Electric Scotland's Weekly Newsletter for June 9th, 2023

Electric Scotland News

Unique Cottages

This company has been advertising with us for many years and we're appreciative for their support and so just wanted to highlight a feature you may not be aware of...

If you join their newsletter list you'll get a monthly newsletter from them which highlights special deals and new accommodation offers but also provides subscriber discounts and other special offers. They focus on the self catering sector and in this sector they are simply the best for Scottish self catering cottages. Like right now you can send in your pictures of Scotland and get the chance to win £150.00 for which see more details at: https://woobox.com/fei5ig

You can visit them at: https://www.unique-cottages.co.uk

As many of you will know many Highlanders were cleared of their land to be replaced by sheep. For this reason I have included a large article on "Economic Aspects of the Scottish Sheep Industry" that I took from a copy of the Transactions of the Highland and Agricultural Society of Scotland published in 1939 as our Story for this week in which a reference is made to the clearances.

Scottish News from this weeks newspapers

I am partly doing this to build an archive of modern news from and about Scotland and world news stories that can affect Scotland and as all the newsletters are archived and also indexed on Google and other search engines it becomes a good resource. I might also add that in a number of newspapers you will find many comments which can be just as interesting as the news story itself and of course you can also add your own comments if you wish which I do myself from time to time. Here is what caught my eye this week...

Salmon firms struggle against current

A large Norway-based producer of farmed salmon says campaigning against the industry is making Scotland an increasingly difficult and uncompetitive location to grow the industry

Read more at:
https://www.bbc.com/news/uk-scotland-scotland-business-65782682

Multi-cancer blood test shows real promise in NHS study

A blood test for more than 50 types of cancer has shown real promise in a major NHS trial, researchers say.

Read more at:
https://www.bbc.com/news/health-65775159

U.S. allies look for their place in the emerging global order

America and the West are more isolated from the rest of the world than at any time since WWII

Read more at:
https://www.japantimes.co.jp/opinion/2023/06/02/commentary/world-commentary/new-global-order/

Planet Holyrood

Deposit return debacle, Labour divided on oil and Glasgow's Low Emission Zone

You can view this at:
https://youtu.be/AS4AyYgr8yw

Sunshine on Rachel House

It's Thursday morning. Sunshine is bouncing off the walls and windows of Rachel House. Birds are singing. After a long, cold spring, flowers are bursting with pent up energy.

Read more at:
https://sceptical.scot/2023/06/sunshine-on-rachel-house/

Radical shake-up of shopping aimed at removing foodbank stigma for less well off

As thousands of Scots families struggle to put food on the table during the cost of living crisis, social supermarkets, where surplus stock from big retailers is discounted, are starting to pop up around the country.

Read more at:
https://www.sundaypost.com/fp/social-supermarkets/

No, Boris didn't sell out British farmers with the Australia trade deal

A scathing recent account of the trade negotiations with Australia suggests Boris Johnson 'sold out' British farmers. Yet if you look at what was actually agreed, a very different picture emerges one that suggests the then PM had a clear idea of what he was doing and what the benefits for the British people would be.

Read more at:
https://capx.co/no-boris-didnt-sell-out-british-farmers-with-the-australia-trade-deal/

The good book

If you thought American book-banning couldn't get any more ridiculous, think again. A school district in Utah, one of the most religious states in the country, has banned the Bible. It's a reminder that, in the US at least, the threats to Western culture come not just from the woke left, but from the snowflake right as well.

Read more at:
https://www.spectator.co.uk/article/book-banning-has-come-back-to-bite-us-conservatives/

A bedrock of our defence

By George Robertson, former Secretary General of NATO

Read more at:
https://www.scottishreview.net/GeorgeRobertson661a.html

Scotland's skills: Are they unfit for the future?

Scottish ministers commissioned a report into the skills and training system. Seven months later, its author has handed them a harsh judgement and a huge challenge

Read more at:
https://www.bbc.com/news/uk-scotland-scotland-business-65841509

Canada wildfire smoke: Flights grounded across US east coast
Airports across the US east coast have been experiencing delays as smoke from Canada's wildfires continues to limit visibility on Thursday.

Read more at:
https://www.bbc.com/news/world-us-canada-65839336

Ukraine dam: What we know about Nova Kakhovka incident
A huge dam in the Russian-controlled area of southern Ukraine has been destroyed, unleashing a flood.

Read more at:
https://www.bbc.com/news/world-europe-65818705

The world still needs trade
The idea that free trade promotes global peace and prosperity is coming under attack, as policymakers argue that Covid and the war in Ukraine prove globalisation has made us weaker, not stronger. But international cooperation is more necessary now than ever, and must be reimagined for the future.

Read more at:
https://www.foreignaffairs.com/world/why-world-still-needs-trade

Electric Canadian

The Battle of Hill 70: Canada's forgotten World War One victory
You can read about this at: http://www.electriccanadian.com/forces/hill70.htm

Henry Kelsey
Explorer, Mariner, and Overseas Governor of the HBC

You can read about him at:
http://www.electriccanadian.com/transport/hudsonbay/kelsey_henry.htm

Canadian Songs and Poems
Voices from the Forests and Waters, the Settlements and Cities of Canada, Selected and Edited by William Douw Lighthall, M.A., of Montreal. (1892)

You can read this at:
http://www.electriccanadian.com/lifestyle/poetry/canadian-songs-poems.htm

A Boy's Workshop
With Plans and Designs for In-Door and Out-Door work by a Boy and his Friends with an Introduction by Henry Randall Waite (1884)

I added this book to our section on "The Works of D. C. Beard" as I thought it might be of interest to those reading his many books.

You can get to this at:
http://www.electriccanadian.com/pioneering/boysworkshop.htm

Moosonee, Ontario
Videos and other information on the town and also the Cree Nation

You can get to this at:
http://www.electriccanadian.com/history/ontario/moosonee.htm

Thoughts on a Sunday Morning - the 4th day of June 2023 - Values
By the Rev. Nola Crewe

You can watch this at:
http://www.electricscotland.org/forum/communities/rev-nola-crewe/26355-thoughts-on-a-sunday-morning-the-4th-day-of-june-2023-values

London and Middlesex Historical Society
Created a page to hold copies of their transactions which you can get to at:
http://www.electriccanadian.com/history/ontario/transactions.htm

Wardsville Volunteer Infantry Company
Including background on Military service in Canada and the Fenian Brotherhood by Ken Willis (pdf)

You can read this at:
http://www.electriccanadian.com/forces/The-Fenians-are-Coming-Wardsville-Volunteer-Infantry-Company.pdf

Electric Scotland

The Boy Travellers in Great Britain and Ireland
Adventures of two youths in a journey through Ireland, Scotland, Wales, and England, with visits to the Hebrides and the Isle of Man by Thomas W. Knox (1891)

You can read this at:
https://electricscotland.com/kids/stories/boy-travellers.htm

The Scotch-Irish of the Valley of Virginia
And their influence on Medical progress in America by Hugh H. Trout, M.D. Roanoke, Virginia (pdf)

You can read this at:
https://electricscotland.com/history/scotsirish/annmedhist1.pdf

A Compleat History of the Rebellion
From its first Rise in 1745, To its total Suppression at the glorious Battle of Culloden, in April, 1746. By James Ray, of Whitehaven, Volunteer under his Royal Highness the Duke of Cumberland (1752) (pdf)

Another book where the letter S is written as the letter F but well worth a read and you can get to this at:
https://electricscotland.com/history/culloden/A_compleat_history_of_the_rebellion_from.pdf

Brave Spirits
By Georgina Sime and Frank Nicholson (1952) (pdf)

Interesting selection of short stories which you can read at:
https://electricscotland.com/history/BraveSpirits_94_text.pdf

Select Biographies
Edited for the Woodrow Society, chiefly from Manuscripts of the Faculty of Advocates by the Rev. W. K.

Tweedie in two volumes (1845)

You can read about these interesting folk at:
https://electricscotland.com/history/selectbiographiess.htm

The Leith Flag

Added an obituary for Alexander Wilson who was the main driving force behind getting the flag retuned to Leith

You can read about him at:
https://electricscotland.com/history/articles/leith_flag.htm

The Episcopal History of Perth 1689-1894

By the Rev. Geo. T.S. Farquhar, M.A., Oxon., Canon and Precentor of Perth Cathedral and Supernumerary of the Diocese (1894) (pdf)

You can read this book at:
https://electricscotland.com/history/perth/Episcopal-history-of-Perth.pdf

English and Scottish Popular Ballads

Edited by Helen Child Sargent and George Lyman Kittredge (1904) (pdf)

You can read these at:
https://electricscotland.com/poetry/englishscottishp00unse.pdf

The Income of Tenants on a Scotch Openfield Farm in the Eighteenth Century

From the Economic Journal of March 1924 by I. F. Grant (pdf)

An interesting account which you can read at:
https://electricscotland.com/history/articles/incomeoftenants.pdf

Story

Economic Aspects of the Scottish Sheep Industry

By Allan H. H. Fraser, M.D., B.Sc., Rowett Research Institute, Aberdeen.

Sheep have a history and Scotland has a history, and the history of Sheep and Scotland are interwoven. They run back together to the times when an abbot, following a procession of white-robed choristers, might wonder how the ewes were lambing on the abbey's pastures, or a distressed Scottish Council, seeking a ransom for a too impetuous king, would seize on wool as the country's principal source of easily realisable wealth. Much of this history of Scottish sheep has been told in the 'Transactions of the Highland Society'; indeed, these 'Transactions' themselves form much of the original source of that history over the last hundred and fifty years. Yet, since history is history and farming is farming, and the main interest of the sheep-farmer lies not in the rent roll of abbeys but in the balance in his own bankbook, it would be beside the point to describe in detail how Scotland's early wealth was found in wool and other products of a rugged soil and wind-swept seas; how its later wealth expanded in industry and its craftsmen's skill; how industry has languished and the land decayed until there is danger of Scotland becoming a wilderness, undisturbed and silent save for the song of the whaups and the cry of a summer tourist surprised into exclamation by the finding of a living Scotsman, still inhabiting his native land, still versed in his native tongue. The present time is critical and the future more full of difficulty and danger than the past. The story of the modern bank-book must dominate the records of the ancient chartulary. So that a modern flockmaster, pondering the history of his industry, must come to this first and main conclusion —that sheep-farming in Scotland once upon a time was a much more profitable occupation than it is to-day.

The rapid spread of Blackface and Cheviot sheep throughout Scotland in the late eighteenth and early nineteenth centuries was due, in the main, to two things—Cumberland's conquest of the Highlands, and the profit from sheep. The profit from sheep was obviously of first importance, since had not sheep been abundantly profitable between 1745 and 1800, the destruction of feudalism north and west of the Highland line would have been followed by some other form of commercial exploitation. Sheep spread over Scotland because they paid very well. Sheep remain in Scotland because, at least until very recently and in most districts, they paid reasonably well. Should Scottish sheep cease to pay, then, in course of time and under any conceivable system of private enterprise, there will be no sheep in Scotland.

These facts are plain. They must be stated before giving more detailed consideration to the problems of Scottish sheepfarming as they exist to-day. To the statesman and economist it is of interest and importance to study the fluctuations and changes of Scotland's sheep population. To the man who owns or handles sheep, the main questions at issue are what profit sheep are likely to leave, and what scale of wages the industry is able to afford. The maintenance or expansion of the Scottish sheep industry, while it remains in the hands of private individuals who must make a living if they can, or sign a trust deed if they cannot, depends, and must always depend, upon making sheep-farming pay. A system of sheep husbandry may be very productive and yet lose money. Such a system is useless to a sheep-farmer.

Pedigreed rams could be bred at the top of Ben Nevis—at a cost. Who shall bear the cost? It cannot be the Scottish farmer, who stands independent and alone between his family and the glen road. This view is stressed because in sheep-farming, as in other branches of agriculture, it is so much easier to increase production than to maintain profit or to minimise loss, so that if sheep are losing money, one sheep is most definitely better than two—for the man who owns them.

Another fact which should be stated at the outset is that the Scottish sheep industry has a complex, although a well-organised structure. There is considerable division of enterprise and of labour. Many men fatten lambs which others breed; some breed lambs which others fatten; while an increasing number fatten the lambs which they breed themselves. It follows that some sections of the industry may be more profitable or less ruinous than others, even in the same year. What then is the nature and importance of this industry To What is its extent and what are its subdivisions?

There are over three million breeding ewes in Scotland, and from these ewes some three million lambs are bred each year. National expenditure makes three million seem a ridiculously small figure. Yet three million ewes is a quite considerable number of sheep. If arranged in single file they would stretch all along the road from Wick to London, and all the way back again. If ever they had to be slaughtered they would provide each person in Scotland with one pound of mutton a week for the better part of a year. If ever we are forced back to savagery, they would provide every adult Scotsman with a well-wooled sheepskin to keep out the cold. Three million ewes and their followers is a useful national asset, and a considerable source of real wealth. The money value of the industry's produce varies in an amazing manner from year to year. In one year they may be valued at six million pounds. In the very next year at something less than four million pounds. Fortunately, the sheep are just the same. Where the millions of pounds have vanished to nobody quite knows.

In the year 1935-36 the value of mutton and lamb produced in Scotland was calculated to be £5,740,000, and the value of wool grown to be £750,000. The calculated value of the wool is thus something between a seventh and an eighth of the value of mutton and lamb, one reason why sheep are increasing in the lowlands where lambs can be fed, and decreasing in the high hills where little but wool can bo grown. The value of mutton and lamb produced in Scotland is very roughly a third of the total value of the mutton and lamb imports to the United Kingdom. It constitutes about 17 per cent of the total value of Scotland's agricultural produce. Wool constitutes a further 1 per cent or so. That is to say, about one-fifth of all Scotland's agricultural wealth lie in sheep. Moreover Scotland, as regards sheep, is an exporting country. Roughly, one-third of Scotland's mutton and lamb is exported to England as store stock, sheep ready for slaughter, or as dead meat.

Scotland's sheep, far more than her cattle, are the true produce of Scotland's soil. There is no import of store sheep comparable to the import of Irish store cattle, and imported feeding-staffs are far less used in the sheep than in the beef or dairy industries. Indeed, sheep are a far greater source of national wealth than the mere statement that they constitute one-fifth of Scotland's agricultural output can possibly convey. A hill lamb, a pig, twelve score of eggs, may each be worth a pound, but if the lamb has been reared on heather and moss, while the pig has grown fat and the hen laid eggs on a diet of imported grain, then surely the lamb has contributed more to the net agricultural income of Scotland. Indeed, the great importance of the sheep industry to Scotland lies in the fact that the sheep, particularly the hill sheep, is a real primary product, not merely converting one form of primary produce into another; and that it utilises the vast, infertile hill areas of Scotland—areas which otherwise could make no considerable contribution to the feeding of a nation. For the beginning of Scottish sheep is in the hills. There lies the great nursery of sheep stock, the breeding ground from which, each autumn, the lambs and the cast ewes, the season's produce and its pensioners, come down to fill the plains. There are two breeds of sheep on the Scottish hills—the Blackface and the Cheviot. From the first flows the black line of Scottish sheep-breeding, from the second flows the white.

The black line of Scottish sheep-breeding begins in the Blackface hill stocks of the least fertile, most elevated, the more heathery grazings of the Scottish hills. From these stocks come wether lambs, cast ewes, and the surplus of ewe lambs not required for stock, and all these sheep are Blackfaces. Everything else along this black line of breeding is derived from this stock.

On the less elevated, more fertile, heather-covered hills the stock of Blackface ewes is maintained by annual purchase of Blackface gimmers. All the ewes are crossed with the Border Leicester and the cross lambs are called Greyfaces. The Greyface ewe may be crossed with a Down ram, giving Down cross lambs, unused for breeding. The maintenance, character, and constitution of all sheep in this black line of breeding depend upon the Blackface stocks of the higher hills. Should these stocks decay, the whole black line will decay, and sheep of the Blackface breed or of its first and second crosses are the most numerous in Scotland.

The white line of Scottish sheep-breeding begins in the Cheviot hill stocks of the Southern Borders and the farther north. There are the two kinds of Cheviot—the Border or south country Cheviot, and the north country Cheviot from Sutherland, Caithness, and parts of the adjoining counties. The white line begins in the less elevated, more fertile, more grassy hill grazings of Scotland. Prom these stocks come the wether lambs, the cast ewes, and the ewe lambs not required for maintaining stock, and all these sheep are Cheviots.

The surplus Cheviot ewe stock crossed with the Border Leicester gives the Half-bred, which as ewes, gimmers, ewe hoggs or lambs has been in great demand in England during recent years. The extension of grassland in England, which followed the depression in cattle and corn, required new stock for its profitable utilisation. There are many fine breeds of sheep native to England, breeds built up to fit in with the husbandry system of hurdles and arable land, but less suitable as grassland sheep than the Scottish Half-bred has proved itself to be. The Half-bred ewe, crossed with Down rams, gives Down cross lambs unused for breeding.

The two lines of Scottish sheep-breeding, beginning in the hill stocks of Blackface or Cheviot, run parallel to one another. In both lines there is a first cross with the Border Leicester, a second cross with a Down ram, and the final end is the abattoir. The organisation is obviously sound. Particularly in the fact that it safeguards the constitution of the country's sheep stocks, it is wholly admirable. Let us compare it, for example, with the organisation of the poultry industry, which has proved so fragile to the onslaughts of disease.

In Scottish sheep-breeding the foundation stocks are bred under the most rigorous conditions which sheep can survive. Breeding, apart from the production of pure-bred rams, is conducted under conditions where natural selection can wield its pruning-hook. There is a clear separation between stock kept for breeding and those primarily destined for early slaughter. The butcher's ideal is aimed at, not by modification of the foundation breeding stock, but by repeated crossing, the final cross being rejected for further breeding. In poultry, on the

contrary, until recently, the most intensive production methods were used in the rearing and management of breeding stock. Thore was no clear realisation that the management and feeding of breeding stock should be very much more rigorous, natural, and conservative than is necessary, or even sensible, in endeavouring to produce the maximum production from an animal which is to leave no descendants. The Scottish flockmaster has succeeded in avoiding such error, and, so far, has resisted every temptation, save one, to risk the constitution of his sheep. That one temptation lies in the use of bought-in tups.

Now, bought-in tups serve many useful purposes. Their use avoids in-breeding, stabilises the character of the breeds, maintains uniformity, encourages early maturity. But there is danger in the increasing tendency to pamper rams of the hill breeds intended (either themselves or their immediate male descendants) for ultimate use on hill grazings. For, while the ewes of a hill stock must retain their hardihood or else they die, the tups are usually bought in from flocks specialised for the production of rams. In the rearing and bringing out of such rams there seems to be a greater concentration on a gallant appearance at sale-time than on the fostering and retention of the special characters valuable in hill sheep. It is common knowledge that, in many of these pedigreed flocks of hill breeds, the sheep never climb a hill. Much is done to give the young rams a fine appearance in the sale ring. The ram lambs are housed during winter, clipped early, hand-fed. Some would even have it that they are bottle-fed. There is competition to produce an early maturing sheep, with the ewe's milk merely one article of diet in a menu of meal, milk, cabbage, condiments, and cod liver oil. There seems a danger of sacrificing the inherited qualities of value to hill sheep—hardihood, economical feeding, milkiness rather than mutton—which a sire of hill sheep should carry with him on his November adventures. It seems evident that the characters desirable in a Blackface or Cheviot ram intended for hill breeding are very different from those of the Border Leicester or Down rams, whose main function is to produce good mutton or ewes for lowland pastures. In any case, the preparation of the young ram with a pail at his nose and a cow round the corner seems poor training for seeking shy brides among the heather and moss. But, of course, a hard winter will correct, at a cost, the damage that over-fine tups may do.

The maintenance of the character of hill sheep is the foundation of the Scottish sheep industry. Unfortunately, these hill stocks are especially vulnerable to periods of low sheep prices. There is no alternative or supplementary branch of farming that can hope to counterbalance a fall in the value of sheep. There is no chance of what is made on the swings paying for what is lost on the roundabouts, for everything is either on the roundabouts or on the swings. There is no possibility of employing mechanisation, reducing labour, or of increasing output to lower production costs.

Yet these elevated grazings, carrying a stock of Blackface ewes with Blackface lambs, are of first importance. The importance of these stocks is twofold. In the first place, they are the main form of agricultural enterprise over a considerable area of mountainous Scotland. In the second place, they are the ultimate breeding source of the predominant line of Scottish sheep-breeding. It is unfortunate, therefore, that a Blackface hill stock is less remunerative than some other branches of the industry, and that many stocks of this character are completely unremunerative and in danger of dispersal. There are several reasons why stocks of this type do not pay. Owing to the system by which hill stocks are usually taken over, the capital required is substantial, yet the production of such stocks is low and the value of lambs, cast ewes, and wool generally below that of other sheep. The large amount of capital sunk in a Blackface hill stock must, in many instances, make a satisfactory rate of interest impossible. Such stocks are usually 'bound to the ground' meaning that the entire breeding stock must be taken over at valuation from the out-going tenant, either by the in-going tenant, or failing such, by the proprietor. The difficulties and anomalies of this system have recently been considered by a Commission without any very drastic alterations being suggested in existing legislation. The extra value to be attached to a sheep stock because of hefting and acclimatisation is undoubtedly difficult to assess. It would be absurd to argue that it surpasses the value of the sheep itself, yet in practice two good ewes could often be bought in the .open market for the price of one ewe taken over at the valuation of a bound stock. It must surprise a lowland farmer to learn that on the Scottish hills a small and under-nourished ewe with a single lean lamb may be reckoned to be worth five guineas or more. Probably it is fairly generally agreed that the valuation of bound stocks has become somewhat inflated, the difficulty of remedy being that deflation would mean a serious loss of

capital to sitting tenants. On the other hand, the present system has the important advantage of tending to stabilise the population of hill sheep. Were it not for the heavy loss involved in writing off acclimatisation value, it is certain that, in times of depression in the sheep industry, many more hill stocks would be dispersed.

At the present time it is generally admitted that a Blackface hill stock is less profitable than certain other branches of the sheep industry, and that many stocks of this character are completely unremunerative. The general picture of a Blackface ewe stock in the less fertile areas of the West Highlands is that of low stocking, perhaps one ewe to three to five or more acres; low fertility, about 50-70 per cent of lambs weaned from every 100 ewes put to the tups; a high death-rate among ewes and hoggs, varying from 5-20 per cent, depending upon season; and a low price for the saleable produce—viz., the wether lambs, the surplus ewe lambs, the cast ewes, and wool. On some grazings, owing to low fertility and high death-rate in the stock, there are insufficient ewe lambs of suitable class to keep up the numbers of the stock, and ewes have to be kept on which, on account of age or ill-health, would be better away. The following figures are taken from the records of two hirsels of an Argyllshire Blackface commercial stock, having no connection with any research institute or experimental work:—

Year.	Ewe Stock.	Per cent of Lambs weaned to Ewes tupped.	Per cent mortality of Ewes and Hoggs.
1912 . . .	1000	72	7
1913 . . .	993	51	14
1914 . . .	993	70	8
1915 . . .	992	71	8
1916 . . .	1013	59	11
1917 . . .	1008	51	11
1918 . . .	928	62	13
..	..	..	..
1921 . . .	841	71	16
1922 . . .	840	69	11
1923 . . .	920	72	10
1924 . . .	942	57	17
1925 . . .	927	62	14
1926 . . .	915	71	10
1927 . . .	939	70	16
1928 . . .	912	68	15
1929 . . .	910	62	16
1930 . . .	875	51	16

Several facts may be deduced from these figures, which are probably fairly typical of many West Highland grazings. In the first place, there is an indication of a reduction in carrying capacity of the pastures and a suggestion of an increasing mortality in the stock. Recently, and in many articles, especially that of Greig and King, it has been shown that the sheep stocks of the Western Highlands have suffered a notable decline in numbers within the past half-century, and that this decline is not entirely explained by the virtual disappearance of adult wethers. Thus, in the fifty-year period previous to the year 1929, there was an estimated reduction of 17 per cent in the ewe stock of Argyllshire, in addition to a reduction of 61 per cent in other sheep over one year old.

The records of this West Highland grazing also illustrate the slow rate of reproduction compared with that of sheep on better pastures. The highest figure is 72 lambs weaned from each 100 ewes put to the tup. The lowest

figure is 51.

The figures show the profound influence of annual variations in weather conditions as they affect the productivity of a hill sheep stock. In the year 1912, 72 lambs were weaned from each 100 ewes, and 7 per cent of the ewes and hoggs died. In the next year, 1913, the corresponding figures are 51 and 14. It is clear that, apart altogether from unpredictable variations in the sale value of produce, hill sheep-farming is something of a gamble, due to weather conditions alone. Moreover, it is obvious that where such wide variations in productivity may occur without any change of management, the very greatest caution and a long period of observation is necessary before attributing any change in production, whether for better or worse, to any particular change in management adopted.

The next set of figures we shall consider are those for the year 1929-30 of the experimental sheep farm of Garrochoran in the Cowall district of Argyll. The figures are those of the whole farm for a complete year in which no experiments were conducted. The sheep were managed on customary commercial lines and not artificially fed:—

Number of ewes put to tup	= 455
Percentage mortality of ewes	= 11·43
Average weight of lambs at weaning	= 44 lbs.
Number of lambs weaned per 100 ewes tupped	= 44
Average fleece weight (unwashed) of ewes	= 3·5 lbs.

Such a result of a year's working in which 44 lambs are weaned from each 100 ewes kept is a sufficient explanation of the difficulties of maintaining a sheep stock of this low grade.

Even where all the ewe hoggs are retained, they are barely sufficient to replace cast ewes and casualties. The total gross income from Garrochoran in the same year was as follows:—

1. Wether lambs, 86	£66	13	4
2. Cast ewes, 63	63	0	0
3. Wool	52	9	6
Total gross income	£182	2	10
Gross income per ewe		8	0

What is the reason for this low level of production? The fault is not in the sheep themselves. Cast ewes from Garrochoran, taken to the Duthie Stock Farm at Aberdeen and mated there with Blackface rams from Garrochoran, gave satisfactory production results, as the following figures show :—

Number of ewes put to tup	= 64
Percentage mortality of ewes	= 3
Average weight of lambs at weaning	= 66 lbs.
Number of lambs weaned per 100 ewes tupped	= 87
Average fleece weight (unwashed) of ewes	= 4·5 lbs.

These results were obtained without any artificial feeding of the ewes. They had no turnips or trough feed, and hay only during a few days of storm. Otherwise pasture was their only food.

It is clear, therefore, that the low productivity of sheep on grazings such as Garrochoran is due to their

environment and not to any inherited defect of the sheep themselves. Without further discussion of the figures it may be concluded that the low rate of production on grazings such as Garrochoran is a fault of the grazing, not of the sheep. Wherein does this fault in the grazing lie?

One of the more immediately practical aspects of the experiments at Garrochoran was to discover whether the low rate of production and the high death-rate, both of ewes and lambs on West Highland grazings of this type, were due to a mineral deficiency of the pasture. The fact that mineral deficiency of pasture may cause a low rate of production and actual disease in stock grazing them has been amply demonstrated in many parts of the world. The possibility that disease and low productivity among sheep on the poorer class of West Highland grazing was due partially, or even mainly, to mineral deficiency of the pasture, therefore deserved full and careful examination.

It merely remains, therefore, to give a brief summary of the experiments and of their results over a period of six years.

The analysis of the pasture at Garrochoran showed deficiencies of lime, phosphate, and chlorine in comparison with cultivated pasture. A mineral mixture was designed which, fed at the rate of 1| oz. per head per day, was estimated to increase the mineral intake of the sheep to the level of sheep grazing cultivated pasture. This mineral mixture, with the smallest possible addition of maize and bran added to induce the sheep to eat the minerals and of cod liver oil to supply vitamin D., was fed to one large group of sheep. Maize was fed to a second large group; maize + minerals to a third group; no supplement of any kind to a fourth. For convenience sake these groups, which were kept entirely separate from each other throughout the experiment, are referred to as Hefts 1, 2, 3, and 4. For reference the supplements given to the four groups are summarised below in tabular form:

	Maize.	Bran.	Mineral Mixture + C.L.O.
Heft 1 . . .	½ lb.	Nil	Nil
Heft 2 . . .	½ oz.	½ oz.	1½ oz.
Heft 3 . . .	½ lb.	½ oz.	1½ oz.
Heft 4 . . .	Nil	Nil	Nil

This, the original plan of feeding, was adhered to during the four years 1930-34. Feeding was commenced after tupping and discontinued at lambing. In the following years the feeding of maize was discontinued because of its expense and because the production results from the maize-fed sheep offered no hopes of off-setting that expense. In the year 1933-34, mineral mixture manufactured into cubes was fed to Hefts 2 and 3, Hefts 1 and 4 receiving no supplementary feeding. In the year 1934-35 Hefts 2 and 3 were again fed mineral cubes, and Heft 1 received dried grass, 1 lb. per head per day, from after tupping until lambing. In the year 1935-36, Hefts 2 and 3 received mineral cubes, Hefts 1 and 4 again receiving no supplementary food.

Summarising these data, it is seen that Hefts 2 and 3 received a mineral mixture calculated to remedy the mineral deficiencies found by chemical analyses of the Garrochuran pastures for six successive winters. Heft 4 never received any supplementary feed during this same period, while Heft 1 was fed first maize, then dried grass, and in other years no supplement of any kind.

The main production results for the six-year period are summarised in the table below, which gives the figures for the percentage death-rate of the ewes, the number of lambs bom and weaned from each hundred ewes, the average weight of lambs at weaning, and the average fleece weight of the milk ewes:—

Average for six years.	H 1	H 2	H 3	H 4
Percentage death-rate of ewes .	12	9	13	11
Number of lambs born per 100 ewes tupped . . .	83	83	83	83
Number of lambs weaned per 100 ewes tupped . . .	56	59	54	53
Average weight of lambs at weaning (lbs.) . . .	48	49	48	48
Average fleece weight of milk ewes (lbs.)	3·7	3·8	3·8	3·7

The only possible conclusion that can be drawn from these figures is that the feeding of mineral supplements over a period of six years to the Garrochoran sheep had no effect upon their productivity.

Naturally, during the course of the main experiments, several additional possibilities were explored in order to find, if possible, the reason for the low level of productivity at Garrochoran. The feeding of dried grass, 1 lb. per head during winter, to Heft 1 group of ewes was expected to give encouraging results. On the contrary, the production of the ewes in Heft 1 during the season the ewes were fed dried grass was not appreciably better than in other years. Again, the possibility that vitamin A. was deficient in the dried-up, fibrous, winter pasture of Garrochoran was investigated, but the analysis of livers of Heft 4 ewes and lambs dying at Garrochoran gave no evidence of vitamin A. depletion. C.L.O. and other sources of vitamins were fed in addition to minerals.

The question of one or more specific diseases being responsible for the high mortality and low fertility of this sheep stock was considered. But one of the reasons that Garrochoran was selected in the first place for these experiments was because inquiry suggested that specific diseases such as louping-ill were absent or unimportant. Observations throughout the experiment confirmed the results of these inquiries. Moreover, a veterinary officer attached to the Agricultural Research Council spent some time on the farm investigating the sheep diseases present there, and came to the same conclusion —namely, that the low productivity of the Garrochoran stock could not be attributed to the losses from any infective disease.

What then is the true cause of the low productivity of West Highland grazings? The experiments at Garrochoran and observations on the sheep there very strongly suggest that the general poverty of the pasture in late winter and early spring is the real difficulty that must be faced.

On grazings such as Garrochoran the ewes are in good condition in autumn. A Blackface ewe will then weigh about 90 lbs. Even by the time tupping commences in late November the ewes are falling back in condition. They are, in fact, mated when their weight has fallen to about 80 lbs. This is one very probable reason of the low fertility observed, since it is known that sheep are most prolific when mated in improving condition. Then, while the ewes are in lamb, between November and April, they are progressively losing weight. Thus a ewe weighing 90 lbs. in October may weigh only 60 lbs. when ready to lamb. After lambing she may weigh only 50 lbs. That is to say, a ewe on a grazing of this type will lose almost half her weight during winter and early spring. She comes to lactation when she is at her weakest. In view of the observed condition of these ewes at lambing time, it is really remarkable, not that so many of them live, but that any of them survive. During summer and autumn the ewes gradually pick up again to their best condition in October. During summer they do reasonably well. In fact, the value of such grazings during summer is probably quite high, were the ewes in better condition at the end of winter to make use of them. The difference between the winter and summer value of the grazing on hills such as Garrochoran is obviously very great. A hill on which owes grow thin and perish of starvation during winter, in summer will enable the same ewes to grow fat again, their lambs to grow; will carry not only

the ewes and their lambs, but the returned ewe hoggs and a number of store cattle as well. Indeed, it may be doubted whether many West Highland grazings are fit to carry a ewe stock throughout the winter.

In former times so much was not expected of the grazings, and that, too, when they were better than they are to-day. Garrochoran, at one time, was reputed namely for its wethers. When wethers were profitable and all grazings of this type carried either a wether stock or a running stock, partly ewe and partly wether, there was less asked of the grazing and less asked of the sheep. Land fit to carry mature stock may not have the fertility— may never have had the fertility— to supply the amount of protein, of minerals, of vitamins, for lactation and growth. Again, a wether sheep could lose half its weight during winter and yet improve through summer to be fat by autumn. That was all that was asked of a wether sheep. But a ewe on such grazings goes directly from winter starvation to summer lactation. She has only the brief two months' interval between the weaning of the lambs and the arrival of winter in which to regain her strength and to replenish her frame, and she is subjected to the same annual ordeal for four or more successive years. It says much for the endurance of hill sheep that they survive.

Then while the substitution of ewe stocks for running stocks and the demand for more early maturing sheep has increased the demands on the pastures, the pastures themselves have, suffered deterioration. The causes of that deterioration are more economic than biological. Take the question of bracken as one example. The spread of bracken is the result of depopulation of men and cattle and of the cost of labour. Bracken doos not grow on the poorest, thinnest soils. It invades the better, deeper land, which is one of the worst features of its menace. Bracken is merely returning to the places from whence it was cleared once upon a time. Similarly the green, fertile patches and strips in the glens have been covered up by the heather and the bracken and the whins in the very places from whence it was cleared once upon a time. In fact, Highland sheep-farming fell heir to a certain heritage of the results of human labour which has been squandered in the last hundred years. There has been more exploitation than cultivation, and the flora of the hills invades the valleys all along the Highland line, a result which must be attributed to depletion, not of minerals but of men.

The old Highland system of farming, where the uncultivated hill was an annexe to the cultivated valley, lasted for many hundreds of years. It was a system in which the valley was used for the provision of shelter and of winter food, the hills for summer grazing. In the winter the men and stock were in the valleys living — living poorly but still living — on the summer surplus the valleys produced. In summer the men and the stock migrated together to the sheilings in the hill places where the butter and the cheese were made and a harvest gathered of the mountains' summer abundance of natural* grazing. It was a system which in its essentials endured a thousand years.

Highland sheep-farming, as we know it to-day, is less than two hundred years old. In the beginning it was the exploitation of cheaply rented sheep-clean land with the cultivated holdings of the Highlander cleared and thrown in as discount. Even at the beginning, thinking men knew that to turn the whole of the Highlands over to one class of stock, although immediately profitable, must end in damage to the Highlands and loss of profit in the stock. There were people of vision who pleaded for the retention of more men and more cattle, if only to keep the bracken down. But because of immediate profit the exploitation went on. The profits are dwindling, exploitation is at an end. Is there hope of a revival of a more balanced Highland agriculture?

It is possible that the system of sheep-farming, introduced to the Highlands from Southern Scotland less than two hundred years ago, was suitable enough when wethers were an important produce of the sheep stock, as they were until fifty years ago. It is more problematical whether that system is equally suitable to-day, when ewes and lambs are the only stock which can be kept with any hope of profit, or whether the system is the best which could be devised either for the grazings or for the sheep which they carry. The possibilities of profit are insufficient meantime to induce flockmasters to risk capital in trying out new or forgotten systems of sheep husbandry. Nor are proprietors in a better position to do so. Nevertheless, the natural hill pastures of the Highlands are important as a source of food if only because of their vast extent. It is problematical whether, under existing conditions, the best use is being made of their potentialities. There is no doubt that sheep are

eminently suited for exploiting such hill pastures. How best can the sheep be employed?

It is highly probable that, if adequate wintering could bo provided for them, sheep would do perfectly well on even the least fertile and least productive grazings. In most hill stocks the ewe hoggs are wintered away. In some the gimmers are wintered away. On the poorest grazing it might be best for the sheep if all the ewes were wintered away. The objection is cost. Flockmasters find the wintering, even of the ewe hoggs, a heavy financial burden. Sheep wintering is costly and difficult to obtain. In many districts sheep must travel far to find it. Could it not be provided nearer home ?

Within recent years suggestions for enhancing or retaining the fertility of hill pastures have been legion. Mineral licks, supplementary feeding, seeding, manuring, all have been suggested or tried. These methods have aimed at increasing the fertility of the hill rather than of linking the natural productivity of the hill to an enhanced fertility of the cultivated valley. Meanwhile, while these suggestions have been made or acted on, the marginal land where cultivation in the foothills grapples with the uncultivated grandeur of the mountains —there the struggle is being lost each year. While the talk has been of improving hill pasture, the real loss has been the extension of hill pasture down over marginal arable land. There is no doubt that any policy which encourages cultivation, which, in Scotland at least, eventually means ploughing, would tend to arrest the deterioration of marginal land and, with it, the decrease in the area for wintering sheep.

So far, the difficulties associated with West Highland Blackface hill stocks have been emphasised. This branch of the Scottish sheep industry is important, both because it is the foundation of the predominant line of sheep-breeding in Scotland and because of the extensive area of otherwise agriculturally unexploited land which is devoted to it. Most of the other branches of the industry, except in the recurring periods of exceptionally low sheep prices, are in a better position. Cheviot hill stocks, because of a more limited supply and a wide demand for ewe stock from the Cheviot breed itself or from its crosses, are more prosperous, especially since the grazings they inhabit are in general more productive and the value of their wool distinctly higher.

The lower heather hills where Greyface lambs are bred from Blackface ewes, because of greater productivity and higher sale value of the lambs, have also proved profitable in the majority of recent years. Low ground sheep-fanning has followed extending grassland over many counties, and in most years it has paid. The sheep-feeder or wintering flockmaster has been at the mercy of price fluctuation. When sheep prices have fallen sharply between one autumn and the next, he has often lost money to the point of ruination. When sheep prices have risen he has, at times, done correspondingly well. In all these different branches of the industry the problem is less that of production, which is generally satisfactory, than of fluctuations of price which are unpredictable and of disease visitation misunderstood or uncontrolled. But much, of recent years, has been accomplished in the understanding and control of sheep disease.

Sheep, like other animals, are the prey of numerous parasites, visible, microscopic, or ultra-microscopic. The practice of sheep-dipping, primarily directed towards the control of sheep scab, is also of use and of increasing application in controlling tick infestation and resisting the blow-fly. While no dip is 100 per cent effective against all these pests, there can be no doubt that most dips give a considerable degree of protection. In a controlled experiment on the Duthie Experimental Stock Farm of the Rowett Institute in which the effects of various dips were compared, the main result found was that dipping with any dip was unexpectedly efficacious compared with no dipping at all. This result was more obvious than the difference between different dips or methods of dipping or spraying. There is no doubt, however, that dips and methods of dipping are capable of improvement, and the partial success of the dips now available gives hopes of progress along these lines. The North of Scotland College of Agriculture is conducting several important researches on the subject.

If we turn up the old writings on sheep, say those of James Hogg, the Ettrick Shepherd, we find that braxy and louping-ill were causes of severe loss to the flockmasters of old. These diseases, still prevalent, can now be controlled. Very largely due to the brilliant researches on sheep diseases, conducted during recent years by the Moredun Institute of the Animal Diseases Research Association, the cause of braxy is known and a preventive

treatment available. Over 67,000 doses of braxy vaccine were issued from Moredun in the year 1937-38. The same Institute has proved louping-ill to be tick-borne, and issued over 120,000 doses of louping-ill vaccine in the year 1937-38 for its effective prevention. Moredun also issued 72,000 doses of lamb dysentery serum in 1937-38 for the prevention of that severe disease of lambs. Scrapie has been shown to be infectious and the first step thus taken for its control.

With veterinary assistance to control braxy, louping-ill, lamb dysentery, and with the probability of future assistance to control scrapie, the modern Scottish flockmaster has an important advantage over the contemporaries of James Hogg, the Ettrick Shepherd.

Research in this and other countries has shown that 'pine,' which title includes a variety of local sheep diseases of an anaemic character, is due to a soil deficiency of certain mineral elements, iron, copper, or cobalt. These pining diseases can be controlled by supplying the sheep with the deficient element, and, owing to the small amount of the elements required and the rapidly beneficial results from their administration, the remedy is not only effective but economical.

Liver fluke, once a notable cause of 'unsoundness' of sheep grazings, can be controlled by carbon tetrachloride, a discovery we owe to research workers in North Wales. Sheep worms can be checked by copper sulphate, nicotine sulphate, and other drugs to some extent, and the knowledge of the worms' life-history can be used to minimise the damage they may do. Research has also shown an important connection between malnutrition and a heavy infestation with worms. As it is only a matter of a few decades since any serious attention was given to research on sheep diseases, the progress made has been rapid and effective and the losses saved considerable. Even the control of liver fluke alone has probably saved as much money as has ever been spent in all types of research work connected with sheep.

If research has been effective, and no unprejudiced person can deny its successes whilst admitting its failure, for it is in the nature of research that one may try not three but a thousand times before one succeeds—if research has been effective, why are the results not more patent in increased prosperity of the industry? For the industry as a whole is not so prosperous as it once was, although sheep have taken an unexpectedly long time to follow cattle and corn into the slough of agricultural despondency. The reason is that prices, particularly instability of prices, has checked prosperity, and that a real improvement in the possibilities of production has been negatived for lack of financial inducement for its adoption. It is the lesson of history that agricultural improvements follow prosperity, not depression. In this respect the Scottish sheep industry is simply one part of British agriculture. The necessity for aid is admitted. How best, and in what most practicable and fair way, can that aid be applied. It may be worth making the suggestion (it is only a suggestion) that any subsidy or system of price insurance applied to sheep might be more simply and effectively based on the price of wool rather than that of mutton and lamb. Subsidy or price insurance based on wool might be easier from the point of view of administration, and would be of direct and effective assistance to those hill grazings where breeding stock and wool are the only products for sale. Moreover, the less fertile the grazing, and consequently the more requiring of assistance, the more important is the sale of wool relative to that of lambs. Thus, at the Duthie Experimental Stock Farm, an arable farm, the value of wool sold in the year 1931 was only 8 per cent of the value of lamb sold in the same year; at Garrochoran, an infertile Argyllshire hill grazing, the corresponding figure was 78 per cent. Wool is thus, speaking relatively, a much more important item of revenue on a hill grazing than on an arable farm. Now, from the point of view of the Scottish sheep industry, the hill stocks, being the source of the country's breeding sheep, require first consideration. From the national outlook the hill sheep stocks require most encouragement, since they utilise extensive tracts of country for which no other agricultural use can be found, while the advisability of encouraging sheep on arable ground is more debatable. Finally, from the economic standpoint, no regular branch of the Scottish sheep industry is more urgently in need of assistance than the high-lying Blackface stock.

Sheep subsidy or price insurance through wool rather than through mutton and lamb appears to offer certain advantages in administration. The sale of wool is usually a direct and bulk transaction, very different from the

irregular and dispersed sale of fat sheep. Payments might bo arranged through wool-brokers. Finally, wool is, on the whole, a more uniform product than mutton or lamb where quality is less easily assessed.

In this review of the Scottish sheep industry no attempt at exhaustive treatment has been made. Certain aspects have been dealt with more fully than others because of their apparent urgency or importance. It is remarkable that the industry has so long survived the full severity of the depression afflicting other branches of Scottish agriculture. One probable reason is that the great extension of grassland which resulted from the depression in corn and beef cattle resulted in a very active demand for sheep to stock the new grasslands with the minimum outlay on capital and labour. Thus, while the sheep population of Scotland has been maintained, there has been a sweeping change in its distribution. Sheep have followed receding cultivation down to the valleys, leaving the hills bare. They have followed the ploughmen and the farmers' sons to the very gates of our industrial towns.

In seeking remedies or attempting reorganisation in agriculture, one branch of the industry cannot well be separated from others without unbalancing the whole. Where State aid is granted, it must be applied in such a way as to preserve a balance advantageous to the State. This principle may be well exemplified from the example of Scotland's sheep industry. It is not necessarily advantageous to the State that all branches of a complex industry be equally encouraged. In a balanced national agriculture the sheep has its place just as the plough has its place, and sheep should not graze where the plough should be driven. That is not to say that lowland sheep are incompatible with intensive and good farming. In sound cultivation the sheep has always had its place, and where cultivation is made profitable through a paying price for grain, then sheep, of the right kind and in the right proportion, will certainly follow. They may be breeding sheep or feeding sheep, but sheep there will be.

Lowland sheep, used in the right way, may be essential to arable farming. Used in the wrong way they may be a paltry substitute for it, grazing on grass laid hurriedly down while the plough lies idle, exploiting the soil's legacy of fertility until the grass runs out and the sheep grow worm-ridden and diseased: a mere shamefaced shift of desperate men to stave off bankruptcy until the tide may turn. That is not the sheep farming a State should encourage. It is a waste of land, a waste of men, a waste of stored fertility, and, in the final end, a waste of sheep. Any policy designed to make sheep profitable while cultivation is prejudiced by loss—any such policy which encourages immediate pastoral exploitation of the capital stored by age-old cultivation—is a policy which no State should encourage or subsidise, a policy no owner of sheep could defend.

But sheep, except in times of unexampled agricultural depression, are unlikely to become the main source of agricultural income in most lowland areas. They will find their place in a balanced agriculture, possibly with its peak in animal products, but with its roots planted firmly in regularly tilled soil kept properly cultivated through a subsidy on grain. That lowland Scotland should become a sheep ranch, with a couple of worm-infested sheep to a weed-ridden acre, is an unthinkable wastage of a country's land. It is unlikely that any such form of sheep husbandry could receive a nation's temporary aid or permanent consent.

The Scottish hills are the proper home for the bulk of Scotland's breeding sheep. It is in the hills that they should be encouraged to remain and to multiply. The expenses of cultivating hill land are necessarily such that it should not be contemplated until such time as every acre of low ground and of the valleys and straths among the hills is in perfect cultivation and in full production. The crops proper to the hills are the heather, the draw-moss, the hill grasses, and only through the mouths of breeding sheep or breeding cattle can they be brought to a modern utilisation for the production of human food. If the sheep industry of the hills should perish, then the potential human food of half Scotland will go to waste, and it is in the higher, more infertile hills that the danger of the industry's decay exists. Since wool is of far greater relative value on the hills than in the lowlands, and since Blackface hill stocks are in greatest need of timely aid, we again suggest that aid should be given to the Scottish sheep industry on a basis of wool rather than of mutton and lamb, that the aid should be greatest for wool of the hill breeds, and greatest of all for the wool of the Blackface breed— Scotland's pioneer sheep.

Every effort, every sensible device for the more efficient wintering of hill sheep—any system of management which might stem the tide of winter starvation without sacrifice of the hardy constitution of the breed—should be attempted and put to practical proof. Too much research is devoted to sticking in props to maintain decaying agricultural structures; too little to laying the foundation of new structures proof against the economic and political wind. More, better, and cheaper wintering for hill sheep is required, and such sheep wintering would already be provided were the straths and glens the cultivated homes of Highlandmen as they were in the past, rather than the desolate haunt of the marsh birds which we find them to-day.

Acknowledgment. — I should like to record my indebtedness to Sir John Orr and Mr Arthur Crichton of the Rowett Institute for their suggestions and criticisms of this essay and for their friendly co-operation during several years of conjoint research and observations on sheep.

END.

Weekend is almost here and hope it's a good one for you.

Alastair