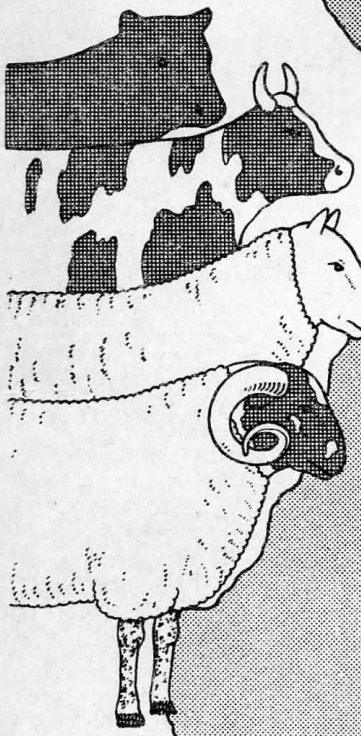
MARCH 1963



Journal of the South West Scotland Grassland Society

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DUMFRIES

CASTLE DOUGLAS

STRANRAER

WIGTOWN

KIRKCUDBRIGHT

No. 2.

JOURNAL OF THE SOUTH WEST SCOTLAND

GRASSLAND SOCIETY

(AFFILIATED TO THE BRITISH GRASSLAND SOCIETY)

Vol. 1, No. 2, March 1963.

Contents

SOUTH WEST SCOTLAND GRASSLAND SOCIETY

List of Officials November 1962.

CHAIRMAN - IAN JENNINGS, Shiel, New Galloway, Kirkcudbrightshire, Dalry (Kirks.) 252.

VICE CHAIRMAN - D. BRUCE JAMIESON, West Glenstockadale, Stranraer, Wigtownshire, Leswalt 230.

TREASURER - DR. M.E. CASTLE, Hannah Dairy Research Institute, Kirkhill, Ayr, Prestwick 77292.

SECRETARY - I.V. HUNT, Grassland Husbandry Department, West of Scotland Agricultural College, Auchincruive, Ayr, Annbank 234 (office), Prestwick 78288 (home).

MEMBERS OF COMMITTEE

Ayrshire

R.W. MONTGOMERIE, Lessnessock, Ochiltree, Ochiltree 226.

WM. YOUNG, Skerrington Mains, Hurlford, Kilmarnock, Kilmarnock 268.

Kirkcudbrightshire

JAMES BIGGAR, Chapelton, Castle Douglas, Haugh of Urr 208.

N. PETER MACLAREN, The Leaths, Castle Douglas, Castle Douglas 2151.

Dumfriesshire

J.D. BALLANTYNE, Tinwald House, Dumfries, Amisfield 221.

J.G. MARSHALL, Hardgrove, Carrutherstown, Dumfries, Carrutherstown 209.

Wigtownshire

F.R. EVANS, Penkiln, Garlieston, Garlieston 221.

T. MCFADZEAN, Brightside, Ardwell, Stranraer. Ardwell 47.

ADVISORY OFFICERS OF THE WEST OF SCOTLAND AGRICULTURAL COLLEGE

Ayrshire - DR. ROBT. LAIRD, College Office, 20 Miller Road, Ayr, Ayr 64627.

Kirkcudbrightshire IAN W. MITCHELL, College Office, 82 King Street, Castle Douglas, Castle Douglas 2743.

Dumfriesshire ALISTAIR CAMPBELL, College Office, 43 Whitesands, Dumfries, Dumfries 4174.

Wigtownshire JOHN THORBURN, College Office, National Commercial Bank Buildings, Bridge Street, Stranraer, Stranraer 200.

CO-OPTED MEMBERS

PROF. D.S. HENDRIE, Principal, West of Scotland Agricultural College, 6 Blythswood Square, Glasgow C.2. Glasgow City 5211.

A.E. PARKINSON, Director of County Advisory Service, West of Scotland Agricultural College, 6 Blythswood Square, Glasgow C.2. Glasgow City 5211.

ALEX. REID, Diddup, Saltcoats, Ayrshire, Ardrossan-Saltcoats 639.

Brief Announcements.

March 7th, 1963. Mr. J.S. Morrey speaks at 2.30 pm. in the Unionist Rooms, Loreburn Street, Dumfries.

Late April. Tour of Wigtown farms.

May 27-30th. Tour of Yorkshire farms.

March 26th. British Grassland Convention, Kenilworth, Warwickshire.

July 11th. British Grassland Society Tour of Narbeth district of South Wales. Two members, not members of the British Grassland Society, may attend this as delegates from our own Society. A contribution towards the cost will be made by the South West Scotland Grassland Society.

Stapledon Memorial Trust. This trust is being established in memory of Sir R.G. Stapledon, first director of the Welsh Plant Breeding Station, writer of many fine books on grassland farming, the inspirer of many present day grassland scientists. An appeal has been made for funds to establish this trust. Details are enclosed with this journal.

Editorial Note

Spurred on by two letters from members (pages 17/18), this number of the journal has been packed with facts including a fair proportion of interest to the hill farmer. There has been no shortage of material, the present number being considerably bigger than the last. It is pleasant to have within it contributions from farmers but more would be welcomed, including suggestions for articles for future numbers. Four members describe visits they made to places and gatherings of interest in the series 'On tour'. Principal Hendrie continues the series 'Focal Centres' and sketches College activities. At the request of many members who attended and those who were unable to be present at the Annual General Meeting, a full report of the talk by Mr. A.S. Cray, our Guest Speaker, is included in this number.

Research reviews is continued with summaries and comments on 28 recently published scientific articles. To show what proportion this bears to the total number of articles produced in a year, it is enough to mention that a Government Publication 'Herbage Abstracts' issued every quarter published abbreviated abstracts of 1700 articles of grassland interest during 1962 and has published a somewhat similar number every year since it started in 1931.

Four original articles are included on subjects chosen by the authors themselves.

The activities of our own Society are recorded in the report of the Annual General Meeting, a pen portrait of our Chairman by Ian Mitchell, the revised and, it is hoped, the final constitution and a list of new members. Space prevents including the full membership which will be printed in a later number issued before the next Annual General Meeting. Forthcoming activities and a note about the activities of the British Grassland Society are included, but in the interval during which the journal is being printed, some of these may be overtaken. Members will, however, receive notice of them.

REPORT OF THE 1st ANNUAL GENERAL MEETING
Civic Theatre, Ayr, 2.30 p.m., 12th November, 1962.

Guest Speaker - Mr. A.S. Cray,
Southdown Farm,
Medstead,
Alton,
Hants.

Mr. Jennings, Chairman of the South West Scotland Grassland Society, introduced the speaker, Mr. A.S. Cray, who had left his farm in Hants that morning for an hour's journey to London Airport, flown to Renfrew by 11.30, travelled across to Ayr to give the Association its first address. We were indeed honoured. Mr. Cray was known to many, especially those interested in grass as one keenly aware of the need for improvement in grassland management, for the incorporation of the very latest scientific knowledge of grass into practical grassland husbandry. By his support of the British Grassland Society, basically a gathering of scientists, by voicing the farmers needs and problems at their scientific gatherings, he had fostered active farmer/scientist relationship. He was the first farmer president of the British Grassland Society, a member of its Council for many years, had assisted in preparing a report and a system of Grassland Recording which had been adopted as a basis for wide studies of the subject. In connection with the integration of Grassland Science into farm practice, he had visited most of the important centres of research in New Zealand, Australia and Europe.

All this, whilst running his own farm in Hampshire and several other farms as Managing Director for Messrs. Cow & Gate Farms Ltd. It would be easy to go on praising the speaker but the main purpose of the meeting was to hear Mr. Cray and he had great pleasure in calling on Mr. Cray to address the Society.

'The Farmer and his Grass'

by A.S. Cray.

The need for continuing links between the Grassland Scientist, the British Grassland Society, Local Grassland Societies such as the South West Scotland Grassland Society and the grass conscious farmer cannot be too strongly stressed. A two way traffic between solution and problem is the only way to resolve the complexities of grassland management and to explain its many apparent contradictions.

Grassland management is more complex than arable management where it is possible to work to optimum conditions at all stages of growth of the crop and to measure accurately the yield when it is harvested.

Grassland management deals with many crops at once; a continuous harvest of variable quality for an infinity of purposes. I have found Prof. Cooper's latest book (Grass Farming 1961) a great help in smoothing out complexities.

Grassland management is at all times a compromise since an overriding need is to make grass serve the stock even if this means doing the wrong thing to the grass. Knowledge of the behaviour of grass under all conditions is the only method by which the best compromise for each set of circumstances can be chosen. The present time when the country is about to enter the Common Market is a particularly difficult one, but it is quite evident that if cereals rise in price, even home grown cereals, efficient grassland management will provide a very strong lever for competing with Europe in livestock production. Efficient utilisation of grass and especially winter use was likely to be a key to success.

I am conscious of the danger of advising grassland practises in a general way. My own experience on hill farms in the South West and Wales are sufficient to show how foolish it would be for instance to advocate general intensive fertiliser usage.

So that you may gauge the value of my comments here is my background. In 1920 I was in a farming partnership with my brother. The estate was sold and I went into the Dairy Trade at the end of 1922. I learnt a lot about farming from the outside at a most difficult period.

In 1940, I bought a run-out farm in Hampshire and put into effect ideas on grassland improvement. In 1950 I took on, as one of my duties, the setting up of Cow & Gate Farms Ltd., a development made necessary for the disposal of whey from Churn Factories in the Cow & Gate Group. Three farms are concerned, a free draining dairy/arable farm on Yeovil Sand in Dorset, a sheep/beef farm at 1000 ft. near Bodmin Moor, Cornwall, and a dairy/beef farm in Carmarthenshire, South Wales.

My own farm is of clay with flints on chalk and by no means easy to run. Originally 90 acres, it has been gradually increased to 260 acres.

In my farming career, I have been interested in all the various controversies and propose to mention a few of my own convictions.

1. Leys or Permanent Grass.

My own Hampshire farm was poor and completely run down when I took it over. Ploughing and reseeding resulted in quadrupled yields. The decision as to which was the better — ley or permanent grass — is a

question of the state of the grass. If it is poor because it contains the wrong grasses, then it must be ploughed and the correct grasses sown unless ploughing out is difficult for some reason. If it is poor because of bad management, then it can be improved by correct management to give an output equal to that of the leys. The problem once a farm is sown to good leys is to maintain them in that condition. By correct management, they can be maintained as permanent grass for an indefinite period.

The requirements are:-

Full establishment. (a). In my own case, I used to under sow 50% and sow 50% without a cover crop to give maiden grazing during mid-summer. Now I sow all my leys without a cover crop in order to ensure full sward establishment.

(b). Spring ploughing often produces an unsuitable tilth and loss of moisture with low production in the seeding and in later years. A frost tilth following autumn ploughing makes the best seed bed.

High fertility. Both with perennial ryegrass/white clover leys and with Timothy/meadow fescue leys, I find high fertility necessary for persistence. This became evident during some trials on extra Nitrogen usage when half a field was dressed with my customary 4 cwt. compound fertiliser, the remainder with the same plus additional dressings of 6 cwt. nitrochalk. By the 4th year, the former was running out whilst the latter was as good as ever. With high Nitrogen usage I find that my Timothy/meadow fescue mixtures improve year by year.

Chain harrowing. With our low rainfall, fouled ungrazed grass patches persist over winter into the spring. The lush grass kills itself out and becomes a site for the establishment of weeds. I find that thorough autumn chain harrowing distributes the dung, leads to more even grazing and less likelihood of weed invasion.

If a ley does not maintain its production, it is ploughed up and reseeded and the management corrected to ensure persistence.

2. Seed Mixtures.

I have passed through various seed mixture phases, starting with Seed Catalogue mixtures, then a modified Cockle Park mixture totalling 24 lb. per acre of persistent varieties of perennial ryegrass and cocksfoot (8 lb. of each), 6 lb. Timothy and 2 lb. white clover. I found the ryegrass seedheads troublesome in mid-summer.

I tried special single grass mixtures, some based on perennial ryegrass and some on cocksfoot but found this system too rigid, and not flexible enough. Since 1947, I have been extraordinarily successful

with the Timothy/meadow fescue mixture. It can give very early grazing with suitable autumn rest. I used to keep some perennial ryegrass leys because of their greater persistence but they no longer show to advantage in this respect. We were very much affected with ryegrass rust this autumn and I have noticed that the ryegrass remains free from rust, and grows vigorously when dressed with chicken dung or sludge tank waste. It leads me to think that we might do more with late dressings of nitrogenous fertiliser than we have done in the past probably at low levels of application.

I was led to using Italian ryegrass with New Zealand H.1. ryegrass some years ago when, in order to deal with weeds, I sowed this mixture in mid-summer to allow me to spray the weeds. The conventional method of spraying proved ineffective but spraying after flattening the thistles plus ryegrass with a Cambridge Roll seemed to make the thistle more susceptible. A small acreage of these types is now a regular practise, giving me weed control, maiden grazing, early bite and further grass for various purposes. I usually sow S.22 Italian ryegrass even though it is not the highest yielder. It is more resistent to winter frost than H.1. With regard to winter kill of ryegrass swards I find that autumn management aimed at close grazing and dense tillering helps to produce frost resistence. It is the overgrown, open, tillered ley that suffers.

Usual long ley sowing rates in the south are around 12-14 lb. but I use rather more, a tendency that is spreading in the south now. I know that in Scotland you have favoured heavy seed rate for many years and are encouraged to reduce them. We on the other hand have been accustomed to very low rates. It looks as if we will be all drifting to a common intermediate rate.

3. Fertiliser Policy.

Lime. I apply 2 tons Ground Chalk (equivalent to Ground Limestone in value) per acre every 5 years. Soil tests on leys of various ages show this rate of application over a 20 year period to be about right.

Phosphates. In early years I applied 10 cwt. basic slag to my seed beds with 3 cwt. Muriate of Potash and some nitrogenous manure at sowing time. Extra potash showed up and right through the war I continued to apply dressings of this order. I noticed that soil analyses over many years showed no changes and now I regard trial strips coupled with my own records of crop production and previous manurial treatment as being the best guide. Hamilton in a paper given to the Fertiliser Society in 1950 (The role of fertilisers in increasing output from grassland) pointed out that cut herbage needed ten times as much Potash and Phosphate as herbage grazed by mature meat animals.

Nitrogen. My customary 4 cwts. of 12-12-18 compound plus 2 cwts. nitrogenous fertiliser giving about 80 units Nitrogen was suppressing clover and not giving a net increase in herbage yield. Dr. Baker of the

Grassland Research Institute, Hurley, has been carrying out nitrogenous fertiliser trials on my farm since 1956. He guessed that yields would be up in 1st year, about even in the 2nd year and down in the 3rd year (because clover would be suppressed during the second year) but was surprised to find yields up about 40% each year with 90 units extra Nitrogen.

Nowadays, I apply 200 units N. (equivalent to 9 cwt. Sulphate of Ammonia) and because of low response to phosphate and potash just 50 units Phosphate and 70 units Potash. The nitrogen used to go on at 50 units per dressing four times in the season but I found that the best response came from the early applications so now I use 60 units for early bite, followed by 80-100 units for the main growth with the remainder for later grazing.

With regard to white clover, research work shows that 5000-6000 lb. dry matter is the top yield at the Grassland Research Institute from pure white clover with a 30" rainfall. This is roughly equal to about 20 cwt/acre utilised starch equivalent (U.S.E.). To get higher yields, it is necessary to use a lot of fertiliser nitrogen. Now with 200 units Nitrogen (N) I get 9000 lb. herbage dry matter or 3400 lb. U.S.E. I have been interested in grassland recording and favour the use of this term U.S.E. (utilised starch equivalent). It can easily be converted approximately into the units used in other systems. Thus, lbs. of U.S.E. divided by 12 equals Cow Grazing Days and by 6 equals gallons milk per acre.

The profitability of using heavy dressings of nitrogen is plain from figures such as the following which was an average response over 11 years.

Average yield without N	6,500	lb. dry matter/acre
" " with N	9,000	lb. dry matter/acre
Increase	2,500	lb/acre.

This is equal to 1250 lb. starch for an extra £5 or less than 1d. per lb. As cake, this would cost 5d. per lb., as hay 4d. per lb. Using N. fertiliser is good value.

The extra starch could yield 200 gallons more milk per acre. White clover is more productive in wet areas. Really vigorous white clover seems to follow the use of pig slurry, for a reason that so far is not obvious.

4. Level of Production.

In 1960/61, our milk yields average 950 gallons/animal from a herd 2/3rd of which are Friesians and 1/3rd Guernseys at an average concentrate

use of 1.4 lb/gallon. In 1961/62 yields were somewhat lower because my silage was not so good but concentrate usage was still 1.4 lb/gallon.

5. Winter Fodder.

A proportion of silage making is a must for the intensive grass farmer. Mid-June haymaking is followed by a rather slow aftermath growth. Earlier cut silage leads to a quicker, more vigorous aftermath. One of the puzzles in regard to grass is that maintenance plus 5 gallons can readily be achieved by grazing whilst maintenance plus $\frac{1}{2}$ gallon is commonly the limit with silage. Few of us do better than maintenance plus 2 gallons. We must obviously get to work on the production of higher quality silage. A high dry matter content is very important and we achieve this by wilting, finding it convenient to cut the crop with a 60" forage cutter and to pick it up with a 40" cutter.

On my son's farm in Cornwall using a mowing machine followed by a forage harvester actually takes less man hours than picking up direct.

Discussion

Mr. Peter MacLaren, Leaths, Castle Douglas opened the discussion, thanking Mr. Cray for his most interesting talk, finding fault in only one respect namely that he agreed so wholeheartedly with every statement that he could not pick out any area of disagreement. He much preferred to open a discussion by disagreeing with a speakers theme. He wondered rather why Mr. Cray was so sore on ryegrass. Mr. Cray's target of M + 5 (maintenance plus 5 gallons milk) was moderate. Why not M + 8.

Mr. A.S. Cray. Ryegrass was perfectly satisfactory for sheep farms but not for a dairy farm where one looked for M + 5 from the grass. In considering output from grass it had been shown that the higher the stock rate the higher the output per acre. The more mouths, the more was the grass output. This was rather a puzzle since half the grass eaten was used for maintenance whilst only half was actual production. Increasing the number of stock per acre would appear merely to raise the amount of maintenance or unproductive overheads.

His own explanation was that a herd grazing a field consisted of some high yielding individuals with a potential not of 8 gallons but 9 and 10 (probably outside Mr. MacLaren's experience) as well as lower yielding individuals.

If swards were managed to provide maintenance + 8 or 10 gallons, the 2-3 gallon individuals would be overfed. Efficiency demanded that the grazing be provided for the 2-3 gallon level and special provision made for the higher yielding individuals.

In reply to other questions, Mr. Cray said that he fed concentrates through early summer as a magnesium carrier. His policy of cutting back phosphate seemed to be satisfactory although he agreed that one could apply more with no harmful effects.

On the other hand, Potash was both expensive and possibly dangerous. It would be wrong to exaggerate the danger of potash fertilisers. He learnt a lot from his tour of Holland with the British Grassland Society. In Holland, a warning service is organised for farmers. Grass samples can be analysed for Potash, Magnesium and Protein. It has been shown that herbage low in Magnesium and not too high in Potash or Protein is not dangerous. The danger arises when the herbage has a low Magnesium content combined with high Potash and high Protein.

Fields close to the farm steading which because of a short haul would be dressed with their form of liquid manure (Gulle) most frequently, could show a rapid build up in Potash content in the herbage. Such herbage could with a rise in temperature produce grass staggers in 5 days. Spring was a common time for this type of rapid growth but a similar danger could arise after a drought.

Principal Hendrie asked Mr. Cray whether he reaped any advantage from sowing white clover in mixtures which would be given 200 units of Nitrogen. Mr. Cray considered that the low cost of white clover justified its inclusion since it provided a flexibility regarding use in the early stages of development. One of the big problems being tackled by research workers was the feasibility of using nitrogenous fertilisers and maintaining a worthwhile clover content. In his own experience, he found clover benefited from the earliest dressing of nitrogenous fertiliser.

Mr. Young asked for an opinion on whether the systems of grassland management described by Mr. Cray, obviously suited for milk production, was equally suitable for sheep, beef and for beef from the dairy herd.

A rather shorter tighter sward was more suitable for sheep, a rather lax sward gave the best weight gains in beef cattle.

Mr. Cray was rather pleased to state that the Timothy/Meadow fescue mixture could withstand the closer grazing required for sheep and he considered that grass really good for milk was equally good for beef.

Mr. John Frame asked about the speakers experience with cocksfoot and whether Mr. Cray found it suitable for his Dorset farm on Yeovil sand.

The farm actually did not provide quite the problem anticipated in the question as the sand did not dry out in summer. Cocksfoot was of course a useful grass on the lighter soils because of its drought resistance. It should be heavily fertilised in the spring.

Mr. Graham Berrie asked whether Mr. Cray placed any value on the cheaper forms of phosphatic fertilisers as maintenance fertilisers. Mr. Cray was influenced by the convenience of the fertiliser. He appreciated the usefulness of trace elements in Basic Slag.

Dr. R. Harkess asked three questions. Firstly, whether direct reseeding provided a starch equivalent output greater than that possible from an undersown crop. Mr. Cray's experience was that the output under direct reseeding was 60% that of normal output, but the value in terms of longer life of the ley outweighed this loss in the first year. Secondly, what were the relative outputs of the various types of mixtures sown. Mr. Cray found that there was no consistently high yielding mixture. It might be a Timothy/Meadow fescue, a perennial ryegrass or a cocksfoot mixture depending on the climatic condition and management. The third request was for an opinion of tall fescue. Back in 1950 Mr. Cray had sown S.170 across a field of S.215 and found that stock preferred to eat the S.215 even to its roots. Nowadays, S.170 was being valued as a long lived alternative to Italian ryegrass for early bite production. It had distinct possibilities especially as it was generally earlier growing than Italian ryegrass and he had put down an S.170 ley this year.

Dr. Castle wanted more information on the 1.4 lb. concentrate per gallon. Mr. Cray's practise was to feed through April as a Magnesium carrier averaging $\frac{1}{4}$ lb. per gallon for the summer 6 months. The winter average was around $2\frac{1}{2}$ lbs. One year when he judged that there was no possibility of Magnesium trouble he left out the feed in the spring and suffered no harmful effects.

In reply to Mr. Walker-Love's question Mr. Cray said that his calving programme was continuous calving through the year with a predominance of spring calvers.

Mr. J. Hannah, proposing a vote of thanks to Mr. Cray, found it difficult to adequately express thanks for Mr. Cray taking this long journey from Hampshire to Ayr, bringing with him such a vast volume of knowledge of grassland management. His conclusions were of a practical nature and demanded the closest attention from all present. It was obvious from the complexity of grassland and the many interesting factors that the one certain way of facing the anxieties of the future was to plan for improved grassland management.

SOUTH WEST SCOTLAND GRASSLAND SOCIETY

Report of Proceedings at the 1st Annual General Meeting

At Civic Theatre, Ayr.

Date 12th November, 1962.

Time 4.30p.m. after an address by Mr. A.S. Cray, Hampshire. (See page 5 this Journal).

The Chairman, Mr. Ian Jennings, outlined the activities of the Executive Committee. The period of inactivity since the Inaugural Meeting coincided with a rather busy harvest time but a programme had been arranged with the emphasis on a few items of high standard. The constitution had been studied and certain recommendations of the Executive Committee were incorporated in a Draft Revised Constitution, copies of which had been posted to all members. The journal had been launched and it was hoped that it could be maintained on the basis of literary contributions from members.

The following matters were reported, discussed and decided.

1. Programme

(a) The next meeting was to be a talk by Mr. J.S. Morrey, Devizes, Wiltshire, on Thursday March 7th in Dumfries. The details to be arranged by committee members from Dumfriesshire.

(b) A tour of farms in Wigtownshire to be arranged in the spring by the committee members from that county.

(c) Proposals for a 3-day tour in the summer to be drawn up and members to be circulated.

2. Membership and Finances

Dr. Castle, Hon. Treasurer, reported on finances and presented a balance sheet. These were in a highly satisfactory state with 203 bankers orders in and a further 6 since the balance sheet had been prepared. A copy of the balance sheet is given below. Mr. R. MacKenzie of the Clydesdale & North of Scotland Bank Ltd., Burns Statue Square, Ayr, was thanked for auditing the accounts for the initial 6 months period. In accordance with the constitution, Professor Hendrie and Mr. J. Markham proposed and seconded Miss Hughes, Hannah Dairy Research Institute, as auditor for the coming year.

Statement of Accounts 14/6/62 - 31/10/62

Income		Expenditure	
Cash at beginning	nil	British Grassland Society Affiliation fee	£5: -: -
203 annual subscriptions at £1	£203: -: -	Bank service charge & cheque book	2: 2:10
		Stationery	11: 2: 2
		Postage	13:13: 5
		Typist's fees	4: -: -
		Cash in Bank	167: 1: 7
	£203: -: -		£203: -: -

Bank Reconciliation.

As per Certificate of Balance as at 31 October 1962	£169: 5:11
Less:- Cheques not yet presented	2: 4: -
	£167: 1: 7

3. British Grassland Society

As affiliated members, Mr. Cray's expenses were being met by the Society. The Secretary had received two copies of the journal of the British Grassland Society which were being circulated amongst members. A further two copies were subscribed for so that each county could have its own copy in circulation.

The News Sheet or Local Societies' Journal to be produced by the British Grassland Society was to be ordered in sufficient numbers to supply one free per member. This journal would include articles by members of various local Societies and any sent in by our own members would be welcomed.

The Winter Meeting of the British Grassland Society was to be a Conference on 'Nitrogen and Grass' in London on Friday, 7th December. Two members could attend as delegates. (Mr. J.C. Wardrop's report of this meeting is printed in this journal).

The Summer Meeting of the British Grassland Society would take place in Carmarthenshire, South Wales during July. The dates and programmes would be available from the Secretary.

4. Constitution

Mr. Jennings drew attention to desirable changes in the constitution. These were as follows:

Clause 4(iv). In its present state and indeed in its revised form, there were ambiguities. The opinion of members was tested on various aspects and it was ascertained that (a) it was desirable that farmer membership should be limited to the 4 counties named in the constitution. This was thought necessary so that the way was left clear for other adjoining counties to form their own local society; (b) there should be at least 75% farmer members, so that the Society could reflect mainly the interests of farmers rather than of technical members; (c) technical members could be members even though they lived outside the four counties. If they join the local society, they do so because they subscribe to Clause 4(i).

On a vote it was left to the committee to redraft the clause.

Clause 6(ii) of the draft revised constitution. This proposed adding a Vice Chairman to the Executive Committee. This was agreed to and Mr. D. Bruce Jamieson, West Glenstockdale, Stranraer, proposed by Mr. T. McFadzean and seconded by Mr. Fraser Evans was unanimously elected to be the 1st Vice Chairman.

Clause 6(ii) of the current constitution to be replaced by clauses 6(iii) and (iv) of the draft revised constitution. According to the old constitution, the committee included 12 members, 3 from each county. At the inaugural meeting on June 14th, 1962, the 4 County Agricultural Advisers of the West of Scotland Agricultural College had been elected as one of each group of 3. It was felt that to ensure continuity of communication with members in each county it was not desirable for these to retire in rotation. The clause was thus amended so that 8 members would be elected 2 per county whilst the 4 County Advisers would remain on the committee.

Clause 6(v) (old constitution). According to the old constitution the expenses of the Secretary were to be met by the Society. This was amended so that the Treasurer would be on the same footing.

Clause 7 (revised draft). This new clause set out the method of election of committee members.

The requirement that nominations for the committee had to be sent in writing to the Secretary 28 days before the Annual General Meeting was discussed on the suggestion by Mr. J. Markham that the number of days notice was too long.

Two matters affected the choice of date: (a) it had to be long enough to allow the Secretary to prepare for voting which might be by postal note or conducted through the County Agricultural Adviser's office for each of the 4 constituent counties; (b) it had to be short enough to come within the normal time of notifying the date of the Annual General Meeting.

It was decided that the second requirement could be met by notifying the date at the last summer function of the Society, or by assuming that it would be held on 1st November each year.

The second item discussed was the voting powers and representation on committee of technical members. As a result, the Secretary was asked to allocate each technical member to a county, generally that in which he lived or worked. The member could then nominate representatives, be himself nominated and vote within one of the 4 county constituent groups of the Society.

The voting procedure as shown in the clause was adopted.

The constitution was discussed and noted clause by clause. Those not mentioned in this report were adopted without amendment.

That the revised constitution be adopted was proposed and seconded by Mr. R.M.T. Wilson and Mr. D.B. Jamieson respectively.

The revised constitution is printed in this Journal.

Mr. Peter MacLaren proposed a vote of thanks to the Chairman and the 1st Annual General Meeting concluded.

Membership

The following new members have joined since the last published list:-

R.M. Nicholson, Messrs. Nicholson & Sons, Kidsdale, Whithorn, Wigtownshire.
D.C. Smith, Fisons Technical Adviser, Ardcraig, Minnigaff, Newton Stewart.
Dr. A.M.M. Berrie, Botany Department, University of Glasgow.
T.W. Ritchie (Dunns Farm Seeds), High Park Smithy, Glenlochar, Castle Douglas.
J. Stewart Esq., Dalquharran Castle, Girvan.
H.O. Chalmers, Craigencrosh, Stoneykirk, Stranraer.
J.H. Smith, Veterinary Surgeon, Whiterig, Galston, Ayrshire.
T. Hamilton, Briery Hill, Lockerbie, Dumfries.
J.W. Edgar, Cults, Whithorn, Wigtownshire.

Membership now stands at 241 and a full list will be included in the next number of the journal.

Letters to the Editor

Banks Farm,
Drumstinchall,
Dalbeattie.

10.11.62.

The Editor,
Journal of the S.W.S.G.S.

Sir,

Please, please not another cosy, chatty journal, suitable for the whole family.

May I plead for concise information and informed opinion, written in plain English for plain men.

Style, yes! Poetry, verbosity or just old fashioned blather - No!

Let us have science with practice, let the facts be plain and the opinions various, and a correspondence section open to all.

Congratulations on the factual presentation of Journal 1.

Yours faithfully,

Roy D. Wilton,
Farm Manager.

Drumhumphry,
Corsock,
Castle-Douglas.

19.12.62.

Dear Mr. Hunt,

As one of the foundation meeting members of the Society, I have naturally followed the initial steps taken by it with great interest including a bedtime study of the first issue of the journal.

In the very early and formulative days of a Society, one hesitates to advance any criticism which might be taken as other than constructive and I would earnestly ask you to regard the following train

of thought as being on the constructive side. Having attended the inaugural meeting, being unavoidably prevented from being present at the first A.G.M. and read the journal carefully, these thoughts are as follows:

Writing as a hill farmer for whom, with an eye on the future, the improvement of grass is at least of as great, if not greater, importance than any other branch of the industry, I cannot rid myself of a feeling that the interests of the hill and upland farm may well run a poor second to those of the dairy farmer.

I have gone through the names and addresses of members at the end of the journal and realise that the dairy farmer is probably well in the ascendency as far as numbers go. This is partly the fault of the hill man. If the experience of the Local discussion Society of which I am a committee member can be taken as a guide, the hill men are slow to come forward to a new venture. It would be interesting to know how many of those from the hill farms originally invited actually joined.

However, the hill farmer must interest himself in the problems of the low ground man and the low ground man vice versa if the Society is to benefit all in the South-West.

Once the Society is on its feet, I feel that members must be prepared to get away from their own boundaries to keep abreast with modern developments. I will write to you again with some suggestions which might be of interest to all members, also hill and low ground sections.

Speaking again as a 'hill man' problems which I feel are worthy of investigation are:

(1) Chemical renovation and reseeding of hill pasture.
(2) Sod-seeding techniques and results to date.
(3) Progress with bracken spraying.
(4) Splitting up of large hill hirsels into fenced (200??) acre blocks and ensuing management of grass.

Having probably said more than enough, I will leave you with these thoughts and meantime wish you a very happy Xmas and prosperous and profitable new year.

Yours sincerely,

J. Aird Smith.

On Tour

Report of the Winter Meeting of the British Grassland Society, held on 7 December, 1962.

by

J.C. Wardrop
Auchenfranco, Lochfoot, Dumfries.

The theme of the 1962 Winter Meeting of the British Grassland Society was "Nitrogen and Grassland".

Clover and Fertilizer Nitrogen

The opening paper of this conference entitled "Nitrogen and Herbage Production" was presented by Dr. M.E. Castle & Dr. D. Reid of the Hannah Dairy Research Institute and provided interesting information on the responses of two different grasses with and without clover, to various levels of fertilizer nitrogen over a three year period. It was shown that both clover and fertilizer nitrogen could substantially increase yields of herbage dry matter although there was a natural tendency for the dry matter yield of the ley to diminish over the three years of the trial. This could be obviated, however, with liberal dressings of nitrogen spread throughout the season with a consequent reduction of the clover content by the third year.

Based on the experimental findings a suggestion was put forward that no fertilizer nitrogen should be applied in the first two to three years in the life of a grass + clover ley, with a consequent saving in the cost of growing grass; this being the period when the clover in the sward is capable of fairly high yields. Later in the life of the ley when the amount of clover has decreased and grass has become dominant, fertilizer nitrogen should be applied. Thus over the whole life of the ley the maximum use would be made of both the clover and fertilizer nitrogen.

At the present time approximately one quarter of the Institute's grassland has a vigorous clover content and receives no fertilizer nitrogen whilst the remaining area of grass may receive up to 7 cwt/acre of "Nitro-Chalk" each year. In 1961-62 the average application of fertilizer nitrogen was given as 90 lb/acre of grass, and one adult stock-equivalent was kept on 1.47 acres after allowing for sales and purchases of food. This was a point of considerable interest, but coming from the Hannah Institute, it sounded to me rather like slipping into reverse gear.

Seasonal Production

The seasonality of grassland production was discussed by Mr. D.W. Cowling of the Grassland Research Institute, Hurley in his paper "Nitrogenous Fertilizers and Seasonal Production". A number of home truths emerged from the rather complicated picture generally presented by grassland workers, viz:-

(1) At any time of the growing season nitrogen will increase grass yield.

(2) There is usually a residual effect from nitrogen following the first cut after its application. The residual effect could be either an increase or a decrease in the yield at the next cut.

The general conclusion drawn by Mr. Cowling was that fertilizer nitrogen was more effective in raising grass production in the summer and early autumn relative to the contribution from clover. He stated that the idea that all grass should have, as a routine, an annual spring dressing of nitrogen, should be discouraged. Spring dressings should be used for special purposes. He emphasised the danger of relying on a low-clover sward, without additional nitrogen, to fill the needs of grazing stock in mid and late summer.

Nitrogen on grass & clover

"The use of Nitrogen on Grass + Clover Swards" was the title of the paper delivered by Dr. J.S. Brockman & Miss K.M. Wolton of Levington Research Station, Suffolk. From an exhaustive series of trials, a general pattern emerged.

Relatively low levels of fertilizer nitrogen increased yield slightly, but reduced the contribution to total yield by the clover present in the sward. A single spring dressing of nitrogen, increased the yield of the first cut of the season, but was off-set to some extent by a reduced yield in the second cut. With increasing rates of nitrogen, the total yield increased, while the contribution by clover gradually diminished.

Heavy applications of nitrogen to grass + clover swards produced no more herbage than similar rates of nitrogen to all grass swards but with applications of up to 120 lb nitrogen/acre on pure grass swards yields were no higher than those from a vigorous grass & clover sward receiving no fertilizer nitrogen.

Dr. Brockman advocated heavy applications of nitrogen only in circumstances where the enterprise could absorb high cost grass production, and where the management was of a very high standard. With

enterprises of lower output per acre, the level of applied nitrogen could be reduced to allow part or all of the supply of nitrogen to the sward to be contributed by clover.

Grazing results

So far in this conference, the proceedings had dealt mainly with the technique of producing grass, and much of the information had originated from plot experiments. In these the yield data were obtained by cutting rather than by grazing. The conference turned now towards the practical implications of these techniques when Mr. R.R. Turner of Jealott's Hill Research Station, Berkshire, gave his paper, "The Value of Nitrogen for Milk Production".

Mr. Turner presented much interesting information accumulated over a period of years and referred to the results of a number of successful farmers who have co-operated with I.C.I. in the Grassland Management Investigation. He also provided detailed information from Henley Manor Farm, Somerset.

On this farm two similar areas of 54 acres each, were suitably equipped for milk production. One area received heavy applications of nitrogen, 230 lb/acre, while the other received no fertilizer nitrogen. The number of cows carried on each farm was adjusted in accordance with the anticipated level of production of grass and both enterprises were fully costed. The average profit per acre over a five year period was £39 on the nitrogen farm and £15 on the no nitrogen farm, an increase of 150% on the nitrogen farm.

Animal health

The final paper of the conference was read by Professor Dr. Th. de Groot, Wageningen, Netherlands, under the title "The Influence of Heavy Nitrogen Fertilizer on the Health of Livestock". Much of the information supplied by Dr. Th. de Groot was collected from ordinary commercial farms throughout Holland and he stated that in 1962 the average rate of nitrogen application in Holland was 150 lb per acre. This level had been reached in increasing stages over a period of years.

When discussing hypomagnesaemia Dr. de Groot described the success on one small farm on a sandy soil where dressings of magnesium to the soil had increased the magnesium content of the herbage. As a result concentrates containing magnesium were now omitted from the cow's diet throughout the whole year. The speaker explained that high rates of application of potash had a tendency to render the magnesium unavailable and it was important to attain a balance between magnesium and potash. If soil potassium is brought to a normal level this will have a successful influence on the magnesium level of the cows blood.

In answer to a question, he stated that acetonaemia could be prevented to some extent by ensuring that the starch content of the ration was adequate. In many of the cases he has investigated, the ration given to the animal was too low in starch equivalent, and an increased starch intake brought about a recovery.

Presidential address

The Presidential address was delivered by Mr. F.H. Garner, Principal of the Royal Agricultural College, Cirencester, who selected as his subject "The Palatability of Herbage Plants". Mr. Garner stressed the need for greater attention to palatability by all grassland workers and emphasised that increased yields were of little value if the herbage was not readily consumed by livestock.

Summary

The theme of the conference, "Nitrogen and Grassland", covers a wide field and in the limited time of only one day the five papers gave a balanced programme ranging from the fundamental papers reporting the results of plot experiments at the Hannah and at Hurley to the paper from Mr. Turner describing results on a practical farm scale.

The subject was dealt with at a scientific level and no attempt was made to advocate one specific policy of grassland farming. Much information was presented, however, which will assist the research worker and adviser and hence ultimately the farmer. In particular the information given in three of the papers regarding the combined use of nitrogen fertilizers and clover was of considerable importance and ultimate practical significance.

If one item could be selected for mention it is perhaps the emphasis that was put on the fact that it is the supply of nitrogen to the sward which governs the production of the sward. This nitrogen can come from clover, clover supplemented with nitrogen, or fertilizer alone, according to individual requirements.

Complete reports of the papers given at the conference will be published in the Journal of the British Grassland Society in 1963.

Editors Note

Mr. Wardrop was the official delegate from the South West Scotland Grassland Society to the meeting in London.

Mr. Wardrop farms at Lochfoot, near Dumfries and prior to that was assistant to Mr. N.P. MacLaren at the Leaths Farm, Castle Douglas.

On Tour

European Conference for Forage Production on Natural Grassland in Mountain Regions

Chur, Switzerland, June 25th - July 2nd, 1962

by I.V. Hunt

An International Grassland Congress is held in some part of the world every four years. The next one in 1964 is to be in Brazil and the one following that in Finland in 1967. It was decided at the last Congress (Reading 1960) that a European Conference might be fitted in before the Brazilian Congress. The result was this Swiss Conference, which I, in company with 10 other British grasslanders, attended during last summer.

The first three days of the Conference were spent in listening to and discussing 23 lectures (of which 6 were in English). The papers were not particularly interesting, the Swiss, Germans and Austrians seemed to be concerned with purely botanical aspects of hill grassland in classifying the various types of herbage and in the long term changes which took place in herbage. The most interesting papers were by F. Zurn and N. Mott of West Germany who showed that whenever fertilisers are used on hill grassland one should choose Alkaline and not Acid fertilisers. With the alkaline fertilisers there was a possibility of gradual improvement with little need for a continuing liming policy. If acid fertilisers are used then one must lime often.

The title 'mountain grassland' is rather deceptive. The grassland referred to in these terms was far more productive than Scottish mountain grassland. Thus, Professor Caputa of Switzerland claimed that the best seed mixture for sown meadows at 5-6000 ft. would be one based on Red Clover, Meadow Fescue and Timothy. Our Scottish hills reach 4000 ft. and most of it above 1500 ft. would not be considered worth sowing to any seed mixture at all. Incidentally, Professor Caputa was in Dunblane for a time during the war training with the Polish troops.

The most interesting part of the Conference was the tour of farms and research institutes. The first farm visited, that of M. George Thürer, Gaisweid, Chur, was typical of many which followed. It faced north in a valley with steep mountains all around it, and was regarded as a lowground farm but nevertheless was at 1950 ft. above sea level. The district was a wet one with an annual rainfall of 35 inches, the summer short but warm enough for maize and wine growing on slopes with a southern aspect. M. Thürer's farm was, however, a dairy farm.

Cropping summary	Natural grassland	30 acres
	Sown grassland	7½ "
	Wheat, potatoes	12½ "
	Total for the holding	50 "
Livestock	Horses	1
	Cows	20
	Oxen	3
	Young stock	6
	Pigs	20

Grassland and livestock management

Most of the milk was produced away from the farm. Twelve cows and 3-4 young stock were sent away for 90 days from 22nd June till end of September to graze on a municipally owned alpine pasture (Chureralpen, Arosa). The alpine pasture was managed by wardens appointed by the nearby town of Chur who milked and looked after 552 cows sent to the Alps by the farms of the district. The milk produced was sold liquid in the nearby holiday resorts or made into cheese; the skim milk being fed to pigs kept alongside the cows. These alpine pastures lay at 7000 ft.

Whilst these 12 cows were away, 6-8 cows and the rest of the young stock were kept back on the lowland farm grazing the fields in a rotation, spending about 10 days in each paddock. This was not typical: on most farms, all the cows would be away to the Alps through the summer, but, Mr. Thurer had some liquid milk trade in Chur. During the summer, all the grass on the lowland would be cut for hay, some of it cut 2 or 3 times, some only once per year and about 20 acres cut and grazed in alternate years.

The yield of hay averaged 64 cwt. per acre. When the cows came down from the Alps, they joined with the stock already on the farm and grazed all the grassland as long as grass was available, thereafter spending until 25th April indoors. From 25th April until 22nd June the stock are taken out to pasture for spring grazing for 3 hours each morning and 2 hours each evening.

Many other farmers follow a slightly different system with stock, sending their cows and young stock to a mid alpine pasture (a halfway stage) to graze for a few weeks before going on to the high Alps. This mid alpine farm would be cut for hay once per year. Haymaking was a burdensome task and generally continued right through the summer, taking first cuts on the lowland farm, then moving away to take first cuts at the mid alpine farm before returning to take the second cuts from the lowland farm. On a very few farms, haymaking machinery was

seen but on the majority of farms the hay is cut with a hand scythe or a machine similar to an Allen Motorscythe pushed by hand. The grass is made into hay by much hand tossing. Finally, it may be carried on the back from the field to the steading.

This type of agriculture is only possible because of the small size of the average holding. The total Swiss grassland consists of the following:-

	Hectares	Acres
Sown leys	150,000	370,000
Natural meadows	670,000	1,655,000
Alpine pastures	1,065,000	2,631,000

There are 206,000 holdings of which 53% are less than 5 hectares (12 acres) and only 1.2% more than 30 lectares (74 acres). The great bulk of the farmland of Switzerland (84%) are on holdings between these two limits. The farms are operated as family units, with farmers' sons, wife and daughters all busy in the hay fields throughout the summer.

Farmyard manure and liquid manure are carefully saved and carted out onto the hay meadows. On some farms this will be the only manuring. On the more enlightened, phosphates as super-phosphate or basic slag and potash are also applied. On a few farms nitrogenous fertilizers are also applied. For example, Mr. Thurer applies 30 lb. N., 50 lb. P_2O_5 and 100 lb. K_2O every year to all his mown land in addition to the farmyard and liquid manure.

Many farms use no nitrogenous fertilizer at all, because it is considered to upset the fermentation required for Emmenthal cheese production. The result of continual cutting of lowland meadows with annual dunging and no nitrogenous fertilizer has been to produce swards with no clovers at all, very few of the grasses familiar to us and masses of big leafy weeds.

Their main grasses seem to be Bromes, Oatgrass and Meadow grasses. The 'weeds' which are very highly regarded are Wild Sages, Dandelion, Ribgrass, Knapweed and similar rather coarse looking plants. Mechanical haymaking would be rather difficult with these rather tough stemmed plants. The Swiss climate, even though there is a short growing season, allows very rapid growth and it is possible that they could increase their hay yields by using a nitrogenous fertilizer, but not by very much. One effect of using a nitrogenous fertilizer would be to eliminate the 'weeds' which they value rather highly. A second handicap under which the Swiss farmer operates is that in about half the country he is not allowed to make silage, receiving a grant towards the cost of grass drying to make up for the restriction. Silage is debited with a bad effect on cheese fermentation.

It would be easy to discount their views on these matters but their one concern is to make a cheese of uniform grade and type for export. This they claim is only possible if every farmer contributing milk to the process sticks to certain rules of manuring.

There are many queer features of Swiss agriculture and especially their ideas of grassland management, but behind it all lies the main concern that with so much high altitude grassland, they must develop along lines which make the maximum use of the alpine pastures. The herbage on these pastures is inaccessible in winter so that they must be used for summer grazing. Milk is the main exportable product so the alpine growth is converted into milk. To sustain this practically the whole of the lowland grass must be cut for fodder for the long winter.

In Scotland, by contrast, the herbage grown on the hills is kept for use in winter after it has lost over 50% of its feeding value, because no one needs the hills full potential for summer production.

On Tour

THE HENLEY MANOR FARM EXPERIMENT

by David Reid
Hannah Dairy Research Institute, Kirkhill, Ayr

The results from a 5-year farm-scale experiment to measure the profitability of heavy nitrogen usage compared with using no nitrogen were presented by I.C.I. Ltd at a demonstration on their Henley Manor Farm near Crewkerne, Somerset in October 1962. This was an important experiment because most of the existing information on nitrogen usage was derived from experiments on a much smaller scale.

The experiment started on 1 April 1957, using two 54-acre blocks of land, each with an effective area of 51 acres, selected from the 376-acre Henley Manor Farm. These blocks were as alike as possible in soil type, exposure and other factors. Each block was managed as a separate farm, and was provided with a new steading consisting of yards and a self-feed silo under one roof and an attached milking parlour. These buildings allowed all the work to be carried out by one man on each farm.

Fertilizers and management

Phosphate, potash and lime were applied on both farms, but nitrogen was applied on only one. All other management factors were

standardized as far as possible. Thus grass was the only crop grown; Ayrshire cows were the only livestock carried; similar herd yields were maintained; and the same proportion of the cows' diet was provided by grass on the two farms. In addition the two dairy herds were as closely matched as possible according to yield, calving dates and number of lactations.

The extra grass grown on the nitrogen farm was to be used to carry more cows so at the start there were 32 cows on this farm and 22 on the no-nitrogen farm. Bull calves were sold and heifer calves were transferred to the main farm at market prices, reared there and bought back as second calvers when replacements were required. Over the 5 years of the experiment the average number of cows was 35.5 on the nitrogen farm and 22 on the no-nitrogen farm.

Milk yields and profit

A milk yield of over 1,000 gallons/cow was maintained on both farms throughout the experiment, and a large proportion of this came from grass since concentrate feeding was less than 1½ lb/gallon.

The equivalent of about 10 cwt "Nitro-Chalk" (21% N)/acre was applied each year on the nitrogen farm, and with the extra herbage resulting from this fertilizer only 1.4 acres of grass were required per cow compared with 2.3 acres on the no-nitrogen farm. During the summer months, grazing provided 90% of the cows' diet, while in the winter, grass silage and hay provided about 75% of the diet on both farms.

On average the total milk yield each year was 37,750 gallons on the nitrogen farm, and 22,830 gallons on the no-nitrogen farm. The higher stocking rate and greater milk yield on the nitrogen farm resulted in lower costs here than on the no-nitrogen farm. As a result the annual average profit on the nitrogen farm was £1977 compared with £764 on the no-nitrogen farm.

No marked disadvantages occurred to detract from this considerable financial advantage of heavy nitrogen usage. Both herds had a low replacement rate indicating that there were no major health problems. Hypomagnesaemia and acetonaemia occurred, but to no greater extent on the nitrogen than on the no-nitrogen farm. Infertility was not a problem as the average calving index was 385 days on the nitrogen farm and 368 days on the no-nitrogen farm.

Application of results

The applicability of these results to conditions in south-west Scotland may be questioned. The growing season is much longer in

Somerset than in this area, and the climate allows grazing to continue from March right through into November, or even up to Christmas for day-grazing. However, these factors will not alter the comparison between nitrogen and no-nitrogen systems since they should have about the same effect on both. The most important point to remember in considering the level of nitrogen usage is that maximum profit will be obtained only if efficient use is made of the extra grass produced. This was possible in the I.C.I. experiment because sufficient housing was available on the nitrogen farm to allow a high stocking rate. Heavy nitrogen usage cannot be fully economic where the stock-carrying capacity of the farm is limited by available housing, by lack of capital or any other factor. The level of nitrogen adopted will therefore depend to a large extent on the conditions prevailing on the individual farm.

On Tour

SOME RECENT DEVELOPMENTS IN WEED CONTROL

by R.C. Kirkwood
Botany Department, West of Scotland Agricultural College

Among the more printable definitions of a weed is the one 'a plant growing in the wrong place' or again 'an unwanted plant'. 'Unwanted' because weeds compete with the crop for water, minerals, light and space and can increase the cost of harvesting and marketing the crop. In fact, it has been estimated that as a nation we annually lose £70 million due to weeds on our farms. Commerce is aware of the potential market which has opened up with the development of new weed control techniques over the last 20 years, and today some 250 proprietary agricultural weedkillers are available - a truly bewildering arsenal. Indeed it is difficult to keep abreast of the rapid advances which continue to take place in this rather specialised field of crop production, and this review is intended to summarise some points arising in research papers presented at the 6th British Weed Control Conference held last November in Brighton.

The use of herbicides in grassland

Perhaps the most interesting development in grassland weed control is the finding that low doses of dalapon or paraquat will depress the proportion of 'inferior' grasses such as Agrostis, sweet vernal grass and meadow grasses, while the 'sown' species viz. perennial ryegrass and cocksfoot are relatively unharmed and later increase in yield. Further trials have to be carried out, but it is thought that such treatment, carried out in association with standard husbandry practices,

would have particular application to reverted permanent pasture. The need for renovation treatment of this type is underlined by a survey of permanent grassland of lowland England showing that only 1/5 of such pasture was of good quality, the remaining 4/5 being dominated by inferior grass such as Agrostis.

The use of high doses of dalapon and paraquat for the renovation of rough swards has received further investigation and while the technique has been successfully used, the problem of providing a suitable seed-bed presents a problem, the solution to which is dependent on the environment of the particular site.

With regard to the control of broad leaved weeds in pasture, using MCPA and 2,4-D, it has been shown that the spraying of successive small doses, either in a single season, or in separate seasons, may give better control than a single large dose of these chemicals. For example, application of 8 oz. per acre of MCPA in two consecutive years gave better control of creeping thistle than a single large dose.

Where pastures contain a fair proportion of clover, it has been suggested that MCPA/MCPB mixture may usefully replace high doses of MCPA or 2,4-D. On the other hand another worker reports that application of MCPA 30% in conjunction with compound fertiliser, as opposed to MCPA alone, has given superior production of weed-free grass/clover herbage.

The use of herbicides in arable land

The routine use of MCPA and 2,4-D as part of cereal management has resulted in the build-up of certain MCPA-resistant weeds, e.g. redshank, knotgrass, black bindweed, mayweed, corn spurrey, corn marigold and chickweed. Research has continued on the problem of controlling these weeds and the new herbicides dichlorprop and MCPA/'Banvel D' have given good kill of redshank and black bindweed with satisfactory control of knotgrass and chickweed.

A new development is the testing of certain soil-acting weed-killers for pre-sowing or pre-emergence use in cereals. Herbicides of this type have the great advantage that they kill germinating weeds sooner than a herbicide applied after the crop is emerged, they thus remove weed competition at an early stage of crop growth. This is important since competition between crop and weed during the early stages of crop development is responsible for a large part of yield reduction. Preliminary experiments show that mixtures of diallate/amiben and diallate/naptalam may be of value for control of wild oat and broad-leaved weeds in wheat and barley. Propazine can give good control of several mayweeds and corn marigold without apparent damage to wheat or barley.

The widespread problem of couch grass control has received further investigation. Treatment with amino thiazole should ideally be carried out when couch grass shoots are 3-4 inches high, rain-free conditions must follow for at least six hours otherwise the chemical may be washed off the leaf surface, and ploughing should be carried out 3 weeks after spraying with proper inversion of the furrow. Efficient ploughing is also essential if good control is to be obtained using dalapon.

Kale

At present, several weedkillers are available for weed control in kale, but they are not entirely satisfactory. Three of the soil-acting Triazine group of chemicals have been tested to determine their efficiency in controlling fat hen, redshank and charlock in kale. One of these chemicals has shown sufficient degree of selectivity between fat hen and kale to probably justify commercial development.

Potato

The technique of potato growing seems to be about to change. Traditionally this is a 'cleaning crop' but it now appears that the merit of post-planting cultivations is in question. Trials have shown that the only value of those cultivations is in controlling weeds, equally good crops were obtained when post-planting cultivation was omitted and weeds were controlled by other means. Consequently if a suitable pre-emergence herbicide were available then the crop could be left alone till harvesting time. Quite apart from the saving in labour the formation of clods by tractor wheels running up the drills would be avoided. This would be an important advantage where mechanical harvesting was to be carried out. Trials to find such a herbicide are being carried out, and the soil-acting herbicides simazine, atrazine, trietazine and prometryne apparently exhibit a high degree of selectivity. There is evidence that while crop yields are increased, by weedkiller treatment, this is in fact due to the elimination of weed competition. When the crop is treated with equal rates of the herbicide in the absence of weeds, then yield reductions may occur.

New spraying technique

Normal spraying nozzles form droplets of 50-500 μ in size and these fine particles are liable to drift onto adjacent crops. A new method of applying hormone weedkillers has been developed in which the bulk of droplets are formed in the range 500-1600 μ: being much larger they are less liable to drift. The spray-boom is a horizontal tube perforated with holes at 2-4 inch spacing and this vibrates at right angles to the direction of travel. The technique may be particularly valuable in spraying closely cultivated areas with hormone herbicide.

Chemical control of plant growth

The conference ended with a fascinating account of the role played by three naturally occurring hormones - auxins, gibberellins and kinins - on plant growth. Auxins characteristically stimulate the rate of growth of short cells, gibberellins increase the total length of leaves and shoots and kinins stimulate cell division. The author concluded that before we can modify or inhibit plant growth we must find out more about the natural process of plant growth.

A full account of papers summarised herein will appear in the Proceedings of the Conference to be published later in the year.

THE PLANT BREEDER AND THE GRASSLAND FARMER

by I.V. Hunt

During the past 12 months, most farmers will have heard of Tetraploid grasses. Members of the South West Scotland Grassland Society had an opportunity of seeing part of a field sown to a Tetraploid Italian ryegrass (variety Tetrone) last June at the Hannah Dairy Research Institute and to hear about its good and bad faults. At the London Smithfield Show, visitors were shown the latest novelty, North African tall fescue.

Both Tetraploid ryegrass and North African tall fescue are the products of the plant breeder, the former offered as a means of increasing the yield of grass per acre whilst the latter is offered as a new method of providing outdoor grazing for livestock during the winter. Tetraploids are already on the market, having been originally developed by the plant breeder some 30 years ago and only now being made available in quantity to the farmer. North African tall fescues, on the other hand, arrived at the Research Stations about six years ago and are still being developed.

After 20-30 years of consolidation and laurel resting, plant breeders are looking round for the big break-through which will lead to a vastly increased grassland productivity. It is too early yet to say whether the two recent offerings are likely to be world-beaters, but even if they are not they are signposts which will inevitably lead to a very big increase in yield and profitability of grass. Experimental work involving the Tetraploids and observation work on the new tall fescues is proceeding at Auchincruive and it may be possible to present a few conclusions in a later number of the journal. For the moment, it is proposed to consider the general contribution of the

plant breeder to grassland.

There are three government supported plant breeding stations in Britain concerned with producing improved herbage plants together with a number of private breeding stations run by seed firms. The only official station in Scotland is the Scottish Plant Breeding Station which since 1955 has occupied Pentlandfield, Roslin, Midlothian, and was founded at Craigs House, Corstorphine in 1921. Its crest is surrounded with the name of The Scottish Society for Research in Plant Breeding, a legacy of its origin in the enthusiasm of farmer and scientist encouraged by the Highland and Agricultural Society. Its more easily recognised achievements have been in the production of cereal, especially oats and root, especially potato varieties. The production of varieties of grasses, clovers or indeed any crop is extremely easy and consequently the worth of a plant breeding station is not measured by the number of new varieties. The difficult part is the production of worthwhile new varieties.

A considerable part of the work of the Scottish Plant Breeding Station has been concerned with fundamental studies of, on the one hand, plant inheritance and on the other of conditions of growth in situations where plant breeding might help. In their 1962 report for example there is a description of the results of a survey of plant types growing in the bright green herbage found along the path of hillside flushes.

The Welsh Plant Breeding Station came into being in 1919 mainly as a result of the efforts of the late Sir George Stapledon and through the generosity of Lord Milford. They worked on cereals, grasses and clovers, producing many widely used varieties. The grass and clover programme was aimed initially at improving the persistence of grass leys under grazing conditions. The result was that by about 1930 a series of 2 or 3 varieties generally classified as hay, hay-pasture and pasture varieties according to whether they were early or late growing came into being. The original range of varieties have been modified slightly and some dropped. During the past few years new varieties of perennial ryegrass S.321, cocksfoot S.341 and timothy S.352 have been developed and are available to farmers for the first time this year.

Between 1930 and 1960 there has been much study of techniques and fundamentals which are likely to be very profitable. Some time was spent breeding a cross between Reed Canary grass, the giant grass growing in wet ditches and marshes, and a near relative from Australia. The eye catching work at the moment seems to be the production of a cross between Italian ryegrass and Tall fescue, which should combine the high yield, spring growth and long life of the latter with the palatability of the former.

The Plant Breeding Institute, Cambridge, came into being in 1912 and soon became known for its wheat varieties. Its interest in grasses is quite recent and at the moment it is bringing into being tall fescues derived from North African tall fescues which may combine their winter growth with the summer production of, for example, S.170 tall fescue which is the best of present day varieties. The grass and clover varieties produced by these three Breeding Stations and the few produced by breeding stations belonging to seed firms are supplemented by hundreds of varieties produced by Government and private breeding stations in Sweden, Denmark, Belgium, Holland, France and New Zealand especially Denmark and Holland. Unfortunately these are monotonously similar to those already available although the Tetraploids coming in from Holland were a welcome break.

By and large, it is doubtful if the grassland farmer is able to fully utilise new grass and clover varieties. His interest always lies in a grass ley which can do everything at the same time. The recent productions of the plant breeder and those to come are improvements in restricted special directions, sometimes at the expense of other useful characters. For example, yield or winter growth may be achieved at the expense of palatability or summer production. To fully utilise the gains made the new varieties need to be used in specialized categories, not to take the place of the all round grass ley but to supplement it.

The new tall fescues are admirable examples of this. So far they are generally lower yielding in the summer and although high yielding in the winter, the extra winter growth is very low and does not compensate for the loss in summer. Tetraploid Italian ryegrass which many farmers tried out last summer will be followed by Tetraploid perennial ryegrasses and all the other grasses and clovers.

The term Tetraploid means just 4-fold and refers to the fact that each cell of the plant contains 4 times the basic number of chromosomes, chromosomes being structures by which all the characters of a plant are passed down from one generation to another.

The normal or usual plant has 2 sets of chromosomes, one derived from each parent, and is called a Diploid (two-fold). The result of doubling chromosomes in this way is to generally (a) increase the size of all parts of the plant, (b) reduce the numbers of tillers (= shoots or branches), (c) reduce the yield of seed, (d) increase the moisture content of the herbage, (e) improve the frost resistance, (f) increase the palatability, (g) make it more readily crossed with other plants. The Tetraploid Italian ryegrass (Tetrone) which has been most widely tested in this country fulfils all these characteristics. With regard to the faults (b), (c) and (d), these can easily be eliminated by careful selection since there are individual plants among the present stocks with better performances than the ordinary diploid varieties.

Tetraploids are produced from diploids by shock treatment with heat, radiation or the use of drugs (e.g. Colchicine, Acenaphthene etc.). Of special interest is the fact that these plants occur naturally. Natural tetraploids, hexaploids (with 6 sets of chromosomes), octoploids (8 sets) and dodecaploids (12 sets) occur. For example, the ordinary Timothy grass appears to be a hexaploid derived naturally in the past from a dwarf mountain timothy grass.

The giantness of Tetraploid ryegrass is likely to be not much use to present day grassland farmers. Although it has the ability to produce bigger crops than normal Italian ryegrass, it can only do this if the fertilizers and management allow it to develop its top growth. Until farmers produce the top yields of which ordinary Italian ryegrass is capable with the necessary heavy dressings of nitrogenous and other fertilizers, there is no point in growing Tetraploids whose main virtue is the ability to make use of more nitrogenous fertilizer than ordinary varieties.

One of the subjects being investigated at Auchincruive at the moment and on farms in the West College area, is the amount of nitrogenous fertilizer it is necessary to use to secure the full benefit from a Tetraploid Italian ryegrass.

A CASE OF LONG TERM EFFECTS OF FERTILIZERS IN AYRSHIRE

by Robert Laird, Snr.
Adviser for Ayrshire.

Botanical Analysis - Brackenhill Demonstration Autumn 1961
Herbage Components

Manuring over the years	Good Grasses Perennial Ryegrass, Cocksfoot & Timothy	Weed Grasses Yorkshire Fog, Bent Grass	Clovers Red Clover, Alsike Clover & White Clover	Weeds Daisy Buttercup
Superphosphate	52	35	4	9
Super + Slag	57	27	8	8
Slag twice	52	25	11	12
Super + Lime	59	22	10	9
Slag + Lime	54	15	21	10
Super + Lime twice	54	10	29	9
Slag + Lime twice	51	12	28	7
Slag three times + Lime twice	51	7	32	10

Do you notice anything interesting in this table? It represents the results of calculating the proportions of grasses, clovers, weeds etc. in a sward in 1961 which had received a variety of manuring treatments over the past 25 years.

Take a look at the way the manuring treatments are arranged from Superphosphate down to three times Slag and twice Liming. The manuring follows a pattern of decreasing Superphosphate, increasing Slag and increasing Lime; a range from a generally acid to a generally alkaline (non acid) manuring system.

The proportions of good grasses and the proportions of weeds show little change.

The main change is a fall in weed grasses and a rise in clovers.

The story goes back a long way and illustrates how the appearance of a pasture may be a reflection not of this year or last years management but of the accumulated management or mismanagement of years.

Farmers conditions were improved at the advent of the Milk Marketing Scheme in 1933, but money wasn't plentiful and the subsidising of Lime under the Land Fertility Scheme had not been introduced.

It had been observed, however, at this time that grassland swards greatly benefited from Lime, Basic Slag and even mineral phosphate.

An experiment to compare standard compound manures against slower acting basic manures (Slag, Mineral Phosphate and Calcium Cyanamide) to the same cost per acre over a rotation was established through the co-operation of Mr. J. A. Tannock on Brackenhill, Catrine in 1936. Half of each section received lime when sown out to grass in 1938. It was soon observed that where neither Lime nor Slag had been used the sward comprised 25% useful plants with 75% inferior species (mainly bent grass). Where both had been employed, there were 75% useful species, whilst where either Basic Slag or Lime had been used there was 50% useful grasses.

In 1946 whilst still under grass part of the area was given a further half ton/acre Basic Slag and part given Superphosphate. After two corn crops in 1948 and 1949, a grass seed mixture was sown down and further dressings of half ton per acre Basic Slag and Superphosphate were given with additional Lime to parts of the limed and unlimed areas.

Clover was absent where neither Lime nor Slag had been applied. With Slag and no Lime there was a small amount of clover. With the double liming the clover was profuse and vigorous. Where 3 dressings

the Galloway cow has possibly done as much to improve the Blackface Sheep output as any other factor. Today, Shiel carries one of the larger pedigreed hill herds of 100 Dun Galloway cows and their followers, which has scored in the show ring and sale ring, and at our two National fatstock events.

The improvement of the carrying capacity of the hill grazings and their effect on the stock can best be measured in the sheep stock. Lambing percentage has increased from a 3-year average during the early thirties of 76% to today's 116%, the ewe death rate has been cut from 8% to 3%, and the wool clip has been increased by 500 lbs. There has been a commensurate improvement in lamb carcase quality. Today lambs are graded directly off their mothers in August.

Mr. Jennings is particularly ready to try promising ideas on a pilot scale. He was largely instrumental in the development of the large hill cow concentrate and thus obviate the necessity for the production of bulk fodder on hill farms. Recently he has been experimenting with the "artificial" rearing of motherless lambs and small twins. His maxim, however, can best be summed up in his own words, thus - "Go slow and learn by experience".

Galloway farmers indeed acknowledge Ian Jennings as a leader in agricultural circles and his wise counsel is readily given to young and not so young men individually and through local societies and committees. It is fitting to note that his counsel is sought in the wider sphere, Mr. Jennings being a Governor of the West of Scotland Agricultural College, and the Rowett Research Institute. Our Society is indeed fortunate to have Mr. Ian Jennings as their first chairman.

WILTED SILAGE - A PROGRESS REPORT

by M.E. Castle & J.N. Watson
The Hannah Dairy Research Institute, Ayr

Members of the Society who attended the silage demonstration at the Hannah Institute in June 1962 will no doubt be interested in the silage which they saw being made. It will be remembered that the grass was being wilted in the field for periods of time ranging from 12-24 hours after cutting.

Little waste

The silo was opened in late November 1962 and the silage has been fed to the dairy herd since then. As far as can be seen at present there is little waste. At the sides the amount of waste material is

negligible while at the top there is about 3 inches of black material which is thrown away.

The silage has fermented well, has a pleasant fruity smell and a light brown colour. There are, however, numerous patches of white mould in one layer of the silage which is particularly dry. This layer of silage was over wilted in the field and as a result it was poorly consolidated at the time of making. This material is being fed to the young stock and not to the dairy herd.

Dry matter content

The silage has been regularly sampled and the average dry-matter value is 32%. This is a satisfactory figure and compares favourably with the mean value of 21% dry matter which was obtained in the last few years before wilting was practised. The value of 32% is possibly too high and if a lower figure had been obtained the layer of mould might have been avoided.

Already it has been found that there is a large variation in the dry matter values in different parts of the silage face. The lowest value found was 22% whereas the highest was 46%. This makes accurate rationing of the silage on a dry matter basis extremely difficult and it would be preferable to have a silage with a more uniform dry-matter content.

The future

Much has still to be learnt about the making of wilted silage. Undoubtedly it is a method which can save labour in the field, eliminate effluent from the silo and produce a palatable and wholesome silage. The variations in dry matter content are a problem and as yet little is known about the relative feeding values of unwilted silage.

Investigations into these problems are necessary and it is hoped to write a further note about wilted silage in a future issue of this Journal.

THE WEST OF SCOTLAND AGRICULTURAL COLLEGE

by Professor D.S. Hendrie

The West of Scotland Agricultural College was incorporated in 1899; although thus still in its infancy, it was at least the first agricultural college in Scotland ! Historically, it derived from two main roots, viz. advisory work among cheese-making dairy farmers in

the south west dating from about 1860 and systematic instruction begun in 1885 at Anderson's College. (This instruction was moved in 1886 to the Glasgow Technical College which was later to become the Royal College of Science and Technology and ultimately Scotland's fifth University). By 1899, the former was based on the Scottish Dairy Institute at Kilmarnock and the latter had grown into a chair of agriculture in Glasgow.

The historical headquarters of the College are in the well-known Blythswood Square buildings which were acquired in 1900 and extended in 1906, 1919 and 1930. More recently, the work has overflowed into two additional properties in Glasgow. In 1900, a lease of Holmes Farm, Kilmarnock, was taken and the Dairy and Poultry Schools for Scotland were opened there in 1904 and 1906, respectively. (At first, only 20 of the 220 acres available in Kilmarnock was thought necessary for College purposes!) In 1927, the 660-acre estate of Auchincruive was presented to the College (by the late Mr. John M. Hannah of Girvan Mains) and developed, in part, by public subscription. In 1931, the activities of the College at Kilmarnock were transferred to Auchincruive. It would be idle to deny that this dichotomy involves difficult organisational and academic problems but, nevertheless, the College now has, in Auchincruive, a well-established and increasingly highly developed campus for teaching and investigational work.

The College's work is cast in a three-fold pattern; it is a Scottish Central Institution for systematic teaching; it provides an agricultural advisory service in twelve counties; and it supports its teaching and advisory work by research and investigation.

First, teaching. The main weight of this work is devoted to five 2-year courses leading to Scottish Diplomas in Agriculture, Dairying (Husbandry), Dairying (Technology), Poultry Husbandry and Horticulture. These Diplomas might be described as the agricultural version of the current upsurge in technological training which is slowly gathering momentum in all industries: one longs for the day when a much higher proportion of farmers and managers will take the Diploma training available. Three of the five Diplomas (Horticulture, Poultry Husbandry and Dairy Technology) are provided - in Scotland- only at the West College.

Then there is a variety of systematic short courses, varying in length from a few days to six months. These courses range over agriculture, poultry husbandry, horticulture, milk recording, milk processing, the manufacture of dairy products and, indeed, any new development which is currently important.

The College is also involved in two other levels of teaching which are not its own direct responsibility. On the one hand, it provides the staffing and physical resources required in the subject of agriculture

(covering crops, grassland, livestock, mechanisation, microbiology, accounting and business management) in the curriculum of the Glasgow University Degree of B.Sc. in Agriculture. (The constitutional position thus involved is safe-guarded - on both sides - by arranging for the Principal of the College, the Head of the College's Department of Agriculture and the University Professor of Agriculture to be one and the same person). On the other, although the statutory responsibility for Further Education rests on the County Education Authorities, the College is concerned to give what assistance it can with a considerable variety of evening and day release classes within its territory.

Secondly, advisory work. Extension - to use the modern phrase - is the activity best known to farmers and, no doubt, to the members of the Grassland Society. It seeks to provide (free of cost to the enquirer) the answers to the varied problems of farmers, market gardeners, poultry farmers, crofters, landowners, bee-keepers, dairy factory and liquid milk depot operators, agricultural architects and veterinary surgeons. The service is made up of (a) a front-line corps of some 60 "general practitioners" operating from eleven local offices and (b) a number of specialists, who are stationed centrally, most of whom also do research work and some teaching. With the exception of the veterinary practitioners), the correct - and usually in the end the quickest - access to the advisory service is the county agricultural adviser. Members of the Grassland Society now have an additional link with the service in that the appropriate county agricultural advisers are "permanent" members of the Executive Committee of the Society.

The combination of advisory work with central teaching - which, of course, also applies to the East and North Colleges - has always been favoured in Scotland, mainly because of the vitalising effect on teaching which stems from a close "feel" for problems in the field. The Scottish system is in marked contrast to that of England and Wales but, strangely enough, has a good deal in common with the land-grant colleges of the United States.

The physical volume of the advisory work accomplished is immense. The College's Annual Report for 1961-62 reveals that, quite apart from dealing centrally with 22,000 samples for chemical analysis, 8,500 samples for veterinary diagnosis, 12,000 milk samples, 700 farm buildings problems and carrying out financial studies on some 300 farms, the county service itself made 22,000 advisory visits and was in communication at courses, lectures and demonstrations with 23,000 people. It is extremely difficult - perhaps impossible - to measure quantitatively the impact of all this effort; and, probably, those who see it from the inside are least competent to make the attempt! Suffice it to say that farming - using that word widely and generically - has changed out of recognition in the last half-century and that the tempo of evolution and rising efficiency is, contemporarily, faster than ever.

The College has played a part in this but the story is so much one of the partnership between the best farmers and the forces of science that any parcelling out of credit is a pointless exercise.

Thirdly, research. Research and investigational work is indispensable to effective teaching and advisory work. Historically, this side of the work developed because of the inevitable inability of advisers and teachers to answer all the questions put to them. This naturally led on to the desire to devote at least some of the available resources to seeking new information in advance of actual demand and to explaining experimental findings a little more fundamentally than is required in order to prescribe the immediate remedy in the field. While the College is not a research institute in the normal sense and has only very limited funds for the purpose, it does therefore carry out investigational work of a suitably applied nature. It is one of the deficiencies of Britain - and especially perhaps of Scotland where the College farms are used primarily to demonstrate existing commercial practice as a basis for teaching and advisory work - that there is not enough scope for trying out the findings of more fundamental research under semi-commercial conditions which afford opportunities (under such conditions) for establishing statistical reliability and the economic significance of new developments.

The range of investigational work in progress - spread as it is over some 70 identifiable projects - is, in these circumstances of limited resources, surprisingly large.

Considerable weight is given to the problems of grassland, e.g. the productivity of individual species and varieties; the effect of combining varieties and species in one mixture; the methods and economics of producing early bite particularly in the context of varietal and manurial factors; the exploitation of the new in vitro technique for determining digestibility; the evaluation of cutting and grazing as methods of determining yield; and the economics of producing milk with minimum use of labour and maximum reliance on grass (including barn-dried hay and silage) and other home-grown foods.

Plant nutrition and soil chemistry - both vital to grass production - are receiving much attention.

On the animal side, the feeding management and breeding of bacon pigs has always been and continues to be a major College interest. Work is also being done on the farm-recording of beef cattle and on the progeny testing of performance-tested beef bulls. Assistance is being given with the Scottish trials of the Charollais bull as a sire of beef stores from the dairy cow. The economics and behaviour of dairy cows in a self-feeding and cubicle system at Auchincruive are being studied.

The bacteriology of clean milk production continues to be studied

and the work has been evolved to keep in step with the advent of bulk collection, milk conveyor systems, milking parlours, chemical sterilisation and "quality" payment schemes. In the field of milk utilisation, starters, cheese quality, butter-making and detergents receive attention.

The work on grass is paralleled in arable crop husbandry by the evaluation of crop varieties, the determination of the manurial requirements of crops and the control of weeds on arable land.

In horticulture, tomatoes and other glasshouse crops, chrysanthemums, varieties of fruit and vegetables and the suitability of various types of plant pots figure prominently in the investigational programme.

Both plant and animal diseases are studied in appropriate specialist departments.

It would be gratifying for an institute such as the College to be universally popular, always successful and invariably worth a visit. In real life, such a radiant state of affairs is, perhaps, improbable! The next best thing would be to be well known to all farmers, sometimes controversial or at least never dull, and to be frequently in receipt of constructive criticism. This situation ought to be achievable even if the first is too much to hope for. The worst state of all would be to be known only to a few and ignored by the rest. I hope that S.W.S.G.S. will play an important part over the years in ensuring that the College escapes the stagnation of the third category and, at the very least, generates the dynamism of the second.

THE CHEMICAL CONTROL OF BRACKEN

by R.C. Kirkwood

The problem of bracken control hinges round the difficulty of killing the underground rhizome system. It has been recorded that this mass of underground stems, weighing as much as 40 tons per acre, may annually produce 6 tons per acre of fronds, and the rhizome itself has been known to grow as much as 7 feet in a year. It is a most efficient plant, the fronds which were initially dependent on the rhizome food supply during early development soon manufacture sugars and starches which are transported or 'trans-located' down to the rhizome to replenish the food store. While this process of translocation of foodstuff to the rhizome enables the plant to overwinter, it is also bracken's 'achilles heel', there is an already functioning pipe-line into the stronghold allowing a 'translocated' herbicide to infiltrate by the back door, so to speak. In theory this is an ingenious technique, but in practice there are several points at which things can go wrong. It

is these which we must consider if we wish an explanation of the variable results obtained in the past year or two with the translocated herbicide 4-CPA (known commercially as Weedone Brackontrol and Teridox).

Firstly, the correct dose must be given at the correct time, otherwise local damage (scorch) will be caused to the cells of the frond and consequently food synthesis and translocation will be reduced or halted. In these circumstances little herbicide will reach the rhizome and buds. In addition, there must be reasonably efficient foliar coverage, good retention of the chemical on the frond surface, rapid penetration and efficient translocation from frond to rhizome system. Each of these functions is affected by climatic conditions, e.g. coverage by wind force, retention by rainfall, penetration and translocation by temperature, humidity and sun light etc. In theory if each of these has taken place efficiently then the chemical should enter the buds in sufficient quantity to kill the buds - or at least cause them to split open allowing entry of rot-producing organisms which may render the 'coupe de grace'. But here another factor arises, not all the rhizomes have fronds attached to them enabling entry of the chemical. Some of the deeper rhizomes, which have few or no fronds attached to them, may receive little or no chemical. When the buds on rhizomes with fronds die off, dormant buds on the deeper rhizomes may start developing and are a foci for regeneration of the weed. This concept, put forward by Dr. Elsie Conway of Glasgow University may in part explain the regrowth which generally occurs after treatment of bracken with a translocated weedkiller.

It was implied above that time of spraying is important in effectively treating bracken with a translocated herbicide such as 4-CPA. One fact which has emerged most clearly from the considerable volume of work carried out, is the rather critical period within which bracken should be treated. It seems to be most susceptible for only 2-3 weeks and this period appears to coincide with the time when fronds are just fully expanded and possibly for 10-14 days after this. Clearly then the optimum time to spray depends on the stage of frond development and equally clearly any factor which affects rate of development will affect time of application. Thus the nature of the growing season itself will have an effect. In an 'early' season frond development will take place more rapidly and therefore the susceptible period will occur earlier than normal, conversely spraying will be delayed by a 'late' season. By the same argument it would be expected that time of spraying would be affected by site altitude and aspect, and indeed recent trials carried out by the Botany Department in co-operation with the County Advisory Service of the College suggest that this can cause quite wide variations in the time at which spraying should be carried out. As would be expected bracken develops earlier on a S. facing than N. facing slope and more rapidly at sea level than at say 1500 feet.

So much then for the factors influencing the effectiveness of translocated chemicals as bracken herbicides, the question still remains - which is the best chemical? There is no straightforward answer. One of the objectives of the trials carried in West Scotland was to compare the effectiveness of three chemicals, namely, amino triazole, 4-CPA and MCPA/4-CPA mixture. The results show that where the weather remained dry after spraying, amino triazole gave the best kill, the average reduction in frond density and fresh weight being 70% and 95% respectively. If weather conditions were unsettled then 4-CPA applied as the 'invert emulsion' was most effective. This formulation has good sticking properties and is not readily removed from the frond by high rainfall - this certainly would occur in the case of amino triazole. Unfortunately both herbicide treatments have their drawbacks, amino triazole is not economical at present, the cost of a suitable dose plus application being about £10 per acre; and in the case of the 'invert emulsion' type of formulation there are difficulties in its preparation and application. Treatment with 4-CPA/MCPA mixture ($2\frac{1}{2}$: $3\frac{3}{4}$ lbs. active ingredient per acre respectively) was, of course, much more economical but the maximum average reduction in frond density and fresh weight was only 45 and 60% respectively. Some farmers have apparently been using heavy doses of MCPA with some success.

Many of the difficulties which have been discussed above could be overcome if a pre-emergence type herbicide could be used, furthermore, it could be applied more readily by farm staff thus reducing the costs of application. We have tested several such compounds, but only one known as dichlorbenil (2,6-DBN) has so far showed any promise, applied in February in the granular form it gave up to 80% reduction in frond density, however, regrowth occurred in the following season. The chemical forms a toxic band on the surface, killing developing fronds as they come through, but as soon as residual toxicity disappears the fronds reappear. Unfortunately the sward was also affected otherwise this breathing space of a year could be utilized to establish an active sward so that regeneration could be minimized by heavy stocking. This aspect of bracken control is being kept constantly in mind.

Meantime work is continuing on the screening of promising chemicals as pre or post-emergence bracken herbicides while green house studies are being carried out, using amino triazole labelled with radioactive tracer, to learn more of the basic functions of herbicides penetration and translocation.

Research Reviews.

In the first number of our journal, 12 articles from Vol. 16, No. 1 of the Journal of the British Grassland Society were reviewed. Reviews of six articles from the Journal of Dairy Research have been contributed to this second number by Dr. David Reid of the Hannah Dairy Research Institute (Nos. 13 to 18 below) whilst reviews of 22 articles from Vol. 16, Nos. 2,3 and 4 of the Journal of the British Grassland Society have been contributed by I.V. Hunt and Dr.R.D. Harkess of the College Grassland Husbandry Department (Nos. 19 - 40 below). Volume 16 of the British Grassland Society Journal has been a typical volume and as readers will see has covered grassland topics in a very wide sense. In the next number articles of grassland interest published in other journals will be reviewed. Further information about any of the topics reviewed or the loan of the original article can be arranged on writing to the Secretary.

Abstracts 13 - 18 are drawn from articles which have appeared over the past 3 years in the Journal of Dairy Research which publishes reports on the results of original research in dairy science and related subjects. Most of the articles in the Journal of Dairy Research are concerned with the chemistry and bacteriology of milk and milk products, but for present purposes only those related to grassland and of interest to farmers in south-west Scotland have been abstracted.

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13. STRONTIUM 90

"Strontium-90 from fallout in the diet and milk of a dairy herd".

By G.W. Cox and A. Morgan, Atomic Energy Research Establishment, Harwell, and R.S. Tayler, University of Reading.
Vol. 27, p.47 (1960).

During the past few years there has been considerable public concern over the radioactive contamination of milk supplies by fallout from atomic weapon testing. One of the most potentially dangerous substances in fallout is strontium-90 which is absorbed by the human body in much the same manner as calcium. It is important therefore to discover how much of the strontium-90 in the cows' diet passes through to the milk.

The diet and milk from cows in the dairy herd on Sonning Farm,

University of Reading, were regularly analysed for strontium-90 and calcium. As in other experiments it was found that the cow is a remarkably efficient filter of strontium-90. Only 1.2% of the total strontium-90 in the cows' feed passed through into the milk.

Since grass and grass products provide a large part of the diet of most dairy herds, reduction in the strontium-90 content of the herbage can be expected to reduce that of the milk. Deep-ploughing and reseeding can considerably reduce strontium-90 contents of herbage after short periods of heavy fallout, but will be less effective with long periods of fallout.

D.L. Reid.

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14. SUPPLEMENTARY FEED

"The effect of feed supplements on the yield and composition of milk from cows grazing good pasture".

by M.E. Castle, A.D. Drysdale and J.N. Watson, Hannah Dairy Research Institute, Ayr.
Vol. 27, p.419 (1960).

The two experiments reported in this article provide further evidence that no advantages arise from feeding supplements to milking cows at pasture, given that sufficient herbage of good leafy quality is available.

Feeding hay as a supplement gave no increase in milk yield in one experiment, although it slightly increased the fat content of the milk. Feeding meal slightly increased milk in both experiments, but at present-day prices the increases were too small to be profitable. Thus, in one experiment 34 lb. of meal were required to give an extra gallon of milk, while in the other 42 lb. were required.

Supplementary feeding had no other advantages, having little or no effect on the solids-not-fat content of the milk, on lactation length, or on the liveweight or condition of the cows.

D.L. Reid.

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15. S.N.F.

"The effect of plane of energy nutrition of the cow during the late winter-feeding period on the changes in the solids-not-fat content of milk during the spring-grazing period".

by J.A.F. Rook, C. Line and S.J. Rowland, National Institute for Research in Dairying, Reading.
Vol. 27, p. 427 (1960).

In the experiment described in this article milking cows were turned out on to good pasture in the spring after being fed on different planes of energy nutrition during the late winter period. Cows which had been poorly fed in the late-winter showed appreciable increases in the yield and S.N.F. content of their milk after they were turned out; those on normal feeding showed only slight increases, while the yield and S.N.F. content of the milk from cows fed on a high level in the late winter period decreased slightly.

These observations support the view that an increase in milk S.N.F. with spring grazing is due simply to better feeding and not to a special effect of any constituent of the grass. Spring grass of high quality is equivalent to a concentrated food and as such is superior to the winter ration fed to dairy cows on many farms.

D.L. Reid.

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16. ROOT FEEDING

"The effect of root feeding on the intake and production of dairy cows".

by M.E. Castle, A.D. Drysdale and R. Waite, Hannah Dairy Research Institute, Ayr.
Vol. 28, p. 67 (1961).

The bulky, fibrous nature of hay and grass silage often limits the appetite and nutrient intake of dairy cows, and consequently limits their milk yield.

The investigation reported in this article showed that the total intake by dairy cows fed mainly on hay and silage can be increased by

the addition of roots to the diet; 30 lb. of fodder beet added to the diet increased the total dry matter intake by 3.4 lb, and 60 lb. of beet increased it by 6.3 lb.

The extra intake on the diet containing 30 lb. of beet gave some increase in milk yield, but no further increase was obtained by doubling the beet ration. However, milk S.N.F. increased progressively as the beet ration was increased. Where los S.N.F. is a problem it would therefore seem useful to add some roots to the diet if this consists largely of grass silage.

D.L. Reid.

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17. RYEGRASS or COCKSFOOT

"A comparison between ryegrass and cocksfoot hay for milk production".

by M.E. Castle, A.D. Drysdale and J.N. Watson, Hannah Dairy Research Institute, Ayr.
Vol. 29, p. 199 (1962).

Substantial differences in milk production were noted between Ayrshire cows fed four different hays in the feeding experiment reported in this article. Hay made up 62% of the diet of the cows, whose only other food was concentrates. Two of the hays compared consisted of ryegrass, and the other two of cocksfoot. With each grass one hay had been cut early (May 23-25) and the other 3 weeks later (June 13-15).

Milk yields were higher for cows fed ryegrass rather than cocksfoot, and higher for earlier rather than later cut hays. Differences in milk composition were small.

D.L. Reid.

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18. ZERO GRAZING

"The feed intake and performance of dairy cows fed on cut grass".

by R.J. Halley and B.M. Dougall, Seale-Hayne Agricultural College, Devon.
Vol. 29, p. 241 (1962).

This article is of direct interest only to those farmers practising the zero grazing system of grassland management. The results were obtained over a 3-year period in which sections of the College herd of Guernsey cows were fed indoors on cut grass. The changeover to this system from conventional grazing appeared to have no detrimental effect on milk production, although little information is given on this.

The results presented are mainly on grass intake and factors affecting it. It is suggested that maximum levels of intake and consequently highest milk yields will only be obtained on zero-grazing if the herbage offered to the cows has a high dry matter and low-fibre content.

In 2 or the 3 years of the experiment concentrates were fed to some of the cows in addition to cut grass. This supplement slightly increased milk yields in one year, but had no effect in the other.

D.L. Reid.

Reviews No. 19 - 29 were taken from Vol. 16, No. 2 of the British Grassland Society's Journal. Articles on Weeping Lovegrass, the nitrogenous manuring of timothy seed crops and on the after effects of irrigation have not been reviewed.

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19. BRITISH GRASSLAND SOCIETY

"The British Grassland Society in the World of Tomorrow".

by W. Davies, Director of Grassland Research Institute, Hurley. pages 83-88.

Attention is drawn to the cross section of interests for which

the Society caters and to the fact that members include farmers, technicians and research workers from home and abroad. The foundation of regional grassland societies is praised and it is stated that their task is to integrate fresh knowledge and the new techniques of science into farm practice.

Better grass utilisation and conservation, extention of the grazing season, the investigation of new herbage plant species and economic fertiliser use rank among those problems on which further research is necessary.

Good grassland management must consider not only the pasture but also the animal and the soil in order to produce high yields of herbage and high levels of animal output from grass.

Dr. Davies mentions that hill land grass areas should receive more attention. A nation wide scheme for the eradication of ruminant parasites might produce nematrode free animals with a result akin to the establishment of T.B.-free cattle.

This article was the Presidential address delivered by Dr. W. Davies at the Winter Meeting of the British Grassland Society in December, 1960.

R.D. Harkess.

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20. RANGELAND POTENTIAL

"The Range - Natural plant communities or modified ecosystems".

by R. Merton Love, Department Agronomy, University of California, U.S.A. pages 89 - 99.

This is a historical review of man's attempt to improve productivity of the land from prehistoric times onwards. Due to man's own effort and willingness to apply science and art, the productivity of lowland has multiplied 20 - 25 times. Through lack of knowledge or unwillingness to apply knowledge there has only been a twofold development of range and wild land.

Professor Merton Love sees in rangeland (and we could include Scottish hill land in this term) a vast potential just as challenging to the ecologist as outer space is to the physical scientist.

I.V. Hunt.

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21. NO MAGIC IN URINE

"The Effect of Urine and its Components on the Botanical Composition and Production of a Grass/Clover Sward".

by E.J. Mundy, Wye College, Kent.
pages 100 - 105.

Sheep urine contains water plus plant foods such as nitrogen and potash. In addition there are chemical compounds such as the hormones which can stimulate extra plant growth. The amounts of plant foods are fairly high and indeed urine patches may be fertilised at a rate of as much as 1 ton per acre Nitro-chalk. The experiment aimed at a decision as to what is the exact effect of urine on the grass and clover of a mixed sward.

By applying to swards fertilisers containing amounts of nitrogen or potassium similar to that in urine, and by fertilising with some of the hormones contained in urine such as indole acetic acid, and comparing these with the effects of applying urine, it was possible to ascertain that the effects of the nitrogen and potassium on plant foods far outweighed any effects of the growth hormones. Sheep urine, or nitrogenous fertiliser reduced clover and increased grass production.

The conclusion is that sheep urine has no magical powers and can quite well be replaced by bag fertilisers.

I.V. Hunt.

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22. FERTILISERS AND GRASS QUALITY

"Magnesium, Potassium, Sodium and Calcium Contents of Herbage as Influenced by Fertilizer Treatments over a Three-Year Period".

by R.G. Hemingway, Agricultural Chemistry Department, Glasgow University. pages 106 - 116.

1. Potassium Content of Herbage. The application of ammonium sulphate results in a large reduction in the Potassium (K) content of herbage and potash deficiency symptoms appear on herbage receiving only nitrogenous (N) fertiliser.

   Muriate of potash gives significant increases in herbage K. The balanced use of N & K is necessary. 12 cwt. of ammonium sulphate is balanced by 5 cwt. muriate of potash.

2. Sodium Content of Herbage. The herbage content of this mineral is greatly increased by N Fertiliser application but depressed by the use of potash.

3. Magnesium Content of Herbage. Ammonium sulphate increases the level of Mg. in grass particularly in the second and succeeding cuts. The application of potash invariably reduces the Mg. level in both grasses and clovers. In spring, clover has more Mg. than grass. Although sulphate of ammonia increases the magnesium content of grass, it can reduce the magnesium content of mixed herbage by reducing the proportion of clover in the herbage.

4. Calcium Content of Herbage. Fertiliser application has remarkably little influence on the Ca. of herbage. The Ca. content in a herbage sample depends more on the proportion of grass/clover in the sward since clover usually contains more Ca. than grass.

R.D. Harkess.

23. AERIAL DRESSINGS FOR HILL LAND

"The Response of some Hill Pasture types to Lime and Phosphate".

by R.A. Robertson, Macaulay Institute, Aberdeen, and I.A. Nicholson, Hill Farming Research Organisation, Edinburgh.
pages 114 - 125.

This experiment sets out to assess the value of low dressings of ground limestone (8 cwt. per acre) and of superphosphate by comparing the effects of nine fertiliser treatments combining 8 cwt, 60 cwt. or no ground limestone per acre with 2½ cwt, 8 cwt. or no superphosphate on four types of Scottish hill vegetation.

Applying the top levels raised the amounts of Calcium and Phosphorus in the soil but the effect of the lower levels was not detectable. The top levels brought about a few changes in herbage. Clover was encouraged by superphosphate. Heather was partially replaced by bent grass following liming in one trial but in another centre heather improved at all levels of application of lime. It is suggested that a considerable part of the effect of liming and indeed all fertiliser treatments of hill land is a result of the grazing and if grazing is prevented, changes in vegetation may not take place. At the low rates of application, there were no changes in the soil but there were improvements in the value of the grazing especially of the nardus dominated vegetation. The investigation of the effects of low rates of application is worth pursuing especially for areas where some control of stock grazing is possible.

I.V. Hunt.

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24. BRITISH FARM EFFICIENCY

"The Productivity of Land and Feed used for Livestock Production in Britain compared with Belgium, Denmark and the Netherlands".

by T. Kempinski, Agricultural Economics Dept., Manchester University.
pages 126 - 134.

The first part of this article was reviewed in the previous number of the Society's Journal. Review No. 3.

Because of low average yields of grass and crops; because of less satisfactory conversion rates; because of a concentration on beef, lamb and mutton, which depend more on grass than concentrate feeding, Britain uses twice as much land to yield £1,000 worth of livestock than the three continental countries.

One cause of the difference is that in Britain there are only 38 people engaged per 1,000 acres against 130 people in the Netherlands, thus a low output provides a satisfactory income per person employed. Britain uses labour more efficiently because of her bigger farm units. Approximately 1 person produces £1,000 of livestock against $1\frac{1}{2}$ persons required in the Netherlands.

Some of the difference in yields of crops and grain per acre is due to levels of fertiliser application. In Britain the average application is $\frac{3}{4}$ cwt. Sulphate Ammonia equivalent per acre against $3\frac{3}{4}$ cwt. in Netherlands.

Abstractors comment.

This abstract is naturally very much abbreviated and presents only a fragment of the data used in the arguments. The low average figures for Britain may be a symptom of a very wide gap between poor and good land or efficient and inefficient farmers. It is hoped that during the nine years since this data was collected for study, there has been a general improvement in the outputs achieved by the less efficient farms.

I.V. Hunt.

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25. AUTUMN NITROGEN FERTILISER

The Production of Early Spring Grass.
II. "The Effect of Autumn Management and Nitrogenous Manuring on the Production of Early Spring Grass from Different Sites throughout England and Wales".

by H.K. Baker and J.R.A. Chard, Grassland Research Institute, Hurley,
and D.G. Jenkins, National Agricultural Advisory Service, Cambridge.
pages 146 - 152.

This paper records the results from a survey of grass production for early bite in England and Wales. Autumn management and the use of nitrogen both affect spring growth and the main treatments examined are:-

1. Rest in September and October.
2. Graze September and not October.
3. Rest September and graze October.

These three regimes are combined with the application of 52 lb. of N. in autumn, spring or at both these seasons of the year.

Results obtained show that autumn applied N (in early September) gave a reasonable yield in October but had no great influence on herbage yield the following spring. Spring application of N gave best yield responses. Grazing in September and October has no harmful effect on spring production and indeed on ryegrass fields which are not grazed at this time spring yields may be poorer.

The use of nitrogen both in September and again in spring is very useful in that autumn application extends the grazing season later in the year. Provided this is grazed off and the field then rested a good crop of early bite can be obtained from a spring application of N. The provision of grazing at both these times of year is obviously of considerable interest to British farmers.

R.D. Harkess.

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26. GRASSLAND IMPROVES SOIL STRUCTURE

"Grassland and Soil Structure".

by G.D. Ashley, Soil Survey of England and Wales, Rothamsted Experimental Station.
pages 156 - 159.

A spadeful of a soil with good structure can be tossed into the air to fall apart like a handful of grapes. A bad structured soil would either not break up at all or fall as a fine powder of the individual sand silt and clay particles. The most productive soils, for example the "Black Earths" of Russia have a good depth of soil of good structure. Grassland is recognised as one means of improving

soil structure. A serious challenge to this is the fact that grassland is not only regarded as a soil improver but also as a crop for stock feed production. Used indiscriminately, by heavy manuring for the quickest growth, there is a tendency for roots to be confined to the top few inches. Concentrated grazing with considerable poaching leads to an even shallower root system. Ploughing the shallow layers of good structured soil seems to be the wrong way to improve structure. Surface cultivation would be more likely to retain this well structured soil in the upper layers of the soil.

I.V. Hunt.

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27. STOCK NUMBER PER ACRE IMPORTANT

"Grassland Management and Animal Production".

by J.D. Ivins, Nottingham University.
pages 160 - 163.

This paper is a review of papers on grazing management presented at the 8th International Grassland Congress, Reading, 1960.

Several papers giving the results of comparisons between set stocking, rotational grazing, strip grazing and zero grazing are reviewed. It is appreciated that one of the major factors influencing animal production per acre or per animal is the stocking density or stocking rate. Where these were low no difference was observed between set and rotational grazing. However as stocking rates increase, the production from rotational and strip grazing improved on an acreage basis while at the same time the yield per animal was depressed. By and large zero grazing was no more productive than controlled grazing and much careful thought is necessary before adopting this mechanical feeding technique.

It would appear from this review that high yields of milk per acre are not necessarily linked with high output per animal and it is therefore up to each farmer to decide on his objective. It will largely depend on his farm acreage and whether or not he is selling pedigree livestock.

R.D. Harkess.

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28. HIGH QUALITY - EARLY CUTTING

"Grass and Animal Nutrition".

by C.C. Balch, National Institute for Research in Dairying,
Shinfield, Reading.
pages 164 - 168.

This article is a review of papers on the Feeding Value of Herbage presented at the 8th International Grassland Congress, Reading, 1960.

The measurement of the nutritive value of grass has long been a problem but Balch illustrates from reports at the Congress that several important advances have been made recently. This is due primarily to the work carried out on the digestibility of grass and clover species. In order to harvest herbage at the most nutritious stage it must be cut around or shortly after ear emergence. It is known that voluntary intake (amount eaten) of herbage is related to its digestibility, hence cattle or sheep will consume more young pasture than they would when the herbage is mature, a fact well known to farmers. The early trials on digestibility were carried out using sheep and cattle, but recently a "test tube method" has been found which gives similar results to those obtained from cattle and sheep. This feature is very important from an advisory point of view since the quality of herbage feed is quickly assessed in the laboratory instead of several weeks as is required when sheep are used to determine the herbage digestibility coefficient. There appears also, to be some hope of associating digestibility with the energy value of the herbage which will further add to our knowledge of the nutritive value of grass.

Members may be interested to know that digestibility experiments and test tube digestion methods are being used by the Grassland and Analytical Chemistry Departments at Auchincruive.

R.D. Harkess.

29. MORE PRODUCTION NEEDED

"Practical Implications of 8th International Grassland Congress (Reading 1960)".

by A.S. Cray, Southdown Farm, Hampshire.
pages 169 - 173.

The present world population is 2600 million and this is likely to rise to 3600 by 1980, and possibly reach 5000 million by the end of the century. Today only 25% of the world population is adequately fed. This calls for an increase in effort to improve the efficiency of world animal production through the better management of the world's grassland. Cray quotes from a paper by W. Davies which shows that in the U.K. with a relative grass output in 1960 of 100, the output in 1940 was 41, while the potential for 1980 is 340. Cray considers that the additional output will be required and that the problem of market gluts may not arise.

Other comments in this paper refer to the need for balanced fertiliser application, particularly the use of potassium and phosphate where heavy nitrogenous fertilising is employed. Cray questions the use of white clover in leys where high N fertilisation is used and fields of over 7,000 lb. dry matter per acre per annum are desired. That much of our pasture area is understocked is stressed and Cray states that there is little to chose between efficient rotational and strip grazing.

R.D. Harkess.

Reviews number 30 - 34 have been prepared from Volume 16, No. 3, 1961. Articles on Nardus Stricta, Experimental design, Experimental Wagon for Zero Grazing, Subtropical lawns.Grassland of Japan, Rhodes grass in Kenya have not been reviewed.

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30. FRENCH TOUR

"Report on a Tour in Northern France from 22nd - 27th May, 1961".

by H.K. Baker, Hon. Sec. British Grassland Society.
pages 240 - 243.

Each year the Society endeavours to organise a visit to a European country. This paper is a report on a recent visit to France where 25% of the population is engaged in agriculture (U.K. 4.4%). The French Advisory Service consider the minimum economic size for a holding today is 60 - 90 acres; however at present 80% of the farms are 25 acres or less. The economic squeeze as well as competition from industry is leading to a reduction in the number of farmers and this will no doubt lead to more farm amalgamations in the future.

Much of northern France is occupied by permanent pasture although alternate husbandry has increased since the war. Generally simple seed mixtures (1 grass, 1 legume) are used and the selection of correct varieties is emphasised. Italian ryegrass is rarely sown on long ley mixtures because of its depressing effect on the more persistent grass.

Electric fencing or paddock grazing is used and farmers are advised to graze perennial and Italian ryegrass every 4 - 5 weeks, timothy/meadow fescue 5 - 6 weeks and cocksfoot and lucerne every 6 weeks. Many farms have all the different sward types in order to obtain continuity of grazing. Up to 200 lb. of N per acre are applied in 4 or 5 dressings (there is no subsidy on N. fertiliser in Franch).

Milk is marketed through milk societies or co-operators. (No. M.M.B.). Prices are fixed by the Government and may vary by 19% within a district depending on the season and use to which the milk is put. There is no fixed price for beef but this is indirectly controlled by the Ministry who buy and store surplus meat which is gradually released to the market. The Advisory Service is partially supported by Government funds and partially from a levy on farmers of from 3/- to 20/- per acre per annum.

Generally, as far as grassland farming is concerned, there is great enthusiasm and progress being made. British farms (as a result of subsidies) have better buildings, fences and water supplies. These assets together with the larger size of British farms should enable farmers in the U.K. to compete more effectively in livestock production from grass.

R.D. Harkess.

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31. WINTER GRASS

"The Production and Utilisation of Winter Grass at various Centres in England and Wales 1954 - 1960. I Management for Silage Production".

by H.K. Baker and J.R.A. Chard, Grassland Research Institute, Hurley, and A. Pearson Hughes, N.A.A.S., Cambridge.
pages 185 - 189.

Established swards selected on commercial and experimental husbandry farms were mostly cocksfoot pastures, about half of which were drilled, with a few ryegrass dominant swards. These swards were rested at fortnightly intervals from mid July to mid September. As each area was rested, 52 or 104 lbs. N were applied per acre. Each was then harvested in early December and early January.

Results: (a) As would be expected later resting produced lower yields although this could be overcome to some extent by the use of Nitrogen. Mid to late August appeared to be a reasonable time to rest for winter grazing. Swards rested in July were too mature by December and much of the herbage on them suffered from winter burn.

(b) The application of 52 lbs. of N (approx. $2\frac{1}{2}$ cwt. 20.2% nitro chalk) gave the best response. The higher level of fertiliser while increasing the yield was not considered economically worth while.

(c) The cocksfoot swards, particularly the drills, showed most resistance to winter burn. Ryegrass pastures must be grazed off before December otherwise much of the herbage will rot.

Experiments at Auchincruive - 1955 - demonstrated that closing up fields for winter grazing in the first half of August and applying 52 lbs. N provided satisfactory production.

R.D. Harkess.

32. SOIL IMPROVEMENT.

"Benefit of Leys - Structural improvement Nitrogen Reserves".

by C.R. Clement, Grassland Research Institute, Hurley.
pages 194 - 200.

In systems of alternate husbandry the grass ley is down for three years or so. It is accepted that the ley improves the yield of the following arable crops and this paper discusses how this arises.

1. Soil organic matter is increased by 4 tons per acre after 3 years ley.

2. Water holding capacity of the soil is improved by 10 tons per acre (in fact this is only one day's requirement for a crop in summer).

3. The crumb structure of the soil is rendered more stable by the influence of the ley. Most of this effect is on the top 1 - 2 inches which is ploughed under and so won't directly influence succeeding crops.

4. Improved nitrogen in the soil. This depends on the manuring, legume content and method of utilisation of the sward. It is the increase in N content in the soil that was found to have most effect on succeeding arable crop yields.

R.D. Harkess.

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33. ZERO GRAZING.

"The Rule of Green Soiling in the Economy of the Dairy Farm".

by Ian Moore and H.T. Williams, Seale-Hayne Agricultural College, Devon.
pages 206 - 209.

The development of the dairy husbandry system known as zero grazing or green soiling is discussed. The large increase in silage making has introduced to many farms equipment suitable for handling grass for the zero-grazing system.

Factors which favour zero-grazing are 1) an inconvenient layout of fields in relation to buildings and 2) fields with poor drainage or

fencing limiting the grazing of pasture.

Most farmers using this system report higher stocking rates due to increases in herbage yield (due to more timeous harvesting and resting of the sward) and to a reduction in the wastage of herbage from fouling, trampling and selective grazing. As yet, there is no data on the costs and profitability of these commercial systems but since stocking rates have been reported to be increased from 10% to strip grazing, capital expenditure on equipment and fertilisers may well be justified.

At Seale-Hayne and at Edinburgh animal health, body condition and conception rates are equal to those of normal grazing cattle and milk persistency was the same for both housed and pastured animals.

The general conclusion is that at moderate levels of grassland management intensity, zero-grazing is only likely to increase profits where few additional costs are incurred. Most farmers would be advised to improve and modify their existing grazing management rather than change to a zero-grazing programme.

R.D. Harkess.

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34. ITALIAN RYEGRASS

"The Crude Protein content of Italian Ryegrass".

by I.V. Hunt and R.H. Alexander, West of Scotland Agricultural College, Auchincruive.
pages 226 - 229.

This experiment arose out of the disappointment of farmers at the low crude protein contents of silage made from Italian ryegrass. Three possible methods of improving this were investigated a) Variety, nine varieties were tried b) Doubling the amount of nitrogenous fertiliser from 10 to 20 cwts. nitrochalk (15.5% N) per acre c) Cutting the main crop earlier. In general, the crude protein contents were lower than for other grasses in similar trials. Westerwolth ryegrass had the highest % C.P. content but its yield was relatively low. New Zealand Italian ryegrass had a generally higher % C.P. and Ayrshire Italian a generally lower % C.P. but the differences were not big.

Doubling the nitrogenous fertiliser had a marked effect, and was particularly valuable since it also increased the yield of crop.

Cutting the main crop a little earlier had an effect on the % crude protein of that particular cut but later cuts were hardly affected. The yield of that cut was reduced and in the following cuts the loss was regained, with the advantage of a more uniform level of yield through the season.

I.V. Hunt.

Reviews Nos. 35 to 40 were prepared from Vol. 16, No. 4 of the British Grassland Society's Journal. An article on laboratory drying of grass samples has not been reviewed. Others have been reviewed but cannot be included in this number of the journal due to lack of space.

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35. OUT WINTERING YOUNG STOCK

"The Production and use of cocksfoot foggage for winter grazing in South West Scotland".

by M.E. Castle and J.N. Watson, Hannah Dairy Research Institute, Ayr. pages 247 - 252.

Cocksfoot foggage from both broadcast sowings and from sowings in 28" wide rows (rowcrop) have been demonstrated as suitable for winter grazing. Dr. Castle and Mr. Watson showed that both kinds of sward were a cheap feed for dry stock and bulling heifers. Two heifers per acre kept satisfactorily for the three winter months in four successive winters with this cocksfoot as their only feed at a cost of 3½d. each per day on the broadcast and 4¼d. on the 'rowcrop' sowings. In previous years, young stock had been kept on hay and grass silage. The results favoured the broadcast cocksfoot but a narrower sowing width would probably have had increased yields from 'rowcrop' sowings. There was no evidence that using herbage in the winter in this way had any harmful effects on same growth nor on the lasting power of the swards.

Briefly the management in preparation for winter grazing consisted of applying 2 - 3 cwt./a nitrochalk in the 1st week of August with a rest until required for winter grazing starting sometime in December and finishing in the late winter. During the summer two or three cuts of silage would be taken before preparing it for the following winter grazing.

I.V. Hunt.

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36. SILAGE MAKING

"A review of silage-making techniques".

by J.C. Murdoch, National Institute of Research in Dairying,
Shinfield, Reading.
pages 253 - 259.

Dr. J.C. Murdoch's article is a review of research mainly published during the last ten years, and it is difficult to reduce it to the size of our own reviews without losing much of its value. I shall content myself with drawing attention to a few of his more significant remarks.

(1) Loss of feeding value.

Unavoidable losses due to the silage process itself measured under experimental conditions amount to 15 - 20% dry matter, 20 - 25% digestible crude protein or 25 - 30% starch equivalent. Higher losses are noted from observations on farm scale silos. Low losses are reported from America (10 - 22%) in tower and bunker silos. Protection of sides and top and prevention of air exposure are the controllable factors.

(2) Fermentation.

Successful preservation depends on Lactic acid produced by bacteria.

(3) Bacterial Flora.

Lactobacilli (bacteria producing Lactic acid) are the most desirable types. Although generally present in green crops, the benefit of inoculating even crops short of or without these bacteria with cultures of such bacteria has not yet been demonstrated.

(4) The sugar content of herbage.

Sugar is essential for the right bacterial growth. Adding molasses is the practical way of making sure there is enough sugar. The sugar content of herbage is higher in sunny than cloudy weather, in the spring than late in the year, in ryegrass than cocksfoot, and can be increased by fertiliser application.

(5) The moisture content of the herbage.

Pre-wilting leads to satisfactory silage not only because there is less effluent, and a higher dry matter content in the silage but also

because wilting reduces the losses caused by the development of bacteria of decay.

(6) Mechanical treatment of herbage.

Chopped herbage ensiles better than unchopped.

(7) Effect of temperature.

90 - 110°F has been the normal temperature advocated. Temperature above this results in the loss of feeding value. Temperatures below this are associated with the production of 'butyric' silage. Cold fermentation (below 85°F) can result in excellent silage with low losses of feeding value.

(8) Additives.

Their efficiency depends on their coming into contact with all the crop to be ensiled and they must be carefully applied. Molasses, cereal meal and beet pulp have been used to improve fermentation by making a supply of sugar readily available. Acid additives, sodium metabisulphite, Kylage, and some antibiotics are used to prevent any fermentation at all.

I.V. Hunt.

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37. BRIGHT PROSPECTS OF PLANT IMPROVEMENT

"Chromosomes and Plant Breeding".

by P.T. Thomas, Welsh Plant Breeding Station, Aberystwyth. pages 276 - 277.

High altitude areas in countries bordering the Mediterranean are proving very profitable sources of material for the plant breeder.

A diploid cocksfoot from Mount Sintra, Lisbon, gives double the winter growth of other varieties and good growth in the rest of the season.

The North African tall fescues give good winter growth but poor summer growth so that better practical results can be looked

2. The effect of N fertiliser on grass sown alone was much greater than effect on grass/clover mixture. Thus, for 12 cwt. N/C applied to grass alone yield was increased by 6130 lb. (equal to 510 lb. dry matter per cwt. nitrochalk or 29 lb. dry matter per pound N applied).

   When applied to the grass/clover sward, 12 cwt. nitrochalk produced an increase of 1980 lb. dry matter (equal to only 165 lb. dry matter per cwt. N/chalk or 9 lb. dry matter per pound N applied).

3. It is to be noted that, nevertheless, at 12 cwt. nitrochalk per acre, the yield from the grass/clover mixture is higher than for the grass mixture, so that the clover is of benefit even at this high level of nitrogenous fertilisation.

4. The yields from the grass/clover mixture are shown as the separate contributions by grass and clover. The clover has been reduced by the nitrogenous fertiliser.

5. The yield of grass plus clover given no nitrogenous fertiliser at 6140 is higher than can be produced by 6 cwt. nitrogenous fertiliser on grass alone. The presence of clover was equivalent to up to on average 160 lb. N (just over 9 cwt. 15.5% nitrochalk). The actual benefit from the clover was low in the first year when little clover was present.

6. Even when a nitrogenous fertiliser was applied the clover was advantageous. Thus, the smaller amount of clover (1160 lb) present when 6 cwt. nitrochalk had been applied increased the yield of total herbage to 7050 lb. equivalent to the yield where nearly 12 cwt. nitrochalk had been applied to grass sown alone (7510 lb).

Table 2. Nitrogen content of Herbage. (lb. per acre).

Mixture		Amount nitrochalk applied: None	2 cwt. (35 lb.N)	6 cwt. (105 lb.N)	12 cwt. (210 lb.N)
Grass sown alone		25	44	98	192
Grass/clover mixture	Grass	85	99	135	208
	Clover	98	83	47	15
	Total	183	182	182	223

The interest of these figures lies in following what happens to nitrogen

when nitrogenous fertiliser is applied. The following points are noteworthy:-

7. Where no nitrogenous fertiliser is applied the difference between grass alone and a grass/clover mixture is not only the extra yield of the clover but extra grass as well. Thus the presence of 2400 lb. clover has increased grass from 1380 lb. to 3700 lb.

8. Applying nitrogen to grass alone increased N in the grass.

9. The yield of N in the grass/clover mixture has not increased with added nitrogenous fertiliser until 12 cwt. has been applied. In fact, in terms of herbage nitrogen content, the clover has been equal to up to 308 lb. fertiliser nitrogen (= 17 cwt. nitrogenous fertiliser per acre).

10. The effect of clover in the mixture was to contribute its own yield but also to transfer nitrogen to the accompanying grass, equivalent to the use of 73 lb. fertiliser nitrogen (4 cwt. fertiliser). This is not as high as is found in New Zealand under a more favourable climate for white clover growth.

In the discussion, Mr. Cowling points out that the effect of fertiliser nitrogen on total yield may not be important to the man primarily interested in early grass.

I.V. Hunt.

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39. WINTER GRASS

"The production and utilization of winter grass at various centres in England and Wales".
Pt. 2. Livestock utilization.

by H.K. Baker and J.R.A. Chard, Grassland Research Institute, Hurley, and G.P. Hughes, N.A.A.S., Cambridge.
pages 309 - 313.

In a previous article (our No. 31), the results of experiments on this topic were discussed in terms of herbage production. Beef stores and dairy cows were grazed through various periods of the winter outdoors mainly on cocksfoot leys but in one case on a timothy/meadow fescue ley. All swards had been prepared by resting from mid-August and given 52 lb. nitrogen (3 cwt. nitrochalk 15.5% N) per acre. In the case of the beef stores, the effects were measured by weighing

the animals and comparing their behaviour with similar groups of animals kept indoors by the farmer's normal wintering method. The outdoor groups were grazed at 1 beast per acre from mid-November to early January. All did very well, mostly gaining more than the control cattle indoors.

In the case of the dairy cattle, it was estimated that in some cases from 1 to 3½ gallons of milk per day were being obtained from the grass. In other cases, the grass was considered to replace up to 10 lb. hay per day.

The winter treatment had no measurable effect on the following spring yield of herbage.

I.V. Hunt.

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40. SURFACE SEEDING HILL LAND

"Comparison of grass varieties for surface seeding upland pasture types".

by R. Hughes and I.A. Nicholson, Hill Farming Research Organisation, Edinburgh.

47. Pt. 1. Molinia and Nardus pastures. pages 210 - 221.
48. Pt. 2. Deep peat. pages 314 - 322.
49. Pt. 3 & 4. Calluna heath and General Discussion. Vol.17.pages 74-82.

Varieties of perennial ryegrass, meadow fescue, cocksfoot, timothy, tall fescue, Yorkshire fog, red fescue, meadowgrass, crested dogstail, browntop bent grass and meadow festail, totalling 18, were compared in regard to ability to establish, persist and production following surface sowing on various kinds of hill vegetation. Generally, the area to be sown was harrowed, given limestone at 3 tons per acre, super phosphate at 6 cwt./acre and nitrochalk at 1 cwt./acre. Sowing took place at various times.

Results on Molinia pasture. Yorkshire fog, S 59 red fescue, the meadow grasses and S 170 tall fescue and the meadow fescues showed up well. Ryegrasses and cocksfoots suffered from shortage of nitrogen but the S 143 cocksfoot improved in the second year.

Results on Nardus pasture. Yorkshire fog, S 23 perennial ryegrass and S 50 timothy showed best, while clover developed quickly but did not maintain its early promise. Cocksfoot and red fescue were not nearly so good on this as on the Molinia

Results at Lephinmore (deep peat). Yorkshire fog, timothy, cocksfoot, meadow grasses and ryegrass were outstanding in the first year. S 143 cocksfoot was better than trifolium cocksfoot. S 170 tall fescue and S 59 improved to give excellent swards.
The best swards after two years were meadow fescue, especially S 53, S 170 tall fescue and Scots timothy.

Results at Birkhill (deep peat). S 170 tall fescue and trifolium cocksfoot were consistently good. Cocksfoot did much better here than at Lephinmore.

Results at Glensaugh (dry heather (Calluna) heath). The most productive varieties in the first year were red fescue, Yorkshire fog, S 170 tall fescue, S 50 timothy, S 143 cocksfoot. Trifolium cocksfoot and timothies were satisfactory until the end of the second year.

General Discussion. The sowings were very sensitive to shortage of water and at times looked yellow indicating a deficiency of nitrogen. Some of the grasses e.g., S 143 cocksfoot suffered badly from frost heaving. S 170, tall fescue, red fescue and the meadow fescues seemed to survive both water logging and dry periods. No suggestion of a best mixture is made at this stage.

THE SOUTH WEST SCOTLAND GRASSLAND SOCIETY

Founded June 1962.

CONSTITUTION AND RULES

1. NAME.

The Society shall be known as the South West Scotland Grassland Society.

2. ADDRESS.

Auchincruive, Ayr.

3. OBJECTS.

To further the knowledge of the management and utilisation of grassland in all its aspects and to provide members with opportunities for the interchange of ideas and experiences relating to the art of grassland husbandry.

4. MEMBERSHIP.

(i) Membership of the Society shall (subject to paragraph (iv) of this section) be open to those wishing to further the objects of the Society.

(ii) Applications for membership shall be sponsored by not less than two members of the Society. Election to membership shall be made by the Executive Committee or a sub-committee appointed for this purpose.

(iii) Those persons who were present at the Inaugural Meeting shall be ipso facto Foundations members.

(iv) Not less than 75% of the membership of the Society shall be farmers, farm managers, full-time farm workers or factors of agricultural land working in the Counties of Ayr, Dumfries, Kirkcudbright or Wigtown. The remainder may consist (irrespective of domicile) of persons who are not farmers, farm managers, farm workers or rural factors.

5. SUBSCRIPTION.

There shall be an annual subscription of £1 payable on application for membership and thereafter by bankers order on 1st June each

year. Any member who cancels his bankers order is deemed to have cancelled his membership.

6. MANAGEMENT.

The affairs of the Society shall be managed by an Executive Committee (five of whom shall constitute a quorum) consisting of/ or a Sub-Committee appointed from/the following persons:-

(i) The Chairman of the Society, who will be elected annually at the Annual General Meeting and will normally serve as Chairman for not more than two consecutive years.

(ii) The Vice-Chairman of the Society, who will be elected annually at the Annual General Meeting and will normally serve as Vice Chairman for not more than two consecutive years.

(iii) Eight members (two of whom shall represent each of the aforesaid counties) who will serve for a period of two years. Four of these members (one representing each county aforesaid) will retire annually and will not be eligible for re-election for a period of twelve months. Four members (one representing each county aforesaid) will be elected at each Annual General Meeting.

(iv) The County Agricultural Adviser of the West of Scotland Agricultural College for each of the aforesaid counties.

(v) The Ex-Chairman of the Society shall automatically be a member of the Committee in the period following his term of office.

(vi) The Honorary Secretary and Honorary Treasurer who will be elected annually at the Annual General Meeting will be members by virtue of office. They will be reimbursed for all expenditure in the service of the Society.

(vii) The Committee has the power to co-opt additional members who will serve until the following Annual General Meeting.

7. ELECTION OF COMMITTEE MEMBERS.

(i) Nominations supported by two members should be submitted in writing to the Secretary not later than 1st October.

(ii) For voting purposes, members will be classified according to county. Candidates will be nominated to represent one of the counties whilst members will vote only for their county representative.

8. FINANCE.

Accounts shall be kept by the Treasurer of all money received and expended by the Society.

An Auditor, who shall not be a member of the Committee and who need not be a member of the Society, shall be appointed annually at the Annual General Meeting. A statement showing the financial position of the Society, examined and certified by the Auditor, shall be circulated to all members and laid before the Annual General Meeting.

All cheques on the Society's account shall be signed by the Treasurer and the Chairman or Secretary.

9. ANNUAL GENERAL MEETING.

The Society's Annual General Meeting shall be held in November each year, after not less than fourteen days' notice has been given to members.

10. AMENDMENTS TO THE CONSTITUTION.

This Constitution may be amended only by a general meeting at which at least two-thirds of those present are in favour. Notice of any proposed amendment, supported by the signatures of not less than five members must be given to the Secretary in time for inclusion in the convening notice, which will be sent out to members not less than fourteen days before the date of the meeting.

This constitution was proposed by R.M.T. Wilson Esq., seconded by D.B. Jamieson Esq. and adopted at Annual General Meeting, 12th November, 1962 to replace the constitution as printed in the Journal of the South West Scotland Grassland Society, No. 1, November 1962.