GRASSLAND

JOURNAL

OF THE

SOUTH WEST

AND

CENTRAL SCOTLAND

GRASSLAND SOCIETIES

No. 10 WINTER 1967

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EDITORIAL

With our Editor still overseas and our Acting Editor en route to join him, the final documents for the publication of this edition of Greensward have been passed on to a Deputy Acting Editor.

Several of our members have been called to assist on National and International Committees, mention being made to them under News Items. It is very heartening to know that S.W.S.G.S. and C.S.G.S. members play a role in grassland farming outwith their native heaths and that their comment and judgement is sought by others.

Articles in this issue of the Journal include some thoughts on the self-feeding of silage and a classification of the more common grass and clover varieties on the market. The ever growing use of abbreviations for committees, councils and associations has prompted Dr Frame to list a few of the many that one may encounter in the farming press. Note that B.G.S. is officially recognised as British Grassland Society and British Goat Society I hope there is no reciprocal membership!

Last February both Societies acted as hosts to Professor de Groot from the Netherlands, who gave two lectures on nitrogenous fertiliser. Dr Frame has reported on these meetings which drew record attendances.

The spring tour of our Societies took members to Kirkcudbrightshire and Wigtownshire and Messrs Phillips, Patterson and Barrett have passed on to us a note of their comments and observations during these tours. The British Grassland Society Summer Tour was in Devon this year and the three Society members who attended have written a report for the Journal. Finally, the summer trip made by our own Societies to the Republic of Ireland was led by Mr John Watson of the Hannah Dairy Research Institute and a report on this very successful tour is presented by Mr G. M. Gilmour of West Crosshill.

The membership of both Societies continues to grow and in this Journal new members of S.W.S.G.S. have been listed. Both Societies have drawn up interesting winter programmes and these are noted under Forthcoming Events. Remember that a reciprocal arrangement enables Society members to attend any of these meetings.

RONALD D. HARKESS.

SOUTH WEST SCOTLAND GRASSLAND SOCIETY
EXECUTIVE COMMITTEE 1967-68

Chairman: J. G. Marshall, Hardgrove, Carrutherstown, Dumfriesshire. (Carrutherstown 209).

Vice-Chairman: A. Gray (Jnr.), Ingleston, Borgue, Kirkcudbrightshire. (Borgue 208).

Past-Chairman: R. W. Montgomerie, Lessnessock, Ochiltree, Ayrshire. (Ochiltree 226).

Treasurer: Dr M. E. Castle, Hannah Dairy Research Institute, Kirkhill, Ayr. (Prestwick 77292).

Secretary/Journal Editor: I. V. Hunt, Grassland Husbandry Department, West of Scotland Agricultural College, Auchincruive, Ayr. (Annbank 331).

Elected Members

1966-68: R. S. Smith, Corsankell, Saltcoats, Ayrshire.
L. D. Drysdale, Stewarton, Kirkinner, Wigtownshire.
J. L. Bell, Hoddamton, Ecclefechan, Lockerbie, Dumfriesshire.
M. J. Bannister, Carseminnoch, Newton Stewart, Kirkcudbrightshire.

1967-69: A. Buchan, Ladykirk Estate Office, Monkton, Ayrshire.
H. O. Chalmers, Craigencrosh, Stoneykirk, Stranraer, Wigtownshire.
P. Gordon-Duff-Pennington, Kirkland Tynron, Dumfries, Dumfriesshire.
A. Gray (Jnr.), Ingleston, Borgue, Kirkcudbright, Kirkcudbrightshire.

College Advisers:

A. Campbell, 20 Miller Road, Ayr, Ayrshire. (Ayr 64627).
S. A. Ross, Edinburgh Road, Stranraer, Wigtownshire. (Stranraer 2649).
J. Thorburn, 41a Castle Street, Dumfries, Dumfriesshire. (Dumfries 4169).
R. M. Patterson, 104 King Street, Castle Douglas, Kirkcudbrightshire. (Castle Douglas 2743).

Co-opted Members:

I. M. Jennings, Nether Cleugh, Dalry, Castle Douglas, Kirkcudbrightshire. *
Professor J. S. Hall, West of Scotland Agricultural College, Auchincruive, Ayr.
A. E. Parkinson, West of Scotland Agricultural College, 6 Blythswood Square, Glasgow, C.2.
G. M. Berrie (Secretary: Central Scotland Grassland Society), West of Scotland Agricultural College, 6 Blythswood Square, Glasgow, C.2.

* Resigned July, 1967.

CENTRAL SCOTLAND GRASSLAND SOCIETY
EXECUTIVE COMMITTEE 1966-67 *

Chairman: J. M. Argo, Newton Farm, Cambuslang, Lanarkshire. (Cambuslang 3023).

Vice-Chairman: R. Howie, Drumfork, Helensburgh, Dunbartonshire. (Helensburgh 2329).

Past-Chairman: G. M. Gilmour, West Crosshill, East Kilbride, Renfrewshire. (Auldhouse Cross 232).

Treasurer: J. Waddell, College Office, Portland Place, Lanark, Lanarkshire. (Lanark 802).

Secretary: G. M. Berrie, West of Scotland Agricultural College, 6 Blythswood Square, Glasgow, C.2. (City 5211).

Elected Members

1965-67: A. W. Lyon, Linnhead, Lanark, Lanarkshire.
T. Paterson, Wemysshill, Overtown, Lanarkshire.
W. Andrew, Crossflat, Kilbarchan, Renfrewshire.
N. Simpson, Largievrechtan, Rothesay, Bute.

1966-68: J. McGregor, Boghill, Lesmahagow, Lanarkshire.
W. B. R. Elder, Mid Glen, Langbank, Renfrewshire.
R. Simpson, Duchlage, Crieff, Perthshire.
J. Risk, Gowstone, Buchlyvie, Stirlingshire.

College Advisers:

C. C. Watson, 8 St. Mirren Street, Paisley, Renfrewshire. (Paisley 9152).

A. G. Malcolm, Beechwood, Stirling, Stirlingshire (Stirling 4731).**

Co-opted Members:

Professor J. S. Hall, West of Scotland Agricultural College, Auchincruive, Ayr.

A. E. Parkinson, West of Scotland Agricultural College, 6 Blythswood Square, Glasgow, C.2.

I. V. Hunt (Secretary: South West Scotland Grassland Society and Journal Editor), Grassland Husbandry Department, West of Scotland Agricultural College, Auchincruive, Ayr.

* Owing to the spread of Foot and Mouth Disease the Central Society has postponed its A.G.M. The committee for 1967-68 will be printed in the next issue of Greensward.

**Retired from College service June 1967.

FORTHCOMING EVENTS

S.W.S.G.S. Winter Meetings

Date : Wednesday, 10th January, 1968. 7.30 p.m.
Speaker : NEIL MCCALL SMITH, Esq., Conachan.
Subject : HILL LAND MANAGEMENT.
Place : Royal Hotel, Cumnock.

Date : Wednesday, 14th February, 1968. 7.30 p.m.
Speakers : J. M. FERRIS, Esq., Wynondham, Melton Mowbray, Leicestershire.
J. KERR, Esq., Camiscan, Craigie, Kilmarnock.
P. RENTOUL, Esq., Low Kilphin, Ballantrae, by Girvan.
Subject : SLURRY.
Place : Village Hall, Glenluce.

Date : Wednesday, 13th March, 1968. 7.30 p.m.
Speaker : H. MUDD, Esq., N.A.A.S., Great House Experimental Farm, Lancashire.
Subject : THE VALUE OF PERMANENT GRASS IN THE FARM ECONOMY.
Place : Balcastle Hotel, Lochmaben.

C.S.G.S. Winter Meetings

Date : Monday, 15th January, 1968. 7.30 p.m.
Speaker : NEIL MCCALL SMITH, Esq., Conachan.
Subject : HILL LAND.
Place : Agricultural College, 6 Blythswood Square, Glasgow, C.2.

Date : Monday, 26th February, 1968. 7.30 p.m.
Speaker : Dr M. E. CASTLE, Hannah Dairy Research Institute.
Subject : GRASSLAND MANAGEMENT IN NEW ZEALAND.
Place : Agricultural College, 6 Blythswood Square, Glasgow, C.2.

B.G.S. Winter Meeting

Date : Friday, 8th December, 1967. 9.30 a.m.
Speakers : Six papers will be presented by different speakers.
Subject : GRAZING AND ANIMAL HEALTH.
Place : Royal Commonwealth Society's Assembly Hall, Waren Street, London, W.C.2.

NEWS ITEMS

1. Mr I. V. Hunt, Grassland Adviser for the West of Scotland and Secretary of the S.W.S.G.S. has been elected to the Presidency of the British Grassland Society for the year 1967/68. We congratulate Mr Hunt on receiving this honour and wish him every success during his term of office.

2. Mr W. B. R. Elder of Langside, a member of the C.S.G.S., has been elected to the Executive Committee of the B.G.S. for a three year term of office. The committee were keen to have a former member, especially from Scotland, and we are delighted that Mr Elder has accepted the invitation to serve on the Committee of our parent Society.

3. Mr I. V. Hunt returns from his year's secondment with F.A.O. in the Argentine in early November. Dr John Frame of Auchincruive has acted as S.W.S.G.S. Secretary and Journal Editor during Mr Hunt's absence and we are grateful to him for his efficient execution of secretarial and editorial duties.

4. Dr John Frame is to follow Mr Hunt at the F.A.O. project in the Argentine. Principal Hall and the Governors of the West of Scotland Agricultural College have granted Dr Frame a year's leave of absence. We wish him " un bueno viaje ! "

5. Mr Fraser Evans of Penkiln, Garlieston, was one of the speakers at the Tower Silage Forum at the National Grass Conservation Conference in Bristol (Act. 30 - Nov. 1). The Conference, sponsored by the Farmer and Stockbreeder, was attended by 500 farmers, advisers and research workers.

6. The British Grassland Society is holding its Summer Tour in the West of Scotland in 1969. Messrs Montgomerie, Marshall and Jamieson of the S.W.S.G.S. and Messrs Howie, Argo and Gilmour of the C.S.G.S. are serving on the Local Organizing Committee.

7. The B.G.S. tie may be worn by members of the Local Grassland Societies. The ties with a grass/clover motif on dark blue or maroon background are available at 18/- each, post free, from R. S. Taylor, Esq., Secretary, B.G.S., c/o Grassland Research Institute, Hurley, Maidenhead, Berks.

SOME THOUGHTS ON THE SELF-FEEDING OF SILAGE

by RONALD D. HARKESS

West of Scotland Agricultural College, Ayr

Advantages

In the future it is likely that our industry will be able to afford neither cash nor manpower for the frequent handling of food for stock — especially the bulky products such as silage. The increasing herd size is likely to aggravate this situation. Self-feeding will help, therefore, to reduce labour requirement, lower the cost of animal production and at the same time, it is hoped, save the producers' money. There is also the social aspect of handling silage and self-feeding can lead to improved working conditions and more contented labour.

Prof. Ian Moore at Seale Hayne has recorded the labour requirements for a dairy cow as 140 man hours for the traditional housing system, and 80 man hours where cows are self-fed. This is a saving of around £15 per cow per annum and Runcie at Edinburgh shows almost similar results. By saving up to 2 man hours per day it enables one man to look after more cattle. Some attention will be necessary at the silo of course in order to adjust the barriers, loosen silage, remove spoilage and clean floors, but probably half an hour a day would be sufficient even for a large herd.

If labour is short then self-feeding may be more applicable. However, if land be short and hence less feed available, then some form of restricted self-feeding may be adopted. The factor which is in shortest supply or is the more expensive — labour or feed — must be saved.

On larger farms it may be possible to (a) reduce the number of men on stock work, (b) cut out overtime payments or (c) expand existing enterprises or introduce new ones with the labour saved.

On smaller farms relying on family labour the benefits of self-feeding will only be felt if labour saved is used for expanding farm output and there is usually plenty to do.

As far as the animals are concerned it would appear that they do enjoy a sense of freedom and are much more docile and more easily handled, especially with 24-hour access to the silage. Self-feeding provides exercise, avoids swollen joints and sore feet and in the case of dairy cows, trampled teats.

Another advantage of the yard and self-feed set-up is that usually more cows can be kept than in the less flexible traditional standings. Self-feeding can be treated like summer work in that the cows are collected before milking and returned to the silo in the same way as when out at grass.

Many farm buildings have been replanned to comply with cleaner milk production regulations and many farmers have taken this chance to switch to a yard and parlour layout which, of course, is ideal for self-fed silage. However, people with good byres need not be put off — it is still possible to self-feed although it usually means more limited feeding and it does not do away with tying up cows, carrying bedding and clearing out the byre. One farmer who has a 25-tie byre keeps 50 cows. Twenty-five are self-fed during the day and the remainder at night but extra care has to be taken when using limited access time to the silage face.

Disadvantages

Firstly, some animals may not respond to self-feeding. Smaller and nervous animals may be bullied but reports show that all breeds of cattle can be successfully fed on the system. Individuality is perhaps reduced and this may be more problematical with dairy cows where the herd is run as a single unit rather than as a number of units.

Yield per cow will rarely be as high as when individually fed although 900 gallons should be reached, but of course there are many more factors which can affect the milk yield of a cow. However, because of lower yields it is probably sounder for the farmers with the smaller herd (20/30 cows) to stick to the traditional system and go for higher yields per cow, and leave the more extensive set-up to the larger farms.

While mentioning individual response it is advisable to keep an eye on heifers in-calf — due to their temperament and their teeth changing they need special attention and should be slowly introduced to self-feeding so that they can hold their own when taken into the milking herd. Cattle must be hornless when self-feeding is practised.

Another point to watch is the quantity of silage that can be made. If cows are moved on to unlimited self-feeding from restricted indoor feeding more silage will be required since hay feeding will be reduced, and whereas one can buy hay this is usually not so with silage. Of course it may well be that the areas released from hay for silage will cope with demand.

Thirdly, the additional outlay for concrete floors, aprons, fences, gates, etc. must be considered.

Before starting self-feeding, therefore, one must make sure that sufficient silage can be made, that the aim is for average production of cheap milk from grass products.

Efficiency of Self-Feeding

There are several factors which affect the efficiency of a self-feeding system and brief mention is made to these under the following seven headings. Whilst most reference is made to dairy cattle these basic principles apply to all classes of stock.

Silage quality. Silage must be well made and palatable so that it is readily consumed. This means good fermentation and uniform quality throughout the silo. A high moisture content may limit dry matter intake and in turn affect milk yield. Also one must not be tempted to over-estimate the quality of the silage as is so often done. Remember that in the fermentation process carbohydrates (or energy feed) are lost and so silage may have to be supplemented with a little oats or barley.

Quantity of silage. Consumption can vary from 45-130 lb per head per day depending on several factors:—

(i) size of cow; for example Friesians will eat more than smaller breeds.

(ii) time of access to silo; with 24-hour access a cow can eat up to 130 lb but if the time is limited to 8 to 12 hours then consumption will fall to 40-70 lb.

(iii) width of face per cow; excessive restriction will reduce intake. If access is less than 12 hours then the available face must be $2\frac{1}{2}$ to 3 ft. per cow. This is one factor frequently overlooked. 1 ft. for 12 hours and 6-9 inches for 24 hours are suitable. If the face space is too small then bullying will occur, and if time is limited some of the cows will not consume sufficient quantities of silage. On the other hand if face space is too great, selective feeding will occur and secondary fermentations may reduce the palatability.

(iv) height of the silage may also be mentioned; somewhere around 6 ft. is usual but this can be varied according to the size of the cow. Some farmers make it higher and throw down the silage as in an easy-feed system. Where a Dutch barn is used for roofing it may be advisable to stack the silage as high as possible — to 8 ft. or 9 ft. and so make as much use of the expensive roofing as possible.

(v) the amount of silage consumed will also depend on *other feeds* such as kale and hay. Many strip graze kale during day and self-feed silage at night (56 lb kale, 70 lb silage). At Auchincruive where hay and silage are offered *ad lib.* the cows consume 100 lb silage and 5 lb hay for M+2.

Lacerated or long silage. Generally lacerated silage is easier to pull out and so the cows will tend to eat more. Certainly the degree of consolidation will be greater and so there is more chance of an even silage being produced.

Type of barrier. The barrier must be placed in such a way as to prevent the stock from climbing on to the silage and to encourage them to graze the face as evenly and as cleanly as possible, but it should not limit intake especially when shorter access times are given to the silo. One of two types of barrier is frequently used. The electric fence which is useful in that the height can be varied or the self-supported or suspended gate with a bottom board which can cut out waste at ground level.

It may be necessary to teach the cattle how to graze "vertically." The silage can be offered at first with no barrier. Too great an upset when first introduced to the silo may extend the settling down period and upset the intake of necessary quantities of silage.

The ease of approach. The silos should be easy to get to, well drained, and on good concrete yarding; mud or wet conditions may deter the stock especially younger beasts. It should be of course sited to avoid draughts; built across the path of the prevailing wind rather than into the wind. The actual size and type of silo will of course depend on the cow numbers, permanency and capital available. As the permanency and capital input decreases so the silo becomes further from the ideal type — the open pit being the least desirable. If the silo cannot be built wide enough for self-feeding from one or both ends, then it may be possible to have one of the walls collapsible. If it is not possible to provide sufficient face, an easy-feed system whereby silage is hand cut and placed in racks or troughs beside the silo, is well worth considering. Most of the principles associated with self-feeding also apply to easy-feed systems.

The length of the feeding season. Quantities of other food available will affect the quantities of silage required. The winter feeding period usually extends to 150-180 days. With a 12 hour access, cows will eat 50 to 60 lb per day which is $4\frac{1}{2}$ tons in 6 months. If the cows are on a high silage diet with 24 hour access 100-120 lb per day should be allowed for which is 8/9 tons for 6 months. The ability of individual cows to take in sufficient silage will affect the efficiency of a self-feeding set up. It appears that larger cows and older cows are more suited to this method. Nervous animals and heifers should receive careful handling.

Supplementation with concentrates. Unless the silage is of high quality then the feeding of concentraes is necessary for higher yielding cows. What must be avoided is the excessive consumption of silage and concentrates with little increase in milk production. Every endeavour must be made to take maximum milk from the silage and then supplement according to yield.

A good target at the start will be M+1½ and this may be improved upon as one's knowledge of the system increases. M+1½ should be obtained from 90 lb silage+3 lb hay. If the grass products are of good quality a cereal supplement will probably suffice for the next gallon but thereafter a balanced concentrate will be required.

Note. The Animal Husbandry Department of the West of Scotland Agricultural College has published the following articles concerning the feeding of silage.

1. Self-feeding of silage. Advisory Leaflet No. 51, 1957.
2. Feeding grass silage. Advisory Leaflet No. 50, Revised 1964.
3. Self-feeding of grass silage. D.A.F.S. Advisory Bulletin No. 3, 1965.

The first two are available on request from any College Office or Advisory Officer. The third publication can be purchased through H.M. Stationery Office or a recognised bookseller.

THE CLASSIFICATION OF HERBAGE VARIETIES

Summarized by
J. FRAME and R. D. HARKESS
West of Scotland Agricultural College, Ayr

It has become more important to be familiar with (1) varietal names of grasses and clovers and (2) their classification according to date of heading.

With official Plant Indices for herbage varieties about to be introduced, varietal names will have greater meaning than in the past, since the same variety will not be able to masquerade under several aliases. The Indices have been set up so that plant breeders will receive royalty rights for their new varieties. The Indices will list all the distinct varieties. Before new grasses and clovers can be registered, they have to undergo statutory performance trials. There have also to be tests to establish distinctness, stability and uniformity of a variety before granting rights. A new variety cannot be sold or advertised until it is registered on the appropriate Index and a report of its performance published. The Indices should halt the flood of varieties which comes on to the market year after year. At the same time it should stimulate plant breeding.

Date of heading or flowering has become important because of the relationship between digestibility and stage of growth. Digestibility is now the chief measure of feeding value of herbage. Accordingly, the classification of herbage varieties in relation to date of flowering has assumed new importance. The following classification is taken from the Classified Lists of Herbage Seed Stock, 1966, produced by the National Institute of Agricultural Botany.

Perennial ryegrass

EARLY (E.):	Those heading at the same time as, or earlier than, S.24 (Grassland Ruanui, Presto, S.24).
MEDIUM EARLY (M.E.):	Those which head up to 12 days later than S.24 (Barenza Early Hay, Reveille, Verna).
MEDIUM LATE (M.L.):	Those heading from 12 to 22 days later than S.24 (S.101, Taptoe, Kent, S.321).
LATE (L.):	These which head more than 22 days later than S.24 (Melle, Sceempter pasture, S.23).

Italian ryegrass

EARLY (E.):	Those heading more than 6 days earlier than S.22 (Imperial, Tetila).
INTERMEDIATE (I.):	Those heading from 4 to 6 days earlier than S.22 (Prima Roskilde, Grasslands Paroa, Combi).
LATE (L.):	Those which head less than 4 days earlier than S.22 (Sceempter, Gartons Ellesmere, S.22).

Hybrids between Perennial and Italian ryegrass

ITALIAN (It.):	Those with awned seed, early spring growth, erect habit and open sward (Gartons Own Leafy).
INTERMEDIATE (I.):	Those with intermediate characteristics (Grasslands Manana, Io).
PERENNIAL (P.):	Those with awnless (or short awns) seed, late spring growth, prostrate habit forming a close sward (Grasslands Ariki, Mommersteegs and Sceempter Long Rotation).

Westerwolds ryegrass

EARLY (E.):	Those heading more than 3 days earlier than a Dutch seed stock, Woldi (Gulf).
INTERMEDIATE (I.):	Those heading within 3 days of Woldi (Mommersteeg's, Tewera).
LATE (L.):	Those heading more than 3 days later than Woldi (Sceempter, Barenza).

Cocksfoot

EARLY (E.):	Those heading more than 4 days earlier than S.37 (S.345).
INTERMEDIATE (I.):	Those which head within 4 days of S.37 (Trifolium, Roskilde Late, S.37, Hera).
LATE (L.):	Those which head more than 4 days later than S.37 (Frode, S.26, S.143).

Timothy

EARLY (E.):	Those which head at the same time as, or earlier than Scots (S.352, Scots).
MEDIUM EARLY (M.E.):	Those heading up to 8 days later than Scots (Omnia, Climax, Megill-smith 90).

MEDIUM LATE (M.L.): Those heading from 8 to 20 days later than Scots (S.51, Combi hay, Drummond).

LATE (L.): Those which head more than 20 days later than Scots (S.48, S.50, King).

Meadow fescue

EARLY (E.): Those which head within 6 days of S.215 (Hinderupgaard, S.215, Pajbjerg and Barenza pasture).

LATE (L.): Those which head more than 6 days later than S.215 (S.53, Mommersteeg's pasture).

Tall fescue

EARLY (E.): Those which head more than 4 days earlier than S.170 (Megillsmith Early, Manade).

MEDIUM EARLY (M.E.): Those heading within 4 days of S.170 (Alta, S.170).

MEDIUM LATE (M.L.): Those heading from 4 to 14 days later than S.170 (Kentucky 31).

LATE (L.): Those which head more than 14 days later than S.170 (Ottowa Syn A, Gartons Own Leafy).

Red clover

EARLY (E.): Those flowering more than 10 days earlier than Eng. S/c (Cotswold), and corresponding to the 'Broad Red Clovers' (Dorset Marl, Essex Broad Red, Cotswald).

MEDIUM EARLY (M.E.): Those flowering up to 20 days later than Eng. S/c (Cotswold), being the earlier flowering stocks of 'Late flowering Red Clovers' (Grasslands Turoa, Trifolium, S.151).

LATE (L.): Those flowering more than 20 days later than Eng. S/c (Cotswold), and corresponding to the later flowering stocks of 'Late Flowering Red Clovers' (Altaswede, S.123, Montgomery Late).

White clover

At present, classification of white clovers is made on the basis of length of leaflet. There is a difference of about 5 cms (= 25 units) in length of leaflet between the smallest and largest leaved white clovers: —

SMALL (S.):	Those seed stocks having leaflets as small as, or not more than five units larger than, Kent Wild White (S.184, Kent Wild White).
MEDIUM SMALL (M.S.):	Those having leaflets from 5 to 12.5 units larger than Kent Wild White (Grasslands Huia, S.100, Smalbladet V).
MEDIUM LARGE (M.L.):	Those having leaflets from 12.5 to 20 units larger than Kent Wild White (Kersey, Milka K & V).
LARGE (L.):	Those having leaflets more than 20 units larger than Kent Wild White (Ladino).

ABBREVIATIONS

In speech and writing, new idols are being set up for worship. One of these, whose following is increasing practically daily, is the use of abbreviations. You only need to scan the pages of the daily press or the farming press for proof. To keep our memories in trim as regards the commonly-used symbols in agriculture, a list of some of the more common ones are appended below. Excellent opportunities exist to set up organisation at associations with such symbols as Q or Z. At least, they would be unique and eye-catching. Any offers ?

A.B.R.O.	Animal Breeding Res. Organisation.	B.S.A.P.	British Soc. for Anim. Prod.
A.E.C.	Agricultural Executive Committee.	C.A.B.	Commonwealth Agric. Bureau.
A.L.C.	Agricultural Land Commission.	C.L.A.	County Landowners Association.
A.L.S.	Agricultural Land Service.	C.R.O.	Cereals Research Organisation.
A.R.C.	Agricultural Research Council.	C.S.G.S.	Central Scotland Grassland Society.
B.E.M.B.	British Egg Marketing Board.	D.A.F.S.	Department of Agriculture and Fisheries for Scotland.
B.G.R.	Board of Greenkeeping Research.	E.E.C.	European Economic Committee.
B.G.S.	British Grassland Society or British Goat Society.	E.H.F.	Experimental Husbandry Farm.
B.R.A.	Beef Recording Association.		

F.A.O.	Food and Agriculture Organisation.
F.M.C.	Fatstock Marketing Corporation.
G.R.I.	Grassland Research Institute.
H.F.R.O.	Hill-Farming Res. Organisation.
H.D.R.I.	Hannah Dairy Research Institute.
H.G.C.A.	Home Grown Cereal Authority.
I.C.A.M.	Institute of Corn and Agric. Merchants.
I.S.T.A.	Intern. Seed Testing Assoc.
L.A.S.	Land Agents' Society.
M.A.F.F.	Ministry of Agric., Fisheries and Food.
M.M.B.	Milk Marketing Board.
N.A.A.S.	National Agricultural Advisory Service.
N.I.A.E.	Nat. Inst. of Agric. and Engin.
N.I.A.B.	Nat. Inst. of Agric. and Bot.
N.F.U.	National Farmers' Union.
N.G.D.	National Grassland Demonstration.
O.E.C.D.	Organisation for Economic Co-operation & Development.
P.B.I.	Plant Breeding Institute.
P.I.D.A.	Pig. Ind. Develop. Authority.
P.M.B.	Potato Marketing Board.
R.A.S.E.	Royal Agric. Soc. for England.
R.H.A.S.	Royal Highland Agric. Society.
S.S.R.P.B.	Scottish Soc. for Res. in Plant Breeding.
S.M.M.B.	Scottish Milk Market Board.
S.P.A.L.D.A.	Scottish Peat and Agri. Land Devlopment Association.
S.W.S.G.S.	Sout West Scotland Grassland Society.
V.I.S.	Vet. Investigation Service.
W.P.B.S.	Welsh Plant Breeding Station.
W.R.O.	Weed Research Organisation.
W.S.A.C.	West of Scotland Agricultural College.
Y.F.C.	Young Farmers' Club.

J. FRAME.

NITROGENOUS FERTILIZER AND ANIMAL HEALTH

by PROFESSOR TH. DE GROOT, THE NETHERLANDS

Meetings at Glasgow and Castle Douglas, 27th and 28th February, 1967

On successive evenings, Professor de Groot lectured to the Central and South West Grassland Societies on the subject of nitrogenous fertilizer and animal health.Professor de Groot fulfils a dual role in the Netherlands. Firstly, he lectures on animal nutrition at the University of Utrecht. Secondly, he is employed by the Dutch Nitrogenous Fertilizer Industry to carry out research concerning animal health on pastures receiving high levels of fertilizer nitrogen.

To illustrate the high intensity of pasture utilization in his country, Professor de Groot pointed out that the Netherlands produced 11 per cent of the total milk and 6 per cent of all beef/meat produced by the European Economic Community countries. Yet the Netherlands has only 3 per cent of the total farm area and 6 per cent of the total grassland ! Several factors were responsible for the high intensity. These were: suitable soil and climate for grass growth, low-priced nitrogenous fertilizers and small dairy herds. As a result of cheap fertilizer nitrogen, its use had increased

from an average of 50 units N per acre to 150 units N per acre per annum. Some farms are using 300 units N. As regards the dairy herd structure, two-thirds of the cows were kept in small or very small units. For example, nearly 90 per cent of the farms where cattle were kept had less than 20 milking cows while 56 per cent had less than 10 cows.

To explore the effects of increasing usage of fertilizer nitrogen, a chain of 'nitrogen' experimental farms was set up in 1949. Professor de Groot described some of the work carried out on these farms and the findings. Since animal health would be related to the compositional changes in the herbage as a result of nitrogenous manuring, much effort had been put into studies of these changes. The average composition of 243 herbage samples from the experimental farms in 1964 is shown below:

Average composition of herbage samples
(% in dry matter; minerals as oxides)

Crude protein	25.4	Sodium	0.31
Crude fibre	21.4	Calcium	0.64
Ash	9.8	Magnesium	0.26
Digestible crude protein	20.5	Phosphorous	0.45
Starch equivalent	66.0	Sulphur	0.40
Potassium	3.11	Chlorine	1.29

These figures may be compared with the requirements for milking cows shown below:

Requirements for milk production from cows of 550 kg* live weight and producing 4% B.F. milk.

kg milk/day*	*Crude protein*	*Digestible crude protein*	*Starch equivalent*
5	8.4	4.5	28
10	10.7	6.7	37
15	12.9	8.8	47
20	15.4	11.2	56
25	17.8	13.4	65
30	19.6	15.1	72

*1 kg = 2.2 lb.

It can be readily seen that the herbage had satisfactory contents of crude protein, digestible crude protein and starch equivalent. Excess protein is no problem since it is readily broken down in the rumen. The herbage also had satisfactory contents of minerals for milk production. If mineral deficiency arose, is was most likely to be with magnesium. The magnesium available to the animal was dependent on the dry matter intake, the content of magnesium in the herbage and the availability of the magnesium consumed. A high potash level in herbage could cause unavailability of the magnesium whilst a high potash level in soil could cause a low level of magnesium in the herbage. Excessive potash manuring was therefore unwise. As a target, there should be at least 0.25% of magnesium oxide in the herbage. Although it was important to raise soil magnesium to a satisfactory level, Professor de Groot also stressed that excessive magnesium manuring could lead to calcium deficiency in the herbage.

In recent surveys it was found that the incidence of hypomagnesia (staggers) was 2 to 4 per cent of the cattle on Netherlands farms. On the nitrogen experimental farms, the frequency of occurrence at 0.15% was less than a tenth of the national average.

Professor de Groot went on to describe a method of forecasting staggers knowing the percentage magnesium in the blood serum and in the herbage and the per cent potash and crude protein in the herbage. A prediction accuracy of 86% was obtained regardless of whether 150 or 600 kg N per hectare was applied to pasture (Note: 1 hectare = $2\frac{1}{2}$ acres approximately). A service operated in the Netherlands whereby grass samples could be sent to an analytical laboratory. The farmer then received advice within five days if the herbage was safe for grazing. If the magnesium content was too low, the farmer was advised to mow the herbage for hay or silage.

Milk yields from cows on the nitrogen experimental farms were above average for the country:

Average milk yield per lactation (kg milk)

Year	*Netherlands farm*	*Nitrogen farms*
1962/3	4372	4611
1963/4	4385	4653
1964/5	4298	4526

Professor de Groot then dealt in detail with an experiment set up in 1959 to compare herbage composition and animal performance under two nitrogen manuring regimes, viz., 150 and 600 kg N per hectare. (Note: about 120 and 480 units N per acre respectively). The basic idea behind this experiment was simply to investigate the effects of two differing types of herbage on animal health, one herbage being the result of average nitrogen manuring and the other the result of above-average manuring. Thus the experiment was essentially a veterinary exercise and not an experiment in herbage/animal productivity.

The average composition of the two herbages over a 6-year period is shown below:

Average composition of herbage, 1960–65.

	Nitrogen per hectare per annum	
Per cent dry matter	150 *kg*	600 *kg*
Crude fibre	24.2	23.2
Ash	10.1	10.2
Starch equivalent	62.0	63.0
Digestible crude protein	15.2	21.3
Nitrate	0.21	0.83
Potassium	2.50	2.55
Sodium	0.45	0.63
Calcium	0.65	0.73
Magnesium	0.20	0.23
Phosphorus	0.44	0.45
Sulphur	0.32	0.34
Chlorine	1.67	1.48

The milk production from identical twin dairy cows, split between the two fertilizer nitrogen treatments was as follows:

Average composition of milk.

Year	*Produced*	*Nitrogen per hectare per annum* 150 *kg*	600 *kg*
1962/3 ...	Milk per day (kg)	11.56	13.20
	Butterfat (%)	3.73	3.53
	Protein (%)	3.31	3.32
1963/4 ...	Milk per day (kg)	13.29	12.27
	Butterfat (%)	3.65	3.58
	Protein (%)	3.33	3.32
1964/65 ...	Milk per day (kg)	14.20	13.62
	Butterfat (%)	3.87	3.86
	Protein (%)	3.26	3.28

In effect, there was little difference between the milks. The percentage magnesium, phosphorus and calcium in the milks did not differ either. Thus, in these trials in the Netherlands, Professor de Groot pointed out that high levels of nitrogenous fertilizing had not had deleterious effects on animal health or animal production.

Professor de Groot then amplified many of the points already made by answering a host of questions. Some of these are detailed below:

Q: What are the solids-not-fat contents of the milks from the two nitrogen treatments ?

A: We estimate fat % and protein % and believe the lactose % to be rather constant. The more nitrogen used, the higher the digestible crude protein content of the herbage but the protein in milk does not rise accordingly. If the digestible crude protein content of the herbage is excessively low, the protein content of the milk can be reduced. Re. the fat %, there has so far been no significant difference between the nitrogen treatments. Any difference which arises in the solids-not-fat content would be due to changes in the fat %.

Q: Could you say more about the staggers forecasting service ?

A: The analysis of herbage takes 4 to 5 days and costs £2 per sample. The fact that the herbage in his pasture is five days older when the farmer gets his answer is not allowed for since this older herbage is safer. The time lag therefore is in effect a safety factor. Of grass is betwixt and between safe and dangerous, the farmer is advised to feed magnesium cake. About 8,000 farmers use the service each year.

Q: Do the cows get bloat readily in the experiments ?

A: No. There can be danger of bloat when the crude fibre content of herbage is too low. In the Netherlands, bloat is a hazard when cows from hilly regions (about 100 metres high) are transferred to lowland pastures.

Q: Is magnesium limestone of use in preventing staggers ?

A: Yes, it can be used to increase the magnesium content of the soil.

Q: Is there no danger to animal health from the nitrate content of 0.83% as a result of high nitrogen manuring ?

A: Nitrate ranged from 0.10 to 2.0% with high nitrogen and 0.04 to 0.9% with low nitrogen. The average of 0.83% does no harm. Normally, one reckons up to 2% as harmless and 3% dangerous. We have not experienced nitrate poisoning in the Netherlands.

Q: Could you say a word about the relationship between nitrogen and magnesium manuring ?

A: Sulphate of amonia nitrogen depresses the magnesium content of grass whereas nitrate nitrogen fertilizer increases the magnesium content. A fertilizer containing 20% N and 10% MgO (magnesium oxide) is widely used in the Netherlands. Thus magnesium is applied at the same time as nitrogen and the more nitrogen applied, the more magnesium. Farmers who use a lot of nitrogen use this fertilizer for the first one or two grazings in the spring; alternatively they may apply magnesium fertilizer separately from the nitrogen in March or April. Potash is not applied to fields which are first grazed in spring. It is applied in early or mid summer. It can be applied in spring if the herbage is cut but it may be noted that most cases of staggers recur in fields manured for mowing and then used for grazing because grass is short in the other fields !

Q: What is the optimum usage of fertilizer nitrogen per annum ?

A: In the Netherlands it is reckoned to be about 250-300 units N per acre on peaty soils, 300-400 on clay and 400-600 on sandy soils.

Q: Is fibre content of herbage important when grazing ?

A: Yes. There was no difference between the herbages from the two nitrogen manuring treatments. The older the grass the more fibre is present. If fibre is less than 20%, there is a danger of bloat. We aim for 23-26% crude fibre in the herbage.

Q: What grasses do you sow ?

A: Most of the Dutch grassland is permanent natural pasture containing 60-80% perennial ryegrass, less than 1% clover and traces of timothy and meadow fescue. The remainder is miscellaneous grass and herb species.

Q: Any troubles in Holland due to cobalt deficiency ?

A: We get cobalt deficiency in the sandy regions of the south and east and the growth of stock can be very poor. We apply cobalt sulphate at $2\frac{1}{2}$ kg per hectare. We also have a cobalt/copper manure.

Q: What are your experiences with slurry disposal ?

A: We do not apply slurry, or any manure containing potassium on grazing fields after January, that is in spring. It is all right to do so if the fields are for mowing. Slurry can cause an unwelcome build-up of soil potassium although this is less of a problem in sandy soils where it is readily leached.

Q: Does the use of high single dressings of nitrogen lead to trace element deficiency ?

A: I would not say so. Provided the basic fertilizer policy is right, trace elements will increase. For example, copper will increase the more nitrogen applied. Admittedly the more grass taken off, the more calcium, potassium and sodium is removed but then the more cattle slurry is going back ! In fact there is a recycling of nutrients.

JOHN FRAME.

S.W.S.G.S. SPRING TOUR, WIGTOWNSHIRE

by J. BARRETT

County Advisory Service, Stranraer

The South West Scotland Grassland Society tour of Wigtownshire took place on Tuesday, 9th May, under extremely good weather conditions. The party which consisted of 60/70 members, visited three farms during the day. These were Boreland-Barclye (Mr J. Scott), at Newton Stewart, Inchparks (Mr H. R. Parker) at Stranraer and finally Low Culgroat (Mr I. J. McMaster) at Stoneykirk.

Boreland-Barclye

These two farms extend to about 1500 acres, of which 238 are classified as arable. They have been run as a single sheep/cattle rearing unit since 1943. There is a staff of 3 men. The sheep stock number 420 Blackface ewes breeding pure Blackface lambs at Barclye and 200 Blackface ewes breeding Cross lambs at Boreland. The ewe numbers have remained unaltered since Mr Scott took over but the lambing percentage and number of lambs sold have increased.

Percentage lambs marked.

Year	*Pure Blackface*	*Cross*
1946	95	113
1947	109	114
1965	120	149
1966	124	146

Originally all the stock ewe hoggs were wintered away but half are home-wintered on improved grassland.

Suckling cows were first taken onto the farm in 1942. In 1943, they numbered 15 cows with calves and 65 head of other cattle. They now number 207 cows with calves and 40 other cattle. The hill cows are mainly Blue Grey crossed with a Hereford bull. About 30 Cross Hereford cows are mated to an Aberdeen Angus bull. Calving is usually started in early December and by the end of February about 80 per cent are calved. Most of the calves are sold at the autumn sales but the smaller ones, numbering 20 to 30, are carried over until the spring sales. All the cows are outwintered and fed on hay and hill nuts.

Each year since 1943 an area of bracken land has been ploughed and re-seeded with a perennial ryegrass/timothy/cocksfoot/white clover seed mixture. Other land has been improved by surface regeneration, using seed cleanings with a large proportion of perennial ryegrass and cocksfoot. Up to the time of the visit, about 200 acres had been improved by ploughing and 200 acres by surface treatment. Originally, two crops of rape were taken prior to reseeding, but now it is direct reseeded at the first ploughing. In order to obtain a satisfactory level of fertility in the seed bed, 2-2½ tons ground limestone, 1 ton basic slag, and 4-5 cwt of compound fertilizer are applied per acre. Once the sward is established, 10 cwt of basic slag per acre is applied every third year. Each spring, some of the grassland is top-dressed with compound fertilizer.

The party walked over many of the reclaimed areas on the farm and were able to see the results at first hand. At the various stops made, much discussion took place and everyone was highly impressed with the output obtained from sward improvement on the hill.

Inchparks

Inchparks extended to 160 acres, 10 of which are classed as rough grazing. The remaining 150 consist mainly of grassland for grazing, silage and hay but there are also 8 acres of kale, 8 of roots and 38 of barley.

The grazing for the dairy herd of 80 cows comprises 40 acres of perennial ryegrass/timothy/meadow fescue swards. This area was divided into 20 paddocks which are grazed in rotation for one day and rested for three weeks. Prior to 1967, Mr Parker had strip grazed all his grassland and so far he is pleased with the results from the paddocks. Many questions were debated by the party during the tour, especially the pros and cons of strip versus paddock grazing, severe versus lax defoliation by grazing and the effects of these managements on the rate of recovery. A separate block of grassland is used for silage — and hay-making. At an estimated stocking rate on his grassland of 1 cow equivalent per acre, the grassland management may be classed as highly intensive indeed. This year, summer grazing became available on a neighbouring farm and advantage has been taken of this for grazing the young cattle. This will release more of the home-grown grass for conservation as silage. The total stock is 80 Ayrshire cows, 16 in-calf heifers, 1 bull, 22 heifer stirks, 48 calves and 19 cross Friesian bullock stirks.

In the spring, all the grassland received 80 units of nitrogen per acre as straight nitrogenous fertilizer. Thereafter, nitrogen was either applied as a straight or a compound. A total of about 200 units nitrogen per acre is given during the season. Up to 200 units of potash per acre may be applied in total over the season depending upon the soil requirements.

Low Culgroat

The total acreage is 158 with 65 in pasture, 40 mainly for hay/silage, 40 of barley and 13 for mangolds and swedes. The 65 acres of pasture consisted chiefly of timothy/meadow fescue, ryegrass/timothy and short-term Italian/perennial ryegrass swards. The total stock was made up of 80 Ayrshire cows, 12 autumn-calving heifers, 10 bulling heifers, 10 one-year-old heifers, 35 young calves and 37 beef crosses of all ages. All young cattle except the calves are summered away from home but outwintered at home.

Before each grazing season, a manuring/cutting/grazing programme is formulated for the grassland. However, the plan is flexible and may be altered according to seasonal conditions. By way of illustration the plans for two of the fields are shown below:—

South Field : 11 acres of Italian ryegrass; received 80 units of nitrogen on 6th March; this was strip grazed by dairy herd in the spring at nights only, after which a compound fertilizer was applied and the field was closed for hay. The aftermath will be grazed by the dairy herd and later used as a winter exercise area.

Front Fey : 14 acres of timothy/meadow fescue/clover mixture in third year. No fertilizer to be applied this year, but strip grazing by the dairy herd will go on throughout the season, relying entirely on clover nitrogen.

Fertilizer nitrogen is applied at 120 to 150 units of nitrogen per acre on the fields for conservation and on certain of the grazing fields. The main summer grazing fields, which are based on timothy/meadow fescue/clover swards, receive no fertilizer nitrogen and are managed to encourage vigorous clover growth. Mr MacMaster thus works with a commendable "dual-manuring" plan whereby he makes maximum use of fertilizer nitrogen on certain fields and maximum use of clover nitrogen on others.

All stock are wintered at home on home-grown roughage. Early cut hay is dried with an electric fan in two bays of the hay shed which has a weld mesh floor. Cold air is generally adequate but calor gas is used when required to heat it. The party were impressed with the high output under Mr MacMaster's system of management and discussion flowed at each point of interest on the visit.

Overall the tour was extremely interesting and instructive with an added bonus of scenic beauty thrown in during the travels from one farm to another. Several facets of good grassland management were on view. The main lesson at Boreland-Barclye was that hill land improvement is technically possible and economically sound provided it is gone about in the right way, namely: better swards through reseeding either after ploughing or by

surface sowing; the correct manuring programme with lime and phosphate of special importance; better stock and increased stock numbers. At Inchparks and Low Culgroat, the main lessons demonstrated were : the value of a high stocking rate; the value of closely controlled grazing management; the value of a sound conservation programme allied or integrated with the grazing programme; the use of fertilizer nitrogen for out-of-season growth and for high levels of herbage production; the complementary and not antagonistic use of fertilizer nitrogen and clover nitrogen; the use of special purpose swards and lastly the value of forward planning.

C.S.G.S. SPRING TOUR, KIRKCUDBRIGHTSHIRE

by R. M. PATTERSON and C. R. PHILLIPS
County Advisory Service, Castle Douglas

On 11th May, in spite of a very wet, cold day, over 100 people attended the visit of the Central Scotland Grassland Society to the Stewartry of Kirkcudbright.

Culvennan

The proceedings commenced at 11 a.m. at Culvennan, Castle Douglas, where Mr J. M. L. Milligan has a dairy herd of 125 cows. Mr Milligan purchased and occupied Culvennan 8 years ago. Here there are 170 acres (over 30 acres have been reclaimed by draining) and the farm is divided roughly into 3 x 25-acre grazing blocks, 1 x 25-acre direct reseed, and the remaining 70 acres cut for silage. Grazing fields are largely tetraploid ryegrasses and the silage fields timothy/perennial ryegrass/meadow fescue. In the future, tetraploid perennial and Italian ryegrasses will be favoured for all swards. Normally, the grazing fields receive 105 units of fertilizer nitrogen as a first spring dressing, followed by 2 cwt per acre of a 20:10:10 fertilizer *or* 2 cwt Kaynitro *or* 70 units straight nitrogen after each grazing or cutting. At the time of the visit one grazing field which was being grazed for the second time this season had produced 150 gallons/acre from its first grazing without prior fertilizer application. The average annual nitrogen usage is around 250 units per acre.

Each 25-acre grazing block is divided by an electric fence into 3 areas, each approximately 8 acres. The cows receive their daily grazing allocation by use of a further electric fence which is moved only once in 24 hours. After the grazing fields have been grazed twice or three times, the fresh spring-sown direct reseed is ready to graze and the grazing fields — depending on the season's growth — are cut for silage along with the silage fields. Subsequently, as the season progresses, silage aftermaths become available for grazing too. A total of 900 tons of silage are made for use at Culvennan, but a further 600 tons grown at Culvennan are 'exported' to the adjoining farm of Mains of Greenlaw, which is also farmed by Mr Milligan.

At Culvennan, during the last completed business year ending September 1966, the fertilizer usage was £10 per acre net, milk sales 920 gallons, or £160 per cow, i.e. 700 gallons per acre, and feed input 1.7lb/gallon of entirely purchased concentrate. In the current year, milk production at the beginning of May was 14,000 gallons higher than a year ago, and the target of 120,000 gallons from 125 cows for the current year ending September should be achieved.

The party then moved through some of the Culvennan fields and on to nearby Mains of Greenlaw, which was acquired by Mr Milligan over a year ago. On the Mains there are 100 acres barley, combined on contract and stored in a moist grain silo, 20 acres direct reseed, 70 acres grazing/ silage, and 60 acres rough wet land. The total is thus 250 acres. Fertilizer usage is around £5 per acre, excluding the rough grazing acreage. About 300 tons of silage are produced. There are 25 dry cows and 40 in-calf heifers. The Ayrshire bull calves from Culvennan and other bought-in dairy type bull calves are reared to 12-15 months old, and are all sold fat on a contract basis. New buildings have been erected to finish an output of these bullocks of around 150 per annum. These animals are fed on silage, moist barley, plus some purchased protein concentrate. The performance and condition of the bullocks greatly impressed the visitors.

Altogether Mr Milligan farms around 500 acres with an overall labour force of 3 tractormen, a dairyman and a boy. The annual labour bill is approximately £4,000. Included in the total acreage is the nearby farm of Birkhill purchased in 1965, on which there are 65 acres. Birkhill was not visited. Here there are 8 acres direct reseed, 8 acres for hay, 16 acres for silage, and 33 acres grass. Around 150 tons silage are made and in a normal year there should be a surplus of about 20 tons hay. The standard fertilizer used is a 20:10:10 compound. Fertilizer costs are around £7 per acre. Some 40 calves and 35 stirks are carried.

Torr

By the time the entourage reached Torr there was at least a slight abatement in the downpour. Torr farm, owned by Mr H. M. Paton, encompasses some 640 acres in all, reaching right down to sea level at Auchencairn Bay. Of this, 320 acres is regarded as good arable land. There are 75 acres of woodland, with the remainder comprising of some arable and some rough grazing.

Mr R. M. Patterson, County Adviser for Kirkcudbright, in introducing Mr Hugh Paton who farms Torr, said it was some measure of his personality that, after having arranged to be actually filling his tower silo (encouraged by a favourable meteorological report!) he could actually greet them with a smile on such a terrible day.

There are two main enterprises at Torr. The dairy enterprise, with followers, is concentrated on 110 acres of short duration leys around the steading, and a further 42 acres of rough grazing. The

grass acreage is based almost entirely on short rotation ryegrasses consisting mainly of Tetila tetraploid Italian and some Westerwolths. In addition, a small area is sown under S.352 timothy. Cereal acreages are devoted to both cash crop production and as an energy source to balance a high quality bulk ration.

The dominant feature of fertilizer treatment of the grassland is the heavy reliance placed on fertilizer nitrogen. The initial dressing consists of 104 units nitrogen per acre. This is followed by a further 70 units as required, following grazing or cutting.

The tower silo at Torr has a capacity of 750 tons, and three cuts are necessary to fill it, being made up of 48 acres first-cut, 70-80 acres second-cut and 30 acres third-cut.

The party took advantage of slightly improved weather and went out into the field to see some of the grass which had actually been cut. Mr Paton outlined the procedure needed to wilt the tetraploids (of low initial dry matter) to a dry matter of 40-50%. The crop is first cut and lacerated, using a 6 ft flail mower with sickle-action flails. Immediate and frequent tedding follows so that the desired degree of wilting is achieved in about 48 hours, depending upon weather conditions. Lifting is accomplished using a full-chop forage harvester; the material is tipped into a dump box and loaded automatically into the tower by means of an electrically-powered blower. There is no man at the steading and the worst that has ever happened is that the motor had switched itself off due to being overloaded — this could be re-started when the tractor driver came in with the next load.

In defending his use of tetraploids, which are low in dry matter, under his conditions of heavy stocking, coupled with damage caused by machinery, he was faced with regular replacement of his leys. The speed of establishment of the tetraploids and their winter hardiness were factors which were important. The acceptability of tetraploids to the cows' palate was a very noticeable factor and Mr Paton claimed no real difficulty in achieving the desired degree of wilting even when working with tetraploid grasses, which have a higher moisture content than the usual diploid grasses.

The modern dairy set-up is situated at the hub of the grassland enterprise at Torr. This consists of an eight-point herringbone parlour with cubicles for 130 cows. Both the cubicle house and collecting area have slatted floors with slurry tanks underneath. These have a storage capacity for about six weeks' slurry, which is emptied by gravity into a 750-gallon tractor-drawn tanker. Feeding is to appetite and this is achieved by use of a central trough. This is filled entirely automatically, using a top unloader in the hermetically-sealed tower, with delivery to the feeding trough effected by means of a simple chain and flight system.

Inside the cubicle house, Mr Clyde Phillips gave some indication of the quality of the haylage at Torr. This is summarised below :—

Attribute	1966–67	1965–66
pH	4.80 (4.6)*	4.42
Dry matter (%)...	44.1 (49.2)	38.4
Crude protein in dry matter (%)	18.6 (20.6)	15.9
Starch equivalent	24.3 (27.1)	19.8
Digestible crude protein	4.85 (7.10)	3.72

* Figures in brackets refer to highest analysis figures

The figures show that Mr Paton has mastered the conservation technique. A test carried out in the material showed the digestibility of the organic matter to be 76%. There is a marked excess of protein in relation to the energy value of the haylage and this is balanced by feeding bruised barley without any protein additive. The entire purchased feedingstuffs consisted of 1 ton of soya bean meal.

Most of the problems encountered with the unit were those concerned with keeping large numbers of animals, e.g. identification etc., and the consequences of having to suddenly increase numbers using bought-in animals. With the mastering of the animal side of the enterprise in sight, Mr Paton was confident of improving performance still further. In answer to questioning he maintained that he would now have no qualms about repeating a similar enterprise on another part of the farm.

S.W.S.G.S./C.S.G.S. SPRING TOUR, REPUBLIC OF IRELAND

by G. M. GILMOUR

West Crosshill, East Kilbride

This pleasant and instructive visit commenced on Tuesday, 23rd May and finished on Friday, 26th May. A party of 27 left Abbotsinch in the rain and arrived in Dublin under the same conditions. At the airport we were met by an informative bus driver-cum-guide, and after a running commentary on places of interest in Dublin and the countryside through which we were passing, we arrived at the Animal Production Research Centre at Grange, C. Meath.

Grange, Co. Meath

Dr J. Harte, who met us, stated that there were 650 acres, 800 cattle and 1,000 ewes and lambs. The young calves are put on grass at 3-4 weeks while still on skim milk and then on grass alone after 12 weeks. This practice was being preached by many of the advisory staff in all parts of the Republic.

Beef cattle were being fattened on various rations of hay, cut at various stages of growth and fed at different rates per head.

Shorthorn x Hereford, Shorthorn x Charolais, Friesian x Charolais and pure Friesian bullocks were being fed on silage and barley. The silage was fed *ad lib* and barley at one tenth the amount of silage eaten for various growth rates. Bull beef from several breeds was being tried. Friesian bulls gave a 10% increase over bullocks and now Herefords were being tested. They also had more lean to fat than the bullocks. A cow/heifer scheme has proved successful with the calves being suckled for six months and then the heifer fattened and sold by the beginning of July.

The sheep experimental side was also interesting. Finnish Landrace ewes and tups have been imported to try to increase the fertility rate of the Kerry ewe (Scottish Blackface). Last year the average was 2.9 lambs per ewe.

Ewes and bullocks were being wintered in enclosures on a surface of stones covered with sawdust, given varying degrees of protection from the wind, but no overhead protection from the rain. The results showed that they could increase body weight with side protection from wind, although exposed to the rain.

The general picture given here was that since 80% of the cows calve in the spring, the calves have to be done well during the summer and winter and finished on the grass in early summer. This part of Ireland has a fairly short winter, approximately December to mid-March, so it is not necessary to conserve as much grass for winter feed as in Scotland. Silage making is increasing in this area. Grass production was increased by three tons of fresh material per acre when 46 units of nitrogen were applied.

Dunboyne, Co. Meath

Our second farm visit was to Mr M. J. Bruton, Newtown, Dunboyne, a jolly and outspoken man who dealt with a large number of fat and store heifers on 185 acres of very old pasture — "some 100 years old and still improving," said Mr Bruton.

The fertilizer policy was 6 cwt basic slag per acre every second year (8% P_2O_5; 60-64/- per ton) and lime as required at 20-22/- per ton. The Government pay the railway a subsidy for the haulage of lime, but if the farmer hauls it himself, the Government do not pay him. In early spring, 30 units of phosphate and 60 of potash were applied. Fields of silage were grazed until 1st May, 46 units of N applied, then topped two weeks later to remove seed heads and improve quality. The silage was then ready to cut about 6-8 weeks later. Two self- feed silos had been erected and a third was in progress of being built. The concreting was all being done by the farm staff — and very expertly done ! The side walls were 12 ft. high shuttered concrete. The maximum government grant was approximately £400 per silo per holding provided it was covered. Mr Bruton calculated that it cost 2/- per week per beast to put a roof over them, and 2/- per week for straw for bedding and eating. His policy is to buy in store heifers in October-

November and to finish the best of them before grass time. The price this week (May 22) was £8 per cwt, but six weeks ago it was only £6 10/-.

We were interested in the method of rating and taxation. Farmers mostly pay rates in lieu of income tax as they do not keep books! Mr Bruton's 185 acres was rated at approximately £190, and he paid rates of 48/- in the £ which meant that he was paying £450-£500 per year.

Barley Hill, Co. Kildare

On Wednesday morning we headed in a south-west direction to Messrs Lamb Brothers, Barley Hill, Co. Kildare. This was an intensive fruit farm supplying strawberries and raspberries to Messrs Lamb's jam factory in Dublin. The crops were rotated, and to build up fertility there was a fairly heavy stocking of sheep and single suckling cows. The ewes and lambs were grazing autumn-sown rye and ryegrass. They started in the first week of March and were now eating it for the second time and gaining about 1 lb per day. The aim was to have all the lambs away by the middle of June. The stocking rate for the sheep was 38.2 livestock units of sheep on 52 acres with a gross margin of £25 4/- per acre.

The single-suckling enterprise was more extensive. Calving started in October and finished in December-January. The calves were summered and wintered and then sold in April or May at an average of £55. The gross margin was much lower at £12 10/- per acre last year, because of the low prices for beef. The grass on this farm was showing signs of the excessive wet spell which had lasted since the beginning of May and many parts were still waterlogged.

Dairy Research Centre, Fermoy, Co. Cork

Our next visit was to the Dairy Research Centre at Moorepark, Fermoy. We may have been sleepy-headed after the long journey but were were soon awakened by the dynamic personality of Mr M. J. Walshe, the officer in charge. This centre dealt with a wide range of experiments from milk production on grass to milking machine efficiency.

The policy was again spring calving and summer milk, as 80% of the milk is manufactured and the average price is 2/3d per gallon. Heavy applications of nitrogen are advised and as little concentrate feeding as possible; for example no feeding is given after March for February calvers. Stocking rates were : 1965—35 cows on 52 acres giving 1½ acres per cow equivalent. 1966—35 cows on 42 acres giving 1⅓ acres per cow equivalent. In 1967 there were 39 cows on 42 acres, giving 1.08 acres per cow including land used for silage for the four winter months.

The paddock system of grazing is now showing a 16% output advantage over set-stocked grazing, but the general run of farmers are slow to follow the idea — as usual! Mr Walshe is

absolutely sold on the paddock system at present. He recommended the grass feeding of young calves — out at 5 weeks, grass only from 12 weeks and moving round in front of the cows. To save the capital-starved farmers the expense of erecting more buildings he has successfully outwintered cows and followers on a clamp of silage on a dry base.

An experiment which left some doubt in our minds, was one in which beef production increased by 30% when 200 units of N were used instead of none. There was no response to a further increase of N. Mr Walshe maintained that in the experiment at Moorepark they could not justify frequent reseeding, as the output from their old pasture was every bit as good. He also stated that by using 200 units of N, the acreage had been reduced from 1.5 acres to 1.1 acres per cow.

The milk producers in the group were all interested in the many trials being done with various milking machines. Tests for efficiency, level of vacuum, pulse rate and especially their theory on milk let-down stimulation. The workers have found that incorrect vacuum level can reduce milk yield by 10% and also increase the incidence of mastitis. There is a Code of Practice for milking machines and their installation, and they are prepared to go to court to defend their opinions about an incorrect machine or bad workmanship. This is a point which we could usefully take up in Scotland.

Ballybrowney, Co. Cork

Mr P. Cotter's farm at Ballybrowney was 146 acres, a much bigger size than average for this area. Again this was a February-March calving herd, and concentrate feeding was restricted to 4 lb per gallon over 2 gallons for the earlier calving cows until they went to grass in early March. The policy was to reduce the tillage area and increase the cow numbers as follows :

Year	*Cows*	*Milk yield (gals.)*	*Fert. cost per. acre*	*Silage (acres)*	*Tillage (acres)*
1960	22	720	£2 7 6	27	32 barley 8 beet
1966	57	910	£4 5 0	110	20 barley
1967	64	—	£4 15 0	—	20 barley

The present output was 240 gallons per day to the creamery for manufacture at a price of 2/2d per gallon and paid for on the butterfat content. The breeding policy was based on A.I. using Friesian semen from high-priced bulls bought in England. The original cows were Shorthorn and we could see the tremendous improvement in conformation and Mr Cotter assured us that the production side had made great strides also. Clover predominated in the swards.

Mount North, Mallow, Co. Cork

On Thursday morning we left in bright sunshine to visit a dairy farm in the Mallow area belonging to Mr J. Barclay, Mount North, and were submerged in a deluge ! However, we managed to walk round some of the fields later.

Mr Barclay is a young man bent on making big improvements on this heavy clay farm. Some draining has been done, about 20 yards apart, the effectiveness of which was questioned. No ploughing has been attempted, only the spraying of rushes and initial fertilizer applications of 3 tons lime and 6 cwt slag per acre. Each year afterwards 4 cwt super phosphate, 1½ cwt potash and 4 cwt nitrogenous fertilizer for silage, costing £4 10/- was applied. There is at grant of two-thirds of the cost for draining and spraying. Mr Barclay has built a fairly cheap five-point parlour and milk cooling point all under one roof with only a 6 ft wall dividing.

In 1963 only 17 cows were in milk, but there are now 58 and the eventual aim is 90. No concentrates are fed at grass and the herd average is 800 gallons. This farmer receives a price of 2/6d per gallon because his creamery manufactures high quality cheese. Friesian A.I. is used and herd replacements reared. The calves are out to grass at 5 weeks of age, and are weaned at 12 weeks. The slurry disposal appeared simple; this was merely scraped on to a hard area and then allowed to drain into a ditch and finally lifted when solid. That was the idea, anyway, but some of us were doubtful if it could be lifted by a front loader.

Economic Test Farm, Co. Limerick

Our next visit was to an Economic Test Farm at Herbertstown, where we were shown round by Mr Dooly, farm manager, and Mr Brannick, officer in charge of the economics. The farm had been taken over in poor condition and it was enlightening to see the vast improvement which had been effected. The object was to put into practice, under normal farm conditions, some of the ideas recommended by the research workers at Moorepark. We also saw the ditch purification method of disposal for pig slurry. The cow slurry was being pumped direct on to the land. The land was wet and heavy, and improvements were made without ploughing. The composition of the sward had improved from 4% ryegrass and no clover in 1960 to 50% ryegrass and the clover coming on nicely in 1967.

The farm carried a Friesian herd, again using A.I. from good imported bulls, but we were interested to hear Mr Brannick question this policy, as he felt that with the demand for beef, the Shorthorn or Shorthorn cross suited the demand and were also hardier in the wet climate.

Details of the intensive dairy and pig farm of 64.4 acres are as follows :

Stocking : 37.6 cows and 27 followers
10.1 sows and 88 other pigs

Output		Expenses		
Dairy	£3,137	Rates...	£137	
Cattle	795	Feeds...	1,825	
Pigs	2,259	Fertilizer	702	(including £100
	£6,191	Machinery ...	421	for lime)
Family Farm:		Labour	783	
Income	1,926	Miscellaneous ...	397	
TOTAL	£4,265	TOTAL ...	£4,265	

Utilized starch equivalent (cwt./acre)		Stocking rate and milk production
1960	15.0	1.26 acres per cow.
1961	20.4	569 gallons per acre.
1962	29.6	750 gallons per cow.
1963	33.4	
1964	37.2	

Output per acre ...	£ 96.1
Nett expenses ...	£ 66.0
Family income ...	£ 29.9
Output per man ...	£2,381.0

	Total	*Per acre*	*Total*	*Per acre*	*Total*	*Total*	*Per acre*
Output (£)	3,137	69.6	795	40.6	2,259	6,191	96.1
Variable costs (£) ...	887	19.6	435	22.2	1,468	2,790	43.3
Gross margin (£)	2,250	49.6	360	18.4	791	3,401	52.8

Lismore, Co. Laois

Our last farm visit was to Lismore Farm, Borris-in-Ossory, Co. Laois, where we met Mr and Mrs R. Bennett and Mr O'Keiffe, the advisory officer and two of Mr Bennett's farming friends. The weather was pleasant and we had a good walk round the fields and were amazed to see the ewes and lambs doing so well at fully 6 ewes and lambs per acre. Obviously Mr Bennett is an expert stock-man. The land was good but wetter than usual after the three weeks of fairly constant rain, and I thought, worth more than the £125 value put on it by Mr Bennett's friends.

Some details of the farm are as follows :

	Income (£)		Gross margin (£)	
	Total	*per acre*	*Forage costs not deducted*	*Forage costs deducted*
1966	2,251	34	28	25
1965	2,500	38	32	27
1964	3,130	48	42	36

The lamb prices in 1964 were 15/- per head higher than 1966 and one of Mr Bennett's friends was bitter about the lack of any Government attempt to stabilise their beef and lamb prices. In the last three weeks the average price per cwt had fluctuated from £7 10/- to £9 10/- per cwt at his local market.

Summary

To sum up I feel we had a very enjoyable trip with however a somewhat tight schedule because of distances to be travelled, and great credit is due to Mr John Watson who led the party for his excellent efforts to keep us to time and not leave anyone behind !

Irish farmers are moving forward in their output from grass by using clover mainly to increase output because nitrogen is much dearer than in the U.K. Capital is also scarce for building improvements. We felt a great deal could be done to make the fields bigger and easier to manage. In general the farmers lack the security we have in beef guarantees and they have no Milk Board to stabilise their returns from milk or to organise an economic transport system for their milk. We saw many many pony traps with from one to five cans, all making their way to the creamery, about 10.00 a.m. The farms are very small — 80 acres in most areas is above the average. The farmers have a big advantage in their short winter period, generally 1st December-March, four months in total, and most of their milk is produced from grass being about 80% summer milk. The milk for the liquid market is produced near the main towns, Dublin, Cork and Limerick and the price received is about 3/3d per gallon in winter and 2/6d in summer.

Acknowledgments

Thanks are due to the staff of An Foras Taluntais, and in particular to Mr B. M. Lewis, for arranging the visits. Acknowledgment is also made to Irish advisory staff for their personal attention at the farms and of course to the farmers themselves. Thanks are also given to Dr John Frame for all the arrangements he made and finally to John Watson for leading us so well and for checking over this manuscript.

BRITISH GRASSLAND SOCIETY SUMMER TOUR DEVON, 1967

18th July by W. B. R. ELDER, *Langbank, Renfrewshire*
19th July by R. D. HARKESS, *Auchincruive, Ayrshire*
20th and 21st July by A. G. MALCOLM, *Larbert, Stirlingshire*

Tuesday, 18th July

The farm of Bagtor Barton, Newton Abbot, lies on the southern slopes of Dartmoor at an altitude of 800-1100 ft. It is made up of 165 acres of light loam together with 300 acres of

enclosed newtake (moor) and grazing rights on the moor. Our journey to the farm was via Haytor (1401 ft.) from which height we were assured, one could enjoy magnificent views of the South Devon coastline and the estuaries of the Exe and the Teign. Unfortunately, we saw no more than 50 yards due to mist and rain on a day that must be typical to achieve the district average rainfall of 65-70 inches.

The owner, Mr H. A. Retallick, a man with a delightful sense of humour explained his farming policy of keeping 100 suckler cows and 250 hill ewes " on the hill " and a small expanding herd of 10 Ayrshires and 120 Cross ewes on the low ground. The company were rather surprised, and we Scots rather pleased to see, that the suckler cows were all Galloways or Blue Greys and the " hill " sheep entirely Blackfaces. It was explained that things Scottish do much better under the severe conditions! Gross margin per cow is £48 including hill cow subsidy and winter keep grants. Unfortunately, output and costs fluctuate wildly from year to year due to adverse weather conditions which equally affect the Blackfaces. As well as the normal hazards Mr Retallic mentioned tick pyaemia, road casualties and stealing as causes of a large number of losses.

The grassland has two main roles, namely, to provide grazing for all the stock during spring and autumn and to provide enough hay and silage for all the stock during the winter. Perennial ryegrass/cocksfoot mixtures are used together with 20-30 acres of Italian ryegrass after the 15 acres of barley has been harvested. 12 acres of kale and roots provide winter keep for the flock of 120 Cross ewes. Average rates of application have been 40 units N; 30 units P_2O_5; 30 units K_2O. Winter keep is conserved mainly as hay and some 50-60 acres is cut to provide 80 tons. When asked why hay and not silage?, Mr Retallick replied that hay was much easier transported to the high ground in the winter.

After lunch at Widecombe (of Uncle Tom Cobley fame) our route took us to H.M. Prison and Farm on Dartmoor — and an area much less bleak than most of the party imagined. The farm extends to 1600 acres of which 1000 acres have been reclaimed and enclosed from the moor. The exposed land, lying between 1200 and 1500 ft. " suffers " a rainfall of over 84 inches and is mostly peat overlying granite. The emphasis is on sheep — 450 pedigree Scottish Blackface and 350 pedigree Exmoor Horn, both flocks doing well with a lambing percentage of 80. Rams are reared and sold for stock purposes. Two single suckler herds, Galloways and Devons are kept with some of the calves being sold as stores and a proportion kept and fattened. A dairy herd of 42 Dairy Shorthorns supplies milk for the 600 prisoners. The average yield of 830 gallons on 13 cwt of dairy cake is good.

The 200 acres of more easily ploughed grassland is farmed on a 5-year ley and 2-year roots rotation. A perennial ryegrass/timothy mixture is used and always direct-sown with 6 cwt of superphosphate only. Every third year, all the grass area receives 6 cwt of basic slag (14% P_2O_5) while only the fields used for conservation are given 3 cwt of compound fertilizer and 2 cwt 'Nitro-chalk.' About 300 tons of silage are made in a clamp while 150-200 tons of hay are baled annually.

The party was impressed with the standard of farming and the stock, no mean feat under the conditions even with casual labour in the form of prisoners, some 200 of whom work outside during favourable weather.

The party, rather because it had rained most of the day, arrived back at Seale-Hayne College for dinner, the number intact, none having been detained during Her Majesty's Pleasure!

Wednesday, 19th July

The first visit of the day was to North Wyke Experimental Station, Okehampton, established by Fisons Fertilisers Limited in 1955. The farm extends to 386 acres of which 125 are woodlands and roads. A stock of 63 Ayrshire cows plus followers, 126 beef cattle and 285 sheep is carried on the 209 acres of grassland. Long leys of either perennial ryegrass/white clover or timothy/meadow fescue/white clover are sown and are only replaced when the sown species diminish or when swards are reseeded for experimental purposes. Overall nutrient usage is around 120 units N, 60 units P_2O_5 and 60 units K_2O per acre per annum.

The many experiments in progress are carried out on some 30 acres but because of limited time the party visited only three of the trials.

An experiment on the effects of stocking density on individual animal performance and on output per acre was being conducted using beef animals. Autumn-born cattle were turned out to grass in April and stocked at three densities, viz., high, medium and low under a rotational grazing system. The medium rate was that which the controller of the experiment thought was satisfactory whilst the high and low rates were 20% higher or 20% lower respectively than the medium rate.

The results for 1966 were as follows:

	Stocking rate		
	Low	*Medium*	*High*
Beasts per acre	1.5	1.8	2.3
Daily gain per head (lb.) ...	2.04	2.01	1.80
Seasonal gain per acre (lb.) ...	675	675	750

As would be expected, higher stocking rates led to higher gains per acre but reduced the daily gain per head. Under the conditions of this trial the stocking rate would need to be no higher than 1.9 beasts per acre in order to maintain a daily gain of 2 lb per day.

In 1967 the trial was being repeated at two levels of fertilizer to find out if higher N use would lead to even greater output. In these beef trials, the animals were rotationally grazed and the area offered to them depended on the quality of grass available and the age of the animal. In this way it was possible to obtain some degree of balance between the feeding value of the herbage and the the growth potential of the animals.

The rate of grass growth and uptake of N by the plants following the use of nitrogenous fertilizer was another trial demonstrated. From the results presented, it was noticeable that N uptake was most rapid over the 20 days immediately following top dressing. On the other hand, the herbage did not begin to bulk rapidly till 20 days after N application. Because of this, the nitrogen had little residual effect and it was stated that several split dressings of N were to be preferred to fewer large applications. It was suggested that farmers must therefore relate the quantity of N used to the proposed growth period. Hence, fields on a 30-day grazing rotation would yield better with small dressings after each defoliation than one or two large dressings during the season. The following table illustrates the yield of dry matter obtained from an 8-cut defoliation system with varying methods of N application.

Dry matter production (100 lb./acre)

	Total N per season (units).		
	200	300	400
All N applied in spring	63	76	90
N applied in 2 dressings	72	89	103
N applied in 4 dressings	78	96	113
N applied in 8 dressings	76	100	114

It can be seen that within any given level of N use, the more frequent dressings improved dry matter yield. Seasonal distribution of yield was also levelled out by more frequent dressings since high spring peaks and low autumn troughs in production were less marked.

The final experiment shown and described to the party was a trial examining the contribution made by clover to herbage production both with and without N and under cutting and grazing management.

Where plots were grazed, the clover distribution increased and the value of animal excreta in returning and recirculating N helped to increase herbage production. Where both grazing and N treatments were applied herbage production was increased further despite a decrease in clover content.

The value of clover in a sward was stressed by the indication that a pure grass sward would require 120-150 unit N to attain an annual yield similar to that from a vigorous grass/clover sward. However, for 'early bite' it was mentioned that reliance cannot be made on clover only because of its lateness in starting active growth.

After lunch at Okehampton, the second visit was to the farm of Mr W. C. May, Clannaborough Barton, Crediton. This farm extends to 900 acres of which 200 are permanent grass, 405 are leys and 105 are barley. The remaining acreage is under wheat, winter oats, roots and orchards. The cropping rotation used is three corn crops, roots, corn and a 3 to 4 year ley. Cockle Park-type seed mixtures are used and the swards are managed on a low cost extensive system receiving lime and slag only as required. A small area is top-dressed with fertilizer nitrogen for early bite and some 175 acres are cut for hay.

Bill May is probably the leading cattle breeder of North Devons in Britain and at present has a herd of 91 breeding cows. About 300 head of cattle are maintained each year. A demonstration of Stud bulls and their progeny was staged and records from the Beef Recording Association cited. The 200-day weights for steers and heifers were 520 lb and 480 lb respectively which represents a daily gain of 2.2 lb and 2.0 lb. However, going by the 400 day weights (695 lb for steers and 690 lb for heifers) the daily liveweights gain had dropped to 1.5 lb for both sexes. Mr May was therefore reorganising his feeding management to improve growth rate during the winter months. Weight per age, which is highly inheritable, will be selected for in future breeding programmes and beef recording has proved extremely valuable on the farm.

A flock of 600 Devon Longwool ewes is carried, 150 being mated pure for replacements whilst on the remainder, Dorset Down, Hampshire Down and Suffolk tups are used for fat lamb production. Lambing is 125 per cent and the wool clip averages 15 lb per ewe, putting wool receipts at around £1700 per annum. Nematodirus is, however, now a serious problem and the farm may have to be completely rested from sheep in the near future.

Thursday, 20th July

The first visit was to Pudston Farm, Okehampton (Mrs Squire and Sons). The farm comprised 196 acres, all in grass, and was situated at an altitude of 800 feet in an area with an annual rainfall of 60 inches. The soil was of the famous Culm clay. Because of a clay surface soil and a natural impervious pan some 18 to 24 inches below the surface, the land is not free draining. During wet periods, the surface poaches badly and the passage of machinery causes deep rutting. In dry spells the surface dries out hard and the herbage burns readily. As a result, the grassland management policy is always to have a surfeit of available grass in order to provide the widest possible degree of flexibility.

About a quarter of the farm acreage is sown to short-term leys of Italian ryegrass, usually sown in autumn at 30 lb per acre. Dressings of medium-grade basic slags and 3 cwt per acre of an NPK (22-11-11) compound fertilizer are given in the seed bed. The remainder of the farm is in 6 to 8-year leys of perennial rye-

grass/timothy sown out with similar fertilizers. Full grazing is possible from mid-April to the end of October and 'early bite' and 'late bite' when weather conditions permit. Paddock grazing is now practised in place of strip grazing. Spring manuring is 3 cwt per acre of an NPK compound (22-11-11) and 2 cwt per acre of 'Nitram' (34.5% N) after each grazing or silage cut.

The winter period is 180 to 200 days and at least 1,000 tons of silage are made each year. Two cuts are taken, one in mid-May and another in mid-July. An occasional cut of hay is also taken. Wilting of silage was first carired out in 1966 and this resulted in the production of high-quality silage. The ingathering is carried out by the full labour force of the farm — two sons and one employee only available between milkings. Heavy-grade polythene sheeting is used to seal off the silos.

The stock consists of 105 Ayrshire dairy cows and 70 followers. Part of the cow stock is housed in a large shed accommodating 50 cows and 500 tons of silage for self feed. The remainder of the herd is housed in a cubicle house and have access to two outside silos. Both houses are slatted and the excreta pits require cleaning-out only once a year. Milk yields dropped considerably due to foot and teat troubles when the cows were first put on slatted floors. However, with the introduction of cubicles, these troubles have been completely eliminated and this has made a major contribution to the recent improvement in milk yields. Cows calve mainly in spring or autumn and about 60 per cent of the total milk is produced in summer. With the improvement schemes in hand for drainage and for breaking up the natural pan, it is hoped eventually to increase the milking herd to 150 cows.

The performance of the dairy enterprise is summarised as follows :

	Year			
	1962	**1963**	**1964**	**1965**
Number of cows	87	93	97	105
Milk produced (gallons)	64,737	65,830	70,610	89,665
Yield per cow (gallons)	744	706	725	854
Feed/gallon (lb.)	1.75	1.60	1.90	2.00
Stocking rate per acre	1.60	1.40	1.40	1.40
Gross margin per cow forage deducted (£)	60	63	74	83
Gross margin per acre from grazing livestock (£)	32	33	44	53
Index of farm income...	100	104	190	289

The second visit was to Ellacott Barton, Bratton Clovelly (Mr D. Caudwell). This farm consisted of 519 acres at an altitude of 450 to 575 feet in an area with approximately 40 inches rainfall.

Prior to Mr Caudwell taking occupation in 1964, the farm had changed hands many times since the war and the land had been severely neglected by all occupiers. It was badly water-logged, very deficient in lime and phosphates and nothing was growing but sedges, rushes scrub willows and other plants associated with

water-saturated soils. The greater part of the land is of Culm clay and Mr Caudwell's first steps were to clear over 100 acres of scrub and rushes on an area previously classified as moorland. This was followed by draining. Plastic pipes were used as tiles were unobtainable. The cost was £48 per acre or £8 per chain net. Costs have since risen to £65-£67 per acre. The pipes were set at a depth of 4 feet 6 inches and 2 tons of porous filling per chain length added before replacing the top soil. The draining was followed by a programme of manuring and then two crops of barley taken before one-year grass leys were sown. During the visit, an area not yet tackled was inspected. Almost every known weed was to be found in great profusion, some shoulder-high. Alongside, an area of barley and another area of Italian ryegrass provided a striking contrast. To date, no attempt has been made to intensify grass production or to sow out long-term mixtures. Approximately 30 acres have been cut for hay. The livestock are grazed on a fairly extensive scale to avoid poaching but grazing management will be intensified as the grassland is improved, as it is ultimately intended to establish a dairy herd of 100 Friesians.

To the delegates from the west of Scotland, the inferred difficulties of managing Culm soils appeared to be over-rated by everyone concerned since the clay is not as heavy and tenacious as Carse of Stirling clay and the sub-soil is more open in texture. Shattering of the natural pan by appropriate deep-working implements would give great improvement of soil conditions over a very high percentage of the Culm clay land. Delegates from Somerset, where similar conditions of soil exist, were of the same opinion.

Friday, 21st July

On the forenoon of the fourth day a visit was made to Seale Hayne Agricultural College farm. While the primary objective of the College farm is to provide day-to-day teaching and demonstrations to students, there are facilities for research and experimental work, including 16 acres devoted exclusively to N.I.A.B. regional variety-testing trials. Normal commercial activities are carried on within this framework, and individual enterprises are selected to give as wide a scope to teaching as possible. Crops such as potatoes which are unsuitable for the area are not grown. The farm extends to 327 acres of which over 220 are under grass. This is equally divided between permanent and long leys on the one hand and short leys and one year ryegrasses on the other. Grass is conserved as hay and silage, the proportion varying according to season and estimated requirements. The soils are a mixture derived from slates, shales, and limestone and igneous intrusions. The average rainfall is 40 inches per annum while many fields are difficult to cultivate due to steepness, large boulders or impeded drainage.

Livestock form the basis of the most important enterprises, namely, dairying and sheep. There is also a small unit of single-

suckling Devon beef cows. The aim is to increase the stocking rate by means of increasing fertilizer nitrogen usage, and increased conservation. Sixty Guernsey cows and followers are carried, and last year the cows yielded 827 gallons per head. Consumption of concentrates over the full year was 2.4 lb per gallon produced. Each cow used 1.24 forage acres. Cows are wintered in cubicles for approximately 200 days and fed on self-feed silage and hay with concentrates after the first gallon. Kale is folded before Christmas. The herd is self-contained.

In 1958, The Devon Cattle Breeders' Society presented the College with 10 pedigree single suckling Devon cows and a bull, these numbers are now 19 cows and a bull plus a young bull of their own rearing. The management adopted has been to calve in the spring and wean in autumn. This has meant utilising 1.9 to 2.1 acres per cow over the summer season. The traditional gross margin return for this type of enterprise in the area is in the region of £7 10/- per acre. The College herd last year returned a gross margin of £18 10/-. An attempt is being made to intensify both the physical production, and gross margin per acre from this unit to £30 per acre by stepping up the intensity of grazing in summer with generous fertiliser applications to paddock grazings, by creep grazing of the calves and by feeding straw and appropriate supplements to the breeding stock in the winter. Grazing is over an area of poorer farmland typical of much of the County. In 1966 the calves gained an average of 2 lb per head per day from 20th April, when they went out to grass, until weaned on 14th October at an average weight of 481 lb. The area grazed by the 19 cows and calves extended to 15 acres divided into 6 paddocks. Within these paddocks there is a mixture of swards according to the mixture and age of grasses present. 7.37 acres are permanent pasture of long standing. Four acres reclaimed in 1965 from rough grazing were sown out to

	lb./acre
S.22 Italian ryegrass	12
S.24 Perennial ryegrass	8
S.321 Perennial ryegrass	8
N.Z. White clover	2
	30

4 acres reclaimed in 1965 from an orchard were sown out in 1966 to

	lb./acre
S.24 Perennial ryegrass	4
S.23 Perennial ryegrass	4
S.321 Perennial ryegrass	4
S.48 Timothy	8
N.Z. White clover	2
	22

Fertilizer nitrogen or compound fertilizer is applied after each grazing at the rate of 4 cwt/acre (N.P.K.) compound (25-0-16) in two applications and 4 cwt/acre N.P.K. compound (22-11-11) in two applications.

An observation on cross-bred-beef-cattle started in Autumn 1966 to study the value of the Guernsey cross bred calf for intensive beef production; 24 calves born between 20th August, 1966 and 10th April, 1967 were taken, namely 10 Charolais x Guernseys and 14 Devon x Guernseys, all calves were weaned at 5 weeks old and given access to concentrates and hay. These calves were grazed on a paddock system of rational grazing, each paddock being 0.37 acre in extent which gave a stocking rate of 5 calves per acre.

The next point of inspection was an old flood meadow adjacent to a burn which very often overflowed and kept the meadow always wet. Prior to 1964, it contained an excessive amount of Yorkshire fog and creeping bentgrass, all badly matted. In September 1964, it was grazed bare, ripper-harrowed three times, then pruned closely by forage harvester and all trimmings removed. Hard grazing with frequent topping has been continued since, along with the application of 4 cwt compound fertilizer each spring. It now has a sward containing a high percentage of perennial ryegrass and wild white clover. Previously the field could only carry a few sheep in early spring and late autumn but now provides useful grazing for the dairy cows in summer.

The final point of inspection was the dairy buildings and a newly-built multi-purpose shed measuring 120 feet by 90 feet, the central area being 40 feet broad with a 25 foot leanto on either side. Each leanto could be divided into 8 pens. The central span could hold 22 tons baled hay. In the construction, Yorkshire boarding was much in evidence for adequate ventilation.

Cost of buildings and tubular fittings	£5,220
Site preparation, concrete floors, water and electricity, etc. ...	£3,280
	£8,500 net.

While the Devon farmer has been changing his methods and policies of farming quite considerably since the previous visit of the British Grassland Society members in 1951, the County remains predominantly a grassland area. During the period between the visits the acreage of tillage crops has fallen by over 70% while the acreage of short-term leys has increased by over 33%. Cereal acreage has remained static but with a decided increase in barley as opposed to oats.

On the livestock side intensification has been greater and more rapid. Cow numbers have increased by 50% while milk production has increased a full 100%. All this is pointing to an overall County

stocking rate of 1 cow to 1 forage acre or less. While many grass beef producers have continued their traditional practices untroubled by the up and coming barley beef producers, many single-suckling Devon herds continue on the Culm soils. However, their owners are fast becoming interested in ways and means of intensifying production, seldom as a single enterprise but more usually in combination with sheep farming; this has led to sheep numbers being doubled within the last 10 years.

RESEARCH REVIEWS

125 INTENSIVE SHEEP PRODUCTION

W. M. R. EVANS, *Trawscoed E.H.F. Wales*

Agriculture Vol. 74 pp. 375-378.

Increasing intensity has led to improved profitability in dairy farming but has had less success in sheep farming. Higher fertilizer use and increased stocking rate from $1\frac{1}{2}$ to 4/5 ewes per acre have, on average, increased gross margins to only some £20 per acre and even skilled intensification seems to be unable to break through this ceiling figure. In examining reasons for this, Evans points out that the lowered value of the output per ewe with increasing intensity is one of the key factors. At 3 ewes per acre output per ewe was £12 whilst with 4 ewes and 5 ewes per acre output fell to £9 9s and £8 13s. The reason for this is a lower proportion of lambs being sold fat in early season (May & June) and a higher proportion being sold through the store market. So as intensity increases there is the danger of a fall in the value of the commodity. This is quite different to the dairy industry where the price of milk is the same whether the cow produces 800 or 1000 gallons and that even if intensification leads to a lower output of milk per cow the value of commodity is not reduced.

Most of the EHF's have been looking at the problem of why there are fewer fat lambs despite increased fertilizer use, more grass and some form of controlled grazing with creeps for the lambs. In all systems studied the problem of reduced liveweight gain appeared around the 12th week of grazing which is usually in July/August. Reasons for this are associated with the fall in herbage digestibility, the greater pollution of the pasture by dung and urine and possibly an increasing worm burden. This being the case it would seem reasonable to suggest that fresh pasture should be available after the 12th week and that weaning would also be advantageous at this time since the ewes are making little contribution to the growth of the lambs through milk supply and are in conflict with the lambs for the grass. Weaning at 12 weeks has proved to be quite successful and results from one trial are quoted in the table.

Treatment	Liveweight change per head 12 — 20 weeks
Undosed same pasture	— 2.3 lb.
Dosed same pasture	+ 2.2 lb.
Undosed clean pasture	+17.2 lb.
Dosed clean pasture	+16.7 lb.

Mean 12 weeks lamb weight 58.6 lb.

The value of providing clean pasture for the weaned lambs is clearly indicated even where dosing for worms is carried out. Unfortunately the 12 week period falls in late June/early July when fresh grass may be a problem. No hay aftermaths are then available although the silage makers will be better placed. April direct reseeds will also be useful but farmers with neither of these two latter facilities may have to consider growing a rape crop specifically for fattening lambs. However, the general problem of lamb growth from the 12th week needs further investigation and the EHF's are now looking for new management methods at this critical phase of fat lamb production.

R. D. HARKESS.

126 THE AUTUMN FEEDING OF COWS

S. M. BODEN, *NAAS., Yorks/Lancs.*

Agriculture Vol. 74 pp. 416-419.

With the decling feeding value of autumn and early winter herbage the author discusses some factors concerned in the change over from summer to winter feeding. On supplementing grass in autumn he warns not to be deceived by the lush appearance of pastures. Autumn herbage has a good protein content but is fairly wet and can lack in energy for high yielding cows. By experience M+1 to 2 gallons can be obtained but it may be necessary to provide energy for the second gallon by feeding 3½-4 lb barley. Thereafter a balanced dairy cake is required. In circumstances where it is difficult to feed two types of concentrate, Boden suggests that equal amounts of cereal and fully balanced concentrate can be replaced by their combined weight of a low protein concentrate of grazing nut type. In autumn, the feeding of supplementary cereal will provide a means of staggers prevention if 2 oz granulated calcined magnesite is incorporated in the feed.

Kale, if available for autumn feeding, should be introduced slowly while the cows are still on grass. Excessive kale feeding can be accompanied by infertility, anaemia, and blood in the urine and on any sign of this latter effect, kale feeding should cease immediately. If fertility problems are encountered a mineral mix high in phosphorus and also containing iodine and copper should be fed. The level of feeding at which such effects occur is obscured by many variables, sometimes 110 lb kale per head per day won't cause any upset, other times 70 lb will — it is a case of being on

one's guard. However, kale is a valuable source of cheap nutrients and should not be given up lightly. 50-60 lb kale, 7 to 8 lb hay, and 8 lb barley plus minerals should provide M+2.

If kale is to be followed by silage a good time to introduce this is when the cows are housed at night but are still going out to kale during the day. The value of the silage must not be overestimated once on full feeding. While there will be sufficient energy in the silage for M+1 there is likely to be sufficient protein for M+3 and so cereal supplementation will again be necessary. The author prefers 'easy-feed' systems rather than where the stock have to pull out the silage as with self-feeding.

Autumn is the time of harvest by products such as straw, beet pulp, stockfeed potatoes and pea haulm. If straw is fed, remember that an additional source of carbohydrate and nitrogen is required. This means a solid or liquid feed based on urea and molasses or else a cereal mixture fortified with extra protein. If plenty of straw is available some consideration of straw feeding is worthwhile, but if it has to be bought the economics of the system are less clear.

Dried beat pulp can replace barley and although not so rich in energy is very palatable. Potatoes can also replace barley, 7 lb having about the same feeding value as 2 lb of the cereal. The maximum feeding of potatoes would be around 21 lb per day. Pea haulm silage has equal feeding value to medium grass silage.

Bean growing is becoming more popular due to innovations in husbandry and financial incentives. An example of a home made concentrate mixture using barley and beans is as follows:— 1 cwt soya bean meal, 1 cwt decorticated groundnut, 5 cwt beans, 12 cwt barley, ½ cwt minerals plus vitamins. This mixture should be fed at 4 lb per gallon. A mixture of 3½ lb barley plus 20 lb wet brewers grains plus minerals and vitamins would provide sufficient nutrients for two gallons of milk.

R. D. HARKESS.

127 STORAGE HAY DRYING AT AUCHINCRUIVE

J. M. THOMSON, J. K. S. HALL and A. VEITCH

W.S.A.C. Res. Bull. No. 40, 1967 10pp (price 2/6)

The results of four seasons of storage hay drying are summarised in this publication. The system differs from the batch hay drying technique in that (a) it uses unheated air and (b) once the bales are built into the barn they remain there until needed for feeding. Both these factors lead to a less expensive product while still enabling hay of good quality to be made.

In the field a flail mower is used and this is followed by continuous tedding (alternating the direction of the tedder at each pass) until the moisture content does not exceed 35 per cent. This enables a stable bale of around 8-10 lb per cubic foot to be built into the storage cum drying barn.

Each stack of bales at Auchincruive holds 50 tons and has a duct up the centre with laterals to the corners. Cold air is blown through at the rate of 30,000 cubic feet per minute against at $2\frac{1}{2}''$ water gauge. It has been found necessary to blow continuously for the first 10 to 14 days and then during the day for only the next 7 to 9 days. Thereafter the stack is ventilated occasionally during spells of good weather. If, when switched on, there is a heating smell then moist pockets still exist in the stack and further blowing will be necessary. When the hay is dry the initial air blow (first 5-10 minues) will be cool and fresh. Test blowing for a few minutes at intervals of 10-14 days enables a check to be made.

The cost of the equipment was £600 (fan £210, central bung units (2) £80, wiring etc. £138, underground duct £172). Spread over 10 years this gives an annual charge of £60 and based on 100 tons of hay gives a cost per ton of 12/-. If an existing shed is used then the only other cost will be that for electricity. This has averaged 10/- per ton over the last four seasons. Total cost is therefore around 22/- per ton.

The authors summarise their experiences in producing high quality hay in the following nine conditions **all** of which must be observed.

1. Cut at right stage for high quality and digestibility.
2. Pay attention to field work to reduce moisture content quickly with minimum field losses and achieve 35 per cent moisture content or less at baling.
3. The bale is important, it must allow air to pass through freely but be firm enough to retain its shape in the stack.
4. Stack must be built properly on a good base to give stability. Sufficient lateral air ducts must be formed to give uniform air flow.
5. Continuous blowing is necessary for at least the first ten days (possibly longer) depending on the weather and the amount of air which the fan is blowing.
6. Daily blowing follows 7 to 9 days during periods of low humidity.
7. Finally, occasional blowing and checking during dry weather only, until drying is complete.
8. Prevent the bales from heating at all stages.
9. Maintain uniform air flow throughout the stack.

R. D. HARKESS.

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Cruickshank, W. R. (Snr.), Crofts, Crossmichael, Castle Douglas.

Cruickshank, W. R. (Jnr.), Crofts, Crossmichael, Castle Douglas.

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Flett, I. G. S., 1 Lochview Road, Bishopburn, Stranraer.

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Graham, R. M., Kirkland, Courance, Parkgate, Lockerbie, Dumfriesshire.

Grieve, Col. C. G., 37 Castle Street, Dumfries.

Hall, Principal J. S., West of Scotland Agricultural College, Auchincruive, Ayr.

Layhe, W., West of Scotland Agricultural College, Auchincruive, Ayr.

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Rodger, James, Netherplace Farm, Newton Mearns, Renfrewshire.
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