of the country, there is evidence to suggest that in some parts the low precipitation is equally limiting. The severe conditions for plant growth are illustrated by the temperatures at a 600 m elevation Highland weather station.

Since the time of settlement there have been occasional serious cold spells, which have lasted over a period of years. The coldest of these have been caused by drift ice which sometimes is carried from the Arctic to the northern coastline of Iceland by currents and winds. In this century, however, this has rarely happened, and the glaciers have been continuously receding in arctic and subarctic regions. In Iceland air temperatures have been a little higher during the past decade than the normals from 1901 to 1930.

Geology

Geologically, Iceland is a young country. It contains two major geological formations, the Basalt and the Palagonite formations. The first dates back to the Tertiary period and consists largely of basaltic lava sheets. This formation, which occupies the central zone of the country, is comparatively watertight. The Palagonite formation is younger, partly a mixture of subglacial and subaerial eruptives and partly consisting of glacial, fluvial, and aeolian deposits. With time this mixture has been hardened

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Table 1. Mean temperatures in °C and mean precipitation in mm for six selected Lowland weather stations, 1931 to 1969, and one Highland station, 1966 to 1969 (see also Fig. 1).[1]

Weather stations	Temperature			Precipitation		
	May–Sept.	Oct.–Apr.	Annual	May–Sept.	Oct.–Apr.	Annual
Stykkishólmur, W	8.5	1.1	4.2	237	521	758
Akureyri, N	8.9	0.4	3.9	157	317	474
Hallormssta ur, E	8.8	0.8	4.1	212	452	664
Vík í Mýrdal, S	9.5	2.9	5.7	904	1352	2256
Sámsstadir, S	9.6	1.8	5.0	374	727	1101
Reykjavík, SW	9.4	1.8	5.0	269	536	805
Hveravellir[2]	4.2	–5.8	–1.6	289	398	687

[1] From Vedráttan, 1954.
[2] A Highland station at 600 m above sea level.

into water-permeable rocks. Acid rocks occur in Iceland, but they are of minor significance as a contributor to the formation of soil materials (Jóhannesson, 1970).

In the Palagonite formation volcanic activity has been continuous up to the present time. Since the settlement of the country at least 30 volcanoes have erupted, and the number of recorded eruptions has been about 150. Altogether the number of postglacial volcanoes in Iceland is close to 200. Icelandic volcanism is predominantly effusive, producing more lava than ash. In some eruptions, however, great masses of pumice both of alkaline and acid composition are ejected, greatly affecting the formation and character of Icelandic soils over large areas. Hot springs are common in Iceland as often is the case in volcanic areas.

Topography

Iceland is mountainous yet does not extend to high elevations (Table 2). The highest mountain is 2,119 m. The Highlands (above 300 to 400 m) are a more-or-less slightly undulating plateau with single mountains and ridges protruding up to 1,000 m above the surroundings. The great majority of farms are located below 200 m elevation along the coast and in the numerous valleys that extend into the Highlands. Approximately 11% of the country is covered with glaciers, most of which are in the southern part where the precipitation is highest.

Table 2. Altitudinal distribution (%) in Iceland.

Elevation (m)	Area (km²)	Percent of Iceland
0–200	27,000	26
200–600	37,500	36
600–800	18,000	17
Above 800	21,500	21

Soils

A simple yet practical classification of Icelandic soils, is into dryland soils (well-drained) and wetland soils (poorly-drained) (Helgason, 1966; Jóhannesson, 1960).

The well-drained soils are generally loessial material derived from frost weathering of the bedrock or from material which has been blown out in explosive eruptions. These soils are rather uniform in character all over the country. They are rockfree and clayfree and are mainly silty loams. Accordingly, they are friable and erode easily, and their water-holding capacity and fertility is low. Alternately, they are easy to cultivate. Owing to the origin of the soils, low precipitation, and short frost free period, very little leaching occurs, and profile formation is hardly noticeable.

The poorly-drained soils (peat bogs), which are characteristic of arctic and subarctic regions, are of organic origin. In Iceland, however, their mineral content is relatively high due to inputs of volcanic ash and soil material trans-

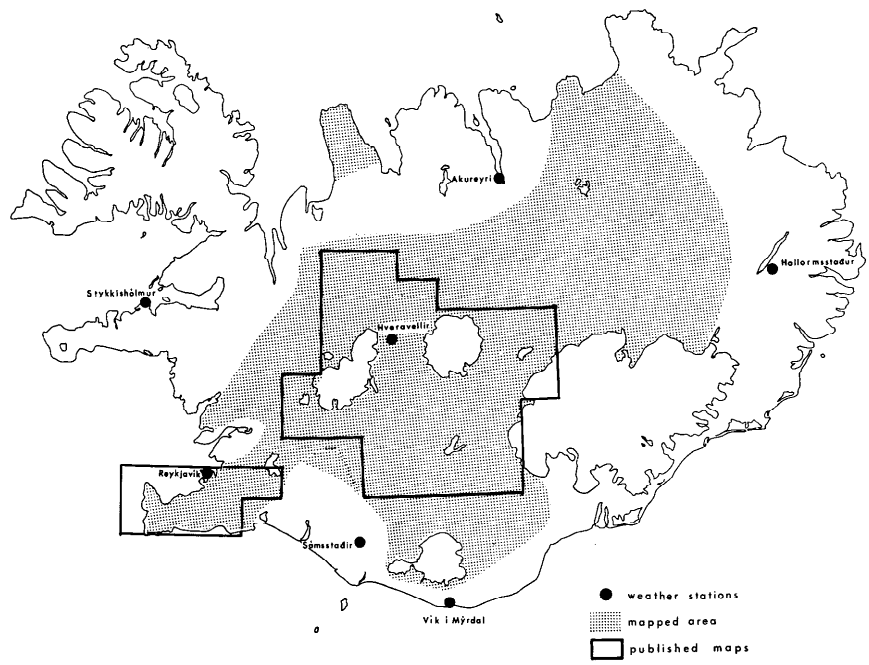

FIG. 1. A map of Iceland showing weather stations referred to in Table 1. Areas mapped under the range survey project also are shown. Large open (white) areas within the island are glaciers; small areas are lakes.

FIG. 2. Before settlement, large areas of the Lowlands of Iceland were dominated by low-growing birch trees with luxuriant undergrowth of forbs and grasses.

ported into the bogs from erosion. These soils cover about 40% of vegetated land in Iceland.

The pH of the well-drained soils ranges from 5.5 to 6.5 and of the poorly-drained soils from 4.5 to 5.5 (Jóhannesson, 1960). Hummocks caused by frost heaving are characteristic for almost all soil types in Iceland, while they are most prominent on poorly-drained soils.

The Vegetation

Previous Vegetation and Soil Erosion

When the first settlers arrived probably about 60% of Iceland's surface was covered with vegetation (Einarsson, 1962; Thorsteinsson et al., 1969). Some 12,000 years had passed since the end of the last glaciation period and during that time the vegetation had developed without human or herbivore influence. It can be expected to have been largely in balance with the prevailing growth conditions (Thorsteinsson, 1963; Thorsteinsson and Steindórsson, 1967). Pollen analysis studies (Einarsson, 1962, 1963) have revealed that the vegetation at the time of settlement was greatly different from the present. This is also indicated by old sagas dating to the 10th and 11th century. On large areas in the lowlands the well-drained soils were then dominated by low growing birch (*Betula pubescens*) with luxuriant undergrowth of forbs, grasses, and browse (Fig. 2). The poorly-drained soils were dominated by sedges with scattered birches.

With settlement through combined effects of uncontrolled grazing of livestock, cutting, burning, and other means of removing the trees, in only 300 to 400 years the forests were reduced to their present level, now covering only about 1% of the country (Bjarnason, 1942; Einarsson, 1962; Thorarinsson, 1961).

The destruction of the tree cover and intensive land use resulted in the start of soil erosion surpassed in intensity only in a few countries of the world (Fig. 3). The low-growing vegetation which succeeded the trees in dominance was, in many instances, unable to bind and protect the loose soils against the ever-blowing winds in Iceland. This was especially the case in the Highlands.

Erosion increased with prolonged intensive grazing through the centuries, and it was accelerated by ash-fall from volcanic eruptions and periodic cold spells. At present about only 20 to 25% of the country is covered by soil and vegetation.

FIG. 3. Destruction of tree cover and intensive grazing of the Highlands of Iceland has in many areas resulted in soil erosion surpassed in intensity in only a few other countries.

Table 3. The most common range plant species in Iceland.

Dwarf shrubs	Sedges	Grasses and grasslike plants
Betula sp.	*Carex goodenoughii*	*Festuca* sp.
Vaccinium sp.	*C. Bigelowii*	*Agrostis* sp.
Empetrum sp.	*C. lyngbyei*	*Poa* sp.
Salix sp.	*C. rostrata*	*Deschampsia* sp.
Calluna vulgaris	*C. rariflora*	*Juncus* sp.
Arctostaphylos uva-ursi		*Kobresia myosuroides*
		Eriophorum sp.
		Equisetum sp.

Thus, in the course of nearly 1,100 years, an area corresponding to 30 to 40% of the total area of the country which formerly was vegetated has become denuded through erosion. Wind has been the most effective erosive force, although considerable water erosion has also taken place (Låg, 1955).

Annual loss of vegetation and soil still exceeds what is being regained by natural regeneration and through resource management efforts (Fridriksson, 1960). Only recently have Icelanders come to realize the destructive effects of overgrazing the vegetation and have started to take measures to insure that vegetation is used according to its carrying capacity.

Present Vegetation

The catastrophic effects of the settlement on the vegetation described here were not only confined to erosion. They also resulted in great changes in the botanical composition of many of the most extensive plant communities.

The most striking feature of the present vegetation is the abscence of trees. Well-drained soils are mainly dominated by low-growing shrubs, sedges and moss, with low palatability. Palatable forbs and grasses which formerly were abundant have gradually been decreasing mainly due to the overgrazing, and the forbs are now rare on open rangelands.

The present botanical composition of the well-drained soils probably is, to a large degree, a result of a retrogressive trend mainly caused by overgrazing and does not reflect current climate conditions (Table 3). Unfortunately, relict areas for comparison are very uncommon in Iceland.

The poorly-drained soils, covering about 40% of total area of the vegetated land, are mainly dominated by sedges. The botanical composition of these areas probably has not changed much during recent centuries as the dominant sedges are unpalatable and have not been grazed heavily. This vegetation therefore probably resembles climax conditions (Campbell, 1957).

Extensive areas, especially in the Highlands, are covered with moss heath (*Rhacomitrium*) of very low productivity. This vegetation is found on areas with unfavorable growth conditions or it occurs as successional vegetation on formerly eroded land.

Another characteristic of the Icelandic flora is its paucity in species. Presently there are only about 450 species of fanerogams which can be considered to be adapted or "natives." Nearly 50% of these are expected to have survived the last ice age, while the rest have immigrated mainly from Europe (Steindorsson, 1964). The main reason for the low number of species is the isolation from other countries and the unfavorable climate.

The floristic limits between the Lowlands and the Highlands are between 300 and 400 m, varying from one part of the country to another, while the height limits of fairly continuous vegetation are 700 to 800 m. The number of species decreases very rapidly with increasing elevation as shown by the following numbers: between 300 and 600 m above sea level 252 species of fanerogams have been found, above 600 m 186 species, above 800 m 90 species, and above 1,000 m 38 species. The proportion of trees and annuals decreases with elevation while low-growing browse and arctic species increase (Table 4).

The Animal Component

Settlers brought livestock into the country mainly from Norway and the British Isles. The breeds have been kept almost pure since and import of livestock is now forbidden by law, supposedly to prevent introduction of disease. The numbers of cattle, sheep, horses, and wild reindeer in Iceland in 1968 were as follows: 52,000, 820,000, 35,000, and 2,700.

The cattle are mainly of dairy type; there are less than 500 beef cattle in the country. The dairy cows are small with an average live weight of about 400 kg. The bulls, on the other hand, can weigh over 1,000 kg.

Table 4. Number of plant species and the distribution of life-forms (by Raunkiaer) at different elevations in the Icelandic Highlands (Steindorsson, 1964).

Elevation (m)	Number of species	Percentage by life-forms[1]							
		Ph	Ch	H	G	H.H	Th	A	E
300– 600	239	1	19	51	13	9	7	54	46
600– 800	186	1	21	58	12	5	3	63	37
800–1000	90		32	58	8		2	81	19
Above 1000	38		49	46	5			97	3

[1] Ph = phanerophytes, Ch = chamaephytes, H = hemicryptophytes, G = geophytes, H.H = hydrophytes and halophytes, Th = therophytes, A = arctic, E = sub-boreal.

Table 5. The average annual milk yield (kg) per recorded cow in Iceland (4% butterfat).[1]

Year	Yield
1900	2000
1910	2200
1920	2400
1930	2500
1940	2600
1950	2800
1960	3200
1965	3400
1968	3600

[1] From Árbók Landbúnadarins, 1950–1965.

The ability of the cows to consume hay is great, and it is not uncommon that a cow eats 10 to 15 kg good quality hay per day. In recent decades the use of concentrates has increased greatly, and due to this and work in animal breeding the average milk yield has increased steadily (Table 5). Dairy production is mainly in south, southwest, and north Iceland.

Sheep raising, which is common throughout the country, is mainly for mutton production while the wool is of minor importance. The ewes weigh about 50 to 60 kg and the rams about 100 kg. Improved winter feeding, management, and breeding work has not resulted in the expected increase in lamb carcass weight. This is in part due to prolonged overgrazing of the summer rangelands. The production per ewe has, however, increased, especially the last 20 years (Table 6). This is due to higher fertility which is now 1.3 lamb per ewe.

Table 6. Average annual meat production (kg) per ewe and lamb carcass weight (kg), 1949 to 1969.[1]

Year	Meat prod. per ewe	Carcass weight
1949	13.7	13.5
1954	16.7	14.1
1959	15.7	14.1
1964	17.4	14.4
1969	17.0	14.0

[1] Personal communication with A. G. Pétursson.

Table 7. Average annual yield (kg/ha, dry matter) (i.e., peak community biomass; 1961 to 1966) and the carrying capacity (ha/ewe/month) (May to September) of some common plant communities in Iceland (Thorsteinsson and Olafsson, unpubl. data).

Plant community	Yield			Carrying capacity[1]
	Herbs	Woody sp.	Total	
Moss heath	120	140	260	1.9
Dwarf shrub heath	190	1020	1210	0.7
Grassland	880	230	1110	0.3
Bogs	1050	70	1120	1.2
Snowpatch communities	460	390	850	0.5

[1] A 50 kg ewe with a lambing percentage of 130.

The Icelandic horses are of the pony type. The height at the withers is about 140 cm and the average weight 370 to 390 kg. For centuries the horse was the only means of transport in Iceland as few roads were built until this century. Due to decrease in the number of farms and mechanization of agriculture, the number of horses has greatly decreased.

Carrying Capacity and Present Use of the Rangelands

The most extensive plant communities on well-drained soils are moss heath and different dwarf shrub heaths. The latter may give fairly high total annual yields, but in general they lack species preferred by the livestock under summer grazing, i.e., grasses and certain forbs. Grass-dominated plant communities have declined the last few decades due to overgrazing, and they are now uncommon on open rangelands. The poorly-drained soils (bogs and marshes) also give high yields, but unless drained they are seldom grazed except in winter and early spring.

Table 7 shows the annual herbage production of some common plant communities in Iceland, giving averages of samples from 1961 to 1966. The table also shows the carrying capacity of these communities in the period May to September. In calculating this it is considered "proper use" when 40% of the weight of the most palatable species has been removed at the end of the grazing season.

The carrying capacity of the Highland rangelands, which provide summer grazing for most of the sheep, varies from 0.5 to 1.6 ha/ewe/month. There is less information available on the Lowland rangelands, but their carrying capacity is somewhat higher.

The Highlands of Iceland are divided into grazing commons by drift fences and natural barriers to livestock movement such as rivers, glaciers, and steep mountains. Each common is utilized by animals from a particular group of farms in the Lowland. In the past the number of animals in a given common has only rarely been regulated, and the sheep and horses are not herded in the commons.

Through range research it has become established that extensive overgrazing of the rangelands is taking place in Iceland (Fig. 4). At the same time as the area of vegetated land has been decreasing, the number of livestock, other than horses, has increased, and now available herbage in the summer is the limiting factor in the animal production. Overgrazing is most severe in the heavier populated districts in the south and southwestern parts of the country, while there are considerable unused range resources in remote areas (Fig. 4). The overgrazing is not only caused by too many animals compared with available herbage but also by uneven distribution of the sheep. The palatable species on the well-drained soils, which are most sensitive to overgrazing, will be grazed

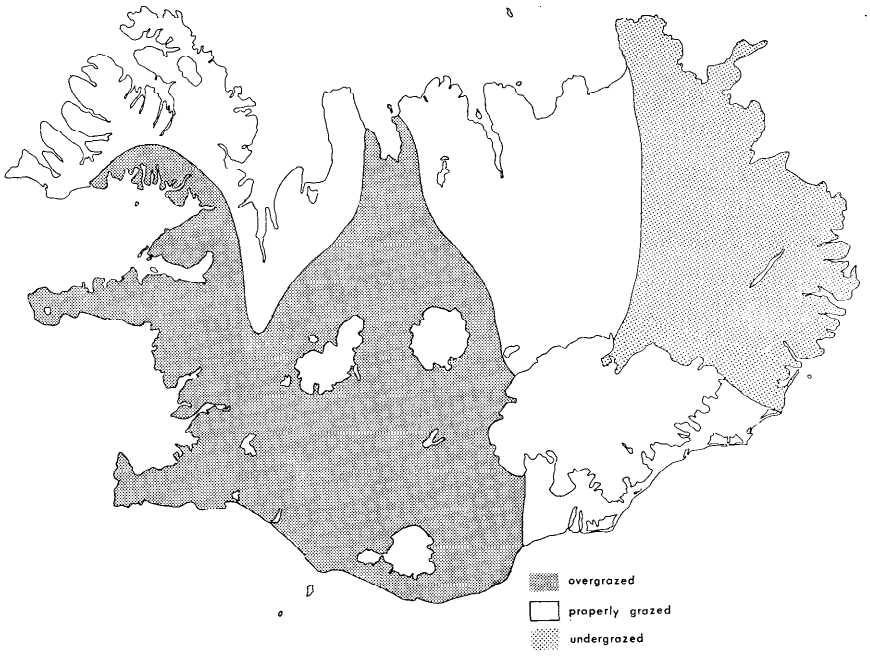

FIG. 4. A map of Iceland showing overgrazed, properly grazed and undergrazed areas based on range survey information.

to ground level before the vegetation of the poorly-drained soils are grazed to any extent. Combined grazing of cattle and sheep could secure more even grazing, as the coarse herbage of the poorly-drained soils would probably be well suited for cattle grazing. But there are less than 500 beef cattle in Iceland.

Range Management and Research

Range Improvement

It is evident that there is urgent need for land reclamation and range improvement in Iceland. Only 25% of the country is covered with vegetation, much of which does not provide adequate protection against soil erosion and has low carrying capacity.

Grazing restrictions have not, until recently, been common in Iceland, as the problem of overgrazing was not recognized. However, in areas which have been protected for reclamation purposes or as parks, the vegetation has gradually changed in botanical composition and density. Palatable grasses and forbs as well as the native birch and willows have increased, clearly indicating the nature of the climax or potential natural vegetation. These changes are slow, however, compared to those in countries with more favorable growth conditions.

Poorly-drained soils cover approximately 8 to 10% of the total area of the country. The vegetation on these soils is of little value for grazing due to unpalatable species and wet surface. When drained, however, the botanical composition changes from sedge dominance to grassland in the course of 2 to 4 years and results in rangelands with high carrying capacity and excellent land for cultivation. The annual land drainage in Iceland has amounted to approximately 5,000 hectares each of the last five years. This might prove to be the most economic way to reduce the grazing pressure on the more erodible land.

Prolonged overgrazing has left the soil impoverished, and fertilization of the rangelands results in rapid, extensive changes of the vegetation in much the same direction as does protection. Grasses become dominant and plant density increases. Generally, an annual application of 70 kg nitrogen and 70 kg phosphate per hectare for two successive years has proved sufficient for a satisfactory change in the botanical composition (Thorsteinsson and Sigurbjörnsson, 1961). As yet it is somewhat uncertain how stable these changes are, and if it is possible to maintain without further fertilization the new composition and increased herbage yield under proped grazing. Aerial application of fertilizers on rangelands was initiated some years ago by the Icelandic Soil Conservation Service. This method is especially suitable for the hummocky surface in Iceland and much of the Highlands due to their inaccessibility to machinery.

In plant communities where woody species dominate, fertilization alone has not been sufficient to markedly change the botanical composition. In such cases application of mixture of 2,4-D and 2,4,5-T has been very efficient in killing the woody species (Thorsteinsson and Gudnason, 1964).

Legislation on soil conservation in Iceland dates back to 1907. There are now two public institutions concerned with this work, the Soil Conservation Service and the Forestry Service. The former has been concerned primarily with protection and reclamation of denuded areas and sand dunes, while the main objectives of the Forestry Service are protection of the remaining forested areas and reforestation with native and imported tree species. Considerable areas of sand dunes have been reseeded, mainly with *Elymus arenarius*. Other denuded areas have been reseeded with grasses, such as different strains of *Festuca, Agrostis* and *Poa* for haymaking and grazing. The reseeding has been restricted to the Lowlands as no seed of native, adapted species is available, and imported species of grass have proven inadequate under the severe Highlands conditions. In

spite of fertilization, most introduced species disappear in the course of 3 to 5 years and are replaced by lower yielding Icelandic native plants.

Different means for improving distribution of the livestock, such as increased fencing, distribution of salt on the range, herding, etc., are being used in limited areas.

Range Research in Iceland

The deterioration of vegetation and subsequent soil erosion in Iceland was to a great part a result of lack of knowledge regarding the carrying capacity of the rangelands and harmful effects of overgrazing. Lack of research and information on land reclamation and range renovation has also resulted in many costly failures.

In 1957 the Agricultural Research Institute in Reykjavík initiated a small-scale study of the range resources in Iceland. The main purpose was to try to determine the carrying capacity of the native rangelands and to test methods for range improvement and renovation (Jóhannesson and Thorsteinsson, 1957).

In 1961 these studies were expanded, to about a 5 man year effort in the past decade, and the program now has the following categories:

1. Vegetation classification and mapping with aerial photographs—about 6,000 km^2 per year (see Fig. 1).
2. Standardized measurements of cover composition and woody vs. nonwoody plant yield—about 100 locations per year.
3. Plant preference of esophageally fistulated grazing sheep (Thorsteinsson, 1964; Thorsteinsson and Olafsson, 1965a)—average about 50 diet samples per year.
4. Chemical composition and digestibility of individual range plants and sheep diets (Thorsteinsson and Olafsson, 1965*b*, 1969)—average about 60 clip samples and 50 diet samples per year.
5. Range improvement studies—about 20 fertilizer study sites per year and 4 herbicide trials (Thorsteinsson and Gudnason, 1964).

The mapping study is the first attempt to measure the area of vegetated land in Iceland and to study its character by quantitative methods (Fig. 1). In the period since the program started about 60,000 km^2 of the Highland range, or more than half of the country, have been mapped. Since 1966 ten sheets of the vegetation map, at the scale 1:40,000, have been published annually (Icelandic Agricultural Research Institute, 1966–1970). Results of these surveys are presented, even before publication of the map sheets, to farmers and agricultural advisors. The stocking rates throughout the country are being adjusted to the results of the surveys. It is hoped that within a few years controlled grazing will replace the present uncontrolled use of the rangelands (see Fig. 4).

Additional research includes: studies on population dynamics and diets of reindeer; effect of elevation on yield, phenology, chemical composition, and in vitro digestibility of several range plants; and determination of chemical composition and digestibility of native hays.

Knowledge gained in range survey and dietary studies had an unexpected benefit following the volcanic eruption of Mt. Hekla in 1970. Volcanic ash covered parts of several grazing commons. This ash is high in fluorine which is injurious to sheep tooth and bone development. Samples of the known preferred plants were collected for fluorine determinations. Knowing the allowable limit of fluorine concentrations, the concentration of fluorine in samples of preferred plants, the extent of the ash fall, and the relative carrying capacity of the different plant communities, it was possible to calculate, prior to stocking of the range, the reduction in grazing capacity by common area caused by this catastrophic event.

Conclusions

Recent calculations show an unexpected importance of rangelands in Iceland. At least one half of the forage consumed by large herbivorous animals comes from rangelands. Animal agriculture is of known importance in Iceland, second only to fisheries. Yet levels of support for research and improvement of rangeland are not commensurate with the value of the resource to the nation. This is particularly distressing when it has been considered that about half of the rangelands are overused, one fourth properly used, and one fourth perhaps underused.

Even more critical is the fact that more land and soil is being lost than is being replaced. With increasing population size and with increasing demands upon the rangeland for food production, imbalance between accumulation of research information, rangeland improvement and conservation, and importance of rangeland use must be considered.

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FIRST CALL FOR PAPERS

25th Annual Meeting, SRM, Washington, D. C.

(SILVER ANNIVERSARY)

The Silver Anniversary meeting of the Society will be a notable event. It is designed to provide for appropriate reports and papers addressed to the occasion, but also to give scientists, technicians, ranchers, teachers, and administrators an opportunity to report new work and, if possible, the relationship of such data to the meeting theme, "Rangeland Resources and Society's Needs—a look ahead to the 21st Century." Volunteer papers of approximately 15 minutes duration in the following topical areas of rangelands—*economics, ecosystems, education, improvement, nutrition, physiology, planning, recreation, wildlife (birds), wildlife (mammals), forest range,* and *new uses of range plants*—from all contributors, Society members and nonmembers, will be considered. Accepted papers by students —graduate, undergraduate, or high school—will be scheduled in similar topical areas of the planned concurrent sessions.

Procedure—Those wishing to present papers at the meeting in our Nation's capital should submit the following: (1) title of paper, (2) a preliminary abstract of not more than 200 words, and (3) a supporting statement indicating the significance of the offered paper. The statement also should specify the method of presentation—reading, charts, slides, special requirements, etc.

Deadline No. 1—One (1) copy of the above documents must be sent to the Program Committee by **June 4, 1971.** Send them to David G. Wilson, Program Chairman, SRM, Bureau of Land Management (390), Department of the Interior, Washington, D. C. 20240.

Deadline No. 2—The Program Committee's final selection of papers will be based on a review of the submitted abstracts and supporting statements. The authors of accepted papers will be notified by September 3, 1971.