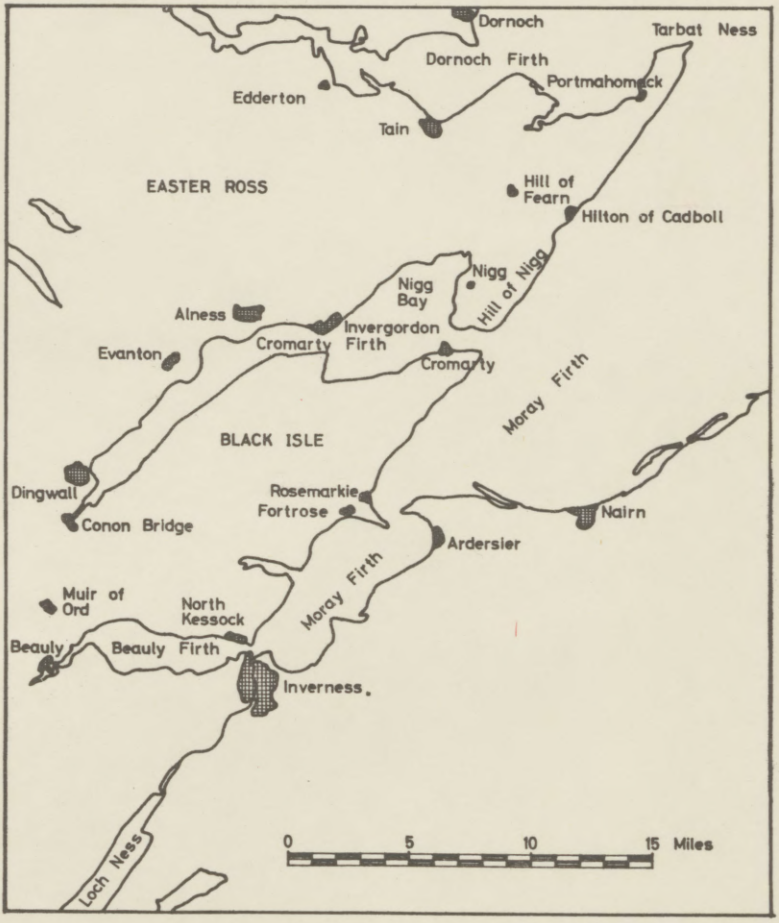
NORTH OF SCOTLAND COLLEGE OF AGRICULTURE
SCHOOL OF AGRICULTURE, ABERDEEN
AGRICULTURAL ECONOMICS DEPARTMENT

An Agro-Economic Appraisal of Agriculture in Easter Ross



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THE NORTH OF SCOTLAND COLLEGE OF AGRICULTURE
DEPARTMENT OF AGRICULTURAL ECONOMICS

AN AGRO-ECONOMIC APPRAISAL OF AGRICULTURE IN EASTER ROSS

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INTRODUCTION

The loss of good agricultural land to urban development is a national problem of serious extent. Its long term and cumulative nature is often unappreciated by those making planning decisions on the basis of short term economic criteria. In 1935 Sir George Stapledon stated the problem quite clearly:

"Our agricultural acres are dwindling rapidly, and dwindle they inevitably must, and unless some decision is made as to the minimum acreage that should at all costs be retained for food production, and appropriate action taken, no more than two hundred years hence may see the farm lands of England reduced to one half. To my mind the whole trouble relative to our land surface arises from short views and short-sighted notions as to economics. Justification is relative" (1). Later, he states that: "Where land, the most precious of all the nation's materials assets, is concerned - since its absolute amount is practically a constant - to plan on anything less than units of a hundred years is inept in conception and can, therefore, only be inapt in realisation". (1)

Best and Coppock (2) have estimated that at the present rate of transfer, the amount of land lost from agriculture for urban development between 1951 and 1971 will be 730,000 acres in England and Wales and 80,000 acres in Scotland. Wibberley has looked beyond this period and has said that: "Cautious extrapolation of present-day trends suggests that by the year 2000 the area of agricultural crops and grass in England and Wales is likely to be less by about 15 to 20 per cent of its 1900 acreage, mainly because of urban demands". (3) In Scotland the area of agricultural land going for housing and urban development and Service requirements is stated each year by the Department of Agriculture and Fisheries in its Annual Report. (4) In the five years from 1962 to 1966 this transfer averaged 2,850 acres per year.

This serious mis-use of the nation's basic resource has led to the philosophy of land use planning. L. D. Stamp (5) presented a thorough analysis of the problem and wrote at length on the principles of land use planning. In this connection the work of the Land Utilization Survey was an objective study and indicated at least some areas in which the land was either wrongly used or was not contributing as fully as it might to the national well-being. This led automatically into the field of land use planning, whereby mis-use can be eliminated and use rendered as effective as possible. L. D. Stamp was in a position to be able to lay down at least some basic principles which should underlie any comprehensive planning of land use, whether national or local.

In the first place, the land can be described as the nation's ultimate

asset and it is to all intents and purposes fixed in area and inextensible. In the second place, the broad physical characteristics of the land are permanent and unalterable influences. The areas of upland must remain upland. Where land is broken by numerous slopes it will continue essentially to retain these forms. Any efforts in levelling, considered in relation to the country as a whole, are puny in the extreme. Still less alterable is its geological structure and the disposition of minerals of economic importance, which remain fundamental in the control they exercise. To a considerable extent the climatic factor is permanent and unalterable also. Land planning is in essence the determination of the optimum use of every acre of the country. But the criterion must not be, as it has often been in the past, the economic advantage of some favoured section of the community.

"The criterion must be the national advantage". (5)

The philosophy of land planning has been accepted by the Ministry of Agriculture, Fisheries and Food and their policy is clearly stated in a recent Report. "Since land developed for most urban uses is permanently lost to agriculture, the Ministry's policy is to steer urban development away from the areas likely to be of the greatest agricultural value in the long term. This places the main emphasis on retaining in farming the land with the greatest inherent value for crop production. Other factors such as the standard of management, adequacy of fixed equipment and farm structure are less important because they are more susceptible to change". (6) Unfortunately the Ministry of Agriculture, Fisheries and Food frequently find their policy completely contrary to that of other Government Departments, and recent examples in Essex (Stansted) and Buckinghamshire (Milton Keynes) illustrate this.

The lack of co-ordination in land use planning has been noted in a recent Report by the Land Use Study Group (7); "A policy of land use, within which the claims of the various competitive activities are recognised, implies co-ordination between the various interests involved in the use of rural land. Such co-ordination has been signally lacking in Great Britain". (7)

Considerable interest has recently been shown in land use in the Highlands, and a thorough analysis was published in 1964 by the Advisory Panel on the Highlands and Islands. (8) This interest was further stimulated by the clear indication in the plan for the Scottish Economy (9) that the development of industrial and urban growth would be actively promoted at certain focal points. The primary responsibility for this development in the Highlands rests with the Highlands and Islands Development Board, and their land use policy is clearly stated in the First Report which has just been published. (10) Paragraph 147 reads: "Any 'land use plan' must stem from a policy. Basic to any such policy is our determination to see that the Highlands and Islands produce as

much as they can from the land, whether it be livestock, crops, timber or recreation. But in determining what is the best use of any given area two factors seem to us at this stage, in the light of our development remit, to be particularly important - productivity and employment. In other words, which particular use of the land will, for a given investment, produce the best return for the largest number of people. To this end we intend to carry out a systematic survey and study of land potential in our region".

The following appraisal of land use in one specific area in the Highlands was produced by the Agricultural Economics Department of the North of Scotland College of Agriculture at the request of the National Farmers' Union of Scotland. The request arose from the concern of the farming community over the possible use of good agricultural land in the Invergordon area for extensive urban development connected with the proposal to site a petro-chemical complex there. It is not a definitive study and should be regarded only as a brief evaluation of the agriculture of Easter Ross. Other studies of this region are being carried out for the Highlands and Islands Development Board and the Scottish Economic Planning Council. The majority of this report was compiled in two weeks for restricted circulation, with minor additions prior to publishing, and in the time available it can only touch briefly on the various areas of study and indicate the agricultural importance of Easter Ross. It was felt, however, that the publication of this Report would be welcomed by all those who are currently concerned with land use matters in the College area.

AN AGRO-ECONOMIC APPRAISAL OF AGRICULTURE IN EASTER ROSS

The agriculture of the coastal strip of Easter Ross and the Black Isle exhibits several outstanding features in relation to that of the Northern Highlands, and compares favourably with other regions of highly productive land such as East Lothian.

Climate

Rainfall varies from 22½ inches per annum near Portmahomack to 30 inches near Evanton, but rises rapidly with increasing land altitude westwards from the coastal strip. (See Map 1 - Rainfall). The Black Isle shows a similar pattern with rainfall of 25 inches per annum near the coast, rising to 30 inches around Mount Eagle. Rainfall rises towards the midsummer period and the wettest months are July, August, September and October (Table 1). The number of days per month during which rain falls is distributed through the year more evenly than the amount of rain per month, and the total duration of rainfall averages 700 hours (Table 1). This rainfall pattern is very similar to that of East Lothian (North Berwick Reservoir) [11] while the annual rainfall at this station exceeds that of Fearn (Table 1) by only 1 inch.

Snow falls on low ground (0-200 ft.) in Easter Ross during 25 days of the year, but the average number of mornings with snow lying at this altitude is only 5 [12]. The East Lothian region shows a similar pattern.

The mean annual temperature is 47.5°F with a gradual rise in monthly mean temperature from 38.7°F in January to 58.3°F in July, declining to 39.8°F in December, as shown in Table 1. The mean annual temperature at East Lothian (North Berwick) is 0.2°F greater, due to slightly higher average temperatures during July, August, September and October, although the difference is slight [13]. The number of hours of bright sunshine would appear to be an important factor causing the differences in average temperature, for in Easter Ross the summer months have considerably fewer hours of sunshine than East Lothian [14]. (Table 1). The potential sunshine due to latitude would be greater during the summer months in Easter Ross, but the actual amount recorded is less, and the annual total of 1,291 hours at Fortrose is 54 less than that at North Berwick.

The dates of the last spring frost and the first autumn frost are closely related to altitude (Map 2 - Frost), being 1st May and 15th October respectively in the coastal strip of Easter Ross. At North Berwick the last spring frost occurs at the same time, but the first autumn frost is 2 weeks later on average [12].

The climate in the Easter Ross area is therefore most suited to a wide range of agricultural operations, and compares closely with that of East Lothian which is one of the most productive agricultural regions in

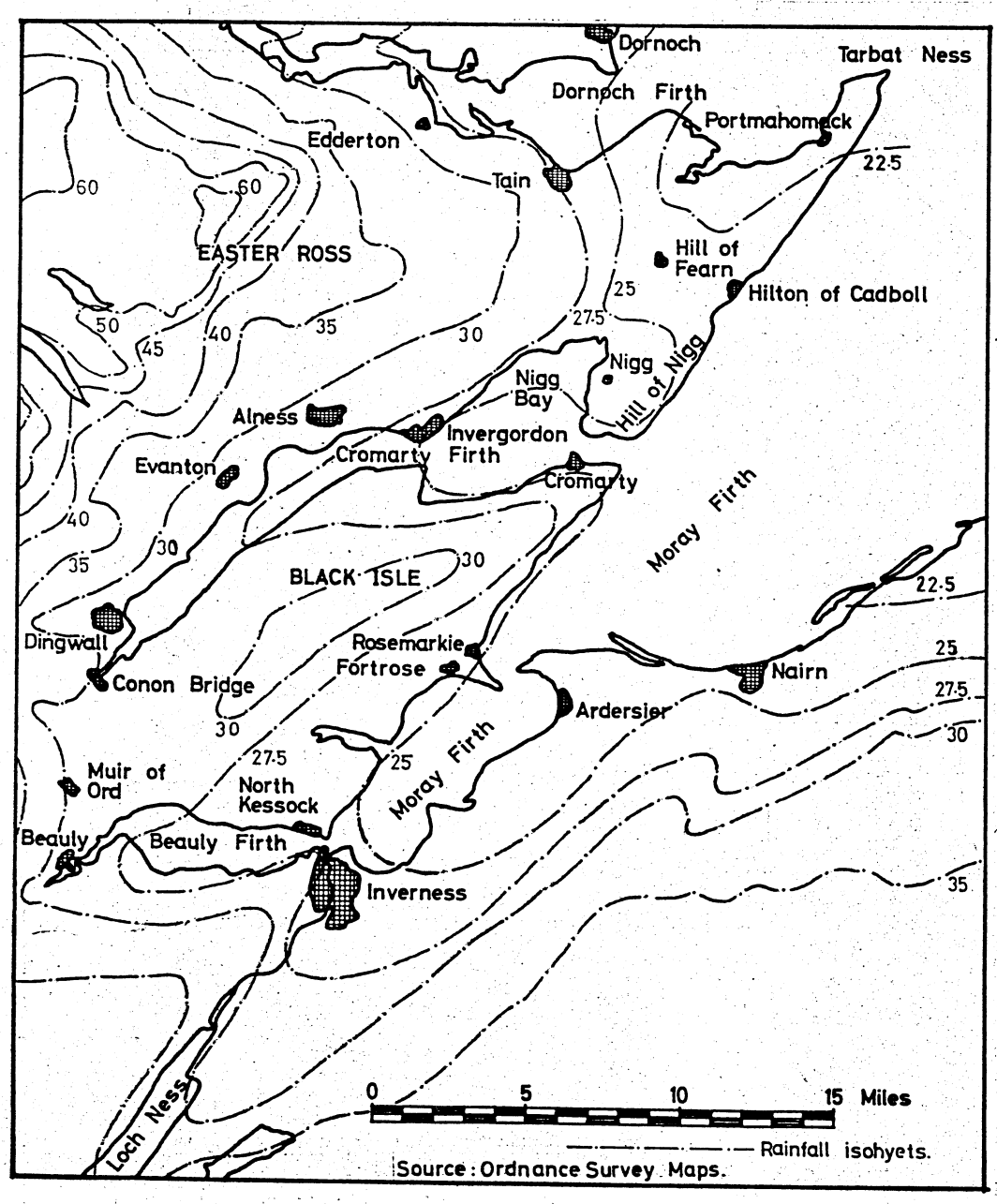
TABLE 1

METEOROLOGICAL DATA FOR EAST ROSS-SHIRE (AVERAGE)

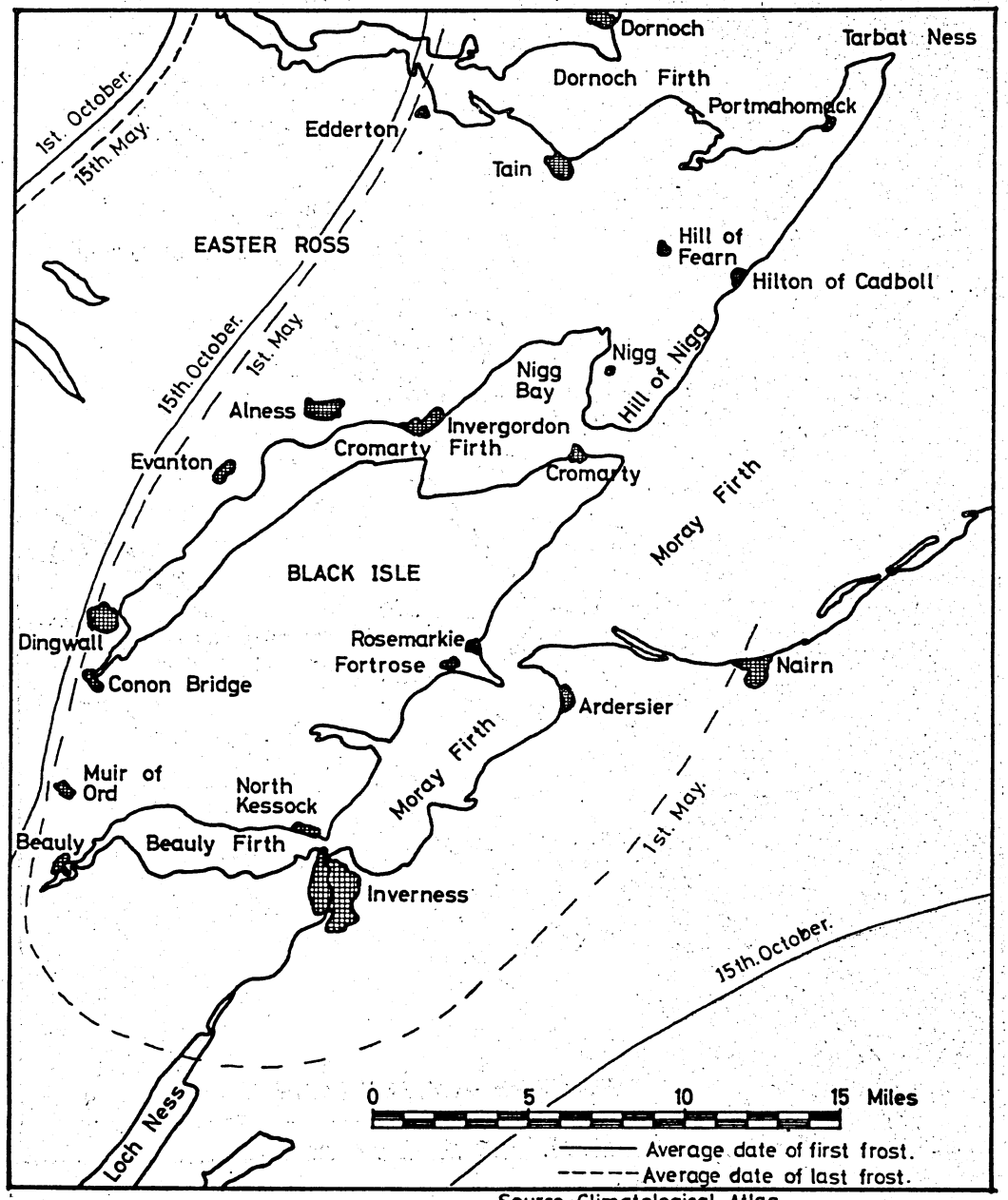
	JAN.	FEB.	MARCH	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	YEAR
RAINFALL - Inches													
Average monthly rainfall at Fearn. 1916 - 1950	1.88	1.32	1.24	1.47	2.01	1.80	2.68	2.49	2.25	2.59	2.04	1.82	23.59
WET DAYS PER MONTH													
Average number of days per month on which rain fell - 1901 - 1930	18	18	20	18	18	16	17	20	18	20	20	22	225 (*700 hours)
TEMPERATURE - °F													
Average monthly mean temperature at Fortrose 1921 - 1950	38.7	39.3	41.8	45.4	49.9	54.7	58.3	57.6	53.8	48.1	42.4	39.8	47.5
SUNSHINE HOURS													
Average bright sun at Fortrose. 1921 - 1950													
Monthly Total	49	70	110	141	170	176	145	140	113	89	54	34	1,291
Daily Mean	1.57	2.49	3.56	4.68	5.49	5.86	4.68	4.50	3.77	2.89	1.80	1.10	3.45

* Although rain falls on 225 days per annum, the actual duration of rain falling is 700 hours.

MAP 1 Average Annual Rainfall



MAP 2 Dates of First and Last Frost



Source: Climatological Atlas.

the country.

Altitude

The greater part of the coastal strip of Easter Ross lies below 250 ft. above sea level, and east of the road from Tain to Barbaraville is almost flat land. Altitude is of extreme importance in relation to the agriculture of the region for the best land lies below 350 ft. and by 500 ft. above sea level is rapidly becoming marginal in type. (See Map 3, and refer to Ordnance Survey Maps). Similarly, in the Black Isle, the land quality rapidly deteriorates with increasing altitude, and the best land lies below 350 ft. with farming becoming extremely difficult towards 500 ft.

To the west of the 500 ft. contour the land rises very steeply. This factor, combined with the accompanying rapid increase in annual rainfall renders this land lying to the west of relatively little value for agriculture. So marked is this effect on the whole Easter Ross area that a rough land classification could almost be made on contour levels alone. Land of low altitude and of high quality as exemplified by much of Easter Ross is rare in the Highland Region.

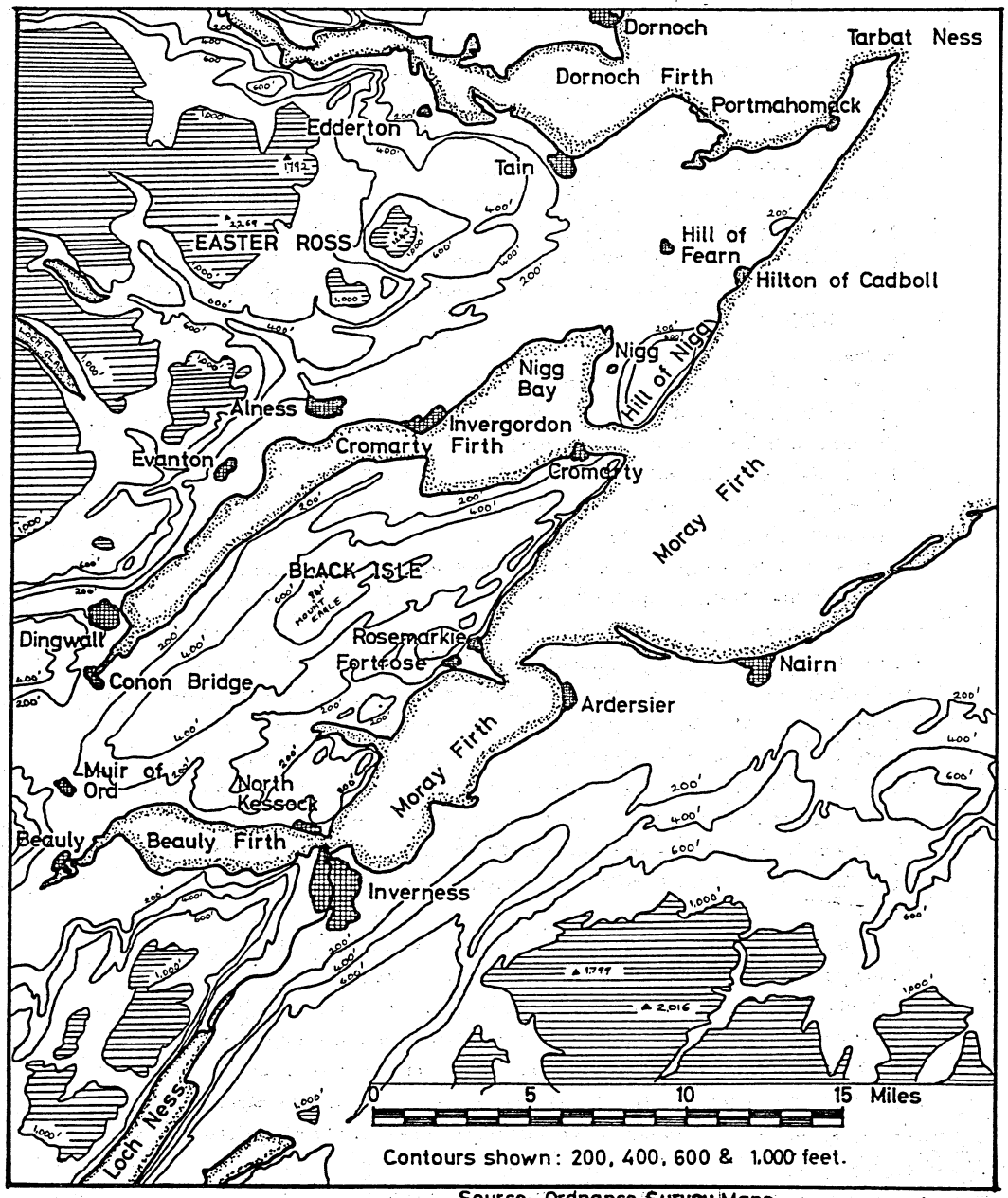
Geology

The geology of Easter Ross and the Black Isle shows clearly how this area has become a distinct agricultural region. A sketch map has been produced to illustrate the main features, but it must be pointed out that this map was condensed from large scale Ordnance Survey maps and on the scale drawn is a guide only, not representative of the actual position of geological boundaries. (Map 4).

The Eastern coastline of the Cromarty Firth region is a continuation of the Great Glen fault, while the western boundary of the region is clearly marked by another major geological fault. The area between the two faults is composed largely of middle Old Red Sandstone. To the west of the sandstone, the rocks consist of silicious schists, granite, and gneiss all of which are hard rocks associated with very poor agricultural conditions. In the area around Tain and Portmahomack there is a layer of upper Old Red Sandstone. The entrance to the Cromarty Firth has on either side of it outcrops of granite gneiss, and a further outcrop occurs on the coast of the Black Isle between Ethie and Fortrose, forming a ridge along the coast. This hard rock is associated with poorer agricultural conditions.

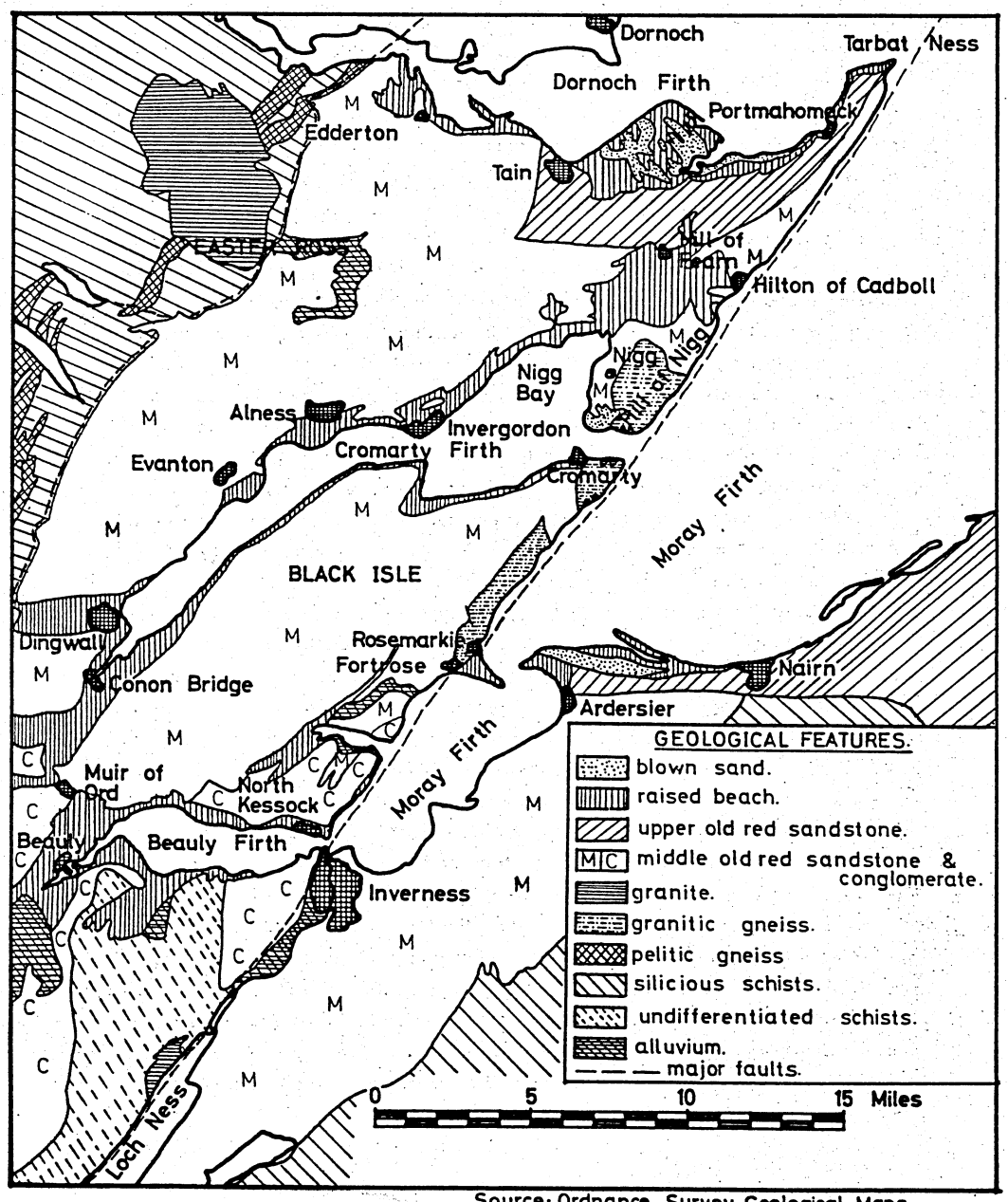
The whole of the Cromarty Firth area was glaciated from an ice shed in the central region of Ross, and this ice cap crossed Easter Ross in an easterly direction. The melting of the ice cap caused two distinct levels of raised beach in the Cromarty Firth area and much of the land on the present coast line consists of this material. The melting of the ice also accounts for pockets of alluvial material where outwash fans occurred. As far as agriculture today is concerned the major effect of the glaciation

MAP 3 Altitude Contours: Easter Ross



Source: Ordnance Survey Maps.

MAP 4 Geology of Easter Ross



Source: Ordnance Survey Geological Maps.

of this region was to cover the majority of the land area with a layer of boulder clay and similar morainic debris. Near Tain, areas of blown sand have accumulated among the raised beach material, and a further deposit occurs to the west of the Hill of Nigg (at the entrance of Cromarty Firth).

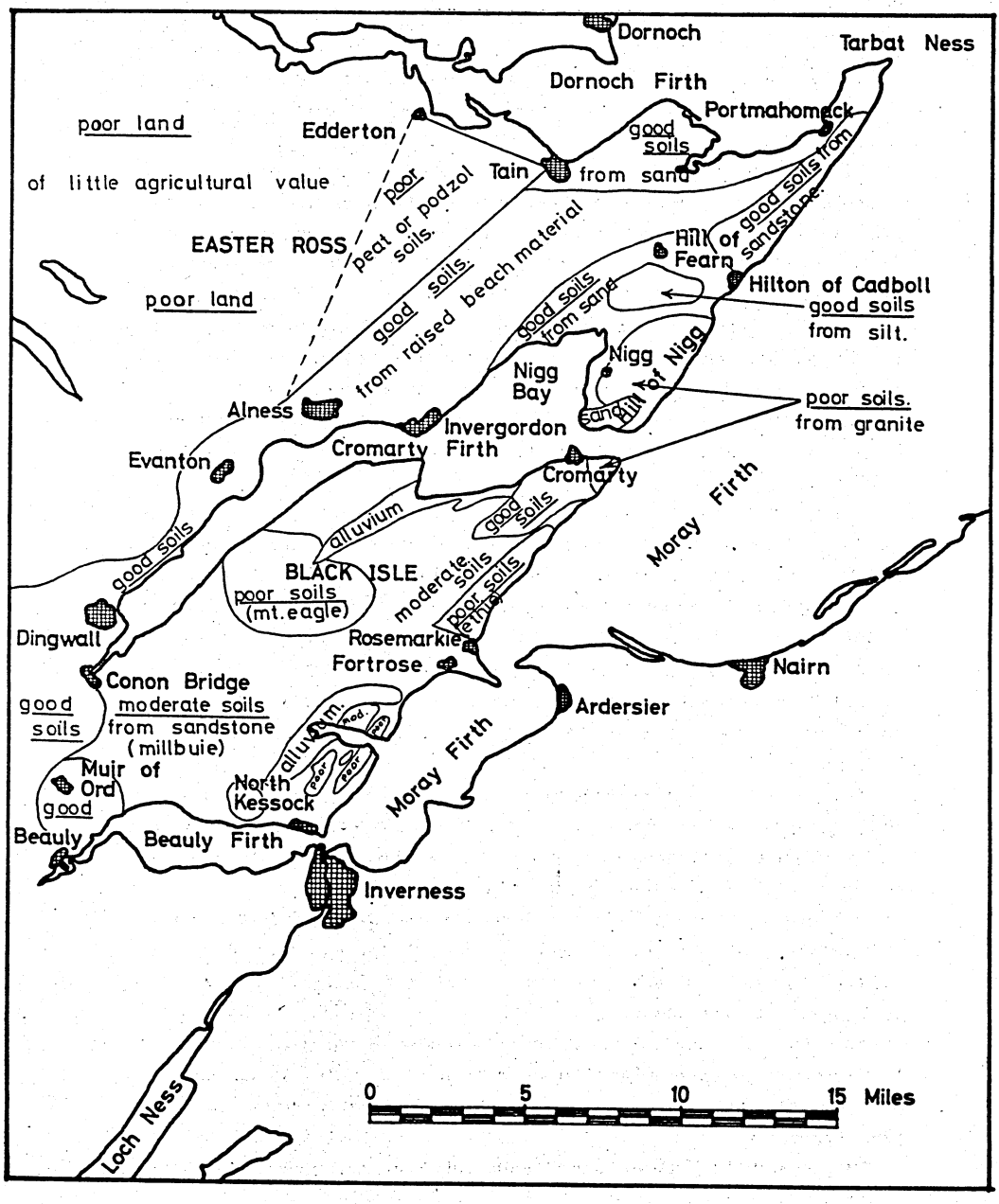
Soils

The mapping of the glacial drift material is incomplete for this area of Scotland, so that little can be said by way of detailed description. The ice cap carried with it extensive deposits of boulder clay and sandy debris which is unevenly distributed over the underlying rock, so that in places the sandstone itself is the origin of the soils which have developed. Near river mouths or where moraine-dammed lakes have existed in the past pockets of alluvial material occur. The result of the variation in parent material is that there are large areas of good soil with small patches of poorer soil which could more readily be lost from agriculture.

The Soil Survey work has been completed by the Macaulay Institute for Soil Research for the area east of a line from Edderton to Alness, and for the Black Isle, but the maps and commentary have not yet been published. Consequently only broad descriptions of the soils of these two areas can be given, with little or nothing relating to the area south of Alness. Map 5 is a rough sketch map to aid the descriptive material which follows, but is in no way representative of the soil maps or land classes of the region. It is merely inserted to allow the reader to identify the areas being discussed. The authors are indebted to research workers of the Macaulay Institute for Soil Research for the following descriptive information on soils in the area.

The triangle of land bounded roughly by a straight line from Edderton to Tain to Alness is mainly poor hill land, and the soils are generally of peat or a peaty podzol type. These soils are of low agricultural value characterised by their strongly leached, acidic nature, with a greyish topsoil. This region of poor land is within 3 miles of Invergordon and its development for urban use would involve no great loss to agriculture. Moreover, because of its slight elevation the site offers greater aesthetic value as a residential area than land adjacent to the town of Invergordon itself. To the east of Tain is an area of sandy or gravelly parent material which has developed soils of light texture and free draining characteristics. The northern end of this Fearn peninsular has a thin supra-glacial deposit over the underlying till and much of this material has worked into good soils of high agricultural value. Along the east coast of the peninsular, from south of Tarbat Ness to about Hilton of Cadboll, the middle Old Red Sandstone comes to the surface and this soft material has been easily ploughed into a good soil of high agricultural value. Further south along this coast the land rises to the Hill of Nigg, composed of granitic gneiss and forming thin, poor soils of low agricultural potential.

MAP 5 Sketch Map of Soil Quality



Many of the soils of the coastal strip of Easter Ross have developed on raised beaches and there are certain differences between the two levels in evidence. The high beach is a more sandy material and the natural soil development is a podzolic soil profile, that is, free draining and acidic. However, with suitable husbandry these naturally occurring soils can develop into light textured soils of high agricultural value. Nearer the coast and on the low beach, mixed parent material occurs with areas of impeded drainage where occasional wet spots develop. The low beach material is of a more silty nature and produces good quality soils.

The Invergordon area is of low beach material with the notable exception of the ridge at Inverbrekie which is from the high beach and is soil of the highest classification. 1½ to 2 miles behind Invergordon ridges in the land surface and the occurrence of the more silty parent material cause local drainage problems and consequent wet spots occur here and there. The Nigg Bay area south of Fearn has an underlying silt platform, but the drainage problem has been overcome by a regional drainage system. In the Fearn peninsular area several unnaturally deep soils occur on ridges and these have clearly been man-made, being frequently calcareous fen peats, resulting from marling onto ridges of poorer material.

The Black Isle is a long peninsular of Old Red Sandstone in a syncline, so that in the coastal areas the rock strata surface at a steep angle. The coast line has a narrow fringe of low (25 ft.) beach of little agricultural use. High beach parent material occurs in small patches near Cromarty on the north coast of the peninsular and at Fortrose, producing soils of high agricultural value. The promontory at Fortrose (Chanonry Ness) is actually a terminal Moraine. This raised beach material develops good soils of a light sandy or gravelly nature, free draining and suitable for all crops.

The greater part of the Black Isle soils are of a light texture from rough sandstone, their colour varying with the underlying rock, and one of their agricultural features is trace element deficiency. These soils, called the Millbuie association, are free or imperfectly drained and the natural soil is a podzol. Where the rock is near the surface the profile is telescoped and even tree crops are poor. These soils are of moderate agricultural value and a great deal depends upon the local geological circumstances.

At Muir of Ord and near Cromarty the sandstone has a supra-glacial cover which is deeper at the Muir of Ord end, and on this association (Cromarty) better soils have developed, of considerably increased agricultural value.

The soils in the area of Mount Eagle and to the north west of it, are

similar to Millbuie soils in being derived from sandstone, but the Mount Eagle soils are directly on top of the rock with a very shallow profile and poor agricultural value.

The cliffs at Fortrose and Gallow hill near Cromarty are outcrops of granitic gneiss and on this hard rock thin soils of the Ethie association have developed. They consist of a mixture of Old Red Sandstone, which has been pushed over the gneiss by glacial action, and gneissic material, going down to solid rock. This type of soil is of low agricultural value.

Near Kessock the basal conglomerate outcrops at a steep angle and the area is characterised by sharp ridges. On the ridge tops the soil is very thin indeed, and between these varying depths of accumulated material occur, but the soils are poor and of no agricultural significance.

On the coastal strip from Evanton to Dingwall the soils are derived from raised beach parent material and are of high agricultural value. In the Dingwall vicinity occurs some of the best land in Easter Ross, and the flat area from there to Beauly is of considerable agricultural potential.

Land Classification

The land classifications at present in existence are considerably out of date. The Land Utilization Survey of Britain, directed by L. D. Stamp, was carried out in Ross and Cromarty between 1931 and 1932 (15). The latest statistics in this work relate to 1936, and both the text and the Ordnance Survey Maps derived from the field work were published in 1944.

The Department of Agriculture and Fisheries for Scotland Lands Officers have compiled a land classification based on 6 inch Ordnance Survey Maps printed in 1902, although the classification was done after World War II. Categories of A, B and C were used with "plus" and "minus" subclasses, and a class D of no agricultural use. However, considering that this work is now some 20 years old its relevance to the present day seems rather remote.

A new land classification system has been recently agreed on in England and Wales (16), which classifies land into the following 5 grades:

Grade I

Land with very minor or no physical limitations to agricultural use. Yields are consistently high on these soils and cropping highly flexible since most crops can be grown, including the more exacting horticultural crops.

Grade II

Land with some minor limitations which exclude it from Grade I. A wide range of agricultural and horticultural crops can usually be grown, though there may be restrictions in the range of horticultural crops and arable root crops on some types of land in this grade.

Grade III

Land of average quality, with limitations due to the soil, relief or climate, or some combination of these factors which restricts the choice of crops, timing of cultivations, or level

of yield. Grass and cereals are the principal crops and the land is capable of giving reasonable yields when judiciously managed and fertilized.

Grade IV

Land with severe limitations due to adverse soil, relief or climate, or a combination of these. Land in this grade is generally only suitable for low-output enterprises. A high proportion of it will be under grass, with occasional fields of oats, barley or forage crops.

Grade V

Land of little agricultural value with very severe limitations due to adverse soil, relief or climate or a combination of these. Grade V land is generally under grass or rough grazing, except for occasional pioneer forage crops.

At present, this system has not been applied to Scotland, and the only land classification taking place currently is a Land Use Survey. This work was initiated by a Committee set up in 1964 representing a broad spectrum of interested organisations such as geographers, agriculturalists, planners, education authorities, National Trust, Nature Conservancy, botanists, Ordnance Survey and many others. The Land Use Survey, as its name implies, consists of mapping what is there and does not attempt to classify land according to its potential. The work is being carried out by volunteers under the direction of the Committee and the work has been largely completed, although publication of resulting maps is negligible.

In terms of the England and Wales classification system, it is apparent that a considerable proportion of the land in Easter Ross is in the higher classes - a great deal of it being in Grade II.

Soil - Rainfall Relationship

Previous reference to the low rainfall of this region, and the fact that much of the soil is of a sandstone origin may lead to the implication that soil water deficit is a limiting factor. This implication has been expressed in map form [17], and using available figures [11 & 18] one can calculate that the average cumulative soil water deficit is about equal to 3 inches of rain. However, it has been pointed out that "Potential water deficit must be considered in relation to soil and plant before conclusions are reached about actual water deficit" [17]. In this area of Easter Ross drought is not known to be a limiting factor in agricultural production.

Agro-Economic Importance

Table 2 illustrates the overwhelming importance of Easter Ross agriculturally, in the county of Ross and Cromarty as a whole. Map 6 shows the boundaries of parishes, and of parish groups used in the Tables. In 1966 the Easter Ross region contained 86 per cent of all the tillage in the county and 74 per cent of all the crops and grass, yet

MAP 6 Parish Boundaries

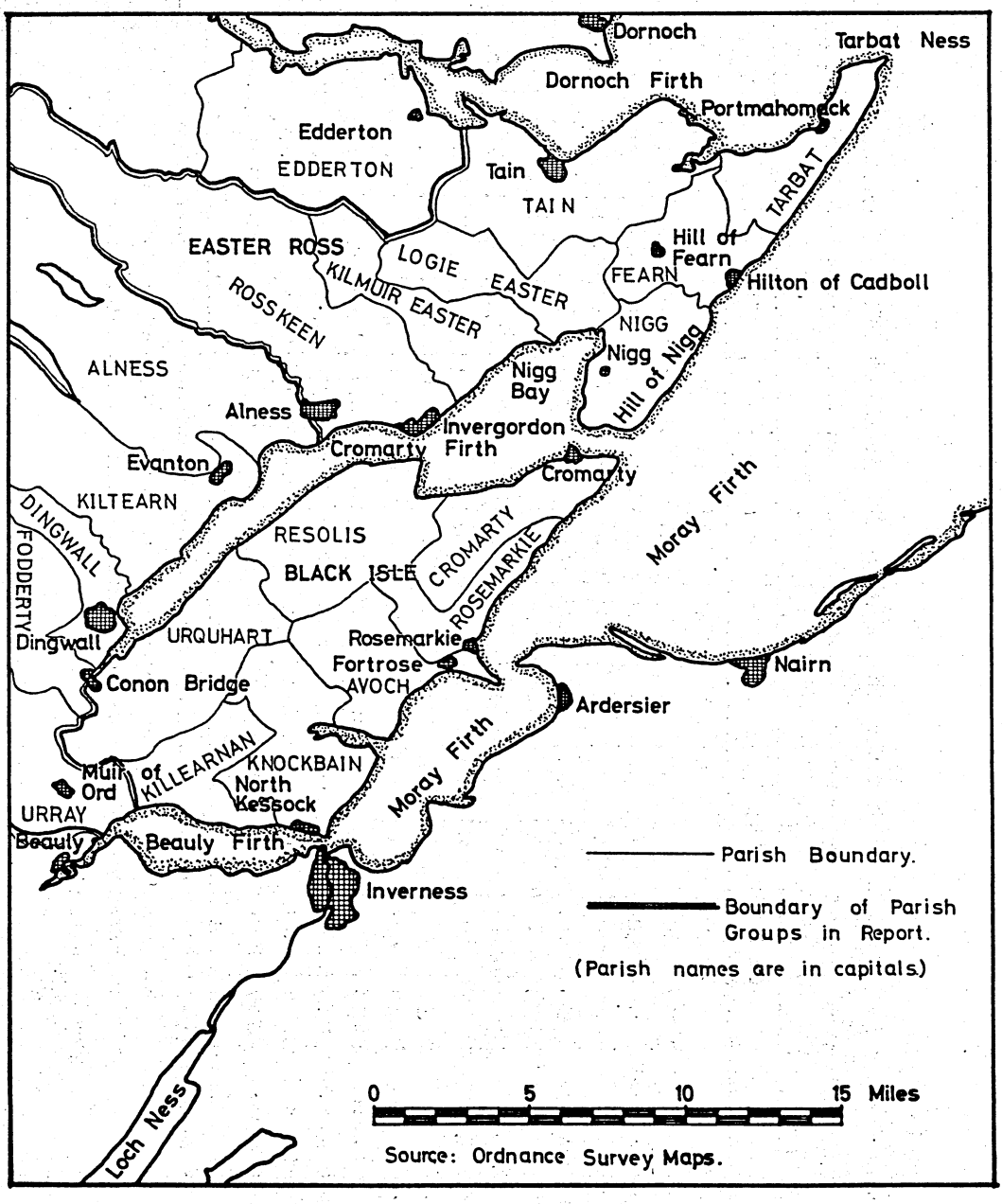


TABLE 2 CROPPING IN EASTER ROSS - GROUPED PARISH STATISTICS, REGION & COUNTY TOTALS, 1955, 1960, 1966.

ACRES

CROPS	TAIN TO ALNESS*			ALNESS TO MUIR of ORD			BLACK ISLE			TOTAL EASTER ROSS			TOTAL ROSS & CROMARTY		
	1955	1960	1966	1955	1960	1966	1955	1960	1966	1955	1960	1966	1955	1960	1966
Wheat	932	1,200	1,407	41	193	818	380	377	761	1,353	1,770	2,986	1,359	1,768	2,984
Barley	2,571	3,157	8,288	418	891	3,871	2,206	3,269	8,795	5,195	7,317	20,954	5,424	7,530	21,507
Oats & Mixed Grain	5,992	5,325	2,390	5,453	4,528	2,503	9,133	7,464	4,193	20,578	17,317	9,086	27,113	22,799	12,401
Potatoes	1,691	1,836	1,533	537	537	419	1,268	1,309	1,270	3,496	3,682	3,222	5,297	5,220	4,233
Turnips & Swedes	3,370	3,111	2,075	2,178	2,045	1,460	4,220	3,925	3,028	9,768	9,081	6,563	10,321	9,739	7,055
Other Roots	6	-	10	-	-	-	8	3	-	14	3	10	15	3	9
Fodder Crops	484	405	320	405	395	298	434	576	391	1,323	1,376	1,009	1,580	1,731	1,253
Other Crops	10	58	85	16	22	103	40	63	138	66	143	326	92	191	400
Fallow	-	29	34	15	21	154	17	25	85	32	75	273	177	1,010	1,794
Grass for Mowing	3,158	4,566	5,030	2,297	3,538	3,358	4,236	7,459	6,535	9,691	15,563	14,923	16,392	23,419	22,926
Grass not Mown	16,765	15,848	15,864	12,560	11,853	10,795	15,870	13,976	13,958	45,195	41,677	40,617	64,966	60,085	60,477
TOTAL Crops & Grass	34,979	35,535	37,036	23,920	24,023	23,779	37,810	38,446	39,154	96,709	98,004	99,969	132,737	133,495	135,039
Rough Grazing	36,078	40,129	26,862	207,296	316,328	323,670	7,412	21,029	6,082	250,786	377,486	356,614	1,337,533	1,797,335	1,299,749
TOTAL Land Area	71,057	75,664	63,898	231,216	340,351	347,449	45,222	59,475	45,236	347,495	475,490	456,583	1,470,270	1,930,830	1,434,788

* PARISH GROUPS USED:- 1. Tain to Alness - Parishes of Tain, Tarbat, Fearn, Nigg, Logie Easter, Kilmuir Easter and Rosskeen.
2. Alness to Muir of Ord - Parishes of Alness, Kiltearn, Dingwall, Fodderty, Contin and Urray.
3. Black Isle - Parishes of Avoch, Killearnan, Knockbain, Cromarty, Resolis, Rosemarkie and Urquhart.

SOURCE:- Agricultural Statistics

the total land area (including Rough Grazing) of Easter Ross is only 32 per cent of the whole county.

Considered along with the adjacent counties of Inverness and Sutherland the importance of Easter Ross is not diminished. The area of tillage, crops and grass, and total area of these three counties are 92,000 acres, 282,000 acres, and 5.5 million acres respectively. Of these acreages Easter Ross contains 48 per cent of all the tillage, 35 per cent of all the crops and grass and yet is only 8.3 per cent of the total land area. From this comparison it is clear that the region of Easter Ross is a unique area of high quality agricultural land in an area of overwhelmingly poor class land.

Statistical Importance

Reference to the agricultural statistics contained in Tables 2, 3 and 4 indicate the predominance agriculturally of Easter Ross, within the county of Ross and Cromarty inspite of being only 32 per cent of the land area. , (There are some slight discrepancies in the tables due to rounding of fractions during grouping) (Map 6). Easter Ross contains all the wheat, nearly all the barley and 75 per cent of all the oats in the county in any of the years shown. It contains a similarly high proportion of the potatoes, turnips and fodder crops and about two-thirds of the grass for mowing, and for grazing. In fact, as far as crops of value are concerned the remaining two-thirds of the land area of Ross is of very little significance.

The Easter Ross region contains about half of the dairy cattle (in 1966 - less in former years), but over three-quarters of all the beef cattle. It also contains nearly all the pigs, about half of the poultry, and only about one-third of the sheep. The sheep are mostly hill sheep in this county and are therefore located mainly on the rough grazing. (In 1965 Hill Sheep Subsidy was paid on 100,500 ewes in the mainland portion of Ross and Cromarty).

Table 5 indicates the importance of Easter Ross with regard to agricultural employment, that is, paid agricultural workers. The region contains two-thirds of all the regular agricultural workers, and a little over one-third of the part-time and casual workers. These figures do not account for the farmer and his wife, or any unpaid family labour and one can only estimate the numbers of these persons involved. From information in Tables 6, 7 and 8 it can be estimated that there are 2,500 farmers in Ross and Cromarty on commercial holdings, and about

1,000 farmers in Easter Ross (see calculations in footnote on this page). Easter Ross therefore employs a total of about 2,200 farmers and workers out of 4,400 in the county as a whole, or, 50 per cent of the employment is on 30 per cent or so of the land area, with the numbers being, roughly, half farmers and half paid workers.

Table 6 shows the importance of agriculture in relation to the employment in Ross and Cromarty as a whole, according to the 1961 census. Agriculture is only exceeded by the distributive trades as an employer of the economically active population, and constitutes 13.8 per cent of all employment. The estimated population of Ross and Cromarty at June 1966 is shown in Table 7. About 34 per cent of the population live on the island of Lewis, 11 per cent in Wester Ross, and 55 per cent in Easter Ross. Thus, of the mainland community 83 per cent live in Easter Ross and only 7 per cent in the remainder of the county to the west.

Analysis of Farming

The agriculture of Scotland has been classified by economic type (Scola [19]) and a summary of this analysis for the county of Ross and Cromarty is shown in Table 8. This shows that numerically, among full-time farms, the arable types are of major importance i.e. rearing with arable, arable rearing and feeding, and cropping farms. These types are 69 per cent numerically of all full-time farms in Ross and Cromarty and are almost entirely in Easter Ross.

Table 8 also shows the extent of part-time and spare-time units, and this is highlighted when an analysis of units by crops and grass acreage is studied (Table 9). The average acreage of crops and grass on spare-time farms shown in Table 6 is 5 acres, and Table 9 shows that over 50 per cent of the holdings fall into this category, while a further 29 per cent of holdings have less than 15 acres of crops and grass. According

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Footnote on number of farmers

Of all holdings, 32 per cent are full-time or part-time (Table 6). 55.6 per cent of all holdings have under 5 acres of crops and grass (Table 7), therefore some 12.2 per cent fall between part-time farms and very small units which can only be spare-time. Number of units in Ross-shire in 1966=6,529. 32 per cent = 2,089. Add half of those in intermediate size group = 6.1 per cent of 6,529 = 398. Total = 2,487 or approximately 2,500.

Easter Ross = 1,181 holdings (Table 8) whose average size is 85 acres of crops and grass and would therefore be full-time. Allow 15 per cent off for crofts of non commercial size = 1,000 farm units of full or part-time size.

TABLE 3

CATTLE IN EASTER ROSS - GROUPED PARISH STATISTICS, REGION & COUNTY TOTALS, 1955, 1960, 1966.

HEAD

CATTLE	TAIN TO ALNESS*			ALNESS TO MUIR of ORD			BLACK ISLE			TOTAL EASTER ROSS			TOTAL ROSS & CROMARTY		
	1955	1960	1966	1955	1960	1966	1955	1960	1966	1955	1960	1966	1955	1960	1966
DAIRY															
Cows in milk and in calf	632	440	761	657	535	408	758	590	490	2,047	1,565	1,659	5,826	4,285	3,049
Heifers in Calf	163	81	43	109	88	126	118	40	54	390	209	223	659	424	313
Other cattle 2 yrs. +	68	1	4	53	23	29	117	18	21	238	42	54	437	118	89
" " 1-2 yrs.	143	57	115	181	119	91	172	50	121	496	226	327	1,005	612	532
" " Under 1 yr.	111	63	187	152	148	74	150	74	113	413	285	374	1,135	995	670
Bulls & Bull Calves	11	4	6	14	18	3	14	16	9	39	38	18	71	62	21
TOTAL DAIRY CATTLE	1,128	646	1,116	1,166	931	731	1,329	788	808	3,623	2,365	2,655	9,133	6,496	4,674
BEEF															
Cows in milk and in calf	2,400	3,509	3,768	1,742	2,506	2,480	3,017	4,297	4,349	7,159	10,312	10,597	9,273	13,742	14,459
Heifers in Calf	309	508	419	296	246	229	312	481	491	917	1,235	1,139	1,094	1,532	1,528
Bulls & Bull Calves	216	247	166	115	119	84	234	230	153	565	596	403	646	702	494
Other cattle 2 yrs. +	793	670	318	960	771	386	1,514	1,334	555	3,267	2,775	1,259	3,789	3,472	1,582
" " 1-2 yrs.	1,990	2,115	1,876	1,890	1,910	2,127	3,565	4,316	4,454	7,445	8,341	8,457	8,686	9,695	9,784
" " Under 1 yr.	2,311	3,428	3,672	1,690	2,406	2,451	3,119	4,505	4,668	7,120	10,339	10,791	9,246	13,974	14,590
TOTAL BEEF CATTLE	8,019	10,477	10,219	6,693	7,958	7,757	11,761	15,163	14,670	26,473	33,598	32,646	32,734	43,117	42,437

* For details of groups see note on Page

SOURCE: Agricultural Statistics

TABLE 4

SHEEP, PIGS & POULTRY IN EASTER ROSS BY GROUPED PARISHES, REGION & COUNTY TOTALS, 1955, 1960, 1966.

HEAD

	TAIN TO ALNESS*			ALNESS TO MUIR of ORD			BLACK ISLE			TOTAL EASTER ROSS			TOTAL ROSS & CROMARTY		
	1955	1960	1966	1955	1960	1966	1955	1960	1966	1955	1960	1966	1955	1960	1966
SHEEP															
Ewes	23,927	25,787	27,761	22,410	26,727	23,979	9,498	13,970	14,164	55,835	66,484	65,904	177,453	197,785	205,273
Rams	936	998	905	864	858	772	469	649	625	2,269	2,505	2,302	5,737	6,286	6,330
Others over 1 year	9,233	7,621	7,815	12,774	12,368	8,919	4,767	5,305	3,507	26,774	25,294	20,294	95,733	97,964	88,493
Others under 2 year	30,990	34,953	37,265	18,385	24,022	20,689	12,637	17,891	18,197	62,012	76,866	76,151	135,995	160,378	172,448
	65,086	69,359	73,746	54,433	63,975	54,359	27,371	37,815	36,493	146,890	171,149	164,598	414,918	462,413	472,544
PIGS															
Sows & gilts in pig	203	149	163	110	56	82	321	302	253	634	507	498	696	509	501
Other adult pigs	119	77	46	67	34	53	187	120	154	373	231	253	434	235	257
Other pigs 5 months+	888	269	268	329	43	57	971	430	571	2,188	742	896	2,407	760	921
" " 2-5 months	1,011	566	709	616	197	335	1,887	1,240	1,314	3,514	2,003	2,358	3,852	2,109	2,395
" " Under 2 months	546	377	269	283	173	287	1,233	709	804	2,062	1,259	1,360	2,282	1,262	1,360
	2,767	1,438	1,455	1,405	493	814	4,599	2,801	3,096	8,771	4,732	5,365	9,671	4,875	5,434
POULTRY															
Fowls in lay	14,490	8,052	5,391	10,838	7,447	6,475	23,907	16,671	14,612	49,235	32,170	26,478	112,712	79,041	64,565
Fowls being reared	12,013	6,614	3,807	8,486	5,532	782	29,654	13,402	8,442	50,153	25,548	13,031	83,451	62,188	22,039
Other Poultry	1,572	2,352	830	812	1,191	688	2,018	13,394	14,088	4,402	16,937	15,606	5,391	4,112	16,323
	28,075	17,018	10,028	20,136	14,170	7,945	55,579	43,467	37,142	103,790	74,655	55,115	201,554	145,341	102,927

*For details of groups see note on Page

SOURCE: Agricultural Statistics.

TABLE 5

FARM LABOUR IN EASTER ROSS - BY GROUPED PARISHES, REGION & COUNTY TOTALS, 1955, 1960 & 1966(1)

	TAIN TO ALNESS*			ALNESS TO MUIR OF ORD			BLACK ISLE			TOTAL EASTER ROSS			TOTAL ROSS & CROMARTY		
	1955	1960	1966	1955	1960	1966	1955	1960	1966	1955	1960	1966	1955	1960	1966
FULL TIME WORKERS:															
Male : Over 65 years	42	25	48	23	11	12	21	17	15	86	53	75	99	72	143
Male : 18 to 65 years	540	546	352	313	293	216	484	423	285	1,337	1,262	853	1,582	1,477	1,192
Male : Under 18 years	49	32	23	17	20	8	52	31	16	118	83	47	138	94	70
Female	39	25	11	23	7	4	28	22	11	90	54	26	133	75	107
TOTAL FULL TIME WORKERS	670	628	434	376	331	240	585	493	327	1,631	1,452	1,001	1,952	1,718	1,512
PART TIME & CASUAL WORKERS	82	79	40	55	44	35	106	85	97	243	208	172	314	288	449
TOTAL LABOUR	752	707	474	431	375	275	691	578	424	1,874	1,660	1,173	2,266	2,006	1,961

*For details of parish groups see note on page

(1)Paid farm workers only. Does not include farmers and wives.

SOURCE : Agricultural Statistics.

TABLE 6 PROPORTION PER 10,000 IN EMPLOYMENT BY INDUSTRY

ROSS & CROMARTY 1961 CENSUS

CLASS	DESCRIPTION	NO. PER 10,000
1.	Agriculture, forestry, fishing	1,942
	Agriculture and horticulture	1,382
	Forestry	216
	Fishing	211
	Estate Management	134
2.	Mining, quarrying	15
3.	Food, Drink, Tobacco	87
4.	Chemicals	31
5.	Metal Manufacture	5
6.	Engineering and electrical goods	15
7.	Ships and marine engineering	62
8.	Vehicles	-
9.	Metal goods	5
10.	Textiles	1,033
11.	Leather and Fur	-
12.	Clothing, footwear	-
13.	Bricks, pottery, glass	21
14.	Timber, furniture	103
15.	Paper, printing, publishing	15
16.	Other manufacturing industry	5
17.	Construction	971
18.	Gas, Electric and Water	226
19.	Transport and Communication	827
20.	Distributive Trades	1,429
21.	Insurance, Banks, Finance	139
22.	Professional and Scientific Services	1,053
23.	Miscellaneous Services	1,249
24.	Public administration, defence	694
25.	Industry inadequately described	73
		10,000

SOURCE: 1961 Census Data

TABLE 7 ESTIMATED POPULATION AS AT 30th JUNE, 1966
ROSS & CROMARTY

ROSS & CROMARTY COUNTY	57,128
SMALL BURGHS	14,210
Cromarty	593
Dingwall	3,883
Fortrose	977
Invergordon	1,839
Stornoway	5,202
Tain	1,716
LANDWARD	42,918
DISTRICTS:	
Avoch	3,000
Dingwall	4,150
Fearn	2,200
Fortrose	1,050
Gairloch	1,700
Invergordon	3,050
Lewis	16,050
Loch Broom	1,400
Loch Carron	1,200
Muir-of-Ord	5,100
South West	2,300
Tain	1,650

SOURCE: Annual Estimates of Population of Scotland 1966. H.M.S.O. 1967.

TABLE 8 CLASSIFICATION OF FARMS IN ROSS-SHIRE (1962)

Type of Farm / Average Distribution of Cropping, Stocking and Labour	Hill Sheep Farms	Upland Farms	Rearing with Arable Farms	Rearing with Intensive Livestock Farms	Arable Rearing and Feeding Farms	Cropping Farms	Dairy Farms	Horticultural Farms	Poultry Farms	Pig Farms	Mixed Intensive Farms	Other Units: Part-time	Other Units: Spare time
Number of Units	69	104	254	14	158	86	29	5	Nil	Nil	4	1,440	4,604
Total Acreage	9,873	3,068	324	162	193	279	364	15			132	66	50
Total Crops & Grass	33	99	129	97	157	239	160	12			97	9	5
Grass for Mowing	8	21	19	17	21	29	29	-			28	2	1
Grass not for Mowing	20	53	59	45	65	91	64	8			24	4	3
Total Tillage	5	25	51	35	71	119	67	4			45	3	1
Wheat, Barley, Oats	3	17	33	25	47	75	44	1			34	2	1
Potatoes	-	1	2	1	5	19	7	-			3	-	-
Workers:													
Full-time	1.8	1.4	1.5	1.4	2.2	4.3	3.6	0.8			3.5	0.2	0.1
Part-time & Casual	0.5	0.4	0.2	0.1	0.2	0.5	0.3	0.8			4.2	0.1	-
Standard Labour Requirement. Man/Days per Year	818	797	831	839	960	1,614	1,504	469			1,757	102	25
Dairy Cows	-	1	1	-	1	1	42	-			16	1	-
Other Dairy Cattle	-	-	1	-	-	-	24	-			7	-	-
Beef Cows	14	31	19	13	15	19	-	2			-	1	-
Other Beef Cattle	14	37	35	22	36	43	5	2			1	2	-
Ewes for Breeding	707	195	81	64	80	137	52	2			21	33	7
Other Sheep	732	235	139	123	137	250	72	3			43	42	9
Pigs	-	1	4	103	5	11	6	-			243	-	-
Fowls Over 6 Months	9	24	35	174	29	26	66	3			50	13	6
Other Poultry	5	11	26	71	5	32	63	4			1,546	9	4

SOURCE: P. M. Scola. Scottish Agricultural Economics. Vol. XV. 1965.

TABLE 9 ANALYSIS OF AGRICULTURAL UNITS IN ROSS & CROMARTY BY CROPS AND GRASS ACREAGE SIZE GROUPS, JUNE 1966

	Total Units	Units With No Crops and Grass	¼-4¾ Acres	5-14¾ Acres	15-19¾ Acres	20-29¾ Acres	30-49¾ Acres	50-74¾ Acres	75-99¾ Acres	100-149¾ Acres	150-299¾ Acres	300-499¾ Acres	500-999¾ Acres	1,000 Acres & Over
Number	6,529	202	3,439	1,881	131	137	199	159	76	95	110	67	31	2
Percentage	100.0	3.1	52.7	28.8	2.0	2.0	3.0	2.4	1.2	1.5	1.7	1.0	0.5	-

TABLE 10 AVERAGE[1] SIZE OF HOLDINGS IN EASTER ROSS BY PARISH GROUPS[2] JUNE 1966

	TAIN TO ALNESS	ALNESS TO MUIR OF ORD	BLACK ISLE	ALL FARMS IN EASTER ROSS
TOTAL ACREAGE				
Crops and Grass	37,036	23,779	39,154	99,969
Rough Grazing	26,862	323,670	6,082	356,614
Total	63,898	347,449	45,236	456,583
NUMBER OF HOLDINGS	303	371	507	1,181
AVERAGE ACRES PER HOLDING				
Crop and Grass	122	64	77	85
Rough Grazing	89	872	12	302
Total	211	936	89	387

[1]Straight average from parish agricultural statistics.

[2]For details of parishes in each group, see note on page

SOURCE : Agricultural Statistics.

to Table 8 many of these would be part-time farms as the average acreage of crops and grass on this type is 9 acres. This may lead to the conclusion that there are a great many crofts, but the Crofters Commission record only 666 crofts (equivalent to 413 working units) in the East Mainland of Ross and Cromarty in their recent Report [20] Table 10 shows that the average size of farm in Easter Ross is 85 acres of crops and grass and 302 acres of rough grazing, with detailed figures for the parish groups indicating the differences between the districts.

In spite of being a favourable area for agriculture, dairy farming is evidently of minor importance (Table 8). Recent surveys by the Scottish Milk Marketing Boards [21] show that there were only 29 herds in Ross and Cromarty, with an average number of cows of 51, representing breeds in the proportion of 70 per cent Ayrshire, 27 per cent Friesian and 3 per cent other breeds.

Financial Accounts Data

In the Financial Accounts Scheme operated by the Department of Agricultural Economics of the North of Scotland College of Agriculture there are some 27 farms located in the county of Ross and Cromarty. These consist of 15 arable farms, 6 cattle and sheep farms, 2 dairy farms and one each of the other farm types. The data for the 15 arable farms and the 6 cattle and sheep farms have been averaged and are given in Appendix I to V. It must be stressed, however, that these data are not necessarily representative of these farm types in the county, nor are they comparable with data in the North of Scotland College of Agriculture Farm Income Reports, for the size composition of these groups of 15 and 6 is very different from the size distribution of farms in the county of Ross-shire as a whole, or from the farms constituting similar type groups in the Financial Accounts Scheme. The data should be regarded as case study information only and not as necessarily typical of the Easter Ross region. For these reasons it is only proposed to point out a selection of the more important features arising from an examination of the data.

1. Size The average size of both types (arable 466 acres, cattle and sheep 618 acres) is much greater than that of similar types shown in Table 8.

2. *Rent per acre on arable farms of £2 18s. is very close to that

*It must be stressed that the rent per acre figures for farms for which information is available in Easter Ross and in the Financial Accounts Scheme do not represent rents for farms which have recently changed hands. The rent figures reflect actual rents which in many cases were fixed many years ago.

of all arable farms in the Financial Accounts Scheme (£3 0s.), while the rent of cattle and sheep farms (£2 18s.) is above average for this type (£2 6s.). In spite of these relationships rents are fairly low for this type of land.

3. Cropping The cropping per 100 acres on the arable farms is fairly similar to that on farms in South East Scotland as reported by J. D. Nutt for that area, [22] except that 10 per cent of the grass in the Easter Ross area is rough grazing. Thus in South East Scotland the arable farms are 60 per cent crops and 40 per cent pasture, while in Easter Ross these farms are 50 per cent crops, 40 per cent pasture and 10 per cent rough grazing. 50 per cent of an arable farm in grass is a high proportion for this type. By comparison Easter Ross cattle and sheep farms have over 20 per cent rough grazing.

4. Crop Yields Yields of wheat on both types of farm (arable 36.1 cwt., cattle and sheep 39.6 cwt.) exceed the average estimated for Scotland over the previous 5 years of 31.3 cwt. [23] and even that of the South East of 35.8 cwt. For the same year i.e. 1965, the Easter Ross farms again exceed the yields for the country as a whole, and for the South East Region. Yields of barley on both types (arable 28.8 cwt., cattle and sheep 25.8 cwt.) are below the national average for the same year (30.9 cwt.); the yield of oats on cattle and sheep farms (28.6 cwt.) exceeds the national average for that year (22.4 cwt.), while that of the arable farms (18.8 cwt.) is below it. Potato yields (arable 7.5 tons, cattle and sheep 6.2 tons) are also below the national average for the same year (8.7 tons), but since this crop is grown exclusively for seed in Easter Ross one would not expect yields to equal an average derived from farms mainly growing for ware production.

5. Total Output per acre on both groups of farms (arable £39.1, cattle and sheep £32.2) are only slightly below the average of all farms in the Financial Accounts Scheme in these groups, (arable £39.8, cattle and sheep £33.4). However, because of the much greater size of the farms in Easter Ross that are being compared, the output relationships are very different, for if farms of this size are achieving outputs close to those of smaller farms, their potential for greater output must be considerable.

6. Gross Margin per acre (whole farm) As with total outputs, the gross margins being achieved on the two groups of farms (arable £28.0, cattle and sheep £22.1) are very close to those of all farms of the same type in the Financial Accounts Scheme, (arable £28.3, cattle and sheep £22.3). Considering the size discrepancies involved, the capability of Easter Ross farms for

high outputs and high gross margins must be substantially greater than is occurring at the moment.

7. Fixed Costs per acre. On both arable and cattle and sheep farms in Easter Ross the fixed costs are comparable with all farms of these types in the Financial Accounts Scheme, except that regular labour is somewhat greater. This would be accounted for by the importance of the potato crop with its high labour demand.

8. Outputs and Gross Margins (individual enterprises) These figures are presented as sample data for the area. The number of farms being averaged is occasionally too small for the results to be considered representative. However, the figures compare favourably with outputs and gross margins being achieved by a larger sample of farms in the area from Nairn to Caithness where production of these commodities takes place. Enterprise outputs and gross margins for 1965/66 are shown in Appendix Table V. By comparing the figures contained in this table it can be seen that the sample output and gross margin figures for Easter Ross farms are consistently higher on the arable farms than those of the Northern Scotland Sample, while on cattle and sheep farms in Easter Ross outputs and gross margins for wheat, oats and sheep are above the Northern Scotland Sample, cattle figures are very similar and barley and potato figures below.

Farming in the Easter Ross area

The farms in the Easter Ross area vary widely in size and type. Very few farms are purely arable, as they nearly all have some marginal land. The larger farms are generally well equipped and well managed, but on other farms the management level varies considerably.

In the Muir of Ord area there are a large number of crofts of 20 - 30 acres. The parish of Resolis is also mainly crofts, but of a greater size. Cromarty is mainly larger farms, while Fortrose is mixed, with more farms of family size. Knockbain is mainly large family farms, while Kiltearn has family farms as well as large amalgamated units under estate management. Alness is composed of mixed farm sizes in the 150 to 250 acre size group, while the parishes of Nigg and Fearn contain mainly large farms. Generally the farming structure is good. With the exception of crofts, which occupy a small proportion of the land, the size structure is better than in many other parts of the country, and holdings of commercial size (over 600 standard man-days) are larger than average for Scotland. It is important that farms are not damaged structurally by the removal of parts of the unit for other uses, and a steady progression to larger average size is desirable. In this respect

the amalgamation of small crofts is progressing, but in a rather disorganised manner and mainly on the poorer farms.

A common hazard of farming in Easter Ross is trace element deficiency which is easily counteracted if tackled properly. Cobalt is a common deficiency which is readily corrected by treating the land even though this raises production costs. Copper deficiency is also widespread and becomes evident in cereal crops through soil testing. Combined copper and cobalt deficiencies also occur, and a depressed copper status caused by high molybdenum (not due to low copper itself) is fairly common. These deficiencies are a feature of middle Old Red Sandstone areas.

The low rainfall in the area is beneficial to cropping. This is seen in wet years when barley yields are depressed and potatoes get blight to a greater extent. Also, wherever drainage is imperfect a wet autumn has a marked effect on the winter wheat crop. In this context, a proportion of the land is in need of being properly drained.

The large potato acreage is entirely for seed, with the majority of sales being through private deals with merchants, or long established links with farmers in England. Turnips and swedes, formerly declined in acreage, are now coming back for two reasons. On the smaller farms they supply more feed per acre than silage, and the previously high labour cost has been substantially reduced by the use of pre- and post-emergence sprays and precision seeders.

Generally the area does not exploit grass as a crop and relatively little fertilizer is applied to this crop after the first year. In an area like the Black Isle with large numbers of stock in a truly mixed farming complex this under-intensive use of grassland is to be deplored. Great numbers of hill ewe hoggs are wintered in the Black Isle from farms located at a distance - even at the high costs of today. These wintering farms have no sheep of their own and usually feed the hoggs well, often finishing the winter on turnips.

Easter Ross has a large number of beef cows, and the area produces traditional Scotch beef which earns a premium. Sheep, which were formerly of major importance on the low ground, are disappearing rapidly. Sheer economics are forcing them out for the margins being achieved on good land are lower than those from cattle. Another result of economic circumstances is an increase in cash cropping, but problems can be foreseen if there is a continuation of this process. Poor seedbeds, the spread of couch grass and fungal disease take an increasing toll, and where there is not a large break crop of potatoes some alternative crop may soon be needed on some farms.

Many grain growers attempt to produce malting samples for distillers,

but there is little apparent advantage in this for they might well gain more by going for maximum yield, and accept the production of a malting sample as a bonus.

Dairy farming is of minor importance probably due mainly to lack of technical knowledge and expertise. Poultry and pig farming are also of minor importance.

Co-operation among farmers has not yet had a significant impact. The one prominent group of Easter Ross Farmers Ltd. is mainly a grain drying and storing syndicate, with bulk potato marketing as a secondary line of business. , The grain drying project had to increase its capacity and may well be over subscribed at present. Apart from this one major co-operative which may expand itself into other areas of business, there are a few machinery syndicates of local, but not widespread benefit. According to the Annual Report (1965-66) of the Scottish Agricultural Organisation Society [24] the co-operatives in Easter Ross consist of the following:

Easter Ross Farmers Ltd.	Fearn
Highland Poultry Products Ltd.	Invergordon
Ross-shire Farmers Ltd.	Conon Bridge
4 Rabbit Clearance Societies	
5 Registered Machinery Syndicates	

As with most other co-operative ideas the basic barrier to progress is the individualism of the farmer and his attitude.

The marketing of most products is by private dealings by individuals, with the single exception of Easter Ross Farmers potato arrangement. Store livestock mainly go to Dingwall Auction Mart and Table 11 shows average prices, by class of stock, at autumn sales in 1965 and 1966. Fat stock are slaughtered at abattoirs at Tain, Invergordon and Dingwall (Table 12), but a considerable proportion of fat animals go to Buchan Meat Producers Ltd. (Evanton and Dingwall). Individual farmers sell cattle at all stages from weaned calves to fatstock, and there is no recognisable pattern of production.

Total Agricultural Output of Easter Ross

Using the Standard Net Outputs listed in the report on "Agricultural Land Classification" [16] it is possible to make a rough estimate of the value of total output of Easter Ross (Table 13). Since the Standard Net Outputs used relate to 1962-63 the resulting figure of output for the region of £2.98 million pounds is certainly an underestimate. The Net Output of Easter Ross is likely to be in excess of £3 million.

TABLE 11

SALES OF STORE LIVESTOCK AT AUCTION MARKETS JULY TO NOVEMBER, 1965 and 1966

CLASS OF LIVESTOCK	DINGWALL MARKET				ALL MARKETS	
	Numbers 1965	Numbers 1966	Average Price 1965	Average Price 1966	Average Price 1965	Average Price 1966
			s. d.	s. d.	s. d.	s. d.
Blackface Uncrossed Ewes	839	644	53 : 2	40 : 10	79 : 0	60 : 10
Blackface Wedder Lambs	2,553	1,061	63 : 9	48 : 6	74 : 0	66 : 1
Blackface Ewe Lambs	488	280	55 : 5	40 : 4	78 : 3	71 : 8
Cheviot Uncrossed Ewes	2,746	2,846	99 : 4	69 : 6	92 : 7	67 : 11
Cheviot Wedder Lambs	7,432	6,135	97 : 10	78 : 1	91 : 2	77 : 2
Cheviot Ewe Lambs	3,955	3,040	104 : 11	75 : 4	105 : 6	85 : 8
Half Bred Wedder Lambs	95	75	113 : 10	91 : 10	125 : 2	115 : 2
Half Bred Ewe Lambs	66	64	119 : 8	98 : 7	150 : 4	132 : 10
Grey Face Lambs (B.F. x B.L.)	1,819	553	98 : 8	66 : 8	106 : 9	98 : 0
CALVES						
Bullocks	995	883	£40 : 18 : 0	£32 : 7 : 2	£40 : 18 : 2	£34 : 1 : 7
Heifers	822	680	£33 : 18 : 1	£25 : 2 : 2	£35 : 6 : 8	£27 : 11 : 6
All Calves	1,817	1,563	£37 : 14 : 9	£29 : 4 : 1	£39 : 15 : 5	£33 : 9 : 5

TABLE 12 SLAUGHTERINGS AT DINGWALL, INVERGORDON AND TAIN, 1963-1966

Slaughter-house	Type of Stock	1963	1964	1965	1966
Dingwall	Cattle	4,065	5,298	4,754	5,342
	Sheep	29,604	26,990	24,511	37,322
	Calves	69	46	24	41
	Pigs	950	937	1,493	2,664
Invergordon	Cattle	2,504	2,373	1,987	2,148
	Sheep	22,175	23,425	21,593	24,849
	Calves	23	20	9	5
	Pigs	384	315	571	466
Tain	Cattle	1,051	799	1,224	871
	Sheep	4,981	5,223	8,420	9,741
	Calves	5	10	2	2
	Pigs	21	1	-	-

SOURCE: Communication from Ross County Council to J. H. Smith, Department of Agriculture, University of Aberdeen.

TABLE 13 ESTIMATED NET OUTPUT OF EASTER ROSS*

Item	Acres or Number 1966	Standard Net Output*	Total Net Output	Percentage
		£	£	
Wheat	2,986	38	113,468	3.9
Barley	20.954	33	691,482	23.2
Oats & Mixed Grain	9,086	25	227,150	7.6
Potatoes	3,222	135	434,970	14.6
Turnips, Swedes	6,563	50	328,150	11.0
Other Crops	336	20	6,720	0.2
Hay	14,923	16	238,768	8.0
Dairy Cows	1,659	80	132,720	4.4
Other Cattle, 2 years +	1,313	6	7,878	0.3
" " 1-2 years	8,784	20	175,680	5.9
" " under 1 year	11,165	30	334,950	11.3
Bull calves (30%)	126	30	3,780	0.1
Ewes	65,904	4	263,616	8.8
Others, 1 year +	20,241	1	20,241	0.7
			£2,979,573	100.0

*Net output defined as:-

1. Crops - (Average yield per acre x average price) minus value of seeds.
2. Dairy cows - (Average yield per cow (1962-63) x average price per gallon) minus value of concentrates and forage crops.
3. Beef cows - value of calf only (i.e. cattle under one year old).
4. Heifers in calf - dairy cow, i.e. as heifer is only for replacement it is not credited with any output as the cow is credited with a full year's production even in the year it is replaced.
5. Sheep - value of lambs and wool in case of ewes, minus value of concentrates and forage fed. Other sheep - increase in value plus wool in one year minus value of concentrates and forage.

National averages used in every case.

*1962-63 figures.

Summary and Conclusions

1. Agriculturally Easter Ross is a unique region in the Highland area. Its climate, altitude, geology and soils are suitable for a wide range of agricultural crops and the conditions compare favourably with East Lothian, considered to be some of the best land in Scotland.

2. In relation to the remainder of Ross and Cromarty, and the adjacent counties, this region is of outstanding importance containing the majority of the tillage, crops and grass, and livestock with the single exception of sheep. Almost all the high output, high value production in the county of Ross and Cromarty takes place in this one-third of the area.

3. The farms in Easter Ross are predominantly arable, or arable and livestock, and the full-time holdings are well above average size for the county and near the average size for that type in the country as a whole. They are therefore structurally superior to most farms in the Highlands and any move which reduces the economic viability of these commercial farms is to be deplored.

4. A sample of farms in the area indicates that crop yields, outputs and gross margins are above average for Scotland, and comparable with high quality farmland in the South-East of the country. The physical potential is high, and the economic potential considerably in excess of that being achieved.

5. Technical problems arise, and the resources of the area in agricultural terms can be utilized still further. There is scope for greater exploitation of grassland and the traditional crops. More rational amalgamation of the large number of small units could be achieved, and there is scope for greater co-operation and concerted marketing of the principal products.

6. The agricultural land quality and present production from this region are very high. There is also a considerable potential for agricultural expansion.

7. The agricultural net output of Easter Ross is estimated to exceed £3 million.

8. Good agricultural land is a national resource of increasing scarcity, as the area available for food production is steadily eroded by transfer to other uses. The study on Land Use in the Highlands and Islands [8] shows that in this region good agricultural land is a comparative rarity, being only 7 per cent of the agricultural area. From the viewpoint of wise land use planning and maximum use of the nation's resources the transfer of such good land to urban use would seem undesirable.

9. If one accepts the philosophy of land use planning and the policy of the Ministry of Agriculture, Fisheries & Food (p. 2.), it should be recognised that within 3-4 miles of Invergordon is land of poor agricultural value which also has attractions for housing arising out of its elevation, suitable fall for drainage and magnificent views.

10. There may well be additional development costs in using this land, but against these costs must be set the greater benefit to the nation of using poor agricultural land in preference to very good land for urban purposes.

11. The authors do not wish to enter into the pros and cons of industrial and urban development, but would plead for the rational application of sound land use criteria in any planning which may arise.

APPENDIX

Financial account and gross margin data for farms located in Easter Ross and co-operating with the Agricultural Economics Department of the North of Scotland College of Agriculture, for the year 1965/66.

TABLE 1 CROPPING AND CROP YIELDS, 1965/66

	Mixed Arable Farms	Mixed Cattle and Sheep Farms
Number of Farms	15	6
Average size (adjusted acres)	466	618
Rent per acre	£2:18s.	£2:18s.
CROPPING - per 100 Adjusted Acres	Acres	Acres
Wheat	9.4	5.5
Barley	31.2	11.4
Oats	0.9	7.2
Potatoes	6.4	1.9
Turnips	2.0	6.6
Arable Silage	0.1	1.5
Others	0.4	0.9
Total Crops	50.4	35.0
Hay	6.6	6.0
Grass Silage	5.6	5.1
Grazing	27.8	32.4
Total Crops and Grass	90.4	78.5
Rough Grazing	9.6	21.5
	100.0	100.0
CROP YIELDS PER ACRE		
Wheat	36.1 cwts.	39.6 cwts.
Barley	28.8 cwts.	25.8 cwts.
Oats	18.8 cwts.	28.6 cwts.
Potatoes	7.5 tons	6.2 tons

TABLE 11 STOCKING NUMBERS AND INTENSITY MEASURES, 1965/66

	Mixed Arable Farms	Mixed Cattle and Sheep Farms
Stocking - per 100 acres.		
Bulls	0.20	0.23
Dairy Cows	0.07	1.38
Beef Cows	6.33	9.52
Under 1 year	6.38	9.98
1 - 2 years	4.51	8.06
Over 2 years	0.84	4.82
Total Cattle	18.33	33.99
Ewes	60.68	52.81
Rams	1.81	1.90
Lambs	60.12	45.07
Other Sheep	16.87	31.52
Total Sheep	139.48	131.30
Sows	0.03	-
Boars	-	-
Young Pigs	-	-
Other Pigs	0.18	0.08
Total Pigs	0.21	0.08
Laying Poultry (over 6 months)	5.17	1.13
Other Poultry	0.45	2.25
Total Poultry	5.62	3.38
Livestock Units per 100 acres	29.9	38.9
Feed acres per Livestock Unit	1.8	N.A.
Grazing acres per Grazing Livestock Unit	1.1	1.0
Forage acres per Grazing Livestock Unit	1.5	1.3

TABLE III FINANCIAL DATA PER ACRE, 1965/66

	Mixed Arable Farms	Mixed Cattle and Sheep Farms
	£	£
Gross Output		
Cattle	7.3	13.7
Sheep and Wool	5.4	6.5
Pigs	0.1	-
Poultry and Eggs	0.4	0.1
Milk	0.1	1.0
Total Livestock	13.3	21.3
Wheat	4.0	2.1
Barley	11.0	2.6
Oats	0.4	1.9
Potatoes	8.2	2.2
Fodder	0.9	0.6
Others	-	-
Growing Crops (±)	+ 0.3	+ 0.2
Total Crops	24.8	9.6
Sundries	1.0	1.3
Total Output	39.1	32.2
Total Variable Costs (1)	11.1	10.1
Gross Margin	28.0	22.1
	39.1	32.2
Total Fixed Costs (2)	25.3	19.5
Total Costs	36.4	29.6
Net Farm Income	2.7	2.6
	39.1	32.2

(1) Variable Costs consist of: Foods, Livestock Expenses, Seeds, Fertiliser and Lime, Crop Expenses, Carriage, Casual Labour and Contract Work.

(2) Fixed Costs consist of: Regular Labour, Equipment Repairs and Depreciation, Fuel, Other Repairs, Rent, Rates and Miscellaneous Costs.

TABLE IV PROFITABILITY, NET OUTPUT, CAPITAL & EXCHEQUER SUPPORT, 1965/66

	Mixed Arable Farms	Mixed Cattle and Sheep Farms
	£	£
Measures of Profitability per acre		
Net Farm Income	2.7	2.6
Farmer & Wife Labour	0.9	0.7
Management & Investment Income	1.8	1.9
Tenant's Capital	45.1	47.7
Interest on Tenant's Capital	2.3	2.4
Management Income	- 0.5	- 0.5
Labour Income	0.4	0.2
Return on Tenant's Capital	4.0	4.0
Net Output per acre		
Gross Output	39.1	32.3
Less Purchased Feeds and Seeds	3.6	4.5
Net Output	35.5	27.8
Net Output per £100 Labour	266	266
" " " " Labour & Power	171	183
" " " " Capital	80	63
*Tenant's Capital per acre	45.1	47.7
Exchequer Support per Farm		
Hill Cattle Subsidy	138	726
Calf Subsidy	248	614
Cereal Deficiency Payment	909	933
Ploughing Subsidy	274	355
Winter Keep	6	26
Hill Sheep	-	106
Other Subsidies	26	73

*Tenant's Capital per acre is based on data contained in farm valuations. In many cases, following usual valuation practice, items such as breeding herds are valued at constant levels which will be below market value. Again, the value attaching to machinery and equipment will be depreciated value. The tenant's capital per acre accordingly does not reflect capital requirements.

TABLE V OUTPUTS & GROSS MARGINS PER ACRE, 1965/66

Easter Ross Farms compared with a sample of farms in Northern Scotland situated between Nairn and Caithness.

	EASTER ROSS FARMS		NORTHERN SCOTLAND FARMS
	Mixed Arable Farms	Mixed Cattle and Sheep Farms	All Producers in Sample
	£	£	£
Output per Acre			
Wheat	44.4	45.3	42.2
Barley	39.0	32.0	36.5
Oats	25.8	36.3	26.3
Potatoes	131.1	104.3	119.8
Cattle	39.3	(Beef 34.3 (Dairy 29.1	(Beef 32.4
Sheep	28.3	33.3	24.6
Gross Margin per Acre			
Wheat	36.5	35.8	33.7
Barley	32.4	21.0	29.2
Oats	20.5	29.9	19.5
Potatoes	74.0	56.3	62.9
Cattle	27.3	(Beef 16.6 (Dairy 15.0	(Beef 17.0
Sheep	15.3	21.4	14.2

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