GRASSLAND

JOURNAL

OF THE

SOUTH WEST

AND

CENTRAL SCOTLAND

GRASSLAND SOCIETIES

No. 14 SPRING 1971

CONTENTS

EDITORIAL

Time has slipped by rather more rapidly than usual. Concern for the growing cost of our journal, the pressures of other writing commitments, the appearance of the new version of Grass Today (formerly Herbivaria) all were taken as reasonable excuse for slowing down the issue of our own Societies' journal from 2 per year to perhaps 3 in two years. Members of the committee of the Central Scotland Grasland Society are however keen that two issues should be maintained even if one is a relatively smaller one.

Part of the object of our journal is to record our activities, which are surprisingly numerous. For instance, since the last Greensward went to press, 24 events have been held by our two Societies.. The difficulty of gathering in reports of all the activities of the two societies is to be resolved by appointing reporters for some of the events.

This number contains reports by Clyde Phillips, Allan Buchan and Robert Graham (S.W.S.G.S.) and Campbell Watson, J. Scott-Park and Ian Mitchell (C.S.G.S.). My colleagues, John Frame and Ron Harkness have contributed research reviews.

The effect of all this reporting is that we have no room for original articles, but hope to include these in the next number. For the keen ones, might I suggest writing to our college librarian for copies of articles produced by college staff, choosing from lists 12/13, which are included with this issue of Greensward.

SOUTH WEST SCOTLAND GRASSLAND SOCIETY

Executive Committee 1970-71

Chairman:	Allan Buchan, Ladykirk Estate Office, Monkton, Ayrshire.
Vice-Chairman:	Robert Graham, Kirkland, Courance, Lockerbie, Dumfries.
Past Chairman:	H. O. Chalmers, Craigencrosh, Stoneykirk, Stranraer, Wigtownshire.
Treasurer:	Dr. M. E. Castle, Hannah Dairy Research Institute, Kirkhill, Ayr.
Secretary/Journal Editor:	I. V. Hunt, West of Scotland Agricultural College, Auchincruive, Ayr.

Elected Members

1969-71

J. Stewart, Dalquharran Castle, Girvan, Ayrshire.
R. McClelland, Lowtownhead, Dalswinton, Auldgirth, Dumfries.
K. A. Kelly, Barncleuch, Irongray, Dumfries, Kirkcudbrightshire.
G. Torrance, Dindinnie, Stranraer, Wigtownshire.

1970-72

T. R. Logan, Holehouse, Kilbirnie, Ayrshire.
D. Grant, Burrance of Courance, Lockerbie, Dumfriesshire.
A. Brown, Corseyard, Borgue, Kirkcudbrightshire.
J. Lindsay, Auldbreck, Whithorn, Wigtownshire.

College Advisers:

A. Campbell, College Office, 20 Miller Road, Ayr.
C. Phillips, College Office, 41a Castle Street, Dumfries.
J. Thorburn, College Office, 41a Castle Street, Dumfries.
J. Barrett, College Office, Edinburgh Road, Stranraer.

Co-opted Members:

Principal J. S. Hall, W.S.A.C., Auchincruive.
A. E. Parkinson, W.S.A.C., 6 Blythswood Square, Glasgow, C.2.
I. W. Mitchell, College Office, Beechwood, Stirling.

CENTRAL SCOTLAND GRASSLAND SOCIETY

Executive Committee 1970-71

Chairman:	W. B. R. Elder, Mid Glen, Langbank, Renfrewshire.
Vice-Chairman:	A. Smith, Hazeldean, Stonehouse, Lanarkshire.
Past-Chairman:	R. Howie, Drumfork, Helensburgh.
Secretary:	I. W. Mitchell, Agricultural College Office, Beechwood, Stirling.
Treasurer:	J. Waddell, Agricultural College Office, Portland Place, Lanark.

Elected Members

Retire 1971:

Peter Fisken, High Craigton, Milngavie, Glasgow.
J. Pettigrew, Newsteadings, Lanark.
G. W. Haynes, Middlebank, Ravenstruther, Lanark.

Retire 1972:

J. D. Brown, Gaindykehead, Glenboig, Coatbridge, Lanarkshire.
J. H. Scott-Park, Portnellan, Gartocharn, Alexandria, Dumbartonshire.
D. S. Robb, Meadow Farm, Strathaven, Lanarkshire.

Retire 1973:

W. M. Andrew, Crossflat, Kilbarchan.
E. Anderson, Kippencross, Dunblane.
J. McEwan, The Lurg, Fintry.

College Adviser:

C. C. Watson, Agricultural College Office, 8 St. Mirren Street, Paisley.

Co-opted:

A. E. Parkinson, W.S.A.C., 6 Blythswood Square, Glasgow.
I. V. Hunt, Grassland Husbandry Department, W.S.A.C., Auchincruive.
Principal J. S. Hall, W.S.A.C., Auchincruive.
G. M. Berrie, W.S.A.C., 6 Blythswood Square, Glasgow.

NEWS, NOTES and NOTICES

The South West Grassland Society has had a particularly successful year with attendances of up to 100. The new venture of informal visits to members' farms during the long summer evenings was successful and is to be continued.

The following new members who have joined since our last Greensward issue are welcomed:

D. F. Anderson, East Lodge, Corsemaizie, Port William, Wigtownshire.
M. P. Burr, College Office, 20 Miller Road, Ayr.
H. M. Borland, 47 Benbecula, St. Leonard's XVII, East Kilbride.
D. J. Barrett, College Office, Edinburgh Road, Stranraer.
F. D. D. Bogie, Glenisla, Islesteps, Dumfries.
J. D. Brownrigg, Broadlea, Lockerbie, Dumfriesshire.
K. G. Campbell, Kearicks Farm, Duncow, Dumfries.
H. T. M. Colwell, W.S.A.C., Auchincruive.
W. R. Costley, Glenling Farm, Port William, Wigtownshire.
A. R. L. Fraser, Auchmannoch, Sorn, Mauchline, Ayrshire.
A. Gray, College Office, 20 Miller Road, Ayr.
I. J. Graham, Calvertsholm, Gretna, Carlisle.
A. J. M. Gunn, 12 Shiel Hill, Woodlea, Ayr.
W. Hogarth, Shackle Hill, Tarbolton, Ayrshire.
C. A. Hardy, C. G. Grieve & Co., 37 Castle Street, Dumfries.
W. S. Jamieson, Kirkland, Closeburn, Dumfries.
R. A. Lockhart, Branet Rigg, Torthorwald, Dumfries.
A. Mowat, Woodland, Newbridge, Dumfries.
J. Maxwell, Coshogle, Thornhill, Dumfriesshire.
P. McMillan, Dalquharran Mains, Girvan.
I. S. McMickan, Herriesdale House, Castle Douglas.
C. Paton, High Mindork, Kirkcowan, Newton Stewart.
K. A. Rundle, 37 Hardthorne Crescent, Dumfries.
J. R. Rutherford, 18 Carrick Place, Prestwick.
J. Rome, Ingleston, Irongray, Dumfries.
B. H. Stones, Crichton Royal Farm, Dumfries.
D. Walker, Rogermoor, Moffat, Dumfriesshire.
E. Whitehead, Arniemean, Barrhill, nr. Girvan.
A. G. Watts, College Office, 41a Castle Street, Dumfries.
T. Young, Nether Gribton, Holywood, Dumfries.

The Central Scotland Grassland Society has also had an active year. New members welcomed during the year are listed below:

Gavin P. Rutledge, 7 Beach Avenue, Hunter's Hill, Paisley.
D. Kerr, Damhill Farm, Lanark.
H. Crossley, Undercraig Farm, Langbank, Renfrew.
D. T. Gardner, Cleddans Farm, Airdrie, Lanarkshire.
J. Bickett, S.M.M.B., Underwood Road, Paisley.
A. R. Williams, Rosebank, Well Road, Bridge of Allan, Stirling.
J. W. Neilson, Woodlaw, Thornton Hall, Renfrew.
J. McCandlish, 83 Ivanhoe Drive, Glenrothes, Fife.

Grass Today. Copies of the new version of "Grass Today" were sent to all members. It is expected that it will be issued twice a year.

Other Scottish Grassland Societies. A new Society, The East of Scotland Grassland Society, came into being on March 4th, 1971, at which I. V. Hunt and W. B. Elder, Chairman of C.S.G.S., presented inaugural addresses. This means that the whole of Scotland is served by 5 Local Grassland Societies with an anticipated total membership of 2,000. The next step is to consider establishing a Federation of Scottish Grassland Societies as has been done for Welsh Grassland Societies.

Forthcoming Events. The British Grassland Society will hold its 1971 Summer meeting in Kent based on Wye College. The Past President of the Society, Dr. William Holmes, formerly of Hannah Dairy Research Institute, will be honoured. There will be delegates going from our Societies. The meeting takes place July 12th-16th.

Summer Meetings are being arranged in Kirkcudbrightshire (17th May) and to the Isle of Luing. Tentative suggestions for the Summer Tour include Cambridge, Italy, France or Holland, to be held late May or late July.

Further evening farm visits are being arranged. If you have something which you think will interest members, contact your secretary or committee members.

Winter Programme. The committee is preparing the Winter Programme. If you did not like last year's, write and suggest alternatives.

Grassland Society Day. An open day will be held at the Grassland Research Institute from 10 a.m. onwards on 20th May, 1971. Members of our Society are invited to attend. Demonstrations will include beef production from grass with bulls and steers; lamb production from grass with various Finn crosses; silage making with additives; calf rearing and yield and quality relationships in grass and forage crops. Light refreshments will be available throughout the day.

ADAM GRAY

Chairman S.W.S.G.S. 1968/69

Adam Gray of Ingleston at Borgue is well known in the Stewartry as a man who handles a large mixed farm, and at the same time devotes considerable energy to a wide variety of local and national organisations.

Ingleston extends to about 730 acres and at present carries a dairy herd of 135 Ayrshire cows. Despite the influx of Friesians in the area, Adam is still an enthusiast for Ayrshires and has no thoughts at all of changing. In 1966 his dairy herd went over to cubicles and self feed silage. Originally the cubicles were bedded with straw which allowed the slurry to be pushed into a large midden and handled by traditional methods. Recently less straw has been available and the slurry system is presently one of the main problems at Ingleston.

A Hereford bull has been used on the heifers during recent years with females being retrained as suckler cows — Simmental blood is presently being used and is probably a forerunner of changes which will take place in beef enterprises where the aim is 100 suckler cows producing suckled calves.

Like many in the South West, Ingleston was a cheese making farm until 1960—and in common with other cheese makers, pigs were carried to use up the whey.

Besides the dairy and beef enterprise, Ingleston runs a flock of 200 North Country Cheviot Ewes with the resultant half-bred lambs being sold at St. Boswells. The tradition of selling at St. Boswells goes back to about 1920 when it was related to serious Scrapie trouble in the Borders. The disease was so bad at that time that auctioneers came down to the Stewartry in their search for half-bred lambs and eventually two special trains used to go through to the market with between 20 and 30 thousand lambs each year.

Adam Gray was educated at George Martin's in Edinburgh after which he went to the West College to take diplomas in Agriculture and Dairying. A bit of a world traveller, he visited Canada in charge of cattle soon after leaving College, and spent about tthree months there working on various farms. Then in 1955, he was awarded a Nuffield scholarship which allowed him to visit New Zealand and while there he took the chance to spend some time in Australia. The main purpose of his visit ' down under ' was to study crops, dairying and sheep. More recently Adam has visited Scandinavia on a Young Farmers visit, and a few years ago when our own Grassland Society visited Holland, he was a member of the party.

Despite extensive farming interests, Adam finds time to do a lot of public work. Currently he is President of the Stewartry Area

of the N.F.U., and regularly attends Headquarters in Edinburgh where he is Vice chairman of the Organisation Committee and a member of the Milk Committee.

Nearer home Adam is President of the Stewartry Agricultural Society and Chairman of the local District Council. Recently he was elected Vice-chairman of the Galloway Farm Secretarial Service.

One would think that all this farming and voluntary work would leave little time for anything else. In fact Adam finds time for many pursuits of a lighter and more relaxing nature, such as the reading of biographies and a profound interest in Burns—his favourite here he declares is Burns " Epistle to a Young Friend."

Mr Gray claims that farming is his hobby — which is quite different from saying he is a hobby farmer. Rather does he immerse himself completely in all the facts of his farm with a particular interest in grassland.—C.R.P.

HEW CHALMERS

Chairman S.W.S.G.S. 1969/70.

Hew Ormiston Chalmers was born and brought up on the family farm in Wigtownshire. He left school in the war years and worked at home, milking in the byres in the morning and doing field work during the day.

In 1951, he obtained tenancy of the 93 acre farm of Craigencrosh, Stoneykirk, Stranraer. At that time, the farm carried 25 dairy cows and followers and grew the traditional crops — oats, turnips and hay. From the outset, he was interested in making the best possible use of grassland, and started paddock grazing in 1952, which he has followed ever since.

Fields are divided into 5 acre paddocks; each paddock is triangular with the points converging at the gate, which does away with the need for an access passage and thus saves acres. Separate paddocks are used for day and night grazing, thus each paddock lasts for 3-4 grazings. A new day paddock is given when the night paddock is half grazed and vice versa, which ensures very level milk production. Every field is grazed in spring, then as growth rate increases fields are closed for silage. By alternating and cutting a fair proportion of clover is retained in the swards, which on average receive over 200 units N per acre.

Most of the grass swards are fairly old and are only renewed when considered necessary. They are renewed by direct reseeding, using a ryegrass based mixture containing 2 lb per acre Kersey white clover.

Stocking

The stock has gradually increased to 85 cows and followers. 20-30 heifer calves are retained each year, mainly for replacement and increasing herd size, but a few surplus are occasionally sold. All stock were grazed at home until 1969 when 20 of the 60 dairy young cattle were grazed away. About 700 tons of silage are made to self-feed the dairy herd and control feed the young cattle.

Mr Chalmers is an Ayrshire enthusiast and has no intention of swinging to black and whites. He considers the Ayrshire to be as good an animal as one can have, provided care is taken in the selection of bulls. He purchases his bulls from a near neighbour and friend, Mr John McColm, Garthland Mains,—President of the Ayrshire Cattle Society. The use of proven sires and sound breeding advice from Mr McColm has resulted in milk production per cow consistently increasing.

Building Alterations

In 1969, the single sided dairy byres were converted to 43 cubicle stalls, and an implement shed was extended and converted

to hold 40 cubicles. Slurry is scraped into slats at the end of each cubicle house, and from there flows to a collecting tank, and then is pumped into an above ground storage tank. Adequate storage was considered to be very necessary on a small, all-grass farm to ensure that slurry is only taken out when the land is dry and will thus not ' puddle.' A 5 point herringbone parlour, self-feed silos, young cattle accommodation and calving boxes complete the range of buildings.

Dairy Performance

Milk sales to creamery are regularly around, or a little over, 1,000 gals per cow per annum. Concentrate use is low at about 17 cwt per cow, leaving a margin over concentrates per cow of a little over £140. Cows receive concentrates for only about 10 days after going to grass, except for 1 lb per day which is fed as a carrier for magnesium for about three weeks after going to grass. Concentrate feeding is not recommenced until calving starts again in September. Calving index is excellent, with few cows failing to calve within 11-12 months from previous calving. The dairy and stock are looked after by dairyman Mr James Brown and his wife. One man does tractor and another field work, with Mr Chalmers helping as needed.

Hew is an enthusiastic curler, and thus in the winter months spends a lot of time away from home. He has a son and two daughters; the daughters are pony enthusiasts, members of Galloway Pony Club, and take part in hunter trials and show events. Three ponies are kept on the farm and are of considerable interest to Hew.

In addition to being Chairman of South West Scotland Grassland Society, he is also on the committee of Wigtownshire Agricultural Discussion Group and the Rhins Branch of the N.F.U. One of our informal farm visits took place at Stoneykirk on 23rd July 1970.—S.A.R.

THE BRITISH GRASSLAND SOCIETY SUMMER MEETING, 1970

By ALLAN A. BUCHAN

The 25th Summer Meeting of the British Grassland Society was held in Shropshire in late July, and with this in mind I found myself being driven at a safe but fairly fast pace by your widely travelled secretary, towards Harper Adams College near Newport, Shropshire. We started off on a traditionally dismal day, yet as we crossed the border one could almost sense a distinct change in the climate. I never cease to wonder, as one travels south, at the ever increasing yellowness of the cereal crops culminating in the sight of combine harvesters taking their toll of the cereal fields almost a full month earlier than at home. Life was not however, a bed of roses in Shropshire. Grass was basically what we had come to see and particularly in Shropshire it seemed that there was precious little about.

The whole conference was well organised and the accommodation of a high standard. The visits were organised with military precision without losing any of the conviviality necessary for the success of such a gathering. In addition to myself, the South West of Scotland Grassland Society was represented by John Lamont, Cockenzie, I. V. Hunt and Malcolm Castle. Carrying the flag for the Central Scotland Grassland Society were Robert Howie of Drumfork, Dumbartonshire, and Lex Smith of Hazeldean, Strathaven.

The eleven items in the programme are described below :—

1. On arrival, Mr Kenney, principal of the Harper Adams College welcomed the British Grassland Society and Mr Sinclair of the Nature Conservancy, gave us an insight into their attempts to preserve natural vegetation in co-operation with the ever increasing demands of highly intensive farming.

2. **Sibden Castle** (Messrs W. F. Alderson & Son). This part of S. W. Shropshire takes in the Clun Valley, a mixture of fairly high but gently sloping hills and some deep fertile land is devoted to a system of beef and sheep husbandry with the predominant sheep breed being the Clun Forest and single suckled beef cows.

Sibden Castle is a tenanted farm and of the 575 acres, 220 acres are re-claimed hill, 51 acres are permanent pasture and the remainder farmed rotationally with wheat, barley, winter oats, swedes and grass leys. Generally, the leys are down for 3-4 years with an arable rotation for the next 4 years. A flock of some 200 registered Clun Ewes is run, with a policy of rearing breeding ewes. Approximately 130 ewe hoggs are retained annually and the remainder sold fat. The ewe hoggs are crossed with a Suffolk tup and the lambs sold fat. The 50 Hereford-cross hill cows were predominantly spring calving and outwintered. In addition, there were 11 Hereford

Friesian autumn-calving multiple sucklers which each rear four to five calves. Mr Alderson said that Hereford bulls are used as the white-faced calves were more readily saleable for the local store trade.

The prime reason for visiting Sibden Castle was to see the successful reclamation of Sibden Hill at 1,000 feet. Sibden Hill was previously almost completely covered with bracken and contributed little to the farm enterprise. Between 1952 and 1956 the land was broken up using crawlers and allied equipment. Four tons of lime, 10 cwts basic slag and 2cwts of a high nitrogen compound fertilizer per acre were sown to a Cockle Park seed mixture. Since then the ground had received only lime and 19 cwts basic slag every 3rd year. As Mr Alderson explained, this was probably a traditional system, but all agreed that the sward on the hill was excellent. Mr Alderson said that apart from a few outbreaks in the 2nd and 3rd year after reseeding, there had been no reappearance of the bracken.

Below are a few of the relevant figures on the various farm enterprises which had been prepared by N.A.A.S.

SIBDON CASTLE

GROSS MARGIN DATA

Livestock		**1969/70**
Beef Cows	(Forage costs excl.)	£58 per cow
Store Rearing (10-13 months)	(Forage costs excl.)	£28.5 per head
Sheep	(Forage costs excl.)	£8 per ewe

Crop	**1969/70**
Wheat	£49 per acre
Barley	£31 per acre
Oats	£35 per acre

OTHER DATA

Forage costs	£3.5 per acre
Stocking Rate	1.6 acres per livestock unit
Total Fixed Costs	Less than £20 per acre
% of Tenants Capital invested in Livestock	60%
Return on Tenant's Capital	15%

3. **Holdgate Hall** (John Hartley). Farm policy was basically meat and cereal production with 330 acres of arable land being farmed in the following rotation : — winter wheat, winter oats, Italian rye grass/roots, barley, barley undersown, 2-3 yr. ley.

One of the main enterprises on the farm was the flock of 225 Clun Forest ewes with the ewes and lambs being set-stocked at eight ewes per acre. Lambs are fattened on swedes and turnips. Thirty breeding cows, mainly Hereford cross Friesians, are bred to a Devon or a three-quarter Charolais cross bull. Multiple suckling is carried out with a further eight cows, rearing six calves per cow. The progeny of this single suckling and multiple suckling unit are fattened on the farm in their second winter. The cattle are grazed on permanent pasture at a cow and calf on 2/3 acre in summer. Calcined magnesite was fed as a precaution against staggers.

Cows with their calves are paddock grazed using a single strand wire operated from a mains electric fence. The wire was adjusted to allow the calves free access whilst restricting the cows. Thirty-five six-month old cattle were also being paddock grazed on a four-paddock system. Grazing land received 1½ cwts of "Nitram" for the first spring grazing, followed by a dressing of 2-3 cwts of a 22.11.11. compound in June. Grass which had been cut for silage received 4½ cwts of this compound for the first cut, followed by 3 cwts of Kay-Nitro (25.0.16) for the second cut.

4. **Walcot Farm, Churbury** (Mr J. Pryce Jones). This was a compact, well kept farm, within a ring fence, with an average altitude of some 360 feet and an average annual rainfall of 32 in. The cropping was 48 acres winter wheat, 28 acres spring wheat, 28 acres spring barley, 60 acres permanent pasture and 196 acres leys (100 acres cut for hay).

The main enterprise was the dairy of 125 Friesian cows where the special feature was the rearing of home bred heifers to calve at 2 years of age. Sixty per cent of the milk is produced in the winter months October-March. Mr Pryce Jones said that he started paddock grazing six years ago with approximately 62 acres divided into paddocks for the cows. Eighteen paddocks provided the grazing in 1969 from 30th April to 9th November and each day the cows were moved to a fresh paddock of approximately 3-3½ acres. His experience had been that after several years on a paddock system his grazing swards were knitting well together and it was not his intention to include the paddocks in the general farm rotation. In the spring, the paddocks received 2½ cwts/acre of "Nitram" and after the first grazing, 2½ cwt/acre of a 22.11.11. compound. Subsequently, after alternate grazings, 65-75 units of nitrogen were applied, 240 units N/acre were used in the paddocks in 1968 and 1969. The paddocks, in the opinion of some of the visitors, were becoming fairly rough with the grass having a high fibre content and giving the general impression that they had not responded adequately to the amount of nitrogen applied. The total rainfall for the previous three months had been 2.4 inches and one would agree

that he had had a particular problem. Some details of the financial results for this farm are given below.

Yield per cow	1,148 gallons
Margin over Concentrates	£110
Concentrates fed per gall.	4.8 lb (inc. beet pulp)
Proportion of winter milk	60%
Gross margin per cow	£100
Gross margin per acre	£92

The cows were housed in two cubicle sheds to hold 126 cows with a centre feeding passage. The yards were scraped regularly and the slurry stored in a 90,000 gallon Boythorpe slurry silo which can hold the slurry from the 120 cows for approximately 11 weeks.

5. **The Walford Small Holding** (Shropshire Farm Institute). We were welcomed by the principal, R. D. Park. The Farm Institute had adopted the following guide lines to cover the management of this 35 acre farm. Basically these were (a) to provide the occupant with a reasonable living and decent working conditions (b) to keep investment in fixed equipment and machinery as low as possible and (c) to keep as much money as possible in working stock, i.e. stock and crops. Several changes had taken place over the years, but at present there is an Ayrshire herd of 54 cows, a herring-bone parlour and an all grazing grassland system, with virtually all winter feed being purchased. Mr Park said, that this plan would simplify and yet make maximum use of grass, labour and capital, and that advantage could be taken of cheap sources of winter feed. Grassland management was based on a simple paddock system. There was little or no poaching, due to the fairly reasonable rainfall. The seed mixture was 6 lb each of S.23, S.101 and S.24 perennial ryegrass plus 2 lb S.48 timothy and $\frac{1}{2}$ lb S.100 white clover per acre.

Lately, several new seed mixtures had been tried, including S.321 and the Tetraploid ryegrasses. Mr Park said that the Tetraploid ryegrass had given palatability, but in his opinion had not resulted in any extra productivity. Fertilizer usage for the 35 acres was about 300 units N, 80 units P and 80 units K. This gave adequate grazing at a stocking rate of 0.66 forage acres per cow and allowed six tons of hay to be made each year. This was an extremely interesting demonstration of how a small farm can remain viable.

6. **Shropshire Farm Institute.** The main farm comprises 560 acres, typical of many of the mixed arable farms of Shropshire. The main enterprise on the farm was the 130 British Friesian cows which last year averaged over 1,000 gallons of milk sold. Table 1 below gives some of the details of the performance of the dairy herd.

Table 1. GRASSLAND PERFORMANCE/SHROPSHIRE FARMS INSTITUTE.

1970 Season

Date of Turnout	20/4/70.
Grazing Method	24 one-day paddocks of 3 acres each.
Herd Size at turnout	101 cows.
Stocking rate on paddock area	0.71 acres per cow.
Fertilizer treatment	Initial dressing 70 units N. in Mid March subsequently 40 units N. after each grazing, alternately as straight N. (Nitram) or as an N.P.K. Compound. Up to end of June approximately 200 units N. applied.
Irrigation	1-3 inches applied on the paddock areas from 1/6/70. Rainfall during April, May, June was 3.44″ (Av. 5.48″). Grassland soil deficit 29/6/70—5.6″ 7/7/70—6.2″

Results	**April**	**May**	**June**
Total milk production	9,825	11,592	10,724
Milk from grass—galls.	—	3,892	4,760
Milk from grass—galls./acre	—	75	65

Conservation

24 acres (7 paddocks) mown for silage 28/5/70.

Previous Grassland Performance	**1969**	**1968**
Av. Nos. cows in herd	114.5	131
Av. milk yield per cow—galls.	1039	1005
Av. milk sales per cow—galls.	1027	997
Av. milk sales per cow—£	165	161
Cow grazing days/acre	245	298
Utilised starch equivalent—cwts./acre	22.2	27.4
Lbs. cones/gall.—summer	2.5	2.12
Fertilizer usage/acre N. units	270	343
P. units	70	60
K. units	70	60
Total milk production/acre—galls.	697	883
Milk from grass acre—galls.	310	397
% Summer milk	55%	61%

The grassland is managed on a paddock system on those fields which are reasonably adjacent to the farm buildings. The fields are divided into 2½ acre paddocks and in a normal season this grassland would receive 320 units nitrogen, 70 units P_2O_5 and 70 units K_2O per acre. The leys were largely of a perennial ryegrass type. In fields which have been sown down in recent years some Timothy and Meadow Fescue were included but more recently S.23 and S.321 have been sown either together or separately. Tetraploid ryegrasses have also been included in an attempt to aid digestibility. The 2—years leys an this farm consisted of S.24/Italian ryegrass mixtures whereas longer leys were based on simple perennial ryegrass mixtures, designed so that the heading date of each one was approximately ten days apart.

Irrigation was another important subject being tested on the farm. A stream provided a good source of irrigation water and this water was abstracted by a permanent electrically driven pump and

delivered into a 5" P.V.C. underground ring main. At the time of the visit some of the grassland was being irrigated and Mr Park considered that it would be possible to apply a maximum of 9 acre-inches per day. The average rainfall on the farm was 24.8 ins. per year, of which some 12.25 ins. generally falls in the period April-September. This year had been an exception as during the three months of April, May and June, only 3.44 ins. of rain had fallen.

7. **Lea Hall** (Messrs S. Mayall & Sons). This farm visit was probably one of the most interesting of all, not only from a grassland point of view, but from the whole farm policy. Lea Hall, with the neighbouring farm of Shotton, totalled about 600 acres, had been farmed for over 20 years on entirely organic principles. All would agree that the results were quite remarkable. The farm was a mixed farm with a dairy enterprise, a pig enterprise, and cereal growing. Unfortunately the Shotton herd was completely wiped out by foot and mouth disease in the recent epidemic, but this had now been largely re-established with first-calf or Ayrshire heifers.

At the outset of the visit, both Mr Mayall, a remarkable man in his seventies, and his son, stressed that their system was no gimmick. They did not regard it as a hobby farm nor as an experimental farm, but purely as a commercial enterprise. They carried out their particular system of farming sincerely believing that what they were doing was in the interests of good husbandry, both livestock and crop. At the same time, they considered that their results were comparable with others and that it was profitable. Mr Mayall stressed that his organic system of farming had been adopted because he believed strongly that the real basis of a sound and lasting farming system consisted of a natural fertile soil with high bacterial activity. This, in his opinion, would result in much healthier crops and stock, and one would scarcely argue with this practise when one considered the results in the dairy herd. In spite of the absence of inorganic fertilizers, a high output had been maintained together with a stocking rate of 1.3 acres per grazing livestock unit.

It was extremely interesting and fascinating to see a potential 2 tons/acre crop of Maris Widgeon wheat grown after a previous crop of wheat on a field which had not received any fertilizer, but had only received a liberal dressing of pig and cow slurry in the autumn of 1967.

For many years the practise on the farm had been to turn all the manure, apart from some pig slurry, into good rough compost, all of which was applied to grassland. However, both the herds were now housed in kennels and almost all the muck was handled as slurry. At Lea Hall farm, the cow and pig slurry was handled in underground concrete slurry tanks, whereas at Shotton, the slurry was stored in a 120,000 gallon Boythorpe slurry silo. Mr Mayall Jnr., said that the slurry, handled by what appeared to be a remarkably efficient tanker known as a Molex, was used to give a dressing of about 1000 gallons per acre. Mr Mayall also outlined one other

interesting practise. After combining, some of the straw on fields which was not required for bedding, was chopped up with a flail mower, treated with slurry at approximately 1,500 gallons per acre and the mixture rotovated into the soil three times. In addition to their own farm slurry, approximately 250 loads a year of poultry waste was imported on to the farms and much of this went to the grassland. One of the interesting results of the original composting system was that it had been found unnecessary to apply any lime for the last 18 years.

The farm rotation consisted of 4 years of ley followed by 2 years in corn. The older leys were at one time Timothy, Meadow Fescue, Tall Fescue Kersey White Clover, Chicory and Rib Grass. However, most of the younger leys sown since 1968 are based on S.321 and S.24 perennial ryegrass which have replaced the fescues.

Looking at the cows as they were grazing on a remarkably fresh and lush-looking bite, it would seem difficult to confound any of Messrs Mayall's arguments.

An unusual sideline at the farm was a small plant for the production of compost-grown whole-wheat flour and other cereals which are sold to bakers, health food stores and private customers throughout the country. Mr Mayall, sen., said he had no desire to extend the practice but did a very steady trade selling whole-wheat flour in 3 lb. bags to customers.

8. **Annual General Meeting—The British Grassland Society.** The new president, Mr Edwin Bushby, of Watson Hill Farm, Egremont, was introduced. Mr Bushby has been an enthusiastic member of the British Grassland Society for many years and after having visited his farm on the way home, anyone would consider his farm an excellent example of the principles which the Grassland Society endeavours to preach. In the late evening we were entertained to cabaret by a group of Shropshire Young Farmers —and young farmers being what they are, I am afraid some of the jokes which were told would not pass the editor's censorship! None the less, we all enjoyed their performance.

9. **Harper Adams College Farm** (Mr Kenney, Principal). This was purely a general visit with no great emphasis being placed on grassland management. Like other college farms, the objectives in the organisation of the farming were teaching and investigation or research along with sound commercial practise. The degree of emphasis put on each of these objectives could and should vary widely, particularly in relation to the amount and type of research work involved. The farm of 370 acres was a mixed farm, where cereals, potatoes, sugar beet were grown and all forms of livestock production practised. Mr Kenney certainly showed his interest in the predominantly Friesian herd and in whole crop cereal silage production. They considered that a ration with a high proportion of straw and either moist or dry barley is an accepted practise and that the combination of these into one feed in the form of a cereal silage was a logical development. An

important advantage of whole crop cereals is that their digestibility does not drop off as rapidly as the digestibility of grass, thus allowing a longer period for successful harvesting. They had a concrete stave tower complete with mechanical unloading, etc. It was considered that better results were obtained with whole crop cereal silage than with high dry matter grass and maize.

Table 2. Harper Adams Whole Crop Cereal Trial, 1966.

Crop	*Date*	*% D.M.*	*Yield Green Material Tons/Acre*	*Yield Dry Matter Tons/Acre*
Dea Barley	7 June	25.7	10.3	2.6
	21 June	28.8	10.8	3.1
Peniarth Oats	21 June	18.1	15.3	2.8
	4 July	23.4	16.5	3.8
	28 July	35.1	13.9	4.8
Rye	26 May	20.4	12.3	2.5
	7 June	26.2	12.1	3.2
	21 June	31.7	11.8	3.7

Next year it is hoped to have a detailed comparison between whole crop cereal silage and self-fed grass silage after splitting the dairy herd into two. One half of the herd will be mechanically fed with the whole crop cereal silage and the other half with self-fed grass silage. Whole crop cereals were considered to have the following advantages over grass silage:—

1. A high potential output of digestible dry matter per acre, particularly when a succession of crops are possible.
2. Growing is easy; only moderate nitrogen levels are needed. Management is easier with cereals than with grass.
3. A more uniform silage is produced which makes rationing easier.
4. Earlier cultivations are possible on difficult land.
5. Wild oats can be controlled and the use of oats as a break crop can help control cereal diseases.

The system appeared to work successfully at Harper Adams College, but some members felt that it was not entirely suitable for general use.

10. **Woore Hall** (Charles Platt, Esq.) This farm extends to 186 acres of heavy loam. Mr Platt devoted his whole farming system to the production of summer milk. The concentration of services and calving into two limited and defined periods eased breeding management and gave him more time off than with a system of all the year round calving. His annual target was to calve all the cows and heifers between February and April and he estimated that in 1970, 140 cows and heifers had calved between 24th February and 14th April. He stated that this kept him fairly busy during that time, but he felt that it was much better to get it over and done with. Because the farm was a heavy loam with steep undulations, ploughing and cultivation were difficult, and the farm was now down to long leys based on perennial ryegrass/

timothy/white clover. One field was down to tall fescue used for early spring grazing followed by silage cuts. Re-seeding is now done only when absolutely necessary.

In addition to Mr Platt and his wife, the labour force consists of a cowman plus one tractor driver. The silage was wilted and harvested with a team of two forage harvesters, six trailers and two buck rakes and made by contractors. The cost is in the region of £1 per ton of settle silage.

Woore Hall is a tenanted farm and Mr Platt explained that his landlord was unwilling to spend any money on buildings. Mr Platt had, however, shown a remarkable degree of improvisation. Most of the cows were housed successfully in low cost cubicles. I must confess that on this farm, and indeed on one or two others, I had a feeling that the local authorities had been remarkably lenient as far as bye-laws were concerned.

Mr Platt explained that he practised a rotational strip grazing system with 5-7 acre paddocks in preference to a formal paddock system, because of its greater flexibility. On the grazing block, the first fertiliser application was $1\frac{1}{2}$ cwts. of " Nitram "/acre with potash and phosphate as required. This was followed up when needed by further nitrogen applications up to 400 units/acre per year. " Kaynitro " might be substituted for " Nitram " as one of the mid-season dressings. Some of the physical and financial data on Mr Platt's farm, which make interesting reading are shown in Table 3.

Table 3 Woore Hall, Shropshire.

	1966/67	1967/68	1968/69
Physical Data			
Average cow numbers	123	129	146
Average number of dairy young stock	75	75	50
Average excluding rented keep	193	186	186
Stocking density	1.27	1.1	1.1
Gallons sold per cow	852	897	879
Concentrates—lb/gallon	1.4	1.2	1.1
Seasonality April—October	74	70	76
Average price per gallon	36.5d	37.7d	37.4d
Fertilizer usage N	304	331	384
P	44	4	34
K	211	73	80
Financial Data			
Dairy Cows			
Output —Milk Sales £ per cow	129.6	141	137
Calf Sales	9.7	7	10.8
(less depreciation)	5.5	4	3.6
Total output	133.8	144	144.5
Variable Costs			
Concentrates	15.7	14.4	12.6
Vet and medicines	1.3	1.0	1.3
Other	3.4	4.3	4.3
Total variable costs	20.3	19.7	18.2
Gross margin per head			
Gross margin per head (excluding forage costs)	113.5	124.3	126.3
Forage costs		23.5	24

Note: All above figures relate to financial year ending 31st January.

11. **The official Reception and Dinner of the British Grassland Society.** The guest speaker was Sir Gwilym Williams, former President of the N.F.U. It was a pleasant evening and the discussions afterwards became quite lively, although perhaps not all of it was on the subject of grassland.

I am sure all of us who attended this Conference felt that it had been well worth while. For some there may have been nothing new to be seen and for others the farm visits may only have brought out one or two novel ideas. To the writer, however, one of the principal values of attending such a gathering lies in the opportunity of meeting people from all parts of the country who have entirely different ideas from one's own. Much good can come from these informal discussions at which problems are thrashed out: problems which would otherwise not come into the open. It gives the farmer an ideal opportunity, in an informal setting, to meet the scientist, the seed merchant, the agricultural advisor, and have a chat with them whilst walking round a farm. I myself met a wonderful individual from Somerset called George Jarret who, apart from being a farmer and drainage contractor, is also the machinery correspondent of the " Field." When I could understand his accent, we spent most of the time discussing sub-soiling, which has been George's first love for many, many years.

Next year's Summer Meeting will be held at Wye College, Kent, and if it proves to be as good as the 1970 one in Shropshire, then one can do nought else but recommend it to readers.

THE BRITISH GRASSLAND SOCIETY WINTER MEETING, 1970

By ROBERT M. GRAHAM

Despite the almost continuous threat of a power cut (which never materialised) the B.G.S. Winter meeting was held in December in the Royal Commonwealth Society Assembly hall. The hall was well filled and I met members from as far apart as Devon and Ross-shire, which I think must cover most of the country, who had come to discuss the subject, 'The Making and Feeding of Silage.'

Mr R. Bee, of Drayton experimental husbandry farm, opened the meeting. He told us that silage was still very much the Cinderella of grass conservation. Only 20% of conserved grass is silage and this figure increases at about 1% annually. Dumfriesshire apparently features high in the charts with over 30% grass conserved in the form of silage. Why not more silage? Mr Bee put forward the following reasons: poor grassland husbandry; low level of fertilizers (only 57% of grassland receives any nitrogen and the average N usage for leys is 97 units, for permanent grass 40); hay, although costlier appears more convenient and last but not least, the smell. Also, the average sized dairy in the East and West is still only 30 cows. He concluded that higher land values greatly increased bought feed costs must be offset by more and efficient conservation of grass—although he admitted finally that he really preferred barn dried hay!

After this 'softening up' we heard R. J. Wilkins of the Grassland Research Institute speak on the subject 'Silage Fermentation and Feed Value.' I took copious notes on this subject as I have always been worried by the really fantastic difference between grass and silage. Too much is lost, but why? Mr Wilkins tackled this problem with a formidable array of tables and graphs, some of which I will attempt to reproduce here. The relative composition of grass and silage varies as follows:—

	Grass	*Silage*
pH	6.1	3.7
Insol Carbohydrate ...	23.8	2.6
Organic Acid	2.7	15.9
Non Protein Nitrogen as % of Nitrogen	17.6	68.2

The process of making silage, although substantially changing the chemistry does not affect the digestibility: the main effect is on the palatability, hence on the intake.

The addition of sodium bicarbonate to neutralize acids produced an average increase of 16% intake. The addition of lactic acid reduced intake. That we should benefit from neutralizing the expensive acid that many of us have been adding came as rather a

blow, however Mr Wilkins had a word for us too. This is his chart for comparison of ryegrass silage treated and untreated with formic acid.

	No Additive	*Formic Acid*
pH	4.0	4.1
Ammonia	7.0%	5.0%
Dry Matter Intake ...	57 lbs.	57 lbs.

The chart for Lucerne silage, however, showed us more encouragement.

	No Additive	*Formic Acid*
pH	5.3	4.4
Ammonia	18.0	5.0
Dry Matter Intake ...	65 lbs.	79 lbs.

Having thus completely confused me, he then recommended that the ultimate way to preserve the stuff was by pickling in it Formaldehyde, as with one's appendix. The cows love it, but the snag here is that the bacteria inside the cows simply hate it. Back to the drawing board! I would like to put in here a note on my own experience with Formic Acid, which contradicts Mr Wilkins' findings. With silage made under perfect conditions, its effect is comparatively marginal, but in any other conditions it dramatically improves the fermentation and palatability.

At this point, the President of the B.G.S., Professor E. K. Woodford, gave a very absorbing address. He felt it was sad that farmers had so little faith in their grassland; but that two recent events of great importance will persuade farmers that they must get more from their grass. These are, the increase in cereal prices which is here to stay, and the impaired soil structure by the continuous growing of cereals. Could we not replace cereals with grass, for instance in the form of dried grass cubes? Again, substantial acres of grass go to forestry, urban and industrial development, 120,000 acres per year. What remains must be more intensified as it is the only sensible basis for livestock production. He hoped for more liaison between research workers, advisers and farmers and indeed this was a primary purpose of the grassland society. He summed up the future of grassland as follows: 18 million acres of rough grazing — due to sociological problems and low animal carrying capacity these lands will tend to become recreational: 12 million acres of temporary grass—these lands will grow beans for direct consumption in the form of artificial steaks, etc.: 6 million acres of permanent grass—it is here that the most dramatic changes in grassland management must take place.

Here we broke for lunch, and after a magnificent and not in any way artificial meal in a favourite restaurant I rejoined the conference to hear and to attempt to undersand Mr G. Alderman discussing 'Laboratory methods for predicting the feeding value of Silage.' My pen was poised for notes, but I regret that most of what he said went completely over my head. After a reference to 'gas liquid chromatography' and the description of Starch Equivalent as (Digestible Protein x 0.94 plus Digestible Oil x 2.25 plus Dig N.F.E. plus Digestible crude fibre—0.58 x crude fibre) I gave up!

However, I do remember the following, which may serve as a cheering jingle to those desperately trying to make silage during a six week monsoon ' Undesirable smelly fatty acids have high energy values.'

Mr Lawton, from I.C.I., brought us down to earth with a bump. His subject was ' System for Making Silage.' Here is the magic formula: grow good grass; cut it at the right stage; make it quick; exhaust air and keep it out. The average farmer tends to make two thirds of his silage in the first cut, to cut in 10-15 days, to work an 8 hour day, and to cut an 8 ton crop. He could improve by: cutting longer (more days): working 14 hour days; achieving higher output per hour, and here the vital factor is tractor power.

He detailed four systems:—the 2 man; the 3 man; the less expensive 5 man and the more expensive 5 man. The more expensive 5 man system involves forage blowers, towers, etc.; the less expensive, one cutting, one lifting, two carting and one buckraking. He gave us a lot of facts and figures, which I reproduce here, as it may be of interest to members to compare with their own results.

1. Output	*Acres/day*		*Tons/cut*		*Tons/season*	
	Good	*Bad*	*Good*	*Bad*	*Good*	*Bad*
2 Man	4.7	2.5	375	200	560	300
3 Man	8.4	5.5	650	440	1000	650
5 Man (low) ...	16.0	10.0	1200	800	1800	1200
5 Man (high) ...	19.0	13.0	1500	1000	2200	1500

2. Costs		*Capital* £/*ton*		*Running* £/*acre*		£/*ton*	
	Output: Total Capital	*Good*	*Poor*	*Good*	*Poor*	*Good*	*Poor*
2 Man	£770	1.4	2.6	4.75	9.0	0.59	1.2
3 Man	£1250	1.3	1.9	4.8	7.35	0.6	0.9
5 Man	£2500	1.4	2.1	5.0	7.9	0.6	1.0
5 Man	£3800	1.7	2.5	5.75	8.4	0.72	1.25

In other words, you pay your money and take your choice, although obviously the higher cost systems depend on maintaining a much higher output in order to keep their unit costs down. Nothing was said about my system, the $3\frac{1}{2}$ man (dairyman cutting to wilt between milkings) so it must be either out of date or not yet developed.'

Finally, we heard a paper from Messrs Lindsay and Messer of the N.I.A.E. about ' Recent and future advances in the mechanised feeding of silage.' Although he started by telling us that most lectures were like silage in that; too much hot air equals rubbish, I felt they had some valuable facts to show and their work might well have important results. Briefly their idea is to mechanically unload a clamp with a kind of chewing auger running along a gantry mounted above the silage. Costs compare very favourably with towers at £5.8/ton dry matter in a mechanised clamp against £8.2 in a tower.

I fear, however, that like many of us, I shall be cutting and forking the stuff for a few years yet and, dare I say it, hay is a lot easier!

SUMMER TOUR, 9th JUNE, 1970 — SOURHOPE AND N.E. ENGLAND

Sourhope, Yetholm, Roxburghshire

(Hill Farming Research Organisation)

Dr Ian Cunningham, Director, Dr Robin Armstrong and J. Eadie, Esq., and Dr J. King described the work of the Station and accompanied the party to various points of interest on the farm.

Situation: The farm lies 15 miles south of Kelso, consists of 2640 acres of hill plus 115 acres inbye at altitudes from 700-2000 ft. 20-30% of the vegetation is Agrostis (Bent grass) and Festuca (Fescue) whilst 70-80% is dominated by Molinia (Flying Bent) and Nardus (White bents). Rainfall averages 35" with August as the wettest month. The estate carries 36 miles of fence and 4 miles of road.

Livestock: 1590 breeding ewes and gimmers, 450 ewe hoggs with a wether sheep stock of 170 and 50 tups (2260 total). The ewes comprise 814 South Country Cheviots, 290 Hill North Country Cheviots and 480 Scottish Blackface ewes. There are 26 Irish bred Cross Hereford bulling heifers to be built up to 50 breeding cows.

Output: Average weaning percentages are 80-85% (South Country Cheviots), 95-100% (North Country Cheviots), 90-95% (Blackface).

Cropping: 55 acres cut for silage.

Basic problems: Shortage of nutrition for the ewe. Winter storms and the provision of sufficient shelter. The tick problem and cobalt pine are the most significant health problems.

Economics: Income amounts to £720 per 100 ewes. Expenditure is £590. The profit of £130 per 100 ewes includes £190 subsidy.

Staff: 3 shepherds, 1 Tractor/foreman.

Dr King discussed the results of some experiments aimed at determining the relative importance of high altitude, poor climate, insufficient plant nutrients and poor drainage as affecting herbage yields.

John Eadie described his interest in developing a system of hill grass management aimed at providing feed of the right quality at times when the ewe responded most effectively.

Typical production characteristics

	Hill land	*Lowland*
Herbage yield lb. dry matter/acre	2000	9000
Stocking rate sheep/acre	0.3	4.0
Weaning %	85%	170%
Weaning weight	50 lb.	80 lb.
Output lamb per ewe	45 lb.	136 lb.
Output lamb per acre	14 lb.	540 lb.

The difference in herbage yield is only 4½ fold but the difference in output per acre is nearly 40 fold. Thus, yield of herbage is not a major factor in limiting output from the hill farm. Much more important is the fall off in herbage quality aggravated by under-stocking through the summer and the opportunity this gives to stock to select the best and accumulate herbage of low quality.

At Sourhope, they are now engaged in testing out various systems of hill land management aimed at providing the ewe with nutrition to match her needs.

Two projects are on hand, firstly an experiment in controlled grazing aimed at hard grazing through the early summer to remove all the low quality shoot bases, followed by a rest period to develop a fresh bite, and finally the injection of the fresh bite into the ewe at critical times especially from October 20th just before the ewe was mated.

A second project looked at the value of inserting in-wintering (e.g. Capital cost of £4-£5 per ewe plus feed cost of £2 per ewe per winter) into a hill sheep system to increase the output by balancing the stocking as between winter and summer.

Both these projects were geared to the use of a low cost but efficient fencing system and to a measure of improvement of the production potential of the enclosed and open hill land.

A satisfactory fencing system costing 9½p/yard had been developed. The improvement of the pastures was being pushed forward slowly since it was hoped to measure the cost benefit of each of the normally used inputs, fencing, liming, phosphates and seeds. At present the emphasis was on the benefits derived from the fences.

Many members of the visiting party were keen to suggest that H.F.R.O. should start with swards given the whole works, lime, slag, seeds, etc., but this would not enable them to distinguish between the effective contributions being made. Ultimately they might be able to say whether it was profitable to step up production by the use of any combination of these above what could be achieved by controlled grazing.

Earls Hill Farm, Wooler, Northumberland

(Mr Charles Armstrong)

Acreage and Site: 2,500 acres of upland backing on to Sourhope.

Improvement achieved: Formerly stocked with 900 Blackface ewes and 40 Galloway cows, this area now carried 2000 ewes of which 700 were Swaledale. The rest were crossed with the Cheviot to produce fat lamb. The cow numbers had risen to 220 and instead of selling calves, these were taken to a lowlands farm to sell later as spring stores.

Philosophy: Mr Armstrong's objective was a sale of 1 sheep per acre per year. Various methods of achieving this were in use. For example, 62½p/head was spent on dried grass, whole crop oats, beet pulp, cobs or Rumevite, whichever offered the best return. Last winter, he had been obliged to lamb 1000 ewes indoors. This had proved well worthwhile and would be repeated.

All the hill land was gradually being improved, tackling big fenced areas by ploughing and reseeding with a seed cleanings mixture. For example, one 500 acre piece had carried 300 ewes but after treatment was now carrying 460 ewes.

I.V.H.

Muirkirk Farms, Ayrshire (R. G. Angus, Esq.)

S.W.S.G.S., 27th August, 1970, at 7.00 p.m.

About 80 members were guests of Mr Angus and particularly interested in this farm, factored by H. J. Bell and Co. of whom our chairman, Allan Buchan, is a member.

Muirkirk Farms were originally eleven separate farms which have been combined to form one unit. Linburn, Upper and Lower Hall, Middlefield, Waterhead, Priesthill, Dippol and Blackside have been run as one unit for some time, the farm of Burnfoot being purchased in 1966 and the farms of Greenside and Mansfield being taken in hand in the same year when the tenant left. The farm of Dippol has long since been derelict and the lands split between Priesthill and Waterhead. Lower and Upper Hall are now also no longer separately used, the land being run with Middlefield.

Linburn is the centre of the beef herd and all the silage and hay cut at this farm and Middlefield is put into the two cattle courts. Hay is stored at most of the sheep farms and is used for feeding home bred rams and the shepherd's own beasts, which they are allowed to keep under their contract of employment.

Stocking: The farms lie between 750-1900 ft. above sea level and extend to 7357 acres, 460 of this acreage being arable, 120 acres approximately being cut for silage and about 20 acres cut for hay.

Beef Herd	*Sheep*
115 Hereford and Shorthorn Cross Cows	3000 Blackface Ewes.
3 Aberdeen Angus Bulls.	750 Ewe Hoogs
15 In-calf Shorthorn Cross Heifers	64 Tups
Labour	*Main Items of Machinery*
1 Managing Shepherd	1 M.F. 178 1 M.F. 35
3 Shepherds	1 Fordson 3000
1 Managing Stockman	1 Kidd Forage Harvester
1 Stockman/Tractorman	3 Trailers
1 Boy Tractor Driver/Shepherd	Buck Rakes, etc.

Farming Policy: The sheep are run from the four farms of Middlefield, Waterhead, Priesthill and Blackside. All the sheep

are Blackface and pure Blackface rams are used on them. Tupping is carried out in Mid November for the production of lambs from approximately 16th April onwards. As little feeding as possible is given to the ewes throughout the winter and the lambs are sold mainly as stores at the Lanark Sheep Sales. Last year 250 lambs were sold fat and it is hoped that this year 500 will be sold fat. This year 100 cast Blackface ewes were retained at Burnfoot farm and Border Leicester Blue Headed Leicester Tups used on them. These are mainly being sold fat off grass from August.

Beef Herd: The policy here is to have the main part of the herd Autumn calving and suckled by their mothers. These calves are summered on the low ground at Burnfoot and their mothers put to the hill after speaning in the spring. The calves are all sold at the Lanark Calf Sales in October.

Approximately 25% of the herd is spring calving and the calves are wintered on silage and barley and are sold in the spring.

All the calved cows are fed on self-feed silage in the cattle courts at Linburn Farm during the winter, the whole feeding programme being aimed to reduce the purchase of bought-in concentrates to a minimum, and last year only barley was purchased. The dry cows are fed a strict ration of silage to avoid excess milk when they calve.

Midglen Farms, Renfrewshire (Manager, W. B. Elder, Esq.)

Undercraig Farm, Langbank

C.S.G.S., 18th August, 1970, at 7.00 p.m.

This farm, extending to 170 acres, is part of a beef breeding and fattening unit which in turn is part of the 900 acre block in Renfrewshire farmed by Midglen Farms Ltd. The soil is a medium loam, fairly free draining, laying between the 300 and 600 feet contours and in "receipt" of 60 inches of rain annually.

Grassland: The majority of the leys are Timothy/meadow fescue and remain down until unproductive, usually from 5-7 years. The most suitable fields are cut twice per season for silage —approximately 60 acres. Aftermaths are grazed. Direct re-seeding is practised.

Fertilizers: Some 200 units of N plus slurry with appropriate amounts of Phosphate and Potash are currently used but will be increased to 250 units of N in 1971.

Stocking: The 500 acre unit of which Undercraig is a part presently carries 130 Blue Grey and Irish cows and calves to be increased to probably 200 cows in the autumn of this year. Lincoln bulls have been used extensively and this will continue. Some 40 of the above cows are stocked permanently on 60 rough acres of Undercraig and are self fed during the winter on site.

The remaining acres supply silage and grazing for some 100 Dairy Beef crosses from the nearby Midglen dairy together with up to 60 suckled calves retained for fattening. A Devon bull has been used for crossing with the Ayrshires.

Conservation: A block of about 60 acres is cut twice. Wilting, for 24 hours is usually followed by a double chop harvester. No hay is made and the fattening animals are easy-fed and consume up to 65 lbs. of silage per day. The silage made earlier this year had formic acid applied at 4 pints per ton of fresh grass. Up to 8 lbs. of rolled barley, fortified with protein if necessary is fed to supplement the silage.

Building: Erected in 1964 after clearing the original buildings, all courts are slatted and a system of sluices and holding tank incorporated underneath. Some 160 animals are housed each winter.

Staff: Manager plus two stockmen. During the silage period this labour force is augmented from Midglen.

Middlebank, Carstairs (M. Haynes & Sons)—**Zero Grazing.**

C.S.G.S., 26th May and again 26th November, 1970, before the A.G.M.

Middlebank is farmed by three brothers, Messrs. George, James and Oliver Haynes.

There are 192 effective acres, of which 131 are in grass and 61 in barley for the cropping year 1969/70.

Prior to 1966, the acreage was 110 which had been farmed traditionally when occupation was obtained in 1945. Silage making began in 1952 when turnips and hay were given up. The main enterprises were cows, some young stock, grass, potatoes, grain and milk retail. T his pattern continued until 1963 when the Central Grassland Society helped Messrs. Haynes to change the policy of the farm. It was at the inaugural meeting of the Society at the Burn Farm, Chapelton, that Messrs Haynes saw the possibilities which grass could provide.

In 1963, when there were 30 cows on the farm, a direct reseeding policy was started. By 1965 the young stock were sold and the cash used to expand the cow numbers. This emphasis on dairy cows and good grass, with some barley, continued on normal lines up to 1968 when there were 108 cows on the farm. This was almost a cow to the acre and it was felt that this number of feet on wet ground was wasting grass and that zero grazing should be attempted. The cows have been zero grazed for two seasons and are now on their third season. Cow numbers (May 1970) are 138 and young stock are once again being reared. In addition 61 acres of barley were grown last year.

Costing data to end of April 1970:—

Costing data to end of April, 1970.

Barley	61 acres	Gross Margin £34.../acre
Grass	131 acres	
Stock	Average Cow numbers	127
	Average Young Stock	59 (Young stock grazed away for part of summer, 4 months).
	Stocking rate 0.88 acres per Cow equivalent	

		Per Cow	
Cow Data	Yield 864 gallons	£147.77	
	Calf sales	3.06	
	Cow depreciation	£19.60	
	Output	£131.23	
Variable Costs—			
	Cones (2.15 lb/gallon) ... (16.65 cwt./cow)	£18.00	or 4.99d./gallon
	Draff	8.20	or 2.28d./gallon
	Vet	1.80	
	Bedding	0.60	
	Others	1.00	
	Total	£29.60	
	Gross Margin	£101.63	
	Gross Margin on 113 acres for cows		£115.32/acre
	Less Forage Costs		11.98/acre
			£103.34/acre
Variable Costs of grass/acre			
	Seed	£0.56	
	Fertilizer	£10.42	
	Spray	0.17	
	Let Grass	0.83	
		£11.98	
	Fertilizer usage	267 units of N 41 units of P 41 units of K + slurry	

Dairy Young Stock: Gross Margin per head £11.29. This figure will rise/head once output of young stock rises in the form of calving heifers.

SPRING TOUR OF WIGTOWNSHIRE

(S.W.S.G.S., 14th May, 1970)

Bill Lammie entertained 100 members to coffee at Laigh Glenstockadale. After a sandwich lunch at Sandmill we proceeded to the second farm, Ardwell Mains (Tom McFadzean). The day was rounded off with a look over the gardens at Ardwell (Mrs J. Brewis).

Messrs R. Lammie & Sons, Laigh Glenstockadale.

Laigh Glenstockadale is a semi-upland dairy farm extending to 305 acres of which 105 are rough grazing and permanent pasture.

Since 1965, the following new buildings have been erected: a tower silo of 550 tons capacity; mechanical unloader and feeder; a herringbone milking parlour with automatic feeders; a cow cubicle house with 105 cubicles; a young stock cubicle with 60 cubicles; a 75′ x 30′ clamp silo; and a sheep wintering house.

Cow numbers have been constantly increased from 39 in 1958 to 64 at the end of the old system in 1965 to 125 at present. Other cattle numbers: 50 bulling and bulled heifers, 10 one-year-old stirks, 36 calves and 109 Cross and Half-bred ewes with lambs.

Grassland Management. Grass is the only crop grown on the farm and is renewed as necessary by direct reseeding. Rotational grass is generally retained for cow grazing and silage cutting and young cattle and sheep are confined on the rough grazing and permanent pasture, except when there is a surplus of rotational grass.

About 50 acres are cut twice to fill the tower silo. The horizontal silo is filled with surplus grass from the grazing areas and is used to self-feed the young cattle.

Economic Information

	1968/69	1967/68	1966/67
Gross output per actual acre—£	£70.05	£64.50	£54.50
Gross output per actual acre—£	87.20	80.20	67.40
Milk output per cow—gals.	975	939	950
Milk output per cow—£	£164	£157	£157
Purchased feed per cow—£	37	36	35
Home grown grain per cow—£	Nil	Nil	£1
Balance over purchased feed and home grown grain per cow—£	£127	£121	£121
Livestock density:—			
G.L.U'S. per adjusted forage acre	1.3	1.4	1.5
Fertilizer expenditure per adj. acre—£ ...	£7.40	£8.30	£6.90

Messrs J. & T. McFadzean Ltd., Ardwell Mains, Ardwell.

Ardwell Mains and Barrhill Farms are run as a single unit with a dairy herd of 118 Ayrshire cows in byres at Barrhill and 130 Ayrshire cows in straw-bedded courts at Ardwell Mains.

About 80 heifer calves are retained each year for rearing. As stirks they spend one summer and one winter on the stock-rearing farm—Alticry; as calves and in-calf heifers they are kept at Ardwell Mains.

In addition to about 250 cows, 12 bulls and 160 other cattle, 600-700 lambs are fattened between August and January. Some of these are from Alticry, the remainder are purchased.

Cropping

80 acres early potatoes	75 acres 1yr. mixture for early grazing and cutting
112 acres barley	286 acres rotational grass
25 acres oats	25 acres permanent pasture
217 acres Crop	386 acres Grass

About 75 acres alternate year about between potatoes and Italian ryegrass. The Italian ryegrass sown after the potatoes are lifted provides late summer grazing for cows and is also used for fattening lambs. The following year it is used for early grazing, then for two cuts of silage.

The Italian receives 80 units N for early grazing, followed by 100 units N in a 2:1:1 compound for each silage cut. F.Y.M. is applied to the potato crop.

In spring the dairy herds are strip grazed on Italian ryegrass, thereafter they are grazed on a one day paddock system on each farm. In 1969 the paddocks received 300 units N per acre.

About 2,000 tons of silage are made each year. Half of this comes from the two cuts of Italian ryegrass. The other half comes mainly from the 150 acres which alternate between grazing the 160 young cattle and cutting. Some silage is taken from the paddocks.

Some Economic Information

1. Farm gross output is high at £70—£80 per acre.
2.

	1967/68	1966/67
Milk sales per cow	960	874
Milk sales per cow	£163	£150
Purchased feed per cow	£32.50	£25
Home grown grain per cow	N.A.	£8

3. Stocking density
   Forage acres per livestock unit 1.2 1.3
4. *Enterprise gross margins.* Approximate returns are calculated for each enterprise, each year. Since November, 1969, more detailed records have been kept, which will enable enterprise gross margins to be more accurately calculated.

TOUR OF THE ISLAND OF BUTE

(C.S.G.S., 12th May, 1970)

Introduction: A beautiful sunny day, two extremely able and pleasant hosts plus excellent nourishment en route provided the setting for a most enjoyable and interesting visit to the Island of Bute by some 60 members of the Society.

Cranslagvourity, Rothesay (Mr W. McMillan). The tenancy of this farm was taken over some five years ago by Mr McMillan, whose policy since then has been to build up an intensive dairy unit.

The holding extends to 213 acres of which 24 acres are rough grazing supporting at present a herd of 90 dairy cows with an equivalent number of followers, a flock of 20 Registered Suffolk ewes and 180 winterers, representing a stocking density of 1.1 acres per Livestock Unit. An all-grass system is practised, the cows being housed in cubicles with access to self-feed silage. An intensive cutting and grazing policy is followed, some 1,100 tons silage being made from 80 acres, fertiliser usage being 226 units N, 137 units P and 78 units K. The cows are paddock grazed, fertiliser usage here totalling 342 units N, 16 units P and 16 units K per acre.

Milk production over the year averaged 900 gallons per cow with a concentrate input of 2.02 lbs. per gallon.

It is Mr McMillan's intention to increase the dairy herd to approximately 120 cows with, if necessary, a reduction in young stock numbers.

Kerrytonlia, Rothesay (Messrs D. & J. McAlister). Since the dispersal some years ago of this well known herd, Messrs McAlister have concentrated on the production of cash crops and fat cattle, a policy which is still in the process of expansion.

The farm extends to 250 acres of good arable land, the main cash crop being 14 acres of potatoes (8 acres earlies and 6 acres main crop) in a rotation which also includes 80 acres of barley, the bulk of which is fed to the fat cattle, and 7 acres of turnips which are fed off by lambs over the winter.

The main feature of the unit is centred round the grassland with the production of 18 month old beef, some 250 fat animals being turned over in a year. Whilst the aim is to have a regular throughput of fat cattle, a fair proportion being finished at grass, the bulk of them are purchased as suckled calves and wintered in yards on self-feed silage and barley.

A flock of 60 Cross ewes is also run for fat lamb production and approximately 400 lambs are purchased each year for fattening over the winter.

Nitrogen usage, to sustain the fairly intensive grazing policy and the considerable silage requirements, varies between 100-300 units N per acre depending on whether the policy is one of cutting or grazing.—C.C.W.

HILL FARMING

Discussion night, S.W.S.G.S., Newton Stewart, 4th February, 1970
Three short papers were presented followed by a general discussion.

1. **The Challenge of the Seventies** (J. McEwan, The Lurg, Fintry.

Sheep farming is faced by a number of serious challenges. There is the old one which has been with us for generations—the lack of control of imports—which is political. There is growing labour shortage which can only be met by making the jobs more attractive. Even making travel across the mountains less onerous would be sufficient. The traditional walking over the hill was good enough for me and my forebears but it is not good enough nowadays. We have the problem of source of capital. Loans will become easier but I wonder how sensible it is to borrow. The real way to secure capital is to make your own out of profits. Then finally we have the continual upward spiralling of costs.

Only by becoming more efficient can we hope to meet these and other similar challenges. We must make our acres more productive i.e. carry more stock. This must be developed from our existing stock and will involve first and foremost extensive fencing.

Ewes must be flushed on good improved reseeds. This ensures a large lambing potential. The twins formerly considered useless in a hill sheep enterprise are now essential to its success. They must be put to better land, which has been rested through the winter.

I cross my ewes with Leicester tups. Only the gimmers are crossed with Black face and Swaledale tups. My breeding policy is aimed at increased prolificacy whilst holding on to hardiness.

For this reason, I can't see housing as a practical solution.

Improvement of grassland is an essential part of my scheme. Much of it is by surface methods. I pick the bits most likely to improve. There are good and bad areas of hill land, the poor areas are better left to forestry.

Following surface regeneration, fencing is essential and concentration of grazing stock. Cattle can be introduced at this point with advantage. Lime and slag are essential and a little compound fertilizer in the year following regeneration and further fertilizer later according to soil analysis. It is remarkable how much extra feed is produced. To use it we need stock. To stock it we need capital. The potential is there. The ability is there. There are enough enthusiasts who will HELP THEMSELVES once they have access to this important starter—capital.

2. **Increased sheep production from the hill** (Dr A. J. F. Russel, Hill Farming Research Organisation.

Acceptance of the pronouncements of scientists does not take a smooth path. Three stages are readily discernible in the responses:

(i) It is not true.

(ii) It may be true but it is unimportant, and finally many years late.

(iii) Yes, of course it is true, of course it is important but it is not new, we have known for years.

This is just as true of the scientific approach to the problem of raising sheep production from our hills.

Typical of present day hill production would be a stocking rate of 1 ewe/2 acres with 80-100% lambing of which 15% of the ewes have twins. Few of the lambs are sold fat. Most of them go along with the wethers as stores. Productivity and profitability are low. The main limiting factor is level of feeding. At the Hill Farming Research Organisation, we have been looking at the relationships between feeding or nutrition and production.

Sheep is a question of lambing percentage and of stocking rate. Lambing percentage begins in the condition of the ewe at tupping time.

(a) **Ewe condition.** Fat ewes are not good but one just 20 lbs. heavier than the normal ewe is in good condition. We find that such ewes shed eggs for 200% lambing compared to 115% for thin ewes. Not all these eggs become lambs, some are not fertilised and some die early. The 'fat' ewes reach 175% lambing but the thin ewes just reach 94%. This is just one facet of the big boost which is possible in production.

(b) **Level of feeding at flushing.** Level of feeding ewes in rising or falling conditions before mating do not seem to have any effect on lambing percentage of fat ewes.

But where thin ewes are concerned the plane of nutrition or level of feeding is very important. The traditional treatment of the typical ewe in moderate condition in October results in her being in falling condition. This is the worst possible combination.

(c) **Feeding before lambing.** Ewes lose weight from October onwards — so much so that they become veritable 'pregnant skeletons in wool.' Dr. Reid, recently director of H.F.R.O. came to Scotland from Australia where a lot of attention is paid to what is called 'Survival limits.' The economic viability of a station (farm) could hinge on the ability of a ewe to survive many days or months on minimum rations in year-long droughts. Nonetheless, Dr. Reid was horrified at the conditions to which some of our Blackface ewes were reduced.

It is a matter of both quantity and quality of food. At this time there may well be bulk but the quality is low. Whatever food a barren ewe needs, a ewe with a single foetus requires twice as much feed and a ewe with twins three times as much. There is no doubt

about it. Feed is just not available at this time of the year in terms of hill herbage for this level of production.

The cynic speaks of the ' Level of Undernourishment ' when he is speaking of feeding in these conditions. Feeding before lambing is not essential. If the ewe is in good condition in October it can afford a fall in weight. The lambs can be produced off the ewes fat.

If the ewe is in poor or traditional condition this might result in a 10% lower birth weight of a single lamb. That is instead of a 10 lb lamb, we have a 9 lb lamb. This difference will not effect the lambs' survival. The matter is quite different where twins are concerned. Weights can be reduced by 25% and a marked drop in the chances of survival especially on a wet open hill.

This is the time when ewe mortality is at its peak. Balancing the needs of the ewe at this stage against economics is difficult even in an experiment and very much more so under hill conditions. Apart from providing hay under stormy conditions it is desirable to feed about 1 to 1½ lb/head at 5 to 6 weeks before lambing and to introduce concentrates on a rising scale to match the rapid growth of the lamb. Start at ¼lb/head per day and increase this to ¾lb or possibly 1½ lb/day according to conditions. This rising ration is better than a flat rate. Energy content is the most important nutrient factor.

(d) **Milking.** It is clear from experiments that there is a milking potential capable of providing a growth rate in the lamb of 1lb/head/day for 12 weeks, but a high level of feed supply is needed until there is fresh grass growth.

The lambs must get good quality grass from about 6 weeks of age, otherwise there is a marked fall in lamb growth.

(e) **Breeds.** Our breeds have the necessary potential in all respects providing feed supply in satisfactory. There is no call for specially prolific breeds such as the Fincross.

(f) **Stocking rate.** The other component for increasing hill sheep production has been traditionally limited by the winter grazing potential of the hill. For long it has been thought that we have ample feed in summer and that the supply of winter herbage is critical. Now at H.F.R.O. we are having second thoughts and finding that the summer herbage is just as critical.

During midsummer, ewes will put on weight but there is considerable decline through late summer and autumn leaving the ewe in very poor condition at tupping time. This is due to undergrazing and the accumulation of increasingly indigestible rejected herbage which not only lowers the quality of feed available but also interrupts herbage growth.

A vicious circle develops. Summer stocking rates are too low because the winter carrying capacity is low. Ewes lose condition because of excess summer growth which leads to still poorer winter herbage plus ewes in poor condition. It is necessary to find a way out of this circle.

The answer is controlled grazing by higher stocking rates in which fences play an essential part.

The aim is to graze the herbage down tight so that the 2000 lb dead herbage in the stubbles is reduced to no more than 500lb/acre. A system is being studied in which the ewe and lamb is on good grass in May, June and July when the ewe needs good milk. The ewes go to the hill and then for 4 to 6 weeks on to improved reseeds to put on condition for the winter and continue on these through to December.

Under the traditional system a ewe would lose 10 lb but on this system she gains 5 lb. This is good preparation for mating, pregnancy and lambing and because of this condition could need less feeding. The ewes will be out on the hill till March, grazing mostly poor quality Nardus and Molinia but getting a little winter green herbage.

Controlled grazing demands fences and when these are available many practises become easier. Early and late lambing ewes and gimmers can be separated off. So far it is not practicable to separate single and twin lambing ewes. It is possible in the laboratory but there is reason to expect developments quite soon to make this possible on the hill. Another method of increasing production is to increase stocking rate whilst maintaining same individual performance. Most developers however combine increasing stocking rate and improvements in lambing performance.

As an example of the possibilities, in 1961 a farm carried 150 ewes and sold 160 lambs. These were raised to 292 ewes. Instead of a fall in lambs the number sold increased to 368. The following year 500 were sold. Last year a dreadful lambing year, the number fell to 450.

3. **Low Cost Expansion** (R. Park, Mark Farm, Creetown, Wigtownshire.

The great tragedy of hill farming is lack of capital. It is useless waiting for a favourable price review. It may be many years before the plight of the hillman catches the eye of the reviewers. We must help ourselves. The way to do this is by Low Cost Expansion as I hope to show you.

My own farm is 1,250 acres, $2\frac{1}{2}$ miles long rising from 300 to 1200 feet. In 1960, there were 125 acres arable near to the steading but in ten years of my own occupancy, I have added 100 acres reseeded by ploughing and 100 acres improved by surface reseeding. The rest is divided by two fences along the top and bottom of the hill.

Stock numbers have changed as follows: —

Breeding cows increased from 29 in 1960 to 101 in 1969.

Breeding ewes increased from 420 to 530 in the same period. There were 539 by 1965 when cattle were 77. From then the ewes have been held whilst the cow were increased.

Further to this obvious evidence of expansion there was an increase in lambing percentage from 80% to 115%. 630 lambs were sold each season. We used to grade 60% and sell 40% as stores, now all are graded. The basis of this improvement has been ploughing and reseeding, surface reseeding and controlled grazing.

Land improvement. The total cost of improvement by reseeding can be extremely high. Applying standard charges allowable for various operations we find that ploughing, discing, harrowing and sowing seeds and fertilizers totals £9/acre. The materials, lime slag, fertiliser, seed totalled £27 giving a grand cost of £36 per acre. This would be sufficient to daunt anyone but if one uses ones own equipment and men and takes a 50% grant for the £27 required for materials, the total outgoing is £13.50 per acre, a much more reasonable figure and enough to encourage me to go forward.

Take fencing, which is vital. This can cost 20 to 25p per yard but I use a 2 strand fence with one wire barbed and cheap stobs. The stobs cost $6\frac{1}{2}$p each and the wire £2.50 per 250 yards, with stobs at 5 yard intervals and no elaborate gates (less the grant for fencing) comes to a figure of $2\frac{1}{2}$p per yard outlay. It is cheap and will not last forever but it suits me well.

Drainage. I bought a digger at £400 and costing labour at 30p per hour, tractor use at 25p per hour, and the digger at $27\frac{1}{2}$ per hour, we are able to do 2 chains per hour for 82p or 41 p per chain. Taking a 60% grant for this, my net cost is 16p per chain. If I do a big enough scheme, I will soon pay for my digger. After the first 250 chains, I had a return cheque for the digger of £60.

There is my recipe for hill farming. Take a hold on the available grants, use them wisely to improve productivity by regeneration, fencing drainage and building up sheep and also cattle.

DISCUSSION

Answers are coded R for Dr Russel, P for Mr Park, and McE for Mr McEwan.

Q1: What type of concentrate is available at 12% CP for hill sheep? How do you prepare it cheaply? Have you considered using Rumevite or similar material to help raise efficiency of use of hill herbage? Have you considered providing hard standings for your escalating cattle numbers?

R. I don't regard the type of concentrate as important so long as it is a high energy feed. I was fortunate to secure Pelleted Dried Grass mixed in with oats. I have no personal experience of Rumevite. Its use could save labour. The blocks are very convenient but it could be expensive.

P. I feed hay, oats and cattle cobs to the cattle. I run them out alongside a track out into the hill and put out the feed and sheaves of oats on hard knowes, and in the shelter of forest belts.

Q2: I cannot get a grant for a 2 strand fence. Why are you able to?

P. It is necessary to battle with the authorities who interpret the regulations differently in different areas.

Q2 (cont.) I could get no assurance of a grant for a 2 strand fence with stobs at 4 yds. and not even for a 3 strand fence.

P. My 2 strand fence is a temporary fence and as such serves its purpose, namely to divide up my hill. On both sides of the fence I have the same kind of sward. Such a fence would not do to separate a lush reseed from rough grass.

McE. Each authority has its own rules. Mine allows me a 2 strand wire fence with 1 plain and 1 barbed wire.

Q3: How does Dr Russel bridge the 'Hungry Gap'? Does he house his sheep from Christmas on? If he did, he could carry more stock and get still better utilisation of summer growth and in addition save winter grass for the ewes and lambs in the spring. I find that I can gain further advantage by turning my smaller cows into the woods in the winter. They keep warmer. They eat less and the open grass on the hill is rested. Why not consider putting the ewes into cheap buildings, e.g., old silage pits, etc.

McE. I mistrust houses. All would be fine if I could be certain of putting the ewes back to the hill without a check but in a bad winter such as last year, the sheep would be put out to lamb in very bad conditions. Once they have become accustomed to shelter they lose their hardiness.

Fencing to conserve grazing and the use of supplementary feed are usually better methods of bridging the hungry gap and still retain hardiness. What a boon it would be if we could have a simple gadget to detect twins. The supplementary feed has varied. Maize, Ewbol, etc. No particular fancy for one more than another. This year, maize is far too dear and I can buy a 14% cake more cheaply. Maize was better than the cakes. They seemed to go grazing more readily after maize than after other feeds.

R. The 'hungry gap' is no bother once we have mastered the principle of controlled grazing through the summer aimed at a ewe in top condition entering the winter period. In-wintering or off-wintering maybe all right in cheap silage pits, etc. but I doubt the economics of elaborate expensive houses. They are very useful and convenient to use in experimental work.

McE. The cost of inwintering puts it right out for my conditions. I reduce the density of stocking by sending my gimmers and hoggs to wintering at just £1 to £1.25 per head which is cheaper than inwintering (This is just for 3 months to December).

Q4: Our speakers are remarkably well matched. The cost aspect of housing is accepted but it is wrong to generalise on this issue. There are many hill farms in the West of Scotland who do not have 100 acres or so which can be improved and no means of wintering. They must look to housing and to using such houses for more than one purpose. e.g. Shearing sheds and fodder stores and wintering sheds.

Fears about checks when ewes leave houses for the hill must be based to some extent on deficiencies in the design of the houses.

Can Dr. Russell tell us something about the electric fencing which has been so successful on H.F.R.O. farms.

With regard to the stress laid by yourself and your colleague J. Eadie on getting rid of the accumulating ungrazed stubbles of summer growth by heavy controlled grazing, has thought been given to the feeding of Urea as a supplement so that this poor quality feed be more advantageously converted into feed for the sheep.

Finally what are Mr Park's health problems.

McE. The economics of inwintering may be in doubt but the most important asset we have in our hill sheep is their hardiness and we must not jeopardise this. I recall an experiment which I conducted when 56 hoggs were inwintered in 7 lots of eight each fed various supplements made up from straw, maize, hay, various cakes, etc. They gained 20 lb/head. They

were tagged and weighed 3 times in the following 2 years. Every time they were handled it was not necessary to look for tags to identify them. My shepherd recognised them and called out " another of they taggy . . . " Years afterwards they could still be picked out.

R. There are some farms where scope for improvement is limited, but look at Lephinmore. It would be impossible to find 100 acres in a single piece there but it is worth searching around for the odd bit of improvable land rather than look to housing.

Our fences are 5 strand, 4 of which are electrified and one earthwire. Posts are set on the high spots at irregular intervals, many yards apart. The fence is then drawn down by chain spacing wires which are tied to the ground by anchor plates. The cost works round at 18p per yard with a negligible cost for electrifying. A useful feature is that the whole fence can be dropped at 1 man hour/mile.

I am interested in Mr McEwan's experience of in-wintering. Although I myself do not believe housing is necessary I wonder whether Mr McEwan's experiment might not have another explanation. Observations on sheep behaviour at H.F.R.O. have shown that after being housed for the winter, the stock seems to be unable to assert rights to grazings and are pushed out by the sheep which were on the hill throughout.

P. I have had 3 health problems. Staggers, Fluke, and Pneumonia. The staggers have been overcome by using various mineral blocks and feeding cattle cobs, containing Magnesium. Up to 5 years ago we lost 3 or 4 a year from staggers but none since.

The 'fluke' is met by drainage and I have inoculated regularly. Pneumonia is not a big problem, I have much more trouble from drowning.

Q5: I am surprised that H.F.R.O. have not done more work on Rumevite. I have used it for 5 years. My 2000 ewes have used more each year. At the end of the year I calculate the cost at a few pence per head, but the return is very much higher.

Firstly, I have a bigger wool crop. There is no break-away. It is convenient to use and to know that all day and every day it is available for the ewes and lambs. The H.F.R.O. should look into this.

Now to a problem which has not been mentioned. What can you tell us about 'couping.' It caused many deaths in the summer. No one seems to declare the toll but it must be high. What is the cause, the prevention, the remedy ?

R. Rumevite and similar products could be labour saving. There is no secret about the important components nor about the way in which they can benefit stock on very poor low protein feeds in South Africa and Australia.

Couping is a problem of rather fatter ewes than ours.

McE. I also favour Rumevite or another similar product. I think it makes more efficient use of labour. There are fewer cases of ewes losing their lambs when the feed is available at lambing time.

Couping is one of my problems too. I am surprised that you are troubled with it on these bleak bare Southern hills. Ewes in olden days had heavier skins. I doubt if there is a cure but the cause is the development of an itch in thinner skinned, overfed sheep. I think it is wise to desist from driving sheep up the hill in hot weather — this leads to itching. Some older shepherds thought it a stomach or colic form of trouble.

I find couping more pronounced on some hills than others. I once stopped dipping and there was an increase in couping.

Q6: Is all this regeneration, and expensive use of fertilizers worthwhile. I agree with the value of fencing but doubt the rest.

P. I could not have increased my stock without regeneration. It is essential to increase stock to reap the benefit from improvements. I have reached the limit in sheep expansion and see my future now in continuing to expand the cattle.

McE. Sheep are a better return than cattle. To buy a heifer costs me £100 and I get 1 calf a year if I am lucky. £100 in sheep gives me 11 ewes and 11 or more lambs per year.

P. But the sheep have a 4 year life whilst the cattle will last 12 years and provide about £60 per year for that time.

McE. I have cross Swaledales up to 8 or 9 years old and at that age they can be sold well for use on the better land.

I believe that we may yet see big advances in breeding. The Hybrids, Cobb, Colbred, etc. are new but the fact that big commercial undertakings are investing in them are signs that we should also be interested.

I.V.H.

CONSERVATION

The A.G.M. of the Central Scotland Grassland Society took its usual form of visits to two farms followed by a discussion led by scientific experts along with the two farmer hosts. One of the farms visited was Middlebank, Carstairs where George Haynes practices Zero Grazing. An account of his farm which had also been visited during the summer is included in this journal. Covington Mains, Covington, (W. Johnstone, Esq.) is described below.

Stocking. The dairy herd comprises 130 cows, of which 96 are normally in milk. All calves are reared, the bullocks being either fattened or sold as stores, depending on the availability of feed. There are at present 190 young cattle.

Feeding Policy. All the conserved grass is now made into haylage, there being two Howard Harvestores each with a capacity of 500-700 tons.

The dairy cows are housed in cubicles and fed haylage ad lib. 6 cwt of rolled barley is added to the haylage and this provides for M+2 galls. Dairy Cake is fed in the parlour via Orby feeders over 2 galls.

Grassland Policy. The whole farm (205 acres) is in grass, 80 acres are normally cut twice to fill the towers. The seed mixture used is Timothy/Ryegrass. All the grass receives 4 cwt/acre high N compound in the spring, followed by 60 units of N for the 2nd cut and 40 units N for grazing. Grazing policy for the dairy herd is free and additional grazing is rented for the young stock.

Housing. All the cattle with the exception of young calves and some bullocks are housed in cubicles. The slurry is stored in an Alfa-Laval tower with a capacity of 150,000 galls.

Labour. Apart from Mr Johnstone and his son, there are two other workers.

Following the Annual General Meeting of the Central Scotland Grassland Society, Dr. Moon, Head of Chemistry Department, dealt with the chemical aspects and Mr W. Davidson, Senior Mechanisation Adviser, the mechanical aspects of conservation.

Dr. Moon stated that there were two principal means of conserving grass—drying or pickling. Taking the first method, he foresaw an increase in the drying of grass since the losses here were extremely low and a very high value product could be produced. The breakthrough however had not yet come in improved efficiency of drying plants to make this procedure of general application. Hay was still the most important single method of conservation, with 80% of grass products conserved in this fashion.

It was relatively easy to dry grass by atmospheric conditions to 65% dry matter, but taking out the next 15% of moisture was much more difficult. Here barn drying had particular application.

In normal hay making, the average loss of dry matter was around 30% ranging from 15 to 60%. The stage of growth at cutting was the critical factor other than weather to obtain the best quality. If one wished quality one had to sacrifice bulk.

Turning to silage, there were two methods of pickling, either by direct addition of acid as in the A.I.V. process or by fermentation where the sugars in the grass were converted to lactic acid. Few farmers in Britain used the A.I.V. process but the addition of formic acid was increasing. Most farmers still relied on natural fermentation. High dry matters in the original material initiated quick fermentation and rapid lactic development, which point emphasised the importance of wilting. Grasses had differing sugar levels with rye-grass being better than cocksfoot. Sugar levels were also higher in the afternoon than in the morning. Cutting in the afternoon and wilting were two techniques which achieved higher sugar levels on which the fermentation bacteria could act.

Although earlier emphasis in silage making was on temperatures around 100°F attention was now directed to low temperature silage. High temperature silage led to greater oxidation which could be minimised by the prevention of convection currents or by weighting. In silage making, the loss of dry matter could range from 20 to 45% of which the greater loss resulted from oxidation.

Mr Davidson reviewed the various machines involved in silage making stating that many of the machines could also be used in hay making. He emphasised the high power requirements of the modern machines and the wide range on the market. Dealing with mowers, the rotary mower caused less stoppage and could cut almost any laid crop when compared with the finger-bar type. On the other hand, for rapid wilting, it did not give the same laceration effected by the flail mower. The Dorset wedge method and the Christie of Monreith method involving the immediate covering of the silo with a plastic sheet in intimate contact with the silage prevented convection and loss. To improve drying, crimping or crushing should take place immediately after mowing. He dealt with various wind-rowing techniques and then considered forage harvesters. The precision chop harvesters were relatively expensive but did an excellent job. In a tower silo set-up, the field machinery was generally the bottle neck in the system. He compared the cost of the equipment involved in clamp silage with tower silage which was as follows: —

No of Cows	*Clamp cost/cow*	*Tower cost/cow*
80	£34.1	£79.2
200	£37.5 forage box feediqg £28.6 self feeding	£46.9 forage box feeding £49.1 conveyor feeding

At the discussion session which followed, Mr George Haynes, Middlebank and Mr Johnston, Covington Mains, joined the panel. The discussion was wide ranging and dealt with silage making, feeding, additives, machinery, and cow health.

Mr Johnstone stressed that 12″ pipe was necessary for conveying grass to the tower and that the bottom unloader worked best.

Dr. Moon stated that wilting was highly desirable not only to increase sugars but if one was using formic acid, less acid was required and less effluent resulted. He also made the point that formic acid did increase the amount of effluent which was a further justification for wilting.

Bill Elder said that cows prefer acid treated grass, which was endorsed by Mr I. V. Hunt. Dr. Castle's work at the Hannah indicated that the use of Add-F was well worthwhile.

On a question of the difference between double-chop over single chop, Mr Davidson stated that less losses resulted with double-chopping since much better consolidation resulted.

The concluding question asked the speakers to gaze into the crystal ball and state whether in ten or twenty years dried grass would be the only conservation product. Both speakers considered that this would not in effect take place and that there would be a place for the other forms of conservation.

I.W.M.

GRASS, CLOVER AND FERTILIZER

A talk given to S.W.S.G.S. after the Annual General Meeting at the Station Hotel, Ayr, Thursday, 12th November, 1970, by J. S. BROCKMAN, Fisons Ltd., North Wyke Experimental Station, Devon.

In most situations, N holds the key to growing grass, but it must not be forgotten that N can come from the soil, clover and animal residues, as well as from the fertiliser bag. The N status of any field should not be measured in terms of fertiliser N input alone, but as the total input (i.e. soil N + clover N + animal N + fertiliser N).

On some well-managed grass/clover swards, stocked at 1.5-1.8 acres per cow equivalent, the N input from non-fertiliser sources can be as high as 200-250 units N/acre. On the other hand, a grass field without clover and farmed as part of an arable rotation may record as little as 30 units N/acre from non-fertiliser sources. It is obvious that the application of 200 units/acre of fertiliser N over the season would result in very different levels of production in these two instances; the dressings on the second only raising the N status to the starting point of the first.

Not only does the total N input determine the total yield of grass produced but also the timing of the input can influence seasonality of production. Intensive grazing sometimes suffers from shortage of grass in the July/August period. Experiments at Fisons North Wyke Experimental Station have shown that regular applications of N for each growth period at the rate of about 2 units N/acre/day of expected growth give much more even seasonal distribution than where all the N is applied in the spring period. For example, at North Wyke only 35% of the annual total yield was obtained in the second half the season where all the N was applied in spring. Where an equivalent N rate was applied regularly over the season, the same total yield was obtained but 45% of the production occurred in the second half of the season.

The herbage that is grown at high N inputs must be utilised efficiently for the full potential of the system to be realised. Grazing control is essential and experiments show that where the daily grazing intensity is high (i.e. 60-80 cow equivalents per acre per day), then utilisation can be much higher than the 60-70% commonly accepted in grazing situation.

Fertiliser N is not a panacea for the various shortcomings of grassland management. It is a potentially powerful weapon in the bid to fit grassland production to animal systems; as yet we have only skirted the fringe of the possibilities that lie before us.

STORE STOCK PRODUCTION

Two papers read by DOUGLAS CURRIE, Esq. and J. P. KAYE, Esq., at a meeting of the C.S.G.S. in Stirling, on 19th January, 1971.

G. Douglas Currie, Manager for the Hill Farming Research Organisation at Lephinmore, Argyll.

Lephinmore is a hill farm, situated on Loch Fyne, and typical of one third of Scotland. The Forestry Commission has planted two 500 acre blocks of trees on this farm. Inherent difficulties are 75" rain, soil infertility and poor vegetation, with a stocking rate of two or three ewes per acre. Only 1½% to 2% of the farm is inbye land, which more or less dictates that lambs must be sold at the store sales.

Prior to 1745, there was a turf dyke at the 200 ft. contour, which allowed an on-off system of husbandry to be practised. When this system ended around that date, there was a 25% reduction in rent, indicating a drop in production. Since then, over the last 200 years, there has been extensive sheep husbandry with the result that by 1957 a typical hirsel with 200 ewes was producing a 60% lambing.

With improved management, the same hirself by 1967 was carrying 370 ewes, with a 90% to 95% weaning. The improvements carried out were as follows:—

1. **On the Hill**

(a) Paddocking, which once more allowed an off-on system.

(b) Fertilisers — 2 ton lime and 10 cwt. slag.

(c) Reseeding—S.59 red fescue grass and wild white clover, which take well on peat, given the fertilisers mentioned above.

(b) and (c) are principally carried out on the knowes and best bits.

2. Supplementary feeding, inbye tupping and inbye lambing.

3. A certain amount of improvement was achieved simply by feeding cattle out on the heather.

Fencing, fertilising and reseeding gave a remarkable improvement in pasture for the lambed ewes going out to the hill; the inbye land is kept for twins and gimmers, and then shut up till mid-October, when the ewes are let in for flushing.

There is one hirself of 240 ewes, above the tree line, at 800 ft. which cannot be brought down. These ewes receive supplementary feeding taken out by tractor, which resulted in the lambing % rising from 51 in 1957 to 100% in 1969.

Lambs sold at the August sales weigh 65 to 70 lbs. Cast ewes are 6½ years old. Swaledale breeding was stopped in 1960 as it was felt that feeding was much more important than breeding, with particular emphasis on the level of nutrition over the summer.

Mr Currie regards the in-wintering of ewes in his circumstances as economic suicide, since it costs 35/- to 40/- per head, but allows that there could be a case for it on a farm with very high stocking rates. The number of broken-mouthed ewes rises from 5% to 30% with in-wintering.

Lephinmore has a herd of Shorthorn Highland cows which are put to an Aberdeen Angus bull. The cattle were complementary to the sheep when there were only a few, but now that cattle numbers have increased, they are in competition with the sheep. Again, heavy stocking could justify in-wintering, but cattle out-wintered on 5 or 6 lbs cobs and heather are more free from disease. The Lephinmore cattle were taken off the hill two or three years ago and are now wintered on the shore, which appears to be ideal. The calves go to the October sales in either Oban or Dalmally.

While Mr Currie maintains that rearing store stock on the hills is as profitable as growing trees, he does admit that all these very real improvements have done little more than keep pace with falling returns: that he is running hard to stand still.

Joe Kaye, Esq., Weston Farm, Dunsyre

One third of Weston is arable land, starting at the 800 ft contour and the rest is hill. Stocking consists of:—

(a) **Cattle;** (i) 40 Galloway cows, crossed with a British Friesian bull, and kept outside all year. The bull calves are kept for about two years, and the heifers go to make up; (ii) The main suckler herd of 120 cross cows, in-wintered and put to an Aberdeen Angus bull. The heifers calve in August, and the cows in October, and all the calves are sold at the following October sales.

(b) **Sheep** (i) 600 South Country Cheviot ewes with 5 Suffolk tups, and 13 Cheviot tups from the South West; (ii) 700 Blackface ewes with 20 Blackface tups. Lambing starts on 17th April.

Mr Kay's view is that £1 for £1, sheep are a far better investment than cattle, and in order to get the best out of them, they should be fattened off — not sold as stores. If you want better returns from the hills, look to the sheep, and develop types such as the small, economically-kept Blackface ewe, which although small herself, produces a fast growing lamb, given slightly better conditions, she can be crossed with a Border Leicester tup, and produce a heavier, better lamb, which can be graded off its mother.

Although Scots cattle such as the Ayrshire, Galloway and Angus are small and economically fed, you cannot get such a marked improvement by crossing.

Mr Kaye felt that the selection of Blackface sheep for breeding had not been based sufficiently on their ability to grade well, and

that the same applied to the selection of Scots cattle. He pointed out the following anomalies:—

(i) A Border Leicester tup costs £20 where a Blackface tup costs £30 to £40.

(ii) A Friesian bull calf in a bag costs £40, to which one must add £50 for rearing, making a total of £90, whereas an Aberdeen Angus bull costs £300 to £400.

(iii) A dairy cows costs £100 and gives a gross margin of £90, whereas a suckler cow at the same price gives a gross margin of only £35, most of which is subsidy.

(iv) Similarly, a Blue Grey bulling heifer costs £88, where a Friesian costs £61, and an Ayrshire £43.

If there should ever come a time when there is no Hill Cow Subsidy, then store producers will have to think again with regard to breed and type of stock kept.

The Weston calves were weighed by the Meat and Livestock Commission just before they went off to the October calf sales. Results are as follows:—

(a) *Cross Cows Herd* Worst 1.1 Liveweight (L.W.) gain per day
Best 3.6 L.W. gain per day (pure bred Friesian x Galloway cow that weighed 799 lbs.).
Average 1.8 L.W. gain per day
(M.L.C. Average 1.9)

(b) *Pure Galloway Herd*

Worst	1.6 lbs. L.W. Gain per day
Best	2.4 lbs. L.W. Gain per day
Average	2.0 lbs. L.W. Gain per day

Mr Kaye's final comments were:—

(i) that the worst calves came from the good looking fat cows (one should go for milkier dams).

(ii) Breed and colour are not sacred — in five years time there will be fewer Blackface tups, and more Border Leicesters, South Country Cheviots, and Suffolks. We may also find herds of Ayrshires and Friesians on the hills. Mr Kaye mentioned particularly the Angus Ayrshire Cross, making use of the heifer calves as hill cows.

(iii) Much more attention must be paid to the milking potential and breeding capacity of bulls.

DISCUSSION

Q: Would Mr Currie consider fattening his lambs ?

A: Mr Currie had fattened his lambs in the past, but had now given that up because he wintered his hoggs at home, and it was not practicable to do both. When he was fattening the lambs, it was essential that they be away fat by mid-October: after that date the lambs did not fatten any more — they only held their own.

Mr Kaye suggested that it might be better to keep fewer ewes, and fatten the lambs: that it was better to have a few profitable sheep rather than a lot of unprofitable ones.

Q: How about housing the lambs and fattening them ?

A: Yes, this had been tried, but what happened was that you got 50 or 60 wedders half fat by Christmas, and the rest just grew instead of fattening: the cost of providing cereals was too heavy. The answer was to take the problem back to square one, and get bigger lambs in the first place.

Q: Why not spread the supply of lambs onto the market, making use of turnips ?

A: If the sales were spread, then all the best lambs would go to the early sales, leaving the smaller lambs for the later sales. In fact, what was required is that the rat lambs must go to the sales in August if they are to be fattened successfully, and the stronger lambs should go to the October sales for fattening on turnips, but it would be difficult to get farmers and markets to change to this system.

Q: Might not lambs be early weaned at 6-7 weeks old, and fattened on good land ?

A: Early-weaned lambs just don't do as well, and nobody wants 38 to 40 lb lambs.

Q: The profitability of the smaller holdings is not very good, and there is the possibility of subsidy cuts: what increase in the price of beef and mutton would be necessary to make these holdings viable, and how should this reach the producer ?

A: (i) Profit and subsidy are much the same: necessity is the mother of invention, and every possible means of improving one's hill land should be looked at.

(ii) If the Hill Cow and Hill Ewe subsidy were abolished, and the price of the end product raised, the cash simply would not reach the producer.

Beef in Britain is worth £12 per cwt, and on the Continent £15 or £16. This represents an increase of 25-30% on British prices, and if this increase were to be reflected onto the suckled calf; it would make a £40 calf worth £50, which would not compensate for the loss of the Hill Cow Subsidy.

Regarding sheep, the European price is 35p to 40p per lb, and it was felt that even at 30p per lb, such a price would not make up for the loss of the Hill Ewe Subsidy.

Mr Currie made the point very strongly that the Hill Cow and Hill Ewe subsidies do not just go the hill farms concerned: they go to the whole Highland economy. Tourism is largely a summer occupation, and all the services required for the tourist industry e.g. garages, are kept going throughout the winter by agriculture, which in turn is dependent to a very great extent upon the subsidies. If agriculture is not kept viable in the Highlands, then the economy of the Highlands as a whole will fall apart, resulting in depopulation, and still greater over-crowding of the industrial areas, such as the South East corner of England.

Q: A man now has to look after 50 cows, where previously he was responsible for 20: could shepherds not do the same ?

A: Yes, the ideal is to produce two lambs, where before only one grew. If this cannot be achieved, then the sheep should go down the road, making room for tourists and forestry.

Q: What bulls should be used on dairy cows, in order to produce suckler cows ?

A: Use a Friesian bull — the milk should be on the **sire's** side; or Charollais for size.

Q: Is there a case for double-suckling to improve profitability ?

A: Possibly, but you would be very busy twinning off: if you used dairy ,cows, they would take more readily to twins. Also brucellosis raises difficulties.

J.S.P.

BEEF PRODUCTION

R. B. MAIR, Director, High Mowthorpe, Experimental Husbandry Farm, spoke to S.W.S.G.S. at Castle Douglas. 10th December, 1970.

High Mowthorpe consists of some 1,000 acres of free-draining land overlying chalk. Most of this has a fertile soil to the depth of 8"-12", but there are some dry glacial valleys with steep sides where the soil is limited to 2"-3" in depth.

Cropping. 650 acres are under cereals and a further 100 acres under other arable crops of various types in any year, making a total of 750 acres or thereabouts under arable cropping. Of the 100 acres, 60 acres are planted to potatoes, 20 acres sown to fodder roots, and a further 20 acres under peas, maize and various other arable crops.

250 acres are under grass. 100 of this can be regarded as permanent grass on steep land. In fact, 40 acres of the permanent grass is on land so steep as to be unploughable for all practical purposes, and the remaining 60 acres are too steep for intensive arable farming. 150 acres are down to two to three year leys along with the occasional one year ley all sown as a break in the arable cropping rotation.

Beef. Prior to 1961, the system was to take the finished animals to 10 cwts at 2-2½ years of age. Some were taken right through from calves to the finished carcase—others were bought in as store cattle. A gross margin of £56 per head was achieved. However, the long period of growth meant that this was the annual produce of over two acres and left a gross margin per acre of only £20 per acre. Since fixed costs were around that figure even in those days, it became obvious that there had to be an increase in output per acre.

500 breeding ewes are kept, mainly to make beter use of the very steep slopes. The remainder of the grass acreage is utilised for beef production.

18 Months' Beef. The aim here was to achieve high stocking rates from grazed grass, supplemented with cereals and especially silage. On this system the calves must be kept going strongly in the first winter in order to be strong enough to make the best use of good summer grazing. By the end of the winter these animals are eating 20-25 lbs/per head silage and 6 lbs/per head of a barley/protein concentrate.

Several methods of turning the animals out to grass have been tried and some more work might be necessary to avoid the severe check which these rapidly growing animals experience when they are turned out to grass. It was found best to continue the winter ration on grass (turning them out early) expecting the grass to take over gradually. Under heavy stocking rates this method is

of turnout becomes impossible due to poaching, when the most successful method is to guess when the grass is going to grow, reduce the concentrate ration to 3-4 lbs and turn out suddenly to grass.

These animals are paddock grazed until mid-October, yarded, and taken to finished weight of 9 cwts or so on silage and barley.

Typical performance figures relating to 208 steers were:—

Weight an arrival	(lbs.)	102	(46.5 kgms)
Weight at turnout	(lbs.)	486	(220 kgms.)
Weight at yarding	(lbs.)	746	(340 kgms.)
Weight at sale	(lbs.)	1,049	(475 kgms.)
Days to Sale		555	

These animals leave a gross margin per head of around £35 and with a grassland requirement of less than 0.75 acres a gross margin per acre of £50. This left a Management and Investment Income of £15-£18 per animal.

Beef from Spring-born Calves. January/February/March-born calves are reared intensively and turned out to grass during the first summer. Calf pellets are fed to appetite during the first four to five weeks on grass and average 4½ lbs/per head eating from a self-feed hopper at up to ten weeks old. Calf pellets are gradually replaced by barley. Barley is eventually reduced to 1 lb/head/day, largely as a carrier for minerals; there is a copper problem on the farm. Barley is kept at 1 lb/a head until August, when it is stepped up to 3 lbs.

The winter ration consists of silage to appetite with 3 lbs of barley. One third to one half are far too forward to turn out in Spring (especially the heifers).

Typical performance figures are:—

Weight at arrival	(lbs.)	95	(43 kgms.)
Weight at yarding	(lbs.)	381	(173 kgms.)
Weight at sale	(lbs.)	769	(350 kgms.)
Days to sale		430	

This is essentially a system with a short fattening period and a low selling price. With a low dependence on forage acres it can leave Gross Margins of £50-60 per acre.

Barley is manipulated as a regulator of silage intake. Increasing the amount of barley fed reduces the amount of silage and increases the weight gain.

Both the systems described rely on barley being fed in considerable quantity. At current prices this is expensive and it may be necessary to rely more on grass. Two methods are readily available.

(i) Lower the stocking rate.

Experiments at High Mowthorpe have shown that relaxing stocking rate can increase the animals' weight by 40 lbs at the end of the grazing season.

(ii) Increase the bulk ration.

The usual 3½-4 tons/head of silage fed over the winter can be increased to 5-6 tons/head with a consequent reduction in barley, and variable costs.

Implementation of both these measures could mean an extended finishing period and would lead to going through the full cycle back to the 1961 situation of 2 years beef.

2 Years' Beef. Under this system animals would be taken through the second winter in advanced store condition, aiming to put on 1.5 lbs/head live-weight gain per day, being finished off grass during the second summer.

The success of this system is going to rely on good utilisation of grass and presupposes a high barley price.

Grazing System. The best individual animal performance has been obtained from set stocking but since the conservation area is so important to the system a paddock grazing system is employed. Six fairly permanent paddocks are used but these are subdivided early in the season using a temporary electric fence: 0.75 acres per cow is allowed and two thirds of the area is cut for silage. The predictability of silage over hay is important rather than performance. The system is simply to graze, top dress, and rest the paddocks in turn, any system which ollows this will be just as successful. Two points are important and must always be borne in mind.

(i) You must be able to cut and remove surplus grass (to this end silage has the advantage over hay) in order to present highly digestible grass to the animals at all times.

(ii) Any system must have the ability to give more grazing later on in the season. This evolves from the increasing needs of the animals as they grow, and the declining production of the grass itself as the season progresses.

Fertiliser. Somewhere in the region of 200 units of nitrogen per acre are applied, depending on the season. 100 units of nitrogen are applied before the stock go out. 40-50 units are applied after each grazing. This means that most of the nitrogen is put on before the end of May, with little more being added to the grazed areas in the second half of the season.

Following silage, 50 units of nitrogen are applied with a further 50 units later in the season.

The leys are mainly I.R.G./P.R.G. with white clover; S.23 is sown in some fields and will fatten stores well at 200 units of nitrogen.

The results at High Mowthorpe have shown that it is possible to grow and finish cattle successfully on grass.

Replying to questions, Mr Mair made the following points:— The varieties of grass grown were: Commercial Danish Italian, although in the past year some Dutch tetraploid (i.e. Tetrone) had been sown; Kent Indigenous perennial—S.24 headed too early at High Mowthorpe; Hunsballe and S.23 perennial were sown in special leys. These are late to commence growth in spring, but then comes a wonderful grass.

1½ lbs per acre of New Zealand white clover (Huia) is sown at levels of nitrogen up to 120-130 units and survives well into the second year. At 200 units it survives the first year only. In a dry spell white clover really earns its keep.

Grass is undersown to barley, top dressed with 50 units nitrogen after harvest, then used for flushing the ewes. 10 cwts/acre basic slag is applied after the stock come off. In the first year, ⅔ is cut for silage, ⅓ grazed. The silage cut helps to break the worm cycle. After the silage cut, potash is applied, unit for unit with nitrogen.

Cereals are fed in the early part of the season at 1 lb/head/day simply as a vehicle for minerals. However the men with the livestock claimed it was easier to keep an eye on the livestock when they were fed regularly during the summer. There was a much stronger case for feeding barley as a supplement to grazing from late July—Mid August onwards. Trials which were conducted feeding 3 lbs of barley/head through the summer as opposed to the same quantity per day from late July onwards produced the results:—

Fed 3 lbs over the whole season	44 lbs liveweight increase
Fed 3 lbs from late July	38 lbs liveweight increase

This means that for an additional 2 cwts of barley fed in early season only 6 lbs additional weight gain was achieved.—C.R.P.

GRASS AND STOCKMANSHIP

Talk given by K. V. RUNCIE, Edinburgh School of Agriculture to the S.W.S.G.S. at Glenluce, Wigtownshire. Thursday, 21st January, 1971.

Growing grass is simple apart from a few problems such as winter-kill. The difficulties arise when we try to turn this grass into profit through milk or stock. Intensification can result in higher animal output by increasing the stocking rate. Rarely do we find increased output/animal. It is easier to achieve more output by putting on more animals to yield 3 gallons milk/head than by using fewer animals at 4 gallons/head. Extra housing could be provided at 7% interest on investment but having taken some steps in this direction it becomes much more difficult to provide further housing with rising charges of 11% and more. Such situations provide the incentive to look more closely at raising output through improved animal performance.

The scope for increasing grass output from 4,000 to 11,000 lb. dry matter by using the right type of grass, fertilisers, etc. is matched by the range found for milk output from 400 to 1,000 gallons milk per acre. The situation is finely balanced. Livestock requirements are fairly stable, grass growth and quality is extremely variable. To secure high animal performance, good quality of grass is essential. Increasing stock numbers lower milk/head/day but raise milk/acre until a point is reached when the performance per animal crashes down.

In other livestock enterprises, e.g. bullock-fattening or fat lamb production, a low stocking rate can result in considerable improvement in animal performance. Reduction in performance by raising stock numbers reaches a critical level where fattening becomes impossible and the enterprise changes to store stock production.

Ewes with lambs are particularly susceptible as has been experienced in many creep-grazing set-ups. The lamb soon competes with the ewe. Just when grass growth and quality is falling off, extra grass of extra good quality is essential to finish off part grown lambs as well as to maintain the ewe flock.

The dairy cow presents a simpler problem. Yield per head can fall and yet be compensated for by increasing the number of cows per acre.

One of the most commonly stated requirements for efficient grass use is that grass must be matched to animal needs. This is easily said but much more difficult to operate.

Cows giving 2 gallons/head can be set at any kind of grass, the quality isn't important. The higher the yield the more critical is grass quality. A typical large milking herd will be planned to milk through winter and summer. During the summer the range will be from 2 to 5 gallons/head/day. Low yielding animals will be alright and probably wasting grass but high yielders will be suffering a

drop in potential yield. The obvious answer is that such herds must be split allowing the high yielders to graze the swards first, taking their required high quality herbage. The rest of the herd can follow taking adequate quantity of the lower quality stubbles. This is not a new idea but one which should be revived in the interests of higher output per animal plus higher output per acre.

The same argument holds for winter fodder but is rather more difficult to operate. From the point of view of efficient silage making, no doubt one big silo is fine since waste is less, but more than one silo with high or low quality for feeding to live stock with different requirements would ensure that the potential performance per animal was reached.

Both these ideas are methods of introducing precision into the use of grass.

Breakdown Points.

Particular attention is needed at certain times or in certain conditions, especially to minerals required by stock and to the need for gradual changes from winter to summer feeding systems. Our fertilisers are purer, slag is less easily obtained, high cost turns attention to more concentrated forms of N, P and K. The most likely cause of trouble is shortage of phosphorus, magnesium and calcium.

Scours from excess nitrogen in herbage arises from grazing too soon after a heavy dressing. At least three weeks should elapse between applying the fertiliser and grazing. There is less risk in sunny weather. The change from winter to summer feeding is a time when the whole of the microflora inside the animals stomach must change over from handling winter fodder to fresh grass digestion. A slow change taking 3 weeks will prevent a sudden fall in production. When there is a sudden rise in production of milk most of us feel a certain sense of satisfaction, but maybe we should look more closely at the winter feed. Why the rise? What was wrong and is now right?

The ideal situation is that the level of milk production should remain constant through the change. Any deviation up or down is an indication that all is not well.

Turning out should be a gradual process. The inclination would be to put the low yielders out first and hold the high yielders in, but this may be wrong. The higher yielders put out first could take the cream of the herbage and maintain yields at high level. The low yielders would be kept back and continue using the tailings of silage, etc., planning to have all cows out by the end of May.

At the other end of the season when grass quality is low is the time to bring the high yielders in first, say at the end of August and leave the low yielders to use the poorer but adequate autumn grass.

DISCUSSION

Q1: Can you tell us something about the possibility of using Urea as a protein supplement?

A1: For low yielding dairy cows giving less than 3 gallons milk it may be profitable to use up to 2% urea in the feed. Generally, winter calving cows should not receive urea. Suckler cows, if any at all, should get little and often. In barley beef systems, only stock over 500 lb. liveweight should be given urea.

The snag is that there is a toxic level. Compound feeds containing urea are safe enough but where a urea concentrate is added to your own feed, mixing thoroughly is required.

The liquid or block feeds are easy and convenient to use but more expensive.

Q2: We hear much of the targets 1,000 gallons/acre milk or 1,000 lb./acre liveweight. What do you yourself achieve?

A2: 850 gallons milk/acre and 870 lb. beef/acre have been reached. The targets quoted are not easily obtained in commercial farming but very easy to obtain if you set out to prove what can be done. For example, if you switch high for low yielding cows on a field, you can touch 1,500 gallons/acre. It is easier to reach with a spring calving herd than with a mixed herd.

Q3: Most of us experience the jump in production when cows are turned out in spring. How do you avoid this?

A3: The past 2 seasons have been particularly difficult, but for 2 to 3 years before that I had no difficulty. Where the jump is big the winter feed must be of low quality and generally it will be the energy content that was low. Maize based concentrates are likely to be better than barley based concentrates. The cost may not be as high as one thinks, the prices change rapidly.

Q4: How can one avoid producing store lambs when so many factors are against fattening plus intensification? Two factors appear to be important.

(a) At weaning time, feed quality and quantity declines just when it is needed to replace milk of the ewe.

(b) There is a critical period at around 85 lb. when the lamb becomes leaner and grows in size. — Is this genetic?

A4: I wonder whether the problem could not be overcome by changing the time of marketing the lambs to September,

finish them off turnips and cash in on the bigger carcase then possible. Earlier weaning and supplementary feeding might make a difference. The falling quality of grazed grass could be supplemented with dried grass rather than barley.

Q5: Change of pasture seems to be particularly important. In our predominantly grassland area we can't expect to switch to arable crops and must sell the stock. Regarding the lean stage, I believe the Ile de France ram will get over this.

A5: Changing pasture is particularly difficult on the sheep farm where it is customary to graze rather lightly in the late winter, resulting in delayed conservation crops with weak, late aftermath growth. Early harvesting of the conservation crop, e.g. using ventilation as per Lister fan to win an early crop will provide better quality hay and release earlier aftermath for finishing lambs.

Q6: Lambs could be weaned early and the ewes packed off to the woods or scrub land.

A6: Certainly, but when there is no roughland for the ewe what can be done.

Q7: Are liverfluke a problem in cattle?

A7: Yes—on wet permanent grass, dosing is profitable.

Q8: Have you any comments on hill cow problems—breed, intensification?

A8: Not much experience of the real hill cow but some of suckler cows in the hill. The worst thing that can happen is to finish up with well grown calves when there is no grass available. I would be inclined to move calving back to April/May, organise some cheap wintering and return them to the hill for the spring flush. A second choice where there is some inbye land would to to sell suckled calves at 4½ cwt.—bringing them on with creep feed and shelter. This is costly in feed. Summer mastitis is becoming troublesome. There was much in the early 50's and we seem to be heading for another cycle probably due to more flies and less dieldrin to control them.

Q9: Can you give us your views on choice of beef or dairy cows for the suckler herd?

A9: Where buildings are plentiful, then go for dairy cows. Where there are no buildings available go for the beef cow.

Q10: Is there any simpler way to providing magnesium than Magnesite? You seem to favour allowing calves to creep

ahead of the cows under a high fence wire. Does this not encourage the calf to wander away to a second or third paddock and spoil grass.

A10: Calcined magnesite at 2 cwt./acre on the pasture is foolproof. Low grade basic slag was good but is now not obtainable. The calcified seaweeds are rather expensive.

Q11: Quality of herbage is frequently mentioned. What aspects are 'important'?

A11: The type of grass is less important than its stage of growth.

Q12: What do you regard as the optimum output per man to aim for?

A12: It is difficult to say what is the optimum since there are many factors to be considered. Some years ago we put up our cow numbers at Langhill Farm from 40 to 70 and thought that we would be stretching things, but now have 105 cows/man with average milk sales per cow of 975 gallons. The key lies in the feeding. If cows per man are increased and feeding maintained then 110/man is quite sound.—I.V.H.

A PROSPERING SMALL FARM

The President's Farm

Mr Edwin Bushby, President of the British Grassland Society spoke to the Central Scotland Grassland Society at Mill Hotel, Rutherglen (24 Feb. 1971) and to the South West Scotland Grassland Society at the Embassy Hotel, Newbridge, Dumfries (25 Feb. 1971).

Where is it?

Watson Hill Farm, Egremont, 125 acres at about 350ft. altitude on the South West coast of Cumberland is tenanted by Mr Bushby, was tenanted by his father before him and includes just a couple of fields purchased a year or two ago. It is on medium to light loam taking about 40" rainfall (1000 m.m.) per year with daily rainfalls of up to 1" (25 m.m.) It is very exposed, receives blasts of sea spray from south, west and north and not surprisingly has just one rather twisted tree.

Achievements

Over 15 years or so he has raised the output of this farm, generally reckoned to be non-viable to a level which would be the envy of many businesses. The basis has been to maximise every asset on the farm, especially the potential grass yield and to turn this grass into milk as efficiently as possible.

Throughout this period, records have been kept with the help of the I.C.I. Farm Management Scheme. So successful has the venture been in the face of considerable forebodings as each step was taken that one must wonder what is the future of this enterprise. Can its progress be continued.

The change during this period is shown by the following figures: —

	1955	1969
Milk yields. Gallons per cow	763	1102
Total gallonage/year	20896	120407
Purchased feed lb./gallon	2.2	2.0

In addition, there is a poultry enterprise of 11,000 birds.

How?

1. **Use maximum fertiliser nitrogen.** The amounts used have crept up over the years. In 1966/67, the average was 303 units/acre whilst in 1960/70, it was 458 units/acre. There is a long growing season, so nitrogen is plastered on immediately a crop is taken as silage or grazing.

As the season progresses, the amounts already given are not considered, every opportunity to apply nitrogen is taken right up to September.

2. **Return of Slurry.** All slurry from the cows and poultry is returned to the fields. This reduces requirement for potash and

phosphate fertiliser. Cow slurry is confined to fields which will be ploughed rather than risk carrying disease such as brucellosis or salmonella.

3. **Reorganisation of buildings.** Formerly the bed and breakfast system was provided on top of the silage but this involved £5/head of sawdust which has now been saved. Cows are housed in 92 cubicles, part over a slatted gangway, part over a solid gangway, with a preference for the slats. Winter feeding is based on self feed silage allowing about 8 tons/head. The requirement is low because grazing is continued outdoors as late as possible, even though the grass will have little production value.

4. **Labour.** Full mechanisation makes it possible for Mr Bushby to run this unit with 2 men plus 1 man fully employed on the poultry unit. Operating this type of enterprise requires men of the highest calibre and Mr Bushby is one of many farmers who believe that it is going to be imperative to pay such a man a good salary. The future is bleak if return does not allow this.

5. **Stock Policy.** High cost grass must be used for high output stock, consequently replacements are brought in as purchased calving heifers in May/June or increasingly, as home bred heifers reared away on contract. This allows for a breeding and selection policy within his own herd without the necessity to use his limited grassland for rearing. The contract rearing scheme arranged through the West Cumberland Farmers, costs approximately £5 per month per calf. They come onto the farm at about the same cost as was paid for purchased replacements. The benefit lies in the security regarding breed and is reflected in the following figures:

Milk yields (gals.) of purchased and contract reared stock

	Purchased Heifers	*Contract Reared*	*Gain in Yield*
1968	949.9	1144.5	194.6
1969	857.4	1023.7	166.3

Calving takes place from July onwards. Selected calves are sent to two rearers, firstly the bucket stage rearer and then to the second rearer until May.

6. **Supplementary concentrates.** For some years, a policy of restricting concentrates resulted in lowering yields per cow. Now, this is remedied by controlled rations based on barley fed throughout. A colour code record system is easily seen by the milkers. The results are illustrated below:—

Late Summer Milk Production

	July	*August*	*September*	*October*
Total milk yield	10050	13657	13608	12366
Price/gallon	(13.9p)	(16.1p)	(17.2p)	(17.5p)
Income	£1395	£2193	£2342	£2170
Concentrate/gall lb.	0.9	1.0	1.2	1.8
Margin over concentrate ...	£1309	£2072	£2139	£1536

Some concentrate feed has to be fed to meet the threat of magnesium deficiency. In an enterprise such as this, the loss of one or two cows can be extremely important.

7. **Use of electric fencing.** Paddocks are considered to be a lazy man's way of strip grazing. Portable electric fencing with a back fence operated on a clock system from the water point so that only one end has to be moved takes just 15 minutes per day. It demands a personal examination of the sward to gauge whether it is to be grazed or cut for silage and thus makes efficient use of the grass part of the system. Paddocks are better than no rotation but built into them is waste and shortage of grass and the hope that the cows will adjust themselves to a variable supply of feed.

Furthermore, paddocks are quite suitable if the number of cows in the herd is constant but at Watson Hill, the milk cows vary from 60 to 110 according to the season.

8. **Conservation.** The present system is to take silage after cows needs have been met. No field is earmarked for silage or for grazing. The sward is cut with a flail mower, picked up with a forage harvester after wilting. This works well and involves machines which are growing old but are easily maintained. No additive is used but he is open to change his mind on this if someone can indicate which is the best additive to use.

Feeding at the face is controlled by a very taut electric (stranded) wire.

9. **Grassland policy.** Two types of ley are used, 35 acres in short lived Italian ryegrass and the rest in timothy/meadow fescue mixture which may be up to 10 years old.

The Italian ryegrass (E.F.486 (Dasas) or RvP) is sown at 40 lbs/acre in spring or again in the late summer and left down for either 1 summer pluss 2 winters or 2 winters plus 1 summer. This always provides fresh grown maiden grass in spring and again in the back end of the year. In its final winter, it is used as a sacrifice field to take any wet weather grazing through its autumn, to outfeed silage and to take slurry which is ploughed down in the spring.

Choice of timothy/meadow fescue has been made because both S.24 and S.23 perennial ryegrass have been unable to stand up to the N+stock.

10. **Troubles. White clover.** Latterly, the swards have become dominated by a vigorous growth of white clover which even 500 lb N/acre cannot kill. He wishes to eliminate this since it hasn't a high enough yield.

Loose turf. All the pastures seem to have particularly loose turf which can be pulled away by grazing cows leaving small to big bare patches which become colonised by the white clover or meadow grass. So far no solution has been found. Mr Bushby is hoping for a grass variety which will allow him to continue his high stocking rate.

DISCUSSION

(Selected from both meetings)

Q1: (a) How to identify cows? (b) What type of wire do you use for your electric fencing? (c) Why put 500 lb N/ac when less is regarded as optimum?

A: (a) Freeze branding with dry ice. (b) Ordinary 16 gauge (not stranded) wire to a Wolseley Battery unit. No trouble experienced if wire is tight. (c) I go to 500 lb to try and kill the clover but have failed. Normally 400 lb would be plenty. Along with this there will be 40 or 50 lb of P and K.

Q2: What is your liming policy. Intensive use of N means a big drain on calcium (4 units lime per unit N). Why use the timothy/meadow fescue mixture which has a much lower yield potential than ryegrass ?

A: Formerly I used calcium ammonium nitrate which did not have a marked acidiying effect. Nowadays the highly concentrated N-fertilisers do require attention to lime needs. This I combine with meeting the magnesium needs of stock by using magnesium limestone regularly.

Experience with the perennial ryegrass has been unfortunate. S.24 and S.23 have not stood up to either the level of nitrogen or the stocking rate. I haven't tried other perennial ryegrasses.

Q3: What is your breeding policy?

A: I have none. I do not use semen from nominated bulls because I had some bad experiences. I prefer to make certain I get vigorous active semen.

Q4: How do you manage the dry cows?

A: These tend to be packed into two or three fields set aside for them and are not on any rotation system.

Q5 What is your supplementary feed ?

A: A barley nut with minerals added and containing 10% protein bought at £33-£35 per ton. Various members thought that it would be cheaper to cube one's own grain if only they could find a suitable cuber.

Q6: Are you brucellosis free?

A: This is one of my difficulties. Since my young stock are away on two other farms, I can't go free until my contract rearers are free.

Q7: Would you not get over a lot of your problem with turf pulling and get far better utilisation if you adopted zero-grazing?

A: I doubt if it is practical. Machinery costs are high and whilst cows have legs I don't think it profitable to use machinery to cart feed in and manure out.

Mr Haynes (Middlebank) who is successfully practising zero-grazing would have none of it and claimed that the machinery requirement is exaggerated. The increase in efficiency of conversion of grass on a farm of limited acreage could be vital.

Mr Bushby stuck to his guns in that at present he was doing nicely, had no ambitions to complicate his life still further.

Q8: Why remain a tenant?

A: The system worked well for my father's father. I own 25 acres out of 127. I will not seriously consider buying until my sons are of an age to decide where their future lies. I am not looking for more acres. I feel I can still employ my capital wisely within this tenanted farm. My contract heifers scheme allows me a form of expansion and is a reserve which could stock another farm or extension if this becomes necessary.

Q9: Do you have a trace element problem ?

A: I take precautions against Magnesium staggers. On advice, I tried a nameless product which was supposed to cure my turf pulling. If anything, the turf came out more easily.

Q10: Are docks a problem?

A: Not at all. Docks are pulled every year and have been since my grandfather's day. My policy of alternate grazing and cutting keeps down other weeds such as chickweed.

Q11: What quality silage do you make?

A: This year's dry matters were 38-43% but are usually around 30%. Proteins were 19-20% and have been as high as 27%. Some years I have reached M+2 but this season only M+1. I was short of silage and made it last the winter by feeding an extra 0.3 lb cake per gallon.

Q12: Do you have trouble with milk quality.

A: My average SNF is 12.5-12.6%. This could be higher but I would prefer 1100 gals at this level than 950 gallons at higher SNF—I.V.H.

145. APPETITE FOR SILAGE

THE VOLUNTARY INTAKE BY CATTLE OF FOUR SILAGES DIFFERING IN DRY MATTER CONTENT

Animal Production (1970), Vol. 12, pp. 591-599.

N. JACKSON and T. J. FORBES, Queen's University and Hillsborough.

Wilting is supposed to increase the appetite of cattle for silage. If silage is scarce this is not a good thing but if it is plentiful, it is economically desirable for stock to take as much as possible because it is cheaper than other production rations.

This experiment set out to measure the difference and to look for an explanation as to why cattle should eat more wilted than unwilted herbage.

Four batches of silage were made from a timothy/meadow sward cut with a flail mower mid-day on the same date in mid-June. The results are shown in the following table:—

Characteristics of the Four Silages

Silage No.	1	2	3	4
No. of hours wilting	1—2	20	30	48
Dry Matter %	19.0	27.3	32.3	43.2
Crude protein %/DM	14.1	13.7	13.7	13.2
Digestible organic matter %/DM ...	67.6	64.7	62.4	64.2
Dry matter digestibility	74.0	71.4	68.5	70.4
Soluble carbohydrates %/DM	1.1	3.4	3.3	5.5
pH	3.95	4.14	4.28	4.48
Volatile acids %/DM	6.19	4.57	3.78	2.08
Amino acids as crude protein %/DM ...	3.95	2.68	2.75	1.97
Residual acidity as Lactic acid %/DM	8.21	5.39	5.70	4.67
Lactic acid %/DM	7.05	5.54	4.54	3.16
Acetic acid %/DM	3.16	1.41	0.66	0.90
Butyric acid %/DM	2.75	2.95	2.68	1.10

Animal performances

Silage No.	1	2	3	4
Mean liveweight of 7 bullocks per batch (lb.)	723	739	739	752
Daily intake silage (fresh)	62.4	50.5	45.2	33.5
Daily Digestible Organic matter intake	8.02	8.9	9.2	9.3
Daily intake fresh silage g/kg	413	330	296	215
Daily intake DOM g/kg	53.0	58.1	59.6	59.6
Metabolisable Energy (ME) of silage k cal/g DM	2.53	2.44	2.33	2.36
Daily ME intake Mcal.	13.6	15.24	15.45	15.48

There was thus a fall off in intake of fresh silage with increasing dry matter content but an increase in the amounts of dry matter, digestible organic matter and energy taken up because the

dry matter content of the silage increased, from silage 1 to silage 2 but not much of an increase for 3 and 4 probably because the digestibility of these silages had been reduced.

Maximum intake of digestible organic matter, the basis for livestock production was calculated to occur at 34.4% dry matter.

There is no doubt that increased dry matter by wilting results in greater consumption. Bigger acreages of grass would be necessary to feed a particular number of cattle. This could be wasteful unless some practical gain could be achieved as lower consumption of alternative costlier feeds, whilst maintaining condition or with correspondng increases in livestock production. Note that these four silages were from the same crop in the same stage of growth. If the increased dry matter of the silage had been obtained by delaying harvesting until the crop was 2 or 3 days more mature, consumption would have fallen because of lower digestibility and probably poorer quality in other aspects.

Why low dry matter silage should be less readily eaten remains a mystery. It is said to be due to its containing more histamines, more volatile acids, more lactic acid or more ammonia which depress appetite.—I.V.H.

146. ANHYDROUS AMMONIA ?

A COMPARISON OF THE EFFECT OF ANHYDROUS AMMONIA AND A SOLID AMMONIUM NITRATE FERTILISER ON HERBAGE PRODUCTION FROM A PURE PERENNIAL RYEGRASS SWARD

J. Agric. Sci. Camb. (1970), Vol. 75, pp. 347-53.

D. REID and M.E. CASTLE, Hannah Dairy Research Institute, Ayr.

Anhydrous ammonia (82% N) and ammonium nitrate (34.5% N) were applied at 100, 200 and 300 lb N/acre per annum to an S.24 perennial ryegrass sward. At each level of application, the fertilisers were applied either as five equal split dressings or as a single spring dressing. Herbage yields were measured by five harvests taken during the year.

Yields increased as level of fertiliser N application was stepped up. At all nitrogen levels, there was little difference in yield between a single dressing or five dressings of anhydrous ammonia. Because of this and taking into account the high cost of application, anhydrous ammonia can be applied as one or two large dressings.

In contrast, five dressings of ammonium nitrate always gave a higher yield than a single dressing. At each level of application a single dressing of ammonium nitrate gave slightly less yield than a single dressing of anhydrous ammonia but when split into five dressings, ammonium nitrate outyielded anhydrous ammonia.

On a practical farm scale, anhydrous ammonia would normally be applied as a single dressing in spring whilst ammonium nitrate would be split over the season. Split dressings of ammonium nitrate gave a more uniform seasonal distribution of herbage production than a single dressing of anhydrous ammonia. On average, the ammonium nitrate treatment outyielded the anhydrous ammonia treatment by 9.3, 15.8 and 16.1% at the 100, 200 and 300 lb N/acre rates respectively. The main reason for the poorer effect of anhydrous ammonia is delayed uptake of nitrogen in the spring since the ammonia has to be converted to nitrate before it can be absorbed by the plant.

The authors concluded that when applied at the same nitrogen rate, anhydrous ammonia has no production advantages over ammonium nitrate as a nitrogenous fertiliser for intensive grassland. —J.F.

147. ANHYDROUS AMMONIA AGAIN ?
THE EFFECTS OF THE DATE OF APPLYING ANHYDROUS AMMONIA OR A SOLID NITROGEN FERTILISER ON THE SPRING GROWTH FROM A PURE PERENNIAL RYEGRASS SWARD

J. agric. Sci. Camb. (1970), Vol. 75, pp. 523-32.
D REID and M. E. CASTLE, Hannah Dairy Research Institute, Ayr.

Two experiments were reported in which spring herbage yields and growth rates from an S.24 perennial ryegrass sward were measured following the application of 120 lb fertiliser N/acre at various dates in winter and spring as (a) anhydrous ammonia (82% N); (b) ammonium nitrate (34.5% N); and (c) sulphate of ammonia (21% N). Herbage yields were measured at successive dates from April until mid-June. Greater yields of herbage and faster growth rates were obtained from ammonium nitrate and sulphate of ammonia than from anhydrous ammonia with all dates of application from January to April. With December application the spring growth rate of herbage was the same for all fertilisers. On average, calculation of dates on which a yield of 2000 lb/acre would be available for grazing, showed a delay of 12-15 days with anhydrous ammonia compared with the other fertilisers.—J.F.

148. WHITE CLOVER VARIETIES
THE EFFECT OF VARIETY AND OF COMPANION GRASS ON THE PRODUCTIVITY OF WHITE CLOVER

'White Clover Research,' Occas. Symp. No. 6, Brit. Grassld. Soc. (1970), pp. 175-80.
R. D. HARKESS, I. V. HUNT and J. FRAME, West of Scotland Agricultural College, Ayr.

Nine varieties of white clover were sown (a) alone (b) with S.24 perennial ryegrass and (c) with S.48 timothy/S.215 meadow

fescue. Yields were measured under a 4 harvests/year system. No fertiliser N was applied. S.24 showed itself to be less compatible to white clover than S.48/S.215. Under this system, the clovers' main growing season followed at a time when growth of the aggressive ryegrass was declining but coincided with the peak growth of the non-aggressive timothy/meadow fescue. By the third harvest year, clover contribution to the swards had fallen markedly but there were varietal differences; Aberystwyth S.100, Grasslands Huia and Kersey were the most persistent and made up a third or more of the herbage in their respective swards. An intermediate group was made up of Cultura, Milka and Zero. The lowest yielding varieties were Pertina, Kent and Smallbladet. There were no differences between clover varieties in digestibility which lay between 74-78%. This stresses the value of a good clover sward as a source of highly digestible material suitable for stimulating animal production. Dry matter production averaged between 6500 and 7500 lb/acre for the nine swards over the three harvest years.

In grass/clover swards, there is usually a decline in clover content with age. This is related to the nitrogen released by the clover encouraging overshadowing by grass. Some of this effect is removed when the crops are grazed. Thus to maintain high grass/clover sward yields, clover decline must be prevented by either appropriate management such as frequent grazing and checking potash and phosphate levels in soils.—J.F.

149. RED CLOVER

A COMPARISON OF SIX RED CLOVER VARIETIES IN ASSOCIATION WITH THREE GRASS SPECIES

Irish J. agric. Research (1970), Vol. 9, pp. 203-213.

V. CONNOLLY, An Foras Taluntais, Oakpark, Carlow, Ireland

The production of red clover/grass swards, using combinations of each of three grasses with each of six clovers to give 18 different swards, was measured.

Total herbage yields averaged 4910, 9780 and 7800 lb/acre (with no fertiliser nitrogen in three years including the seeding year). Swards with S.123 gave the highest yields. S.151, Resistenta and S.123 Nomark were slightly lower yielding, Altaswede and Rea were the poorest yielders. The grass varieties used, namely S.48 Timothy, Ruanui perennial ryegrass and S.22 Italian ryegrass made little difference to overall yield but altered the earliness or lateness of production. The amount of red clover seed used in the U.K. has fallen by 50% in the last ten years. Investigations at Auchincruive have shown that high yields of dry matter can be obtained from red clover dominant swards without the use of fertiliser nitrogen; red clover is also high in nutritive value and mineral content. Further trials have shown yield and persistence advantages in the use of tetraploid rather than diploid red clover. In view of these results and those being obtained elsewhere, the role of red clover in grassland requires a major reappraisal.—J.F.

150. WINTERING SHEEP.

THE EFFECT OF WINTER GRAZING BY SHEEP ON SPRING AND EARLY SUMMER PASTURE PRODUCTION

J. Brit. Grassld. Soc. (1970), Vol. 25, pp. 167-171.

J. FRAME, Auchincruive.

Many lowland farmers winter ewe hoggs on their grassland. The objectives of the experiments reported in this paper were to measure the effects of hogg wintering on subsequent spring and early summer production. Plots were grazed over the winter period from October to March. Some plots were grazed during one month only whilst others were grazed for two or three months during the winter. No plots were grazed for each of the six winter months. In conjunction with grazing, a subsidiary trial was carried out on the effect of adding nitrogen in the spring to overcome the effect of winter defoliation.

Results indicate that grazing after Christmas had a severe effect on early bite, particularly March grazing, which reduced the yield by 50%. This is important since the end of March is the usual time to remove the hoggs. However this effect of early March grazing could be overcome by the application of around 50 lb. N/acre. If the crop was allowed to grow till May or June for silage, 20 lb. N could make up for the reduction in yield. The present charges for wintering would adequately cover the cost of the nitrogen.

Early bite may be more important to the dairy farmer so he could limit the extent of the winter grazing of the hoggs. Otherwise he could make sufficient silage and reduce the need for early bite. On the other hand lowland farms are becoming more heavily stocked and there could be less roughage left on the fields for winter grazing. This, coupled with a reduced acreage available if spring grazing for cattle is to be protected and the rising costs may mean that the hill farmer should be looking for alternative wintering methods.—R.D.H.

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