GRASSLAND

JOURNAL

OF THE

SOUTH WEST

AND

CENTRAL SCOTLAND

GRASSLAND SOCIETIES

No. 12 SPRING 1969

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Contents

Page

Editorial 3

Officials South West Scotland Grassland Society 4

Central Scotland Grassland Society 5

Forthcoming Events 6

Articles:

Wasted Assets—P. Gordon Duff-Pennington 8

The Donaldson Report—John Watson, Snr. 10

Meetings. (S) South West. (C) Central Scotland.

(S) Profitable systems of beef production—Dr. H. K. Baker 12

(C) Research in Grassland Husbandry—I. V. Hunt and Dr. R. D. Harkess 20

(S) The future of hill sheep in Scotland—Dr. J. M. Cunningham 26

(C) Conservation—Ralph Bee 34

(S) Low cost cattle housing—Robt. Forsyth, A. J. Maitland and M. Milligan 38

(C) Hill land improvement—N. McCall-Smith 45

(S) Expand the dairy herd—Pat Jones 49

Research Reviews. Nos. 135—140 57

News Items:

Librarians List W.S.A.C. 64

Change of constitution, C.S.G.S. 65

New members C.S.G.S. 65

Membership Statistics S.W.S.G.S. 66

EDITORIAL

The spring number is a little late this year but it includes reports of all the winter meetings of the two societies prepared by the editor and five more research reviews prepared by Ron Harkess. It looked as if the journal would be a two man affair but two very welcome last minute articles were received from Patrick Gordon-Duff-Pennington and John Watson, Sen. The two societies number 600 members and there must be a few more budding authors.

Look through the topics of our seven winter speakers covering beef, research, hill sheep, conservation, cattle housing, hill farming and expanding the dairy herd. Our own members' recorded experiences of these subjects would be much appreciated by our reading membership.

Reports on the farm visits made during the year have been omitted. The Central Scotland Society visited East Brackland, nr. Callander where the Farmers Weekly are setting out to examine the viability of intensive hill sheep farming. Members who have not yet visited this farm should take the first opportunity of seeing the beginning of this farm scale experiment. The South West society visited North Ayrshire farms to see how three farmers were meeting the call to step up production and reduce costs. Norman Finlayson, Woodlands, Mauchline, was putting in his own cubicle housing to take 60 cows plus followers on his $52\frac{1}{2}$ acres. Sam Anderson, Sorn, was putting cubicles into an existing shed and proposed feeding through tower and augur. Matt Simpson, Muirkirk, had a prefabricated wooden mootel set up for 60 hill cows.

The question of the moment is whether our journal should be developed further to include photographs, diagrams, etc. and whether part of the cost of this should be met by letting advertising space. These possibilities will be explored in the next number, which is being prepared for publication at end of August.

Both West Scotland societies are growing. The two societies in the North of Scotland, in Caithness and in Aberdeen are also thriving with 500-600 members and our neighbours in the east are about to take the plunge. We wish them well.

I. V. HUNT.

SOUTH WEST SCOTLAND GRASSLAND SOCIETY

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Past-Chairman: J. G. Marshall, Hardgrove, Carrutherstown, Dumfries.

Treasurer: Dr M. E. Castle, Hannah Dairy Research Institute, Kirkhill, Ayr.

Secretary/Editor: I. V. Hunt, West of Scotland Agricultural College, Auchincruive, Ayr.
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A. Buchan, Ladykirk Estate Office, Monkton.	1967-69
John Lamont, Cockenzie, Dalry.	1968-70

Dumfries:

P. Gordon-Duff-Pennington, Kirkland, Tynron.	1967-69
Robert Graham, Kirkland, Courance, Parkgate.	1968-70

Kirkcudbright:

A. Gray, Jnr., Ingleston, Borgue.	1967-69
J. M. L. Milligan, Culvennan, Castle Douglas.	1968-70

Wigtown:

H. O. Chalmers, Craigencrosh, Stoneykirk.	1967-69
James Hanney, Low Killantrae, Port William.	1968-70

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G. M. Berrie, W.S.A.C., 6 Blythswood Square, Glasgow.
Professor J. S. Hall, W.S.A.C., Auchincruive, Ayr.

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Past-Chairman: J. M. Argo, Newton Farm, Cambuslang, Lanarkshire.

Treasurer: J. Waddell, College Office, Portland Place, Lanark. (Lanark 2562).

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1967-69

James Clark, Dunrode, Inverkip, Renfrewshire.

A. Smith, Hazeldean, Strathaven, Lanarkshire.

W. Allison, Laigh Cleughearn, Auldhouse, East Kilbride, Renfrewshire.

M. Argo, Newton Farm, Cambuslang, Lanarkshire.

W. Douglas Johnstone, Monkecroft, Auchterarder, Perthshire.

1968-70

P. Fisken, High Craigton, Milngavie, Glasgow.

B. Baird, Jnr., Windhill, Eaglesham, Glasgow.

J. Pettigrew, Newsteadings, Lanark.

T. Hagness, South Hillhead, Carluke, Lanarkshire.

Major R. Tullis, The Baingle, Tullibody, Alloa, Clackmannanshire.

College Advisers:

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

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Co-opted:

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I. V. Hunt, W.S.A.C., Auchincruive, Ayr.

Professor J. S. Hall, W.S.A.C., Auchincruive, Ayr.

FORTHCOMING EVENTS

British Grassland Society Summer Meeting 1969

The Central Scotland and South West Scotland Grassland Societies are joining with the West of Scotland Agricultural College and the Hannah Dairy Research Institute as hosts to the British Grassland Society July 21st to 24th.

The B.G.S. visit one part of Britain each summer. This is their second visit to this area. The programme arranged for them consists of visits to farms in Lanarkshire and Renfrewshire plus a visit to the Experimental grass plots (W.S.A.C.) on peat land at Eaglesham, Renfrewshire on Tuesday, 22nd July. On Wednesday, 23rd July, they will visit Auchincruive and the Hannah Dairy Research Institute. On Thursday, 24th July, there will be visits to Neil McCall Smith's farm Conachan, Crieff and J. McEwan's farm, The Lurg, Fintry. Members of our local societies will have an opportunity of joining in on the Tuesday and/or Thursday at an all-in charge of 25/- per day and in the official annual dinner on Thursday evening at 35/-. They will appreciate the fact that *no private transport will be permitted to join the tour and all participants will need to use the buses provided.*

Forms of application to join in these activities will be sent on to all members.

Summer Tours

Cheshire: Arrangements are in hand for a 2 day tour of farms in Cheshire which will take place 19-23rd May. Members taking part will travel down in their own cars to a hotel in Crewe. The farm visits will be made by bus. This arrangement worked quite well for our visit to the South of England last year.

East of Scotland (mid May):

A day tour of farms in Berwickshire is being arranged by the Central Scotland Grassland Society.

1969-1970

The programme for next winter is now being prepared and comments and suggestions by members will be welcome.

Note the following dates, topics and places:

1. *November 10th* — Conference " Profitable Use of Grass " (Milk and Beef) Castle Douglas.
2. *Dumfries* — Conference on Sheep Husbandry.
3. *Ayr* — Conference on Conservation.
4. *Newton Stewart* — Hill Farming discussion night.
5. *Spring 1970* — Tour of Wigtownshire.

WASTED ASSETS

PATRICK GORDON-DUFF-PENNINGTON

The Knackery came this morning to lift a dead calf. The time was 11 a.m. He had already lifted ten suckler cows elsewhere — £1,000. This happens seven days a week every spring. Are we really the exception we count ourselves or are we too wasting our assets ?

Forgetting Old Daisy, our cows are machines : they need maintenance and full work to make a profit. I believe we should be aiming to produce eight calves in eighty months, instead of ninety-six months or more thus saving sixteen months maintenance. The cow is unlikely to be worth less at the end and we would still have our eight calves. The Snade cows have been coming to the bull fairly regularly three weeks after calving and although it might not suit people aiming at the suckled calf sales, it suits me. Most cows seem to me much too lean at calving and I am sure this is responsible for the dismal calving indices in most herds of hill cattle. If we get rid of the fluke and give the cows enough to eat, with particular regard to energy, rather than protein, I believe we shall continue successfully.

This winter, the Snade cows have had nothing but hay or silage until a week after calving, when we gradually added 2 lb of a 14% cob and 2 lb sugar beet pulp : $2\frac{1}{2}$ oz per day of high phosphorus/high magnesium mineral, with Vitamin A and D, have been sprinkled in the troughs. I do not know if this is adequate on paper, but judging by the condition of the cows it seems satisfactory.

The health of the stock is improving. Calves born July/August had coccidiosis and their mothers suddenly stopped milking in November after a fluke dose. We had to spean them on December 9th, but the cows were kept on very short rations and refluked with Trodax in February. On March 3rd, the calves had put on 1.82 lb per day (bullocks) and 1.58 lb (heifers) on a ration of 3 lb cake (3d per lb) and 7-8 lb hay. I am so delighted with the results that I am beginning to think we should aim to do this again. The cows are recovering quickly and should be in excellent order after their long rest.

We have had little trouble with scour this year, which I attribute to no cake before calving. The feeding stuff people say I am wrong ! We are very conscious of brucellosis, and although we have been lucky so far with the Irish cows, my nerves won't stand it much longer and I think we shall have to start keeping our own heifers from proven dams. With this in mind I have just started with the Beef Recording Association.

Grass is improving with the moderate use of fertiliser and improvement of drainage, but chiefly thanks to the mouths of the hundred cows. There was a time in the summer when I thought they should have been donkeys, but luckily the evidence has been removed ! Putting a field through the modern so-called rotation of barley, barley, barley, grass (or some such nonsense) is a costly operation, so I have given up listening to the ploughers and am converted to Voisin and Mudd. I was interested in paddocks and a very sympathetic fertiliser adviser invited me to spend £11 per acre indulging myself. He was so enthusiastic I nearly agreed, but have decided to spend £4 10/- on some 12:6:6 fish manure. The College tells me with a smile (no long faces this time !) that I'm barmy, but agricultural thought seems to work in circles and perhaps they'll catch up with me one day ! We know we can raise the output of grass by vast applications of nitrogen, but nothing has yet dispelled the doubt in my mind about its effects on the health of stock and the trace element balance in the soil. It isn't arrogance that makes me question the way we are being pushed, but a genuine doubt.

I end on a sober note. Breeding heifers in Scotland are up 17%-18% and in Ireland 34%. The wholesale butchers complain of losses. The housewife begins to resist any price rises. Money from the bank costs 10% at least. Beef Recording Association figures for gross margin per cow are £34. Take an interest charge of £1,000 (10% of value of 100 cows) and one man's wages at £1,000 : it surprises me that we are still in business. The only relief is that a large number of milk producers are not prepared to forego their monthly milk cheque. Perhaps this will dissuade the remainder ! If we are to survive we must improve the records on which we base our decisions. We should ask ourselves whether we are making full use of our existing assets of cattle and grass, and roughly speaking I translate the message as get on or get out !

THE DONALDSON REPORT

JOHN WATSON, Snr.

Messrs McGill & Smith, Seed Merchants, Ayr

In the autumn of 1966, the Minister of Agriculture and the Secretary of State for Scotland, set up a committee to investigate the herbage seed industry. This Committee became known as the "Donaldson Committee," the chairman being Lord Donaldson. Their terms of reference were:—

To enquire into :

(a) The production of herbage seed and the stability and profitability of the herbage seed industry in the United Kingdom.

(b) The quality of seed supplies, both home-produced and imported, and

(c) Export possibilities,
and to make recommendations.

The report was published in September and it is a very exhaustive one, covering practically every phase of this important industry. Perhaps it might be well to consider why the inquiry was thought necessary. Many people connected with the industry were seriously concerned about the decline in seed growing in Britain and also the decline in the consumption of seeds. This decline in the growing of seeds is, of course, obvious when one considers that in 1920 there were about 6,000 acres of perennial ryegrass grown in Ayrshire alone : in 1968 the acreage was not more than 40. There are many reasons for this decline, chief of which must be unprofitability due to low prices coupled with the changing labour position and the changing techniques in handling seed crops. So far as the consumption of grass seeds is concerned, the decline, of course, is mostly due to the reduced number of acres being sown out. In Scotland alone, that acreage has fallen since 1960, by approximately 100,000 acres.

The report is a very comprehensive one and the main recommendations are that a herbage seeds authority for the United Kingdom should be constituted. This authority would include representatives from all the interested parties with a chairman and two non-interested independent members. The authority would have statutory powers to carry out the recommendations in the report. Of those, the chief ones are, the formation of an "Acceptable List" of varieties of the different species of grasses used and any variety not on this list, would not be allowed to be grown or imported and sold in the country.

This is, of course, a form of qualitative control and the committee believe that it would be instrumental in not only raising the standard of all seeds being sold in this country, but would solve some of the problems of over-production and importation presently besetting the trade.

They also propose a new system of price fixing for the growing of home-grown seeds. This system would apply to all grass seeds grown in this country, but not in the meantime, to clovers. The basis of the price fixing suggested is on a target gross return per acre, calculated from enterprise costs, with an extra allowance above the average cereal returns to provide for the special risks of herbage seed growing, owing to their vulnerability to unfavourable harvest weather conditions. While the committee believe that this price fixing arrangement of the acceptable list would bring more stability to the industry, they also recommend in the event of a breakdown in the price fixing system, minimum import prices should be introduced.

They recommend an extension of regional trials and the much more complete distribution of information in regard to those trials. They recommend that wholesalers and importers should be licensed but, in the meantime, do not think it is advisable to license retailers.

There are many other useful and worthwhile recommendations in the report, extending to eleven chapters and seventy-seven pages. The report itself, has had a mixed reception from the trade; the principal objection being the constitution of an authority with statutory powers. There are also objections to the new price fixing arrangement and very strong objections to the fixing of minimum import prices. Strangely enough, this latter objection is mainly from the trade and not, as one would expect, from the consumer. The Scottish Colleges welcome the suggestion of extended regional trials along with the necessary financial support and other facilities.

The report is being considered at present by the various interested bodies and objections to it were to be lodged before the 31st January, 1969, when the Minister will decide what action he will take. My own feeling is that there is much good in it and much that will help to put a somewhat precarious trade back on its feet. No one doubts the importance of the seed trade industry to the country, in spite of the fact that the total money involved is, by present day standards, a fleabite, namely £7,000,000, it should be remembered that seed is the source of grass and grass is the medium by which we produce milk, beef and mutton, and is therefore, of paramount importance in feeding a growing population.

PROFITABLE SYSTEMS OF BEEF PRODUCTION

Dr H. K. BAKER

Meat and Livestock Commission

Guest Speaker at 6th S.W.S.G.S. Annual General Meeting. 7th November, 1968, Ayr.

Mr Adam Gray, newly elected chairman of our Society took the chair and introduced the speaker. Dr. Baker has been for many years on the staff of the Grassland Research Institute, Hurley, in charge of extra-mural investigations, that is looking at some of the findings of the research workers when they were applied to farms. Later, he joined the Beef Recording Society as Executive officer and is now occupying a similar position with the Meat and Livestock Commission.

Dr. Baker:

We are all conscious of the problem, namely, the difficulty of achieving the same profitability in beef as has been achieved for milk. The need for more beef cannot be overstressed. At present we are providing just 70% of requirements. The value of this amounts to £300,000,000 and is second only to dairying in importance to British agriculture.

Although second in importance to dairying, beef production is not necessarily a secondary industry and needs studying just as closely as dairying has had over the last 25 years. Achieving an efficient beef from grass system is complicated by the traditional structure of the industry involving frequent changes in stock ownership from calf to carcase.

Two Types of Animals are Available

1. **Dairy Herd:** In this the Friesian is supreme. The Ayrshire is not so good except possibly for barley beef production. Some Ayrshire crosses are interesting especially the Ayrshire × Charollais. In order to achieve the required output of beef, this source has to be pushed upwards to the limit.

2. **Suckler Herd:** Relatively little research has been undertaken. Profitability is extremely low when managed on traditional lines.

It is clear that all the present ideas on beef production stem from the challenging work of Dr. Preston at the Rowett who demonstrated the possibility of converting cheap barley into profitable beef providing one looked very carefully for maximum performance. For a short period barley beef was a tremendous challenge to grass beef but by now better systems of utilising grass have set the matter right.

The key to success is to achieve a high rate of gain for as long as possible. Thus an average rate of gain of 2 lb/day per head instead of $1\frac{1}{2}$ lb/day/head means the consumption of half the feed requirements of the animal during its life.

A vast amount of information is being obtained on the profitability of various systems from the records of study groups which began 4 years ago. From these records it is possible to set up attainable targets of gross margin (i.e. total income less cost of calf, feed and veterinary needs).

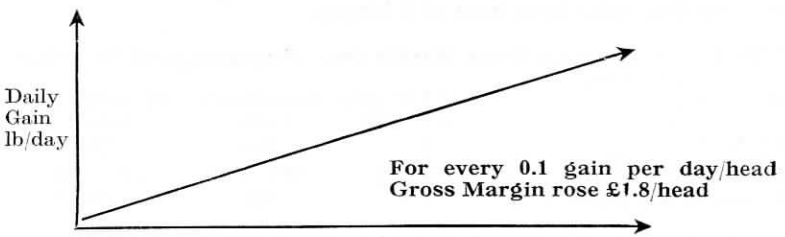
1. Gross Margins from Barley Beef System

Study group results from barley beef production are shown in table 1. In spite of the fact that this is a much simpler system than grass beef there is still a tremendous range in output and profitability indicating that even with a simple feed source, there remains large sources of profit and loss due to management.

Table 1. Study Group Gross Margins from Barley Beef Systems.

	Live weight gain lb./day/head	*Gross Margin head*
Beef Recording Association (B.R.A.) Target	2.5	£15
Range in Study Group	1.—2.7	—£1 to £20
Average of top third in group	2.4	£16

Relationship between daily gains and gross margin :



2. 18 Months System (for the autumn born dairy calf) semi intensive grass cereal beef

Table 2. Production of 18 months beef.

Progress	*Liveweight*	*Feed Source*	*Gain lb/head/day*	*Season*
Purchased	100	Milk Substitute	1.3	Autmun
Weaned	140	Barley/Concentrates		Spring
Turned out to grass...	400	Grass	1.7	Summer
Housed	750	Barley/silage	2.0	
Slaughter (14–19 months) ...	850/1150		1.8	

Various possibilities are still open. Thus one can carry a heavy stock through the summer, make no silage and feed more concentrates during the second winter. This gives higher output at *lower* profitability. Stock can be carried on to light or heavy weights with the advantage usually in favour of the heavier animal but a lot depends on the type of cross used. A Hereford × Friesian would finish early at a light weight using less concentrate feed.

The grassland management system is now becoming standard. Paddocks are essential. From another source it has been shown that systems with more paddocks are more profitable than those with less. e.g. At less than 4 paddocks the gross margin was £38.1/arce whilst with more than 5 paddocks the gross margin was £46.6/acre.

In one instance, a paddock system using 320 lbN/acre, stocked at 1.8 beasts/acre on 27 acres, had produced finished beef to slaughter at 11 months with quality equal to barley beef and when carried on to 1050 lb slaughter weight, higher profit margin.

The basis is management of the grass to achieve 2 lb/head day gain. This is difficult to achieve in mid-summer and only possible if *Rotational grazing is practised, nitrogen applied to maintain vigorous growth and the paddocks topped after mid-summer grazing to remove low quality unpalatable roughage.*

200 farmers are taking up the system every year and the best ones are those who have been at it longest.

Table 3. Study Group Gross Margin from 18 months semi-intensive systems.

	Liveweight gain lb/head/day	*Gross Margin £/acre*	*Gross Margin £/head*
B.R.A. Target	1.8	£30	£50
Range in Study Group ...	1.5—2.1	£10—£40	£21—£67
Average of Top Third Group	1.8	£31	£50

Last year results were better with the top third giving £60/acre and individuals reaching £80-£90.

Capital Return from 18 months System

The top third showed returns from 7-24% depending on the amount of expenditure needed for new machinery, calf rearing and fattening buildings. The best margins came to the improvisors and adaptors and the poorest to those who went in for new buildings.

Another factor contributing strongly to gross margins is stocking rate and high daily gain plus high stocking rate with targets of 600-800 lb liveweight per acre are to be aimed at.

The biggest factors restricting development are parasitic worms. Results are good on a clean ley, almost as good in the second year but way down on a heavily contaminated 3rd year ley.

Some results indicate that the type, condition and weight of the animal at turn-out time is also important. 400 lb + was the ideal weight. The effect on gain in weight during the summer is worth 0.2 lb/head/day. A Hereford × Friesian cross had the same advantage over a pure Friesian.

On Experimental Husbandry Farms, it might be possible to show an advantage in favour of pure Friesians but on commercial farms, the cross had shown itself better able to adapt to fluctuating weather conditions.

3. **Suckler Cow**

With a production of 1 calf per 2 acres and a gain of 1½ lb/day it was difficult to show a profit. We needed the right cow and the right grass.

Table 4. Gross Margins from Suckler Cow Enterprises.

	Liveweight Gain	*Gross Margin*	
	lb/head/day	£/*acre*	£/*head*
B.R.A. Target	2.2	30	40
Range in Study Group ...	1.0—3.0	9—47	13—54
Average of top third in Group	1.9	24	36

There was plenty of room for improvement and this could come from choice of best calving dates, length of weaning period, winter feeding system and stocking rate on grass.

According to the "Little Neddy" the target for meat production requires another 300,000 calves in 5 years time, but in addition to this need for more stock there was need for better stock. Although the management of grass and stock is important there is need to apply dairy herd breeding methods to beef stock.

The character to look for is a high 400 day weight.

There is a big range within every breed as is instanced for Herefords in Table 5.

Table 5. Hereford Herds. 400 day weight.

	Average	*Range per herd*
1064/5	1046	941—1182
1965/6	1055	858—1194
1966/7	1048	866—1244

This range is equal to 6-8 weeks longer feeding requirement for the same slaughter weight. The margin of profitability is low and we must start with the best possible basis. Conformation was no guide to the 400 day weight.

To sum up the way to beef profitably was through genetical selection of the best stock and sound animal management through good grassland management, producing a product which could compete with alternative human foods in price and acceptability. This last is highly important and means that lean meat is in and the traditional fat meat — out. It has been shown time and again that the result depends largely on management since even with evenly matched stock and simple feeding systems a range reflecting management is shown up.

QUESTIONS

1: Why was there a top third? Were there common features? Were they good farmers? Did they use more nitrogen?

A: There were many reasons, but one was experience since they usually included all who had been in the scheme for 3 or 4 years. As noted previously they had more paddocks, used more nitrogen but all this may be due to the farmer being more expert.

2: Management is stressed but how can I define this to students?

A: Attention to detail, planning, thinking before acting, forming a clear picture of the objective.

3: If I am asked £10-£11 per cwt. for stores how can I show a profit?

A: Obviously think and plan before you buy. Choose the stock for a fattening system don't just stock on a whim and then wonder how you will manage them.

4: There still seems to be a mystery attached to management. We all are told that the paddock system is foolproof. Does this mean it requires less management skill?

A: I don't think so. A paddock system may be foolproof but it isn't damnfool proof. Even barley beef is not foolproof and it has the simplest of all basis in terms of food supply. Bad management in such a case is overlooking a slight cough until it becomes an epidemic; allowing feed hoppers to jam; thoughtlessly and needlessly changing of feed composition.

5: Is it true to say that many of the new beef men have moved out of milk because they can't make a go of milk. Are they likely to be deficient in this important management factor?

A: Possible in some cases but generally there are sound technical reasons for the change.

6: I would like to breed replacement cows from my selected cross bred calves using a weighing machine (a progeny tested one I hope). What is the likelihood of success crossing these back to pure bulls or cross bulls? What is the best age to wean calves?

A: Breeding problems are very considerable. Using a dairy cross and keeping pure stock are both expensive. The cross x cross mongrel results in variable offspring. The best compromise is the 3 way cross. The bull has the biggest effect and needs to be carefully chosen with performance more important than colour or breed. At present culled animals are selling well and so offer a good opportunity for grading up a herd.

Re weaning — the answer is not simple since it depends on the system of fattening to be adopted and on the state of the grass, supply of winter feed, etc. Thus for example, the early spring weaned calf turned directly into grass with the cow carried hard, is sometimes recommended but I am not convinced of its merit. With later weaning, the cow takes the grass and keeps it in good condition for direct grass consumption by calf plus feeding through the cow.

7: Have you any comment on paddock construction and advice on worming?

A: Two strands electric wire or electric barbed wire are necessary. Worming is no problem on a clean pasture and probably not needed on a second year pasture. Some people advocate changing paddocks in mid July if they are old contaminated pastures but I am still looking for proof of the value of this.

8: What can you expect in heritability of live weight gain?

A: I would expect between 40% and 60%. In Lincoln Reds, I have heard of 60%.

9: When you refer to 7-24% return on capital, do you include capital invested in buildings? Which of the systems, suckler cow or Friesian & Hereford cows do you look to for a solution to the big increase required in production? Can you enlarge on the demand?

A: We are still importing a lot of meat and at the moment our consumption per head is low, even less than in 1962. Thus we need to consider both the increased population and consumption per head. We shall need even the Ayrshire calves and better still Ayrshire x Charollais calves the dam being a good suckler cow. One source for immediate relief would be wider use of bull beef. This is 10-15% more efficient so one could produce more home beef and at the right price. Capital on money invested includes stock, buildings, fencing, etc.

10: When should calves be away from the autumn calving single suckler herd? On the other hand when should they calve, October or December? If the latter, they would spend a longer time on less profitable conserved feed.

A: Probably October calving is best but it is not easy to maintain a good calving index. Later winter calving may help to keep cow feed costs down.

11: I am building up a suckler cow herd using more nitrogen on grass. I want more cows. If I calve cows in September, I have good grass — cows fit and fat — calves can't take the milk — calves scouring. On the other hand, calving in winter everything is frozen and we are subject to staggers.

A: Cross dairy type is less likely to get staggers, and carries excess milk better. You should start with heifers not cows — they should not be overfit or overfat and it would be better therefore to calve in winter.

12: Would multiple suckling not solve the problem of excess milk in September calvers?

A: Yes, but there are good and bad features to multiple suckling. Single suckling is simple. Double suckling introduces complexities. The calf must be available at the right time and right price and the cow must take to the extra calf.

13: I have just had a deduction from my Meat and Livestock Commission cheque. Am I getting anything for this levy? How is it spent?

A: I personally haven't had your money. The levy is made at at point of slaughter and issued to finance all the responsibilities of P.I.D.A. and B.R.A. plus sheep developement schemes. The various services are being built up as rapidly as suitable staff can be recruited and buildings erected. For example, with 5 control stations already working we have 70 Hereford, 30 Aberdeen Angus, 15 Shorthorn and others to a total of 300 herds on test. Far more applications are coming in than can be met. There are three main statutory committees of Producers, Distributors and Consumers respectively plus an enterprise committee for beef, sheep, etc. The scheme is developing on a regional basis with a seperate chief officer for Scotland. The former Fat Stock Officers and their responsibilities have been taken over. Out of a total levy income of £1.8 million, most is taken up by the P.I.D.A. and B.R.A. Schemes which operated before the M.L.C. £160,000 is set aside for a Meat Research Institute. Some of the levies have been reduced e.g. the pig levy is down from 2/- to 1/9 per head. Much of the current work is at the planning stage.

14: Since crosses show advantages, isn't it possible that the future will see a simple breed develop as has almost happened for poultry.

A: Yes, as with the Landrace × Saddleback pig. But, the beef industry has a very much fragmented individual structure. Single herds are small with a high capital value and a high gambling element. Perhaps breeders co-operatives could be set up. Again, poultry have to exist in a very much standardised environment whilst beef hitherto is produced in widely different conditions.

15: What future has the Ayrshire bull calf for beef?

A: It is possible that a new line might be an advantage. Finnish Ayrshires have much bigger frames than Ayrshires and some are under observation at Harrogate.

K. A. Kelly, of Barncleuch, Dumfries proposing the vote of thanks, expressed appreciation for the words of wisdom which had been put before us. It was one thing to read about such things in pamphlets and papers but far better to discuss the matter with one so experienced as Dr. Baker.

I. V. HUNT.

RESEARCH IN GRASSLAND HUSBANDRY

I. V. HUNT and R. D. HARKESS

Talk to C.S.G.S. at the Annual General Meeting, Stirling, 21/11/68

One of the functions of the Specialist Advisory departments at the West of Scotland Agricultural College is to carry out experiments to provide the facts required for an effective advisory service. These could be needed to deal with specific problems which arise on individual farms or to meet or initiate the continually changing techniques and demands. The Grassland Husbandry department is small, has just three graduate members, two unqualified assistants to help with fieldwork and two clerical assistants for the paperwork. The cultivation of the experimental areas is undertaken by College farm staff. Chemical analyses of about 5000 samples of herbage per year are carried out by Ron Alexander, Mary McGowan, James White, from the Analytical Unit of the Chemistry Department and by Roland Voss of the Spectrographical Unit.

Over the years, the increasing mass of figures collected has necessitated making more and more use of electronic computers, firstly at Rothamsted Agricultural Experimental Station, Harpenden, Hertfordshire, later at the University of Glasgow then at a special unit set up under Dr Finney at the Agricultural Research Council's Unit of Statistics, Aberdeen, recently moved to the University of Edinburgh.

Over the 20 years since the department was set up 350 experiments have been carried out and 250 reports, bulletins, booklets, leaflets, records, scientific and popular articles have been printed. This, like the tip of the iceberg, is only 1/5th of the total amount of information that has been collected. The unpublished work is in the " pipe-line;" some in 1000 or so plots of variously treated grassland of current experiments on the College Farm, Auchincruive, and on the farms of co-operating farmers throughout the West College area (A " Current Experimental Programme " is published every May); some is passing through chemical analyses; some is in various stages of calculation concerned with the mathematical significance of the effects of the treatments. It is not enough to show that one variety of grass yields more than another. It is necessary to determine how reliable the experiment was and the probability that the results obtained in the experiment will be generally obtained. Some of the experimental conclusions lie waiting further investigations or checking.

All the results are fascinating and interesting because they contain the answers to many of the questions put and to be put by farmers, merchants and other members of the advisory service. It would take too long to give a detailed account of all of them so we propose selecting some of the most recent results from several experiments concerning the questions most frequently put to us.

Which grass ?

About 200 different grasses and clovers have been tested under many conditions. Italian ryegrass is the highest yielding grass but is short lived. The next highest yielder is Perennial ryegrass which has so many advantages that one could almost forget about other species. Of the varieties available, S.24 is a very good early variety and S.23, by far the best late variety. These with a little timothy and white clover could provide, with a little help from fertiliser nitrogen, all the hay, silage and grazing necessary for most farms. If carefully managed, the S.23/timothy/white clover mixture could become a permanent high yielding, high quality pasture.

One of our most interesting grass species is timothy, particularly in this part of Scotland. It has been renowned as a high yielding, almost everlasting hay grass, of extemely high palatability for many years. Four tons of hay/acre plus aftermath grazing or 4 cwts timothy seed plus 4 tons threshed straw plus winter grazing is normal production from a Scots timothy meadow in the Carselands of Stirling, Clackmannan or Gowrie. But, like all the grasses and clovers we use, timothy has its snags. It is easily overcome by other grasses. This follows from three basic causes.

(a) It is so palatable that stock selectively graze it. Since it is also later than other grasses, this means that they will be so well grown that they overshadow timothy plants among them.

(b) It carries its reserve store of food in a bulb like an onion at or above ground level. This is easily damaged if the field is closely and continuously grazed.

(c) Once it has been bitten or cut down it recovers rather slowly.

Nevertheless

1. It will go on growing well after other grasses have become unpalatable and indigestible.
2. It will grow on poorer, colder, wetter soils than the ryegrasses.
3. It is not affected by cold wet springs.

The following table shows something of its capability when grown alone at only 6 lb per acre and as is more customary along with 24 lb of S.24 ryegrass or S.215 meadow fescue.

Table 1. Total yield of dry matter and the contribution of each constituent of 3 timothy mixtures (100 lb/acre).

	Constituents					
Mixtures	*Timothy*	*Rye-grass*	*Meadow fescue*	*White Clover*	*Weed*	*Total*
1. 6 lb Scots Timothy ... 1 lb S.100 White Clover	80	—	—	—	+25	105
2. As above plus S.24 perennial ryegrass ...	7	+124	—	+2	+7	140
3. As No. 1 plus S.215 meadow fescue ...	46	—	+50	+1	+20	117

Given plenty of room and no competition just 6 lb Timothy seed per acre has given a very high yield. The ryegrass has all but smothered it. The meadow fescue has blended well with it giving a useful proportion of these two quite valuable grasses.

Red Clover

Just when most seedsmen have become reconciled to forgetting about red clover, we have begun to take a fresh interest in it, not as a constituent of mixtures but as a main crop for winter forage production. Many experiments on red clover have been completed and the most consistent result has been the poor performance of the variety Altaswede. This has been favoured because seed supply was regular and it was cheap. Dorset Marl, Essex Broad and Essex Late, S.123 etc. are all far better in yield, in quality, and in persistence. One variety from Denmark, Tilo, was very high yielding, giving as much crop without fertiliser nitrogen as a grass would give with £6 worth. A new variety, from Hungary, entered our tests in 1965 and produced a fine lush crop in 1966, 1967 and 1968 and looked fit for many years.

This offers a tremendous possibility — to have a crop which can give 20 tons per acre of herbage suitable for silage 4 years in a row with no bill for fertiliser.

Three further experiments were set up immediately, one at Auchincruive, one at Penkiln, Garlieston (Mr Fraser Evans) and one on Killumpha, Wigtownshire (Messrs Torrance).

At this point, it is necessary to utter a precautionary word. **Nobody,** from our department, with more experience of this clover

than anyone in Britain, is recommending this clover for anything except experimental work. It is very, very promising. Some will no doubt wish to jump in but the wise will just dip their toes.

Red clover has well known snags (every herbage plant has some snag).

It may cause bloat !

It contains oestrogens which bring animals on heat. Oestrogens are present in lots of other herbage plants and have been especially troublesome to sheep in one or two varieties of Subterranean Clover in Australia.

Table 2. Tons/acre fresh herbage from 4 varieties of red clover grown alone or with one of 3 varieties of ryegrass. (% Red clover in brackets).

	Variety of Red Clover*			
Companion grass.	*Hung.*	*Es.*	*Dors.*	*Tilo*
None	26.1 (73.5)	22.7 (87.1)	19.6 (84.1)	20.0 (80.2)
S.24	26.6 (72.6)	30.5 (76.3)	27.4 (75.0)	23.4 (74.1)
Reveille	25.5 (72.0)	28.9 (69.8)	24.6 (77.6)	26.2 (71.2)
Tetila	26.4 (78.1)	28.6 (62.9)	28.4 (73.9)	25.0 (76.3)

*Hung.	Hungaropoli Tetraploid Red Clover.
Es.	Essex Broad Red Clover.
Dors.	Dorset Marl Red Clover.
Tilo	Danish Tilo Broad Red Clover.
*S.24	S.24 Perennial ryegrass.
Reveille	Dutch Early Tetraploid perennial ryegrass.
Tetila	Dutch Tetraploid Italian ryegrass.

The yield of Hungaropoli red clover sown alone was higher than the yield of the other three varieties. Where it was sown along with ryegrass, it was lower yielding than Essex Broad red clover.

The important part of the experiment comes next year. So far it is not much better than other good varieties of red clover. Next year, it may show the ability to go on producing top yields.

The use of nitrogenous fertiliser

We all know that nothing acts faster on grass than fertiliser nitrogen. Within days it turns a darker green, and given time there is obviously a bigger crop.

Over the years, the amounts of fertiliser nitrogen on grassland used by Scottish farmers has climbed upwards very slowly and now stands at about 60 units N/acre. This average is made up of

four classes of users; very intensive small farmers using over 300 units/acre for every acre; intensive large farmers, using 300 units/acre on part of their grassland and relatively little on the rest of their grassland; farmers using 50 units or less on their grassland; a few who are antagonistic to the use of any fertiliser nitrogen at all.

One of the most stimulating exercises is to compare the animal outputs of all these different classes of farmers. Since they are interested in different forms of enterprise, the only reasonable basis for comparison is either profitability or the utilised starch equivalent (U.S.E.) of the output.

Averaging many different classes of farmers, it is found that for every unit of nitrogen applied, there is an average increase of 6 lb U.S.E.

6 lb U.S.E. is approximately equivalent to 2 lb live weight gain, 2 gallons milk or 1 cows's maintenance per day.

This can be put another way, namely that 100 units N is equivalent to 1 ton milk or 200 lb meat or 50 cow days/acre (including 3 gallons milk/day).

One unit fertiliser nitrogen costs about 8½d and the potash phosphate, lime, etc., which must be drawn from the soil as extra grass when nitrogen is applied brings this up to 1/3d. There is thus no doubt that the use of fertiliser nitrogen is on average profitable.

The snag is that averages are deceptive. In studying the records of farmers in the West of Scotland, it is found that although one farmer can push up his output by using nitrogenous fertiliser, another farmer can reach just as high an output by better management of his grass. A lot of the benefits of using fertiliser nitrogen are wasted by one of 4 practices.

1. The extra grass is wasted by understocking.

3. The swards are grazed or mown too soon after applying the fertiliser and before the extra nitrogen has stimulated extra growth.

2. Extra herbage is produced at times when it is not required.

4. Fertiliser nitrogen is applied in excess of the swards capacity to use it.

Experimental work at the college has been directed to looking at these sources of waste and a number of conclusions have been reached.

The maximum yield of grass per acre is reached by applying 3 or 4 doses of fertiliser nitrogen each of 100 units/acre and allowing a long interval for growth. This means a total of 300 to 400 units/acre per year giving a yield of 7-8 tons grass dry matter/acre in 4 growths with intervals of 6 weeks.

Increasing the amount of fertiliser nitrogen per dose, raises the nitrogen content (crude protein content) of the grass but does not increase the yield of dry matter and may depress it. Reducing the interval for growth between harvests to 4 weeks provides more harvests but cuts back the yield. Again there is a maximum of 100 units of N/dressing but naturally it is possible to apply a total of maybe 600 lb N/acre. The yield of dry matter will be slightly less than the yield obtained by using 400 lb N/acre at the longer interval but the herbage will have a much higher protein and mineral content.

This and other experiments are the basis for our recommendation that no more than 100 units N/acre should be applied in a single dressing.

This recommendation was adequate until Anhydrous Ammonia became available. It is much slower acting than Sulphate of Ammonia, or Calcium Ammonia nitrate (Nitrochalk, Nitrashell) or nitrate of Ammonia (Nitram). Up to 300 units Anhydrous Ammonia has been applied in a single dose providing a satisfactory response in the first growth and in regrowths up to July. It is cheap in terms of cost per unit of nitrogen but special equipment is necessary to apply it. The usual costs of hiring this makes Anhydrous Ammonia a dear form of nitrogen until about 100 units have been applied in a single dressing and thereafter the whole job becomes cheaper by about 3d per additional unit. Two important features are worth remembering. Anhydrous Ammonia is very slow acting and it is less effective for providing early bite.

The effect of 1 application can last over 2 or perhaps 3 regrowths but by mid July it is necessary to apply more fertiliser nitrogen if grass vigour is to be maintained.

These are just a few of the problems which are being investigated at the West of Scotland Agricultural College. A fuller account of the work in progress in the Grassland Husbandry Department is given in Current Experimental Programme No. 12, copies of which are available on request.

THE FUTURE OF HILL SHEEP IN SCOTLAND

Dr. J. M. M. CUNNINGHAM
Director, Hill Farming Research Organisation

Paper given to S.W.S.G.S. at Thornhill, Dumfriesshire,
18th December, 1968.

Chairman: Mr PATRICK GORDON-DUFF-PENNINGTON

Speculation about the future is generally unrewarding but it is necessary to make the endeavour. Past and present trends are the basis for prophecy and these are rather discouraging.

The economic position regarding hill farming has deteriorated over many years. The various reports published from the colleges all point to profit running very close to the sum total of grants and subsidies. This is not a very happy state. Hill farmers are as independently minded as their lowland brethren and would prefer to stand on their own feet.

There is no mystery about the cause. Costs have risen more rapidly than prices. Hill farming is bound by traditional, inflexible methods. There is difficulty in getting the increase in output per unit of labour which has been obtained in other farming enterprises, and labour is a very large part of the cost. This year there has been a marked improvement in price of the end product but generally we have the high cost - low output situation which cannot succeed in the long run. We must look for some method of breaking out of this straitjacket. What are the possibilities ?

Cutting Costs. An obvious remedy is to spread labour costs by increasing the number of ewes per shepherd. Because this results in less care per ewe, the gains in labour cost must be partly or largely offset by increased ewe and lamb losses.

Such a result is accepted in New Zealand and in Australia but it is not necessarily desirable in this country.

The subsidy system tends to foster such an approach because it can be profitable to maintain a non-productive ewe. The system is, however, against the tradition of good stockmanship and there is no pleasure in lowering stockmanship standards for more money.

Nevertheless, for the poorest situations, such ' ranching ' may be the only answer.

Increasing production. Intensification so that increasing costs can be spread over a higher output.

Continuing on present traditional lines is impossible. There seems no likelihood of better prices for the product. Indeed, there seems to be a downward trend in the demand for mutton. The product has to compete with alternative meats. It must be assumed that costs will continue to rise more rapidly than prices.

Much has been written about this problem and there is agreement among journalists that a radical change is needed and that new practices must be introduced into the industry. All that is lacking in such writings is a clue as to what form the change should take or what new practices are likely to succeed.

Intensification is one answer by which we may gain more output per man plus better hill conditions plus more and better lambs rather than more ewes. This gives more output/ewe and makes life easier for the shepherd because one cannot have more lambs/ewes unless standards for both ewe and shepherd are improved.

What management system can bring about this change? There is no one solution—the problem is not simple—the answers are not yet complete. We often hear the Hill Farming Research Organisation (H.F.R.O.) and also the colleges criticised for being too interested in 'academic problems of sheep husbandry' or of having 'exotic ideas' which bear no relationship to the needs of the commercial farmer. Are these criticisms justified?

Compared to other farming enterprises, the hill farmer is much less interested in development of viable intensified systems. They include some extremely able sheep men—who are stuck fast.

The farmer's approach to a problem of this sort is to try an 'ad hoc' solution and H.F.R.O. are criticised for not tackling the problem in the same way. There is to be much more husbandry research at H.F.R.O. in the future, but much has already been accomplished. The results are to be read in the recently published triennial report.

(Copies of the report (5s) can be obtained from The Librarian, H.F.R.O., 29 Lauder Road, Edinburgh, 12).

Much of the research work as reported will be incomprehensible except to people specially trained in the appropriate sciences but they have added immeasurably to our knowledge of the facts of the 4 basic components of hill sheep farming.

Herbage production.
Herbage utilisation.
Sheep nutrition.
Sheep production.

Sheep nutritional requirements are the prime limiting factor to better production. We all know this and the problem is how to satisfy feed demands and still make a profit.

Draft hill ewes perform very well under more favoured lowland conditions. The condition of the ewe at lambing is of great importance to the lamb crop and big increases can be

brought about by improving condition of the ewe before tupping. In the past, the ewe has been allowed to come to tup in poor condition and the hazard accepted. If the ewe comes to tup fit and goes into the winter in good order it will stand up to climate and other stresses.

It is clear from current work at H.F.R.O. that to starve at this time of the year is bad. If supplementary feeding is practised, it is better to concentrate this in the last few weeks of pregnancy, giving say $\frac{1}{4}$-$\frac{1}{2}$ lb/day rather than to spread it more uniformly over a longer period. This is a more certain way of achieving one objective, namely raising the birth weight of the lamb and improving its chance of survival. This system would have no effect on milk production which would depend on the feeding situation during early lactation.

The hill ewe can achieve remarkable results if it is looked after. Thus, given adequate diet it can provide milk for lamb growth of 0.7 lb/day and this over 12 weeks with a little feeding for the lamb. Thus, there is ample scope for development in the under-utilised Blackface ewe without looking at other breeds.

As regards pasture utilisation, my colleagues at H.F.R.O. have been looking at the herbage which is being eaten, at its quality and other characteristics. The conclusion is that for much of the year its quality is too low.

Traditionally, stocking rates on the hill are low and based on the number that the hill can carry through the winter. Inevitably this means that summer growth is wasted; 60-70% is left for winter consumption by which time it is valueless. Fresh green hill herbage is often just as high in feeding value as low ground herbage but the high value fresh herbage is diluted by fibrous dead waste. Much of this is still there in the spring and lowers the quality of herbage at the most important time of the year.

Here we have a full explanation of the situation. H.F.R.O. could well sit back at this point since it remains for the colleges to advise and the farmer to exercise his judgment.

Development possibilities

Controlled grazing. This is an obvious technical solution but one must approach it with care. I am convinced that any technique must be based on a low capital requirement plus a quick generation of profit so that further capital can be injected out of profit. One cannot hope to inject big capital and look for big profits.

We are to look at one system at Sourhope (H.F.R.O. farm in South East Scotland) on a 700 acre block of grazing hill. We will fence off two 50 acre blocks of the best land which has shown

itself able to carry 5 ewes/acre at the height of the summer. This will be rested through July/August/September for use by ewes in October/November just before tupping. This same land will be cleared of stock until it provides for lactating ewes in late April/May. These paddocks will become lamb production paddocks for more and better lambs. Possibly with more and more fencing, more and more ewes could be carried.

I don't need to stress that this is an experiment which may have application only on this particular part of Sourhope and may not be generally applicable.

At our other farm, Lephinmore, in the west of Scotland we have a much poorer subject to work on but already there has been improvement there. It only carried 250 ewes on 1000 acres. You could not do better than read up the report which was written in Scottish Agriculture by Ian Nicholson (formerly of H.F.R.O.), Douglas Currie (farm manager of Lephinmore) and John McCreath (economist at West of Scotland Agricultural College). (Scottish Agriculture. Vol. XLVII. Summer 1968 p. 123).

The basis of the change there was to fence off two 100 acre paddocks and to improve easily accessible patches scattered within each. The result has been a 70% increase in stocking rate and a 60% increase in the lamb crop over the last 10 years. The next stage is to enlarge the reseeded areas and move towards 100% increase in lamb crop, by providing for twinning.

Again, let me stress, this is not advice but research.

There are still problems, such as the dense congregation of ewes and the danger of overgrazing. There is a marked effect on the balance of herbage species. The first plant to go is Nardus. Its place can well be filled by surface-seeded white clover. This has been done extremely simply on Castlelaw (hill farm of the East of Scotland Agricultural College) where overseeding followed the removal of Nardus by a forage harvester. Such measures will take us out of the cycle of bad grass in the critical periods of sheep husbandry — November and the spring.

In-Wintering. The easiest method of relieving winter stress on the ewe is to put her indoors. This is a sure way of getting more lambs. The system leads to more ewes, and more lambs per man, and a more pleasant life for the man. An important extra is the availability of clean fresh grass in the spring.

The system hinges on costs of feed and housing. Feed could cost 30/- to 35/- and housing £3 or so per head, with rather more if the ewes are kept on slats.

To recoup expenses, there must be more ewes and more lambs. In an experiment at Edinburgh, we started with a flock having

120% lambing and it then becomes difficult to secure the necessary increase except through considerably more twins. Therefore we had to recoup by raising stock numbers. Latterly, these reached 350 ewes on 350 acres and next year will reach 400 ewes, on a hill also carrying 40 cows through the late summer. There were comments that the lambs were smaller but there were far more of them and by weaning time they weighed 3 lb more than previous crops on that hill. Return on capital was about 5 per cent.

Let me stress again, that this is not every farms' solution. Each farm and each farmer must think out his own variation but basically he must achieve more ewes, more lambs at lower cost.

The position is well summarised by J. Harkins (Scottish Agriculture Vol. XLVII. Autumn 1968 p. 196). He offers a method of calculating your own position.

To summarise, I would repeat that whatever technique is adopted it should be applied so that there is quick generation of profit per unit of injected capital. The future demand is difficult to foresee. If it is true that we face a need for more and more cereals and milk from less and less acres of lowland, then there would seem to be a place for upland development of beef and sheep. Hill lamb is a fully acceptable product. All that is necessary is to ensure that it is competitive economically.

DISCUSSION

Q1: Can you foresee a time when production from the hill is 3 times the present level?
What do you think of the suggestion that lamb production and lamb rearing should be clearly separated with lambs taken off the ewe at 48 hours for low ground or intensive finishing, and the ewes relieved of the need to produce milk for lamb growth ?

A: Frankly, the system is not yet realistic. Artificial rearing is a possibility as has been demonstrated at the Grassland Research Institute. It will be possible to apply factory methods to lamb fattening as has been done for poultry. If this does come about, then it could well be a valuable additional outlet for the hill man, but there are many technical problems which need solving.

Q2: It seems that lambs are kept too long on the ewe because they need to be kept until a sale date. Would it not be better to take them off at 12 weeks and allow the ewe plenty of time to prepare for tupping.

A: This is not a new suggestion. My own farm experience was of early August spaining and of even sending the ewe hoggs away to wintering. Although the ewe obviously benefits, the

realities of the situation are that the sale dates are arranged for the lowlanders convenience and to suit the demand.

It might be possible to feed these lambs on in feed lots but the market price for the product does not justify the extra cost.

Q3: Although your brief excluded direct reference to cattle, haven't they a place as far as sheep production is concerned ?

You talk of using forage harvesters to clear roughage and help the establishment of surface sown clovers. Can't cattle do this ?

A: At H.F.R.O. there has been plenty of evidence that herbage and production can be raised by using cattle for this purpose. But it is necessary to do so at high concentration of say 1 cow/5 ewes if there is to be a noticeable impression on roughage. At this level, there will be competition between cattle and sheep. The cattle must be controlled in the interests of sheep requirements. The long term advantages are questionable.

Q4: A sheep's worst enemy is another sheep and intensification will result in this conflict. If cattle are brought in instead of more sheep, they are easier to handle; there are less ingrained prejudices to meet. It is obvious that control is essential. What is the long term alternative. If H.F.R.O. increase sheep stock capacity there is no alternative to more sheep. The lowland dairy or cattle man can always grow barley as his stocking rate rises, but the hill man can't grow barley.

A: More beef is required but so far there is a lot of untapped potential livestock production on the hill.

The lowland normal is about 2 sheep per acre and the hill about one sixth of this at 1 ewe per 3 acres. Thus there is a sixfold gap between hill and lowland production. The lowland potential is much higher at 4/5 ewes per acre.

Q5: What about developing the system of carrying cattle on the hill in summer and moving them away to the low ground in winter ?

A: I still think that you need to decide exactly what you want from the cattle. If they are to remove the rough stuff, then they can be brought on the hill for the winter and fed concentrates with a little roughage when the ground is covered by snow.

If summer utilisation is improved, then there should be less of this winter roughage.

Q6: You haven't touched on the importance of sheep breed ?

A: The initial requirements for successful sheep husbandry are satisfactory feeding at tupping and lambing.

The Scottish Blackface has the unique capacity of putting on fat in the summer up to probably 20-30% of its weight, to carry it through the winter. Other breeds do not have this advantage. Many investigations at H.F.R.O. have shown that the Blackface ewe usually carries 2 eggs and where grazing is satisfactory both are fertilised. What advantage is there in bringing in ewes with 300% lambing potential if the normal feeding management doesn't allow the Blackface to develop its 200% potential. The former is tied to a high cost system whilst the latter can be further expanded within a low cost system.

Q7: How would triplets do on a cold brae face ?

A: They would all die, but no one is suggesting that triplets would be born in such a site.

Q8: Your predecessor at H.F.R.O. seemed to stress the need for better feeding at lactation whereas you seem to favour late pregnancy. Is there any conflict here ?

A: No, these are just two approaches which suit different circumstances. If you have a big lamb crop and poor pasture resources, then you need to feed the ewe. This is more expensive than making better use of pasture to give more milk.

Q9: Why not delay lambing until 1st May and so have much better grass and save concentrates ?

A: This would be fine for the lactating ewe but when the lamb is ready for grass it will be faced with a much deteriorated feed. The choice will be whether concentrates are put through the ewe or through the lamb. I think that the latter is financially not on.

Comment: Ian Dickson of the college endorsed this and referred to experimental work at the college in which it is shown that 2 cwt concentrates are needed to fatten the lamb. The methods were not economic.

Q10: What experience have you of housing ewes ? Have you had any difficulties ?

A: No trouble has been experienced. We find that about 3% will not take to artificial feed of hay, etc. These are taken out and put in separate pens where they develop normally. Just as there are leaders among groups of animals, which get first pick at feed so we have these backward ones. The quality of the hay offered is extremely important. We have been fortunate and can offer barn dried hay.

Q11: Continuing this topic, we find that many ewes are unable to take in the desired quantity of feed from hay. Where 1 lb

hay + ½ lb beet pulp is offered, there is no difficulty about getting satisfactory intake.

A: In 10 years, I have not experienced any difficulties in persuading sheep to take 3-4 lb/day very rapidly and then to find them prepared to play around with barley straw and take in 10-12 ozs/head.

Q12: With increasing interest in dried grass production, there will undoubtedly be some 2nd grade dried grass produced. Would this not be a useful alternative to barn dried hay or concentrates ?

A: Yes, but it depends on the cost. Maybe it would be useful for systems where lambs were finished in feed lots, but there are still some technical problems to solve. There have been cases of satisfactory early weight gains with unaccountable tailing off at critical ages.

Q13: Why not consider wintering ewes on a sacrifice paddock rather than indoors and feed them artificially. One could visualize holding 20 ewes/acre in a sheltered paddock.

A: Certainly it is a prospect. I have experience of using heavy stocking rates of ewes at up to 100/acre. The surface is undamaged even though all herbage is apparently picked off. The surface is ideally prepared for scattering seeds of clover and grass. This system could be tied in to the month prior to lambing.

Time ran out and the chairman Mr Patrick Gordon-Duff-Pennington thanked the speaker for his presentation of the prospect for sheep farmers and the steps being taken by H.F.R.O. to dig out the facts on which development must be based.

I.V.H.

CONSERVATION

RALPH BEE

Director of Experimental Husbandry Farm, Drayton, Warwickshire

Talk given to C.S.G.S. at Airdrie, 13th January, 1969

Chairman: ROBERT HOWIE

The basic problem of conservation is to produce a high quality winter production feed which will replace or partly replace more expensive concentrates. The puzzling feature to both farmers and scientists is that there is no difficulty about securing high production of up to 5 gallons milk from grass by grazing without concentrates; the same grass turned into a conserved product does not do nearly as well. There are good and bad conservation products and some of the bad hay being made is worse than useless. The amounts of concentrates required to go with it are terrific.

Quality is becoming easier to define. The most important part is the digestibility. The objective is to conserve 4-6 week old grass with a digestibility of 80-85%. This then has the same digestibility as barley or concentrates. The digestibility of the herbage falls quickly as it grows, e.g. 70% digestibility in June falls to 50/55% by mid July. A high yield of this herbage is a matter of cutting early and making up for loss of bulk by getting regrowths leading to about 4 cuts per year with high yield plus top quality.

The same herbage is used for all forms of conservation-dried grass, silage, barn-dried hay and field hay, but differs in its age and quality.

Table 1. Herbage and Cattle Feeding at Drayton E.H.F.

	Date cut:		
	23 May	*16 June*	*29 June*
% Digestibility	72	60	58
Live weight gain lb/day/head	3.10	1.77	1.25

10 cwt cattle were fed for 3 months with these three hays and given 2½ lb/day cereal as a supplement.

A similar proof of the value of quality comes from Great House Experimental Husbandry Farm where barn-dried hay and silage were compared with the same grass cut at two dates and the products fed to milk cattle.

Table 2. Effect of quality of fodder on milk production at Great House E.H.F.

	Date cut:			
	4 *June*		11 *July*	
Digestibility when cut	76%		68%	
Type of fodder	*Barn-dried Hay*	*Silage*	*Barn-dried Hay*	*Silage*
Feed value	M + 3	M + 2½	M + ½	M —

The important thing is time of cutting rather than methods of conserving. At each stage barn-dried hay was better than silage by about $\frac{1}{2}$ gallon milk.

The present trends are towards more stock — more fertiliser usage — more conservation — with possibly cattle indoors all day, but for most people for many years it will be necessary to graze and cut for conservation. One of the crucial problems of management is to secure a reasonable balance between land for cutting only, land for grazing only and land for cutting early plus grazing later in the year when supplies of grazing grass are lower.

In one experiment, using 300 units N/acre/year on grass and grazing beef cattle, the original plan was to cut $\frac{1}{3}$rd area to give fresh grazing in late season. This proved too little and it was necessary to cut more than 50% of the area to maintain good grazing in late summer. Such conservation can be called conservation for grazing management. With big herds of cows or cattle to consider, the balancing of grazing and cutting areas is important.

Which method of conservation

Much is heard of conservation losses as if there were no losses in grazing. Wasted grass is common and 40-60% losses can be demonstrated under grazing.

Hay generally shows a loss of 40% of its dry matter. In a good season, this could be 25%, whilst in a bad season such as the last one, we had nearer to 100% loss.

Silage in general shows losses of 25% of the dry matter with 3/4% visible loss, 1% lost with the effluent and 20% fermentation losses.

Barn-dried Hay. The losses are around 13% of which 10% represent losses in the field during handling and 3% losses in the barn. This is the main system of conservation at Drayton, with a production of 120 tons/year.

Haylage. The usual figure quoted is 3.5% but this is only the losses within the tower. There is a further 10% lost in field operations.

Dried Grass. This is the most efficient with just 3-4% loss.

Most conservation is as hay: probably 5 times more hay is produced than silage, in spite of all the publicity. A lot of bad hay with much loss of feeding value is produced. The remedies are early conditioning, tedding, etc. New machines to produce wonderful hay are put on the market regularly. I used to look

at them in Smithfield and optimistically test them at Drayton E.H.F. the following year and was disappointed every year. Now we have stopped being enthusiastic about these machines.

Barn-dried hay is reasonably satisfactory at Drayton but there are bottlenecks which need to be ironed out. The two main methods of handling still present difficulties. Chopping and blowing the hay into the store is liable to stack unevenly and to leave wettish patches. At the National Institute of Agricultural Engineering they seem to be thinking in terms of big (Jumbo) bales.

Additives

The most recent innovation is using Formic acid to cut down fermentation losses. This is a considerable improvement on the old powder additive which could not be uniformly spread through the herbage being ensiled.

Our experiments on this material were hindered last winter by Foot and Mouth. This year we have made silage with the recommended $\frac{1}{2}$ gal/ton and also with $1\frac{1}{2}$ gal/ton.

The material looks alright but all I can say at the moment is that rather a lot of effluent is produced.

Hay Additive. This additive is put into hay at the bales. Various kinds of additives based on formic acid and proprionic acid are available. The proprionic acid is very interesting. It is the preservative used for chilled grain conservation. Grain treated with it remains free from mould almost indefinitely.

This development would seem to have great possibilities. Hay could be cut earlier, treated with a hay additive and besides cutting down losses due to fermentation would produce a feed really able to replace cake.

Grass Drying. Technically appealing but its value is being overplayed a little, in terms of a break crop for the big arable farmers of the Eastern counties. They are dead keen to know how much a dairy farmer in the west would pay for their product. The answer is simple— not very much. Practical farmers are frightened off grass drying by past experiences. Feasibility studies are generally unfavourable.

Conclusions

For us at Drayton, barn-dried grass is the most satisfactory system. We can get 3 lb liveweight gain from it. It may not be the ideal for the West of Scotland because to make a success of it, 2 days field drying are necessary whilst 1 day will do for silage. The chances of getting 2 successive dry days are far less than getting weather suitable for making silage.

I would like to find a method of making dried grass more cheaply so that the dairy farmer can produce his own, rather than buy it from an arable farmer. My thoughts run on the lines of drying the grass down to 16% (which is the cheap part of the drying process) and then using a hay additive or dessicant to complete the job. This works well for chilled grain and I think it can be made to work as chilled dried grass.

DISCUSSION

Q: Adding formic acid gives me good looking silage but cows scour badly when allowed free access to it. Less than 45 lb must be fed?

A: We had a similar experience where we used triple strength. The only way to use up the silage was to reduce intake.

Q: Is the trouble due to using very young grass or to the acid? The cost of the acid is high but if it saves cake it may be on. On my calculations, £150 worth of formic acid would need to save more than 5 tons of cake before it became worth while.

A: Scour was not due to the quality of the herbage. Other methods of conservation were not affected. The herbage was not particularly rich (S.24 perennial ryegrass cut 24 May). Formic acid additives are better than the older types but they take the rust off the forage harvester.

Q: Do you find the milk yields drop along with scouring?

A: No.

Q: How long did you manage to get 3 lb/day/head live weight gain from your beef cattle?

A: We average 2 lb/day through the season with 6 weeks at 3 lb/day.

The discussion continued with many questions on grass drying and particularly the possibilities of co-operative drying. Mr Bee was very cautious in his replies especially when some members began to describe how many feet of rain they experienced.

His idea of combining drying with the use of a desiccant or proprionic acid is worth looking at even though at first sight, the cost of the acid might appear high. The storing of the partly dried grass is, however, not to be entered into lightly. Too many driers have gone up in smoke, to ignore the fire risks.

Robert Yuille proposed a vote of thanks.

I.V.H.

LOW COST CATTLE HOUSING

Discussion meeting of S.W.S.G.S. at Ernespie Hotel, Castle Douglas. 21st January, 1969

Speakers:

ROBERT J. FORSYTH, *Chief Advisor, Farm Buildings, West of Scotland Agricultural College*

W. F. MAITLAND, *Manager, Crichton Royal Farm, Dumfries*

J. M. L. MILLIGAN, *Farmer, Culvennan, Castle Douglas*

Chairman: ADAM GRAY

110 very vocal members and prospective members were evidence of the interest in this subject which although far removed from grass is one of the key factors in increasing stock numbers per farm to the levels appropriate to the productive capacity of modern grassland management.

Each speaker put forward his views for 20 minutes and then took part in a general session of question, answer, comment and flat disagreement.

Robert Forsyth—Basic features of Low Cost Housing

The subject was topical, the agricultural press were full of advertisements — new ideas were being put forward in a steady stream — but to a large extent these were untried.

The need for sound, maintenance-free Low Cost cattle housing was apparent but there was also a need for change in housing brought about by the drift of labour from the land and the increasing cost of that labour. Between 1945 and 1968, farm workers in Scotland had dropped from 117,000 to 51,000. In the same period numbers of cows per herd and per farm had risen, and new methods of feeding had been introduced.

The difficulties of adapting existing buildings had focussed attention on the need to include as part of a building programme, adaptation to changing requirements, and buildings which were cheap enough to be scrapped and replaced, to meet the requirements of new farming techniques. A demountable prefabricated house for 116 cows can be bought for £18 per cow plus the costs of drainage and electricity and less the grants. Any number of bays could be purchased, the first one including two gables and two trusses costing £600 and each additional bay — one truss, no gables — £175.

With the co-operation of building authorities, new cheaper materials could be considered and larger cheaper sheets could be used. Two experimental cow kennels set up at the college farm

were described. The name cow kennel was not favoured since the original cow kennel was just an open ended roofed shelter quite unsuitable for West of Scotland conditions.

The two low cost buildings at Auchincruive were of (a) asbestos and (b) $\frac{1}{2}$" exterior plywood clad. Both had slatted floors in the central gangway.

(a) **The asbestos building** — Every 3rd cubicle carried the roof and the bed area of each cubicle measured 6 '6" x 3 '6". This cost £30/cow without slatted floor, including electricity and excluding grant, plus £20 per cow for the slatted floor.

(b) **Plywood** — Every cubicle partition carried the roof and the lying area measured 6' 8" x 3 '7$\frac{1}{2}$". The cost was £36/cow plus £20 per cow for slatted floor.

These set-ups would have a comparatively short-life but would meet the need for buildings which could be cheaply replaced.

Roofing — A big scope for cost cutting lay in the wide choice of materials for roofing.

The new 21 foot sheets could save 5% of roofing costs, high tensile steel sheet instead of standard corrugated sheeting could save 25%.

The new 'trapezoidal' corrugated sheet was more rigid than the older type and one could use this with fewer purlins.

Asbestos sheeting was common but there was now some interest in oil tempered hardboard as used for piggeries in Scandinavia.

Polythene sheeting was being used experimentally for various kinds of animal shelters and was cheap enough to allow just 1 or 2 years life. The difficulty was to anchor it down firmly to the ground.

The contrast in costs will be realised since high tensile sheeting, needing little or no maintenance cost only £7 10/- per 100 sq ft, whereas $\frac{1}{2}$" plywood cost about £15 per 100 sq ft. Polythene sheet at 1000 gauge would be so cheap that shelter for **sheep** at 8 sq ft per sheep could be erected at 16/- per sheep (2/- per sq ft) or for **pigs** at 5/4d per sq ft.

A shed for beef cattle for 45 beasts could cost only £3 10/- per beast.

A **calf house** for 70 cost only 11/6d per calf. For all the emphasis placed on low cost, this was not the most important criterion. The real issue should be suitability. Even, the elaborate high cost palace wasn't guaranteed to achieve good results.

W. F. Maitland—The Prepack Mootel

Having decided that because of the high cost of labour, it was essential to get rid of the byre, the big question was with what to replace it. It was useless these days to build for the future; change was too rapid. We have seen the bucket give way to rotalacter within 15 years.

The essentials were **labour saving** not only in regards to erection and normal running but also in repair. What was the point of hiring men at 16/- per hour to do repair work if one had men on the spot at 6/- per hour.

The choice was a Do-It-Yourself pack.

Although no grant was available, the fact that the whole set-up came to less than £10,000 was the deciding factor especially since it met other criteria. The basic material was wood and the cubicle space 7′ x 3′ 9″ with provision for a header bar to shorten the available length to suit breed, etc. The total building was 101′ x 74′ with cubicles for 108 cows and cost £3,300 plus £600 for joiner and £200 for concreting and the rest for electricity, drainage, water supply.

The worst possible problem is how to handle the slurry. There is a 9′ passage-way. The heifers are alright and it is hoped that with time they will all learn. The trouble is the old 3 lactation cow who is set in her ways.

I disagree violently with the statement of one member of college staff who claims " it does not matter how cold a cow is so long as she is dry." I believe a cow should be kept at an even draught-free temperature above 45°. This gives you a high fat milk and a mastitis free cow. At 35-37°, I have lost 10 gallons milk in 90 cows and with a quality payment of $1\frac{3}{4}$d we could lose £600 in total. We need extra milk, extra cows and extra quality to pay for labour costs at 6d per gallon.

J. M. L. Milligan—' Like Topsy — it just growed '

In 9 years, I have gradually moved into my present set-up from:—

(a) A byre and turnips and hay.

(b) Grass and silage pits made of steel sheets and sleepers.

(c) Added lean-to sheds to silage pits.

(d) Put cubicles in lean-to's using sleepers standing upright with a 9″ gap for ventilation between the top of the sleeper and the roof.

(e) Two silage pits joined end to end with 60 ft loafing area between. The loafing area was open on two sides to bring as much fresh air as possible to keep down the temperature. Every day, my cows go out to strip graze kale or grass. They grow a good hairy coat and appear to like standing out in the draught-free air of the loafing area.

My old byre was gutted using 25′ to provide a herringbone parlour with the remaining 75′ as a collecting area. All the cows pass into the milking parlour in a natural flow and out through a footbath.

The cows calve in an older byre separated from the milking herd.

My buildings have been cheap to erect and I can pay them off in 4/5 years and then feel prepared to change them as required.

One of my present thoughts concerns silage. The area allowed per cow has proved too small. It is the cheapest winter feed and I am hoping to expand this section.

DISCUSSION

Answered by (F) Robert Forsyth, (M) A. Maitland and (C) M. Milligan

Q1: I believe a constant temperature is more important than high or low temperature. What work is in progress on this subject in Scotland or elsewhere ?

A: (F)—The difficulty lies in holding uniform temperature in various parts of the byre. For example, I would like to know whether Mr Milligan's cows show any preferences for stalls near or far from the side of the lean-to shed which has a 9″ ventilation gap. The Auchincruive experimental houses have no gap in the eaves but open doors and an open ridge.

A: (C)—All agree that fluctuations in temperature are to be avoided. If I am to worry about warmth, I prefer to think of heating the drinking water with a small thermostat.

A: (M)—Cows are resistant to stagnant warmish air but calves, small stock and beef cattle generally seem to be much less able to stand draughts.

A: (F)—The doorway and the cubicles nearest the doorway provide a problem. The end cubicles are often not used.

A: (M)—I would like to see a good flow of clean drinking water and prefer a few drinking bowls constantly refilled rather than a trough. It is important to set the shed correctly with gable end towards the prevailing N.E. wind and put indoors

to keep out the wind. I find that with air at 37° there is a drop in milk yield which may occur that day or the next day. At 39° the milk yield went up 17 gallons; at 50° it went up 30 gallons.

Q2: What should be the important points in cubicle layout - width, passage measurements, number of cubicles per row, etc.

A: (F)—Width of passage should be 6′ for slatted floors or 7′ - 8′ for solid floors. Large cubicles lead to dirty cows. The planning of long ranges of cubicles should be discouraged — the possible limit being 25 cubicles to either side of a side access doorway. It is important to provide for two ways of movement in case a single animal decides to stand across the passage forcing others to lie in the passage. Of the materials, steel should not be too light or it will rust through at the junction at floor level. Concrete partitions are thick and 3′ 9″ width should be allowed per cubicle. Timber can be cheap but it should be treated or tanalised. Treated timber is now accepted by some sanitary authorities.

A: (M)—I prefer a bigger cubicle of 3′ 9″ × 7′ 0″ which allows one the flexibility of shortening it. If it is made too short, then there is no allowance for change.

Q3: What about the drinking water supply. Should we have tanks or bowls ?

A: (M)—Tanks are bad for the legs. I like bowls and a constantly changing supply of fresh water.

A: (C)—I have troughs 6′ × 2′ for 120 cows in the loafing area.

A: (F)—There should be 1 bowl per 22 cows. The end 4 cubicles of a central set could be removed and water bowls put there.

Q4: £200 seems a low price for concreting Mr Maitland's scheme. Did he use his own labour ?

A: (M)—It was partly in the contract. We levelled the site and prepared it.

Q5: What are the ideas on slurry disposal ? I push it all into a a pit and then pull it out with a pump

A: (C)—I scrape it out to a central pit and then take it to the field by tanker. I can't see the advantage of an above ground tank with the need to pump it up and then take it down. I think spray irrigation of slurry the most ghastly thing ever.

Q6: Isn't it wasteful to apply slurry to grassland in winter ?

A: (C)—It is certainly costly to store it.

Q7: Should a farmer building a new unit now put in slatted or solid floors ?

A: (F)—This is difficult to answer. The money put into slatted floors could perhaps, with advantage be put into extra cows. Slatted floors certainly save labour and leave cows in very clean condition. Solid floors are alright if arrangements for disposal of slurry are satisfactory.

Q8: What width of passage is required for beef cows ?

A: (C)—We have 2 houses, one with wide and the other with narrow passages. The wide passage is a continual source of trouble especially to cows or heifers coming into the house for the first time. They stand around and are likely to lie in the passage. There are always bosses in a bunch of cattle and they will keep a narrow passage way clear. The timid, uncertain cow, will quickly dodge into a cubicle just to get out of the boss cow's way.

A: (M)—Slats can be made oneself quite cheaply. The slurry problem is difficult. I don't believe it is good to pump it up and down. I will push it out to a channel outside the mootels. I rather like the timber fittings which I can replace with my own labour. Again, timber yields to knocks and bumps but some materials shatter easily. In studying Mootel costs, I found big differences from my £3-4000 up to £10500, for the same facilities.

A: (F)—It is said that cubicles tie you down to milking cows but the cubicles can be used for many things, e.g. potato storage.

Q9: What can be said about feeding in cubicles. Can we get away from the need for a feeding passage by the use of a conveyor belt ?

A: (C)—There are a few conveyor belts installations. I believe they encourage vice in cattle. When a beast has eaten its own ration it takes its neighbour's feed. You can have 2 cows fighting for a cubicle. Much has been written about mechanised feeding in the cubicles but users seem to be dissatisfied. The cow's mouth is the best feeding machine and I can't see any advantage over self feeding.

Q10: Are lean-to sheds and cubicles eligible for grant ?

A: (C)—Yes, even the sleepers are eligible.

Q11: Doesn't feeding in the milking parlour take a lot of time especially for the high yielders ?

A: (C)—I can't see how it should. The amount should be limited to 10 lb. If more, then the milking does become slower.

A: (M)—I found it worth using a 3 lb cake instead of a 4 lb/gallon cake just to speed up the milking. On a 4 lb/gallon cake a 7 galloner would face 24 lb of cake and an impossible task within the time available.

Hugh Chalmers, Vice Chairman, proposed the vote of thanks to the speakers. It was obvious that the subject had been well received.

I.V.H.

Comment on Temperature and Cows from Specialist Advisor, Animal Husbandry

The question of environment particularly in relation to the cow cubicle, is an interesting one. The review by Dr J. D. Findlay of the Hannah Dairy Research Institute indicates that temperature even as low as 32°F will have little effect on milk yield. Our experience at Auchincruive supports this conclusion, although it is our strong belief that cows in cubicles must have a dry bed and be free from draughts. It is also our opinion that the herd must not be exposed to "cross draughts" or "wind tunnels" in the yard or at the collecting area.

J. W-L.

HILL-LAND IMPROVEMENT

NEIL MCCALL-SMITH
Connachan, Perthshire

Paper presented to C.S.G.S. in Glasgow, 24/2/69

Mr McCall Smith reviewed the problems of hill-land improvement, outlined in his own programme, presented several slides illustrating his methods and achievements and dealt with a wide range of questions from the members present.

A. Problems

The basic problem was that up to now hill farming has been hill exploitation with 'fertility' drained out of the hill as stock and wool and precious little return being made. This has resulted in a progressive fall in carrying capacity.

Some help came from the government, through the Hill Farming Acts, the Security of Tenants Acts and by the injection of grants. Now, we must look to a reorganisation of the grant system so that the emphasis is on production and to scientists to guide the effort in the right direction. A very high proportion of government aid and scientific work in the past has been geared to the dairy farmer. Now it is the turn of the hill farmer.

So far we have only scratched at the surface of the hill with a tendency to waste available assistance by misapplication. The inbye fields have been improved to produce more and more summer growth which is wasted when the core of the problem, undergrazed hill land and winter keep has been neglected.

B. Connachan

The farm extends to 2000 acres at up to 2300 ft lying in the Sma' Glen near Crieff. Without a constructive improvement plan it would be in poor shape at this period of the year (just heaps of baler twine and empty bottles). The vegetation of the hill proper is of natural grasses such as Nardus and Molinia, some good and some bad heather with here and there promising patches of natural white clover. It has always carried a Blackface ewe flock and Blue Grey suckler cows. My father took the tenancy in 1904 and until the present improvement programme was embarked on, it provided a moderate living. The improvement programme started in 1956 with the ploughing and reseeding of 200 acres of land from old heather at an altitude of 1400 feet. This and some improvements in cottages was inspired by the recently enacted Security of Tenants Act. The capital for this development came 50% from the landlord, 20% from the government and 30% from myself. Some preliminary results with herbicide followed by reseeding had not been very promising so the whole piece was ploughed and sown to a timothy/meadow fescue mixture, including pelleted New Zealand white clover.

Generally I doubt the suitability of low ground grasses and would favour red fescue, smooth stalked meadow grass as better able to survive at low levels of infrequently applied fertilisers.

Probably more important than changing the vegetation has been the programme of stock improvement so that the extra herbage can be more effectively converted into saleable livestock products. The main objective of my livestock improvement has been directed to increasing the prolificacy of the ewe and the growth rate of the lamb. These two measures offer the best means of raised profitability.

The only sound basis for this is recording of both ewes and rams and then culling the passengers. Each ewe and its flock were recorded. The results were an eye opener. Many high flown names failed to meet the standard set for lambing and wool productivity. We now have 600 of these top ewes which I call my experimental flock and 700 of the commercial flock.

Some pedigree rams have been bought even at a very high price if they are likely to be useful in furthering my objective. Even a quarter share in one animal has proved worthwhile. Some of the cost is recovered in the sale of progeny but a high proportion spreads through the increasing experimental flock.

In looking for more lambs I have deliberately sought twins. Traditional practise by selecting only the big lamb, could be selecting singles and maybe the low fertility ewe producing just 2 lambs per 4 seasons. I have sought the twins and provided special treatment so that they can make up for their early nutritional set-back.

Last year my experimental flock averaged 150% lambing compared to 110% for the rest of the flock. The variation in ability to grow is wide especially as they approach finishing. There is a family difference in profitability. When tup lambs are compared, 15 to 20 are put to 35 ewes each — the lambs are marked and weighed at 100 days. We look for 100 lbs live lamb at 100 days old per ewe.

The Blackface is not suited to creep or forward grazing but I am quite satisfied with my own system in which the lambs are shed off the ewes each morning. They are put to fresh grass and given supplementary feed if required and then returned at night to the ewes. They soon get used to the drill and present no difficulties.

To prepare my ewes for twin lambing, I flush the ewes, providing hay in nets for eight weeks before lambing and gear my manuring to providing autumn grass not to providing early bite. My " spring " fertiliser is applied in August.

Many slides were shown of the grass, technique of improvement and the stock.

DISCUSSION

Q1: Is bracken a problem?

A: No.

Q2: Have you been interested in herbs as in the Old Clifton Park type of seed mixture.

A: Yarrow, chicory etc. are always included in seed mixtures.

Q3: Are your stock troubled with staggers?

A: Yes. I put this down to the use of more and more refined fertilisers. An interesting observation is that among my twinning ewes, any sudden movement such as putting in dogs will trigger off an attack of staggers. Now I meet the threat by using magnesium limestone, feeding with Mg nuts and forbidding the excessive use of dogs. I am checking the trouble but the threat remains.

Q4: Have you any views on cheap plastic housing?

A: This is a worthwhile development but can only be profitable at high lambing percentages of over 100%. Housing is inevitable because of the shortage of shepherds and the need to increase the man/ewe ratio.

Q5: Can you give us a time scale of your improvements?

A: Over the 1904-1940 period, there were just 5 seasons when 100% lambing was achieved. 150% was achieved over the last 12 years. We have not yet reached the maximum. We still have good and less good ewes to select from. I have great faith in the ability of the Blackfast ewe, given the necessary encouragement, and look for at least 6 lambs per 4 season. A very good indication of prolificacy is lambing gimmers. If the gimmer doesn't lamb she is disposed of. I have noticed that if a tup gets away among the ewe hoggs by accident it is the prolific ewe hoggs that have lambs. These are the nucleus of a selected flock. The base of such a flock can be quite small maybe just 2. I have 2 such ewe families which give tremendous results.

Q6: How do you feed the selected twins?

A: My lambing is staggered between March 24th and April 24th. On this very day, 24th February, the various lots will be getting various supplementary feeds. The first lambs will now be getting 6 ozs sugar beet nuts. Those to lamb 24th March to 5th April will now get 3 ozs proprietary Mg nuts plus 1½ lb hay. The 16th April lot will now get hay. Some farmers concentrate such feeding over a 6 week period but I prefer to spread supplementary feed over a longer period. Recently, I have tried small rations of maize every 2nd or every 3rd day.

Q7: Do you believe in using pioneer crops before reseeding to long term swards?

A: Yes, and on peatland I would also like to be able to bring in poultry manure or some similar substance to activate the soil bacteriologically.

Q8: Have you found herbicides of value?

A: No advantage where the land can be ploughed because they are so much more expensive and reversion takes place sooner.

Q9: It is obvious that you can't get twinning unless you have high conception. Do you take any measures?

A: I use treacle to help make roughage on high unimproved ground more palatable. A week before tupping I bring the ewes down to a reseeded pasture which has had its top dressing of NP. Dogs are kept away. I believe that many a potential lamb is lost by over excitement.

Q10: What is your opinion of the East Brackland Venture (Farmers' Weekly)?

A: Nothing but admiration. I follow it closely. Somebody must try to find out what can be achieved. Their target is high enough to provide many answers to the problem of reaching high outputs from hill farms.

Q11: If you were Minister of Agric. how would you encourage hill farming?

A: The dairy cow has had a fair share — the future for cereals is abundant supply — but meat is scarce and here the hill deserves a turn. The old M.A.P. scheme had a lot of advantages over the present hill cow and hill sheep subsidy which are nothing more nor less than a social service to feed the farmer. I would set up low interest loans at 3-4%. If this is possible in Canada surely it is possible here.

I.V.H.

EXPANDING THE DAIRY HERD

P. JONES

Director, Bridget's Experimental Husbandry Farm (N.A.A.S.)
Martyr Worthy, Winchester, Hants

Glenluce 26th February, 1969 — S.W.S.G.S.

Chairman: ADAM GRAY

Mr Pat Jones was at one time Specialist Adviser in Crop Husbandry at the West of Scotland Agricultural College and has since made a name for himself at Bridget's for his work on forage conservation and grazing management. Latterly he has been given the special task of looking at the problems of the big dairy unit.

Mr Jones:

Bridget's has always been a dairy farm and for many years has had a 100 cow Ayrshire herd in addition to its fairly substantial arable cropping programme. For the last two years, we have been concerned with the problem of changing to Friesians and raising the number to 300. At present we have 235 and with the present crop of heifer calves can see the target being reached quite soon.

As dairy farmers we are faced with the problem of increasing production costs plus static or falling prices which demands greater efficiency in the cost components.

No one can doubt the increase in production costs. Labour accounts for 20% of the cost of production and as we are rapidly losing labour from the land both by the attraction of other work and as part of deliberate policy, we must inevitably pay more to hold men and provide attractive working conditions.

Miscellaneous charges which account for another 20% include the supplies of many products of industry which must recover the costs of S.E.T. and their own rising costs by passing them as well as A.I. and veterinary fees on to the farmer. Food, the main component, offers the best chance of bridging the cost/price movements. One possible method of meeting the 'up costs/down price' situation is by expansion to obtain the advantages of size.

The alternatives are (a) to accept lower living standards or (b) to get out of milk as 4% of dairy farmers are doing or (c) to increase the size of the unit and spread the overheads over a bigger herd. Ideas on expansion deserve very careful consideration. It is not enough to just double up the herd. It is necessary to achieve a bigger output per man, per £1 capital, per acre, and per cow, and this calls for a change in our thinking and ideas of management.

Although there are likely to be many 300 cow units in the future, the bulk of the national milk supply will still come from the 70/80 cow herd. The problems of expansion become crucial when we try to break through this barrier. We have been going for 2 years and have not solved all the problems but we have faced up to many. The main problems appear to be that a large number of cows:—

1. Require a large amount of food for the winter.
2. Produce a lot of slurry, and
3. Should produce a lot of milk and calves.

To cope efficiently with all that arise, it is important that one person should be engaged full time in management. He must do the thinking, noting ,checking and will be wasting his time if he helps in the mucking out.

The basis of management must be readily available facts collected by systematic records. Ideally, one should have a card index per cow system as for pedigree breeding but include on the card a lot more than just the names of the sires and dams and progeny. The card should include performance and health records and especially provide a check on the calving index. 1000 gallons per cow is useless if the calving index is low. Milk sales per cow per year are the only sure guide. These records are the responsibility of the manager not the cowman. The cowman should be fully occupied with husbandry matters and with a 300 cow herd can no longer be expected to recognise every cow and to remember that Susie 12th has 10 lb cake every time she enters the parlour.

The performance of each cow in terms of yield at the end of each lactation is fine for the breeder but to apply an efficient feeding and management programme, the progress of the lactation must be known at least on a week to week basis and 2 hours per week record work will provide this. Curves of progress of milk yield can be compared with a standard lactation curve. Any sudden drop must be investigated as it might provide a warning that something is wrong. Failure to match a standard curve should be the signal to pull the animal out of the general herd and put her into a special byre for individual attention. I find a small separate byre for say 10 special cases needing individual attention, A.I., vet, etc. well worthwhile.

Any animal that fails to meet standards such as regular return to the bull must be culled.

Food Supply

There is no alternative to silage for winter roughage as this is the only system of conservation which allows complete mechanisation from field to cow. Hay making has machinery

and labour peaks and demands constant managerial decisions while silage making can be started and will continue with a relatively low staff without any call for frequent decisions on the part of the manager.

Each cow requires $1\frac{1}{2}$ tons of dry matter for a winter of 180 days or 150 tons per 100 head per winter of 6 months so for my 300 herd plus followers, I calculate I need a total of 750 tons dry matter to see me through the winter which equal about 3000 tons of 25% D.M. silage. This is a massive operation. The job of harvesting my 600 acres of cereals is easy compared to the problem of securing this huge quantity of high quality fodder.

Grass is still the ideal crop for silage giving me 4 tons dry matter/acre in 3 cuts per year. We have found that the satisfactory approach is to set up a forage conservation area separate from the grazing area. This allows me to manage the two systems differently, the selection of the grasses, fertiliser requirements, etc. and also permits the introduction of non-grass crops such as whole crop cereal for conservation as forage. So far I favour winter wheat or spring barley, as oats provide too short a period for harvesting in an ideal high digestibility state. These self wilting crops give me 4 tons dry matter/acre in 1 single cut in July when the weather is favourable and the long hours of daylight enable a large tonnage to be moved each day. Formerly, my plan provided $\frac{2}{3}$ grass and $\frac{1}{3}$ cereal for silage but because of the advantages of whole cereal silage, these proportions will be reversed in 1969.

Storage

Both clamp and tower are practical methods of storing the silage. If stored in a clamp I think self feeding is essential.

I can't see any sense in moving clamp silage from one place to another with mechanical grabs as the cost of the grab and tractor would pay for the mechanical emptying of a tower. While the extra efficiency of the tower system will pay for the tower construction.

Rumour has it that towers are on the way out and especially so in the U.S.A. This is completely wrong. They may be going out in California but they are expanding in New York and Chicago, centres of tremendous milk production.

Summer Feeding

To use zero-grazing is not on. It demands great managerial ability and I shudder at the problem of slurry handling through 12 months of the year. For myself I am content with a 21 daily paddock system using S.23 perennial ryegrass and S.321 perennial ryegrass. I accept that the latter is unsuitable in the West of Scotland but S.23 should be fine.

Tall fescue, our earliest perennial grass is a valuable grass and may become part of our grazing programme. It stands up to heavy N usage and recovers rapidly after grazing requiring a rest period of about 14 days.

I use one-day paddocks at a density of 50 cows/acre with an overall cow density of $2\frac{1}{2}$ cows/acre for the six summer months. Without concentrates, this will produce 1500 gallons milk/acre.

The silage is taken from a similar acreage, that is, 1 acre will supply sufficient for $2\frac{1}{2}$ cows.

The total is as follows:—

Summer grazing	0.4 acres/cow
Winter feed silage	0.4 acres/cow
Total/year	0.8 acres/cow

Slurry

Traditionally, the cow is bedded on straw which absorbs the urine and dung which is handled in the solid state and disposed of on arable land, but this takes time and labour. It is especially costly if straw must be purchased.

There must be an alternative solution.

Cubicles are right — but I feel that £20-£25 per cow for slats is too much. At this moment in time the money could be better spent.

At Bridgets' we scrape the slurry every day to a holding area. This takes 1 man 40 minutes/day for the 250 cows. In the winter, it is pumped weekly onto the arable land. During the summer, the slurry which is mostly washing water is pumped daily onto the paddock just vacated by grazing stock. Some slurry is repumped to the houses to help the scraping.

The alternative is to handle the slurry 'dry.' All water should be kept out to keep it as solid as possible. Eventually it can be handled by conventional equipment.

A pumping organic irrigation system costs around £9 per cow and it works very satisfactorily. Water is costly, so I have a butyl rubber reservoir to trap rain water from my roofs. The reservoir cost £550 and has a capacity of 100,000 gallons.

Housing

Low cost is essential so that they can be written off in 10 years. Cubicles are good provided they are the right shape.

It is easier to manage the stock if they are in 3 or 4 groups. My own are divided according to date of calving not milk production. This means that I need to observe only one quarter of the cows for bulling, etc. It also permits level feeding. It is no longer possible to identify each cow every time she comes

into the parlour to give her individual rations. Level feeding of these groups is just as economical as individual rationing.

This is the present position but I am certain we are close to individual electronic feeding.

Labour

To attract and hold the right type of cowman, the working conditions must be improved. We have 3 men on a five day week for 300 cows arranged so that one man can handle at least 100 cows. The 3 men are together for only one day a week. For the rest of the week, 2 men do the milking, feeding, slurry scraping, and attend to the husbandry needs of the animals. The calf rearing is done by contract and in-calf heifers returned for steaming-up and training, through the parlour. A useful labour efficiency target is 9000 gallons milk/man.

Following the opening talk, Mr Jones showed many slides illustrating the construction of buildings and his layout of grazing system.

DISCUSSION

Q1: Don't you think that the money spent on a Tower silo, augur feeding etc. is an extravagance. A farmer would surely do better investing in cows rather than in concrete and machinery at £25 per cow. It is surely efficient to cart the silage with labour already on the spot?

A: Of course it is right to put your money first into cows. I was indicating my own preferences for a 300 cow unit. A tower system is more efficient because it reduces losses during fermentation although there may well be more field losses due to the extra movement during wilting. With self feeding, you avoid the cost of machinery for handling and moving the silage from silo to feeding area, which the cows can really do for themselves.

Naturally, I regard cows as the first call on investment capital.

Q2: Why do you favour barley to oats. Oats are traditionally a better cattle feed than barley. What is the basis of your faith in tall fescue?

A: Barley has a higher digestibility over a longer period than oats. Timothy/meadow fescue is one of the best grazing mixtures at moderate to low level of N usage, but it has a slow recovery rate so that 28 daily paddocks are necessary. S.23 recovers more rapidly, responds more to N recovers more quickly and allows a 21 paddock system.

Tall fescue grows still more rapidly and could allow a 14 paddock system and with a 14 day interval, it remains palatable. It is only when it is allowed to grow longer that it becomes unpalatable.

Q3: Would you sow S.23 ryegrass under Barley? What is the future for dessicants to assist in wilting herbage?

A: Undersowing barley used as whole crop silage would be ideal to establish any grasses. The usual dessicants are not recommendable because they have not been cleared as safe for crops fed directly to stock. There is no evidence that they are harmful but licenses cannot be granted until tests are complete.

Q4: Does arable silage give the same milk as grass silage?

A: The words " arable silage " are no longer used. Whole crop silage properly chopped with a full chop is slightly less digestible and lower in protein than top quality grass silage but as good or better than the general run of silage made in this country.

Grass can be 70% digestibility and have 18% protein in the dry matter. Whole crop silage cannot touch this.

I would rate them as follows: —

Top quality Tower grass silage ..... M + 2 gallons
Top quality Barley silage ..... M + 1½ „

Q5: What is your experience with milk fever?

A: We have some but our main trouble is grass staggers. We always use calcined magnesite in 2 lb/barley every day. This is unnecessary as feed but is our main insurance against staggers.

Q6: What is your target for milk production/cow at your high number?

A: At the moment we average 900 gallons sold/cow. The target is 1100. As you will realise we are building up and not culling as severely as we should. We also have a high number of heifers in the herd. My feeding policy is simple. Including the 2 lb Barley mentioned above we use 13½ cwt home grown cereals plus 10½ cwt purchased concentrate/cow/year and average £130 gross margin over feed costs.

Q7: What is your experience of cow house cladding materials?

A: It is early days to give an opinion on durability as we are only in the second winter but we have already eliminated hardboard and plywood. The high tensile steel sheets are rusting at the bolt holes. The 25 ft long sheets which we use are laid longways on the building with a 1/40 ft fall so that we only need guttering on the short side of the shed.

Q8: How do they bear up to snow?

A: None to speak of yet.

Q9: You luckily have 600 acres of arable land to take your slurry. How would you face the task with no arable land. I note that the barley barons are to be subsidized £5/acre to grow oil seed rape as an effective break crop for barley growing. Our barley yields are low, so why not a subsidy for growing an arable crop to act as a slurry sink?

A: Whatever the method adopted, it is likely that you will be compelled to get rid of it. There is a lot of research going on at the moment. Some of the proposals seem expensive but it may be essential to treat all slurry to protect our water supplies. The Pasveer ditch at Auchincruive is attracting a lot of attention. I understand that our Netherlands rivals pump it into boats and take it far out into the North Sea.

Q10: Isn't the right idea to use a small sacrifice field and then plough it for a quick annual crop such as Italian ryegrass?

A: Yes, so long as the slurry does not run off the land and contaminate the water supply.

Q11: The problem has been considerable but is it likely to be unsolvable when we move to 300 cows/300 acre?

A: It is possible to consider more expensive systems at a high cow density because the cost is spread over more cows.
A centrifugal system is interesting in which the liquid can be discharged into the ditch and the solid handled mechanically.

Q12: Do you find chickweed becoming a menace where you go in for organic irrigation?

A: Yes, in my new sown grass but this is less of a bother where grass is sown under barley for silage.

Q13: What records do you expect to keep to help management?

A: A complete history of each animal is wanted. Every time the vet calls his treatments should be recorded and the card be just like the card kept by your doctor. Enter every time the cowman treats the animal. Persistent mastitis should be shown up. All the P.D. (Pregnancy diagnoses) go on the card. The records should be kept preferably weekly, or perhaps fortnightly but I believe monthly is useless.

Q14: How do you identify individuals?

A: Freeze branding. You need to decide how and where to brand, at the back for recording milking features — at the front for rationing feeding. I brand at the rear end.

Q15: I question your hypothesis that we as milk producers must bridge rising costs and falling prices. No other industry is faced with this.

A: It is no use wishing. We must be realistic. The indications are that we are not likely to get more total money for increasing milk production.

Q16: We have had two lecturers recently coming out strongly against feeding in the parlour. Why are you so much in favour?

A: I find the movement of cows through the parlour much quicker with concentrates fed in the parlour. In the summer, when I must feed magnesium, there is no alternative to feeding it along with barley in the parlour.

Q17: (a) Arable silage is less compact than grass silage so you find you need more storage room?
(b) Who is right in terms of cubicle sizes?

A: (a) I have no data about bulk of cereal silage and towers but the information is available. Wheat silage is certainly very bulky in a clamp silo. Barley silage is less so. One feature of cereal silage related to its lack of compactness is that it suffers secondary fermentation. When it is opened up for feeding it heats up much more rapidly than grass silage.
(b) I am worried about rather small cubicles. The cows look very uncomfortable. I saw today half a shed strawed and half in cubicles. The cows choose the straw yard and only with reluctance take to the cubicles. This is evidence that something is wrong. The cows had great difficulty in rising. This was due to their over-small size. My own are 7′ long x 3′9″ wide. Maybe my cows are bigger.

Comment

The sizes of the Auchincruive cubicles are adequate. The cows have no difficulty in rising even though they adopt a "camel" motion. The size and shape and many other features are designed to combine high density per sq ft of house and maximum efficiency in terms of clean beds and minimum consumption of bedding. Many of the long cubicles themselves are too long. Heel stones are now compulsory to earn D.A.F.S. grant.

Q18: (a) What alternative summer use have cubicles?
(b) How many cows/paddocks do you have?
(c) You were interested in Rye for spring grazing. What is the present position?

A: (a) No suggestions or experience but maybe turkeys or pigs.
(b) 50 cows/acre up to 70 cows. In August I split off the top yielders.
(c) Rye was abandoned, principally because although it provided early grazing, there was no suitable grazing to follow it and the cows would have to come back to silage.

Q19: What is your labour cost per gallon?

A: We are still short of cows for our 3 men unit but it amounts to about 3½d/gallon.

Mr Michael Milligan, Culvennan proposed a vote of thanks. We are all looking forward to hearing how Bridget develops and to a visit to see the whole thing working. I.V.H.

RESEARCH REVIEWS

135. Nitrogenous fertilisation of Italian ryegrass in spring.

R. G. HEDDLE — *The Edinburgh School of Agriculture*

J. Brit. Grassland Soc. 1968, Vol. 23 pp. 69-74

This paper summarises the result of 18 experiments carried out over the years 1960-66 on a well drained lowland soil near Edinburgh.

Conclusions are as follows:—

(a) Italian ryegrass can make equal use of ammonia sulphate or nitro-chalk for its first spring growth.

(b) Growth appears to commence even when soil temperatures are below 40°F (usually 42° is considered minimum requirement for growth).

(c) Only rarely did nitrogen applied in February result in reduced yields so there is little or no leaching of N.

(d) Yields were reduced by N applications after mid-March. Hence recommended time for Italian ryegrass is first fortnight in March.

(e) The yield of the second growth was greatly influenced by the date of the first cut and time of N application. Where the first cut was taken early, the yield of the second cut was greater because it could use residual N more effectively.

(f) The use of N greatly stimulates first cut yields. Mean response by increasing N from 45 to 68 lb per acre was 11 lb D.M. per lb N. An increase from 68 to 90 lb per acre gave a further response of 6 lb D.M. per lb N. Plots were cut 6-7 weeks after the application of N.—R. D. HARKESS.

136. The effect of stocking rate and supplementary concentrate feeding on milk production.

M. E. CASTLE, A. D. DRYSDALE and J. N. WATSON
Hannah Dairy Research Institute

J. Brit. Grassland Soc. 1968, Vol. 23, pp.137-143

Some of the more interesting aspects of this paper are summarised in the table.

	A		B		C	
	1964	1965	1964	1965	1964	1965
Number of Cows	6	6	6	6	6	6
Acres/cow	0.92	0.92	0.70	0.58	0.70	0.58
Herbage utilized (%)	44	56	58	70	50	63
Digestibility of herbage ...	72.0	—	73.9	—	72.1	—
Milk production lb head/day	35	39	33	32	37	39
Gal/acre	490	530	610	700	470*	550*
Liveweight changes lb/day	+0.7	+1.2	+0.4	—0.01	+0.6	+0.7
Grazing time (hrs/day) ...	8.0	8.2	8.1	8.0	7.1	7.2
Standing and lying (hrs/day)	16.0	15.8	15.9	16.0	16.9	16.8
Ruminating (hrs/day) ...	7.0	6.9	6.4	6.3	6.7	6.5

*Allowance made for barley fed if yield acre is 30 cwt barley.

Treatment A was stocked at 0.92 acres/cow, B and C at 0.70. In 1965, B and C were further reduced to 0.58 acre/cow. Cows of treatment C received 8 lbs of rolled barley per day.

The summary of results show that as stocking rate increased from A to B the utilisation of the herbage increased from around 45% to 64%. At C, utilisation fell, undoubtedly due to the barley feeding. Herbage on offer was slightly more digestible in treatment B — the author's note that regrowths were leafier due to the higher stocking rate and closer defoliation. Milk production from cattle on treatments A and C were not very different but on B, yield per cow fell. However milk yield per acre rose from around 500 gallons to 650 gallons/per acre as stocking rate moved from A to B. The yield per acre fell again to around 500 gallons on treatment C when allowance was made for the barley feeding. The table shows the liveweight changes due to stocking rate and also the effect on animal behaviour. Cows on treatment C spent less time grazing and more time loafing than those in the other two groups. The barley fed to group C replaced some of the herbage intake. Over the trials the response to feeding was 20 lb barley for 1 gallon of milk in 1964 and 12 lb in 1965. The authors conclude that under the present price structure there are no economic gains from barley feeding at grass, provided that leafy highly digestible herbage is an offer to the cows.—R. D. HARKESS.

137. Roundworm infestation in lambs.

R. J. THOMAS and B. BOAG
University of Newcastle

J. Brit. Grassland Soc. 1968, Vol. 23, pp. 159-164

The authors suggest that rotational grazing contributes little to control of parasitism because it is geared to suit pasture requirements and rest periods are less than 6 weeks. Age of lambs, milk supply and stocking rate are all vital in influencing degree of worm infestation and for intensive fat lamb production, anthelmintics are essential. Nematodirus is not dealt with in the paper. Trichostrongylus and Ostertagia were the main subjects of the investigation. Clean pastures were used each year.

In 1966 and 1967 with the use of either Tetramisole or Pyrantel administered to the ewes in two doses, the ewe egg-counts were reduced by 90%. However, the count did increase in autumn and indeed there was no difference between dosed and undosed ewes at this time so there is no long term effect. Nonetheless, the low counts at the critical time from April to June are significant.

Lamb egg-counts rose to only 100-120 e.p.g. (eggs per gram faeces) by July but thereafter the count from lambs from undosed

ewes rose to 1600-1900 e.p.g. whilst in the dosed group, worm burden only increased to 400-600 e.p.g. This reduced worm burden was reflected in the body weight of the lambs being 3 to 8 lb heavier than the undosed control group although the main advantage appeared in August/September when lamb infection began to rise.

Infection from overwintered larvae, the other main source of worm burden, is also discussed. In this instance, lamb egg-counts rise rapidly in April-May, unlike the pattern on clean pasture where infection has yet to be built up. It bears no relation to the 'spring rise' in worm egg output by the ewe. So where the problem of over-wintered larvae arises, the dosing programme will have to be directed towards the lambs.—R. D. HARKESS

138. The use of barn dried hay and silage in fattening young beef cattle.

T. J. FORBES and J. H. BROWN
Northern Ireland

J. Brit. Crassland Soc. 1968, Vol. 23, pp. 299-305

	Barn Dried Hay			*Silage*		
	Daily Gain (lb)	DM intake (incl. barley) lb	DM intake per lb. LWG	Daily Gain (lb)	DM intake (incl. barley) lb	DM intake per lb. LWG
TRIAL 1.						
1. Single suckled calves (5 cwt) roughage only ...	1.36	11.1	8.5	0.63	10.6	17.4
2. Single suckled calves roughage + 3½ lb barley	1.81	14.6	7.6	1.76	14.2	8.3
3. Early weaned calves (4½ cwt) roughage only ...	1.15	11.1	8.5	0.58	10.6	17.4
4. Early weaned calves roughage + 3½ lb barley	2.01	14.6	7.6	1.68	14.2	8.3
TRIAL 2.						
5. Single suckled calves (6 cwt) roughage only ...	1.30	13.8	10.6	1.20	13.8	11.5
TRIAL 3.						
6. Single suckled calves 6 cwt) roughage only ...	0.98	11.7	12.1	0.75	7.8	12.5
7. Single suckled calves roughage + 3 lb barley	1.37	12.9	7.1	1.48	10.1	9.9
8. As in 6 + 6 lb barley ...	1.80	14.5	8.3	2.37	14.4	6.6
9. As in 7 + 3 lb barley (total 6 lb barley) ...	1.75	14.3	8.9	1.98	15.0	7.7

The table summarises the daily liveweight gain, dry matter intake and dry matter intake per lb of liveweight gain for the three trials reported in this paper. The different treatments are numbered 1-9.

Trial 1. LWG was better on the hay only diet and when barley was introduced the response was more marked in the case of silage fed animals (1 and 2).

The early weaned (3 and 4) single suckled calves reacted in a similar manner. Suggestions have been made that 'bucket fed' calves make better use of roughage than suckled calves but this was not apparent in this trial. Note that the suckled calves were $\frac{1}{2}$ cwt heavier.

Trial 2 was conducted with slightly heavier calves (6 cwt). Similar daily dry matter intake was obtained with the hay and silage and only a marginal difference in daily LWG was obtained (5).

Trial 3 was divided into two parts. For the first 70 days the calves received roughage only or roughage plus 3 lb barley (6 and 7). For the next 49 days they received hay and silage plus 6 lb barley (8 and 9). It was hoped to note to what extent compensating growth would take place with animals which had received no barley in the first 70 days. Both steers and heifers (77 lb lighter) were used, but daily LWG was similar and data in the table are for both sexes. The feeding of barley greatly improved LWG (compare 6 and 7) particularly with the silage fed group. When the barley was increased to 6 lb per day (6 compared to 8) (7 compared to 9) there was a marked increase in LWG particularly by the calves on the silage diet, indeed they were marginally better than calves in the hay diet which showed a poorer response to the higher level of barley feeding (7 compared to 9). There was also a marked improvement in the dry matter conversion figures on the silage and barley diet. Whilst compensatory growth was demonstrated with the silage/barley diet there was little evidence of this on the barn hay/barley diet partly due to a substitution of barley for hay.

The barley fed in Trial 3 was fortified with a mineral mixture. The quality of the silage and barn hay was above average with digestibility of the dry matter being around 70 and 72 per cent respectively. Timothy/meadow fescue swards were used for conservation, material for both barn hay and silage being cut in the same day. Grass was wilted for silage which had 26-31% DM in the final product and a pH in the range of 4.3-4.9. Barn hay was baled at 45% DM and conditioned in a batch drier.—R. D. HARKESS.

139. Comparison of diploid and tetraploid ryegrasses in animal-production experiments.

F. E. ALDER

Grassland Research Institute, Hurley

J. Brit. Grassland Soc. 1968, Vol. 23, pp. 310-316

The varieties studied were Danish EF 486 (diploid) and Tetila Tetrone (tetraploid) Italian ryegrass and S.24 (diploid) and Reveille (tetraploid) perennial ryegrass. The data presented are from a number of experiments carried out during 1964/65.

The grasses were sown at rates from 22 to 35 lb per acre but diploid and tetraploid seeding rates were always the same. There were no difficulties in establishing the swards and the tetraploid grasses were equally as persistent as the diploid varieties.

The following table shows the digestibility, soluble carbohydrate content, intake and liveweight gains reported in the paper.

ITALIAN RYEGRASS (Mainly 1965).

	Danish EF 486	*Tetila tetrone*
Digestibility of organic matter (%)		
23 April—20 July (S)*	74.0	75.6
21 July—30 Sept. (S)	72.9	75.0
6 Aug.—22 Sept.	75.0	77.7
30 Aug.—7 Sept.	71.4	74.4
Soluble Carbohydrates (%)		
6 Aug.—22 Sept. (C)	12.9	14.5
Organic Matter intake (oz/lb liveweight)		
23 April—20 July (S)	0.84	0.95
21 July—30 Sept. (S)	0.73	0.78
2 Aug.—22 Aug. (C)	0.41	0.42
20 Sept.—26 Sept. (C)	0.37	0.41
30 Aug.—7 Sept. '64 (C)	0.43	0.43
Liveweight gain (lb/hd)		
26 April—25 June—Cut feed	72	77
Grazed by (C)	80	83
25 June—25 Oct.— Cut feed	174	188
Grazed by (C)	184	229

PERENNIAL RYEGRASS (1965)

	S24	*Reveille*
Digestibility organic matter (%)		
28 May—15 Sept. (C)	70.3	71.5
30 April—3 Sept. (C)	71.7	74.7
Soluble Carbohydrates (%)		
28 May—15 Sept. (C)	12.1	14.0
30 April—3 Sept.	11.6	15.1
Organic Matter intake (oz/lb liveweight)		
27 April—6 June (C)	0.34	0.38
28 June—1 Aug. (C)	0.37	0.36
23 Aug—19 Sept. (C)	0.30	0.38
Liveweight gain (lb/nd)		
26 April—6 June—Cut Feed	54	66
Grazed by (C)	52	47

*S — Sheep. C — Cattle.

The tetraploid herbage contained more soluble carbohydrates and was more digestible than the diploid grass throughout the year. Digestibility differences were slight up till July but the tetraploid advantage was more pronounced after this time. Organic matter intake has been presented as ozs/lb liveweight by the reviewer (the scientific method used to express intake is grams/kilogramme liveweight). Slight but non-significant differences exist between the varieties, with tetraploid being marginally higher. Liveweight gains are also marginally better in the tetraploid herbage except for the grazed Reveille between 26th April-6 June, 1965.

The author concludes that differences between diploid and tetraploid are small particularly in the first part of the season but that tetraploid varieties can have distinct advantages in August and September—R. D. HARKESS.

140. Leather jacket damage to grassland.

J. H. WHITE and N. FRENCH
N.A.A.S., Newcastle

J. Brit. Grassland Soc. 1968 Vol. 23, pp. 326-329

Trials were carried out on grass/clover leys in 1963 and 1964. The population of leather jacket larvae per acre was 1.6 and 1.8 million/acre in 1963 and 1964. No fertilisers were used as the trial was to demonstrate the effect of leather jackets on yield of grass and clover.

Plots were sprayed with 0.18 or 0.15% a.i. DDT at 50 gallons/acre in February 1964 and March 1963 and eliminated the grub (pout) from the treated areas 4-8 weeks after spraying. The yield from these sprayed plots was compared to that from unsprayed controls with the following results.

1963	*Cut* 1		*Cut* 2		*Cut* 3	
(Sprayed 27 March)	29 May		8 July		15 Aug.	
Yield cwt/acre	*Total*	*Clover*	*Total*	*Clover*	*Total*	*Clover*
Control	15.2	0.7	32.7	1.0	17.5	7.1
DDT	21.9	2.9	41.5	3.8	16.8	7.3

1964	*Cut* 1		*Cut* 2	
(Sprayed 5 Feb.)	3 July		16 Sept.	
Yield cwt/acre	*Total*	*Clover*	*Total*	*Clover*
Dontrol	16.5	0.7	10.7	2.3
DDT	28.7	3.7	12.9	2.6

In 1963, the total and clover yields were 45% and 314% higher at the first cut on the DDT plots. By the second cut, the DDT plots still outyielded the control but by August, yield difference had evened out. A similar pattern was obtained in 1964 under a two cut system. Clover was markedly reduced by the leather jackets in the early cuts but showed remarkable recovery after mid-summer.

The larvae feed most actively between March and mid-June and provided the plants are not completely killed they recover fairly quickly after the grubs cease feeding. Over-wintering grubs will cause damage in October so losses can be higher than those demonstrated above.

The economics of spraying DDT cost 12/- per acre plus the application charge. The loss in yield in terms of protein and starch equivalent was £3 6/- and £4 16/- per acre in 1963 and 1964 respectively so it would appear that control of leather jackets is justified economically. However, there is one serious problem: DDT is persistent in the soil and residues in grass may cause complications. Further study of this problem is recommended before DDT spraying can be advocated. Another product, fenitrothion is also being examined for leather jacket control. This is relatively non-persistent and is of low mammalian toxicity.—R. D. HARKESS.

FROM THE COLLEGE LIBRARIAN

Reprint List No. 11, March, 1969

The following publications are available on request:—

1. Bland B. F. White Clover. (*In* World Crops, September, 1968).
2. Bland, B. F. Nitrogen contribution from the soil for herbage growth. (*In* Plant and Soil, Vol. 28, No. 2, April, 1968).
3. Bland, B. F. Notes on the use of polythene below ground to separate the roots of herbage species. (*In* J. British Grass. Society, Vol. 22, No. 4, 1967).
4. European Grassland Federation. Symposium on hill land productivity: programme and guide to pre-symposium tour of 25th June—30th June, 1968).
5. Frame, John. What value white clover ? (*In* Scottish Agriculture, Summer, 1967).
6. Frame, John. Anhydrous ammonia fertiliser. (*In* Scottish Agriculture, Autumn, 1967).
7. Grainger, John. C/R and the disease potential of plants. (*In* Hort. Research, Vol. 8, No. 1, 1968).
8. Grainger, John. An approach by computer to the prediction of crop yields. (*In* Pest Articles and News Summaries, Section B, 1968, Vol. 14, pp. 347–352).
9. Harkess, R. D. How well do you feed your grass ? (*In* Farming News, Vol. 121, No. 7, 1969).
10. Harkess, R. D. Hybrid ryegrasses. (*In* Scottish Agriculture, 1967).
11. Harkess, R. D. Topping grassland. (*In* Scottish Agriculture, Summer 1968).
12. Harkess, R. D. Digestible herbage. (*In* Scottish Agriculture, Spring, 1968).
13. Hunt, I. V. The short ley. (*In* Scottish Agriculture, Spring, 1968).
14. Hunt, I. V. Docks in grassland. (*In* Scottish Agriculture, Summer, 1968).
15. Hunt, I. V. The direct reseed. (*In* Scottish Agriculture, Autumn, 1968).
16. Hunt, I. V. Winter management of grass. (*In* Farming News, 25th October, 1968).
17. LaCroix, E. A. S. and Newbold, J. W. Autumn treatment against leatherjackets. (*In* Plant Pathology (1968), Vol. 17).
18. Walker-Love, J., Laird, R. and Forsyth, R. J. The new pig breeding unit at Auchincruive. (*In* Scottish Agriculture, Spring, 1968).
19. Walker-Love, J. Urea for the dairy cow. (*In* Scottish Agriculture, Autumn, 1968).
20. West of Scotland Agricultural College, Grassland Husbandry Department. Current Experimental Programme No. 11, May, 1968.
21. Martin, D. J. Bracken control trials in West Scotland. (*In* Proc. 9th British Weed Control Conference, 1968).

Requests for any of these publications should be addressed to the Librarian, West of Scotland Agricultural College, Auchincruive, Ayr. It is unnecessary to give the title, merely the **List No.** and **Report No.**, *e.g.*, 11/1.

SIXTH ANNUAL GENERAL MEETING OF CENTRAL SCOTLAND GRASSLAND SOCIETY

21st November, 1968

The minutes of this meeting have already been circulated to members but attention is called to a change in the constitution which was carried unanimously.

Item 5 (III) should now read as follows:—

Nine members representative of the area will serve for a period of three years. Three of these members will retire annually and will not be eligible for re-election for a period of twelve months. Three members will be elected at each A.G.M.

CENTRAL SCOTLAND GRASSLAND SOCIETY

Members Joined Since 1/10/67

K. S. Fairweather, 18 Delves Road, Lanark.

G. MacKenzie, Chanory, Sunningdale Drive, Bridge of Weir.

J. Kaye, Weston, Dunsyre, Carnwath, Lanark.

D. M. Crawford, Syde, Strathaven.

Howard T. Franks, Lawside of Heads, Glassford.

J. R. Lang, The White House of Milliken, Brookfield, Renfrewshire.

INTRODUCING MEMBERS OF S.W.S.G.S.

Since the foundation of the Society, nearly 387 farmers and advisors (college and commercial) have become members. Sixty-one have been lost through death or resignation, leaving us with about 326. It is necessary to say 'about' because there are 2 or 3 paid up members whose mail is being returned by the Post Office marked 'gone away' and another 2 or 3 who have membership forms but have not completed the formalities (e.g. returned them to the Secretary or sent in a signed Banker's Order form). In the early days, a few members objected to Bankers' Order payments but it is now realised that they allow the secretary and treasurer to do their jobs more effectively.

As we stand at present we have had 15 new members since the membership list was posted in October (21/10/68).

The following changes should be made to the list:—

Change of Address

Dickie, D. T.—The Craig, Sandy Grove, Edinburgh Road, Dumfries.
Hannah, John J.—3 Baird Road, Alloway, Ayrshire.

Address Unknown

McSkimming, W.—Formerly: Meikle Culman, 1 Lochfoot, Dumfries.
Horne, P. I. H.—Formerly: Sandhill Farm, Drongan, Ayrshire.

Resigned

Sadler, D. Gerald—Old Manse, Dundrenan, Castle Douglas.

New Members: Technical

Reid, Wm. J. P.—161 Brooms Road, Dumfries; a member of staff of Dept. of Agriculture and Fisheries for Scotland.
Chard, P. G. — 6 Carrick Avenue, Ayr; a newly appointed lecturer in Agriculture at the College and until recently an intensive grassland farmer in the S.W. of England.
MacEwen, N. — 2 Inchnagrannachan, Dunkeld. Harvestore: Consultant.

Farmers

Kerr, Alister—Camiscan, Craigie, Kilmarnock.
Rome, J.—Kirkbog, Thornhill, Dumfries.
Laurie, T. R.—Casterton, Lockerbie, Dumfries.
Sproat, W. T.—Lennox, Plumton, Borgue, Kirkcudbrightshire.
Marshall, D. T.—West Kirkland Farm, Newton Stewart.
Barbour, D. L.—Sestri, Maxwell Street, Dumfries.
Campbell, W. A.—Auchlane, Castle Douglas, Kirkcudbrightshire.
Stewart, R. W.—Corsehead Farm, Glenluce, Wigtownshire.
McDougall, A.—Bloomsbank, Auchincruive, Ayr.

The roll now stands as shown in the following table. Some information taken from Questionnaire No. 1 is also included to give a clue to members' special interests:—

County	*Members*	%
Ayrshire	77	23.6
Dumfries	55	16.9
Kirkcudbright	63	19.3
Wigtown	68	20.8
Non-farmers	63	19.3
Total	326	100

	College	*Commercial*	*Others*
Non-farming Members	20	31	12

Information from Questionaire No. 1.

1. Interest in Conservation.

County	*Completed forms received*	*Making only hay*	*Making only silage*	*Making silage and hay*
Ayrshire	42	11	4	26
Dumfries	33	7	1	25
Kirkcudbright	39	15	7	17
Wigtown	42	7	11	21
Total	156	40	23	89

2. Livestock Interests of Members of S.W.S.G.S.

	Ayrshire	*Dumfries*	*Kirkcud-bright*	*Wigtown*	*Total*
1. Milk production	36	22	30	36	124
2. Dairy Pedigree	16	10	9	10	45
3. Dairy Rearing	28	21	14	33	96
4. Dairy beef	14	16	15	17	62
5. Beef finishing	19	15	10	13	57
6. Beef rearing	14	22	25	15	76
7. Beef pedigree	6	2	8	3	10
8. Hill sheep	4	12	11	6	33
9. Hill sheep breeding	3	8	9	2	22
10. Lowland sheep	16	14	19	12	61
11. Lowland sheep breeding	15	14	10	11	50
12. Fat Lamb	20	19	19	17	75
13. Poultry	10	6	8	7	31
14. Pigs	9	4	4	6	23
Maximum possible	42	33	39	42	156

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