HERBAGE

# JOURNAL OF THE SOUTH-WEST AND CENTRAL SCOTLAND GRASSLAND SOCIETIES

No. 6, SPRING 1965

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# JOURNAL of the South-West and Central Scotland Grassland Societies

No. 6, Spring 1965.

GREENSWARD

JOURNAL OF THE SOUTH-WEST SCOTLAND AND CENTRAL SCOTLAND GRASSLAND SOCIETIES

Spring 1965.

Contents

The next number of this Journal is already in preparation. It will contain reports on the spring discussion meeting of the South West Scotland Grassland Society on grazing systems and on the spring tours and an article by a farmer member, Mr. Derek Tough, which was too late to be included with this Journal.

Apart from these, it is intended to devote the next number to the theme "How to judge grassland" dealing with all the factors which decide whether grassland is good or bad.

How do you decide what is good and bad grassland?

How important is it to know good from bad grassland?

These questions are suitable ones for farmer members to try their hand at answering.

## Editorial Note

According to previous issues this journal should be labelled No. 6 March 1965. It will be ready for the printer in March but not ready for issue for some weeks. The November 1965 issue was delayed 6 - 8 weeks. In order to regularise the position I have taken the liberty of renaming the two issues Spring and Winter.

Most of the space in this number is occupied by reports on activities prepared by Dr. Castle, Dr. Reid and myself. Dr. Harkess has included reviews of eight papers appearing in the British Grassland Society's Journal. This is less than usual because of lack of space. Three original articles are printed. Mr. Hall recounts his experiences in buying seed cleanings, Mr. Brownlie of the Department of Agriculture Office in Ayr describes the restoration of open cast coal sites whilst Mr. John Frame sets out on the A.B.C. of charts and diagrams, taking the digestibility curves of grasses as his first example.

Two farmers responded to our request for questions to be dealt with in written, carefully considered replies. More of the same would be appreciated by editor and readers.

The 'spring' meeting at Glenluce had to be abandoned because the speaker, Mr. A.S. Foot, and his guide were snowbound near Dunure. I understand no members were able to reach the venue for that evening. From my talks with Mr. Foot it is certain we missed a particularly interesting lecture and expect he will have an opportunity of visiting us again soon.

I.V. HUNT

Editor.

For those who wish to complete their sets of journals, back issues of the journal are available at 2/6d. each post free.

# SOUTH WEST SCOTLAND GRASSLAND SOCIETY

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SECRETARY/ JOURNAL EDITOR - I.V. Hunt, Grassland Husbandry Department, West of Scotland Agricultural College, Auchincruive, Ayr (Office - Annbank 234
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T. Hamilton, Briery Hill, Lockerbie. 1964.
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A.E. Parkinson, Director of County Advisory Service, West of Scotland Agricultural College, 6 Blythswood Square, Glasgow C.2. (Glasgow City 5211).

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

## FORTHCOMING EVENTS

Some of these may be past by the time the journal reaches the reader.

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|---|---|
| May 13th | Tour of South Ayrshire Farms arranged by Central Scotland G.S. |
| May 20th | Tour of North Ayrshire Farms arranged by South West Scotland G.S. |
| June 10th | Visit to Bush Estate, College Farm of the Edinburgh College. |
| July 19th - 23rd | British Grassland Society Summer Tour in Cumberland and Westmorland. |
| July 27th | Visit to Northern Ireland arranged by South West Scotland G.S. |

# CENTRAL SCOTLAND GRASSLAND SOCIETY

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TREASURER - John Waddell, College Office, Portland Place, Lanark (Lanark 802/3).

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A.P. Anderson, Kippenross Home Farm, Dunblane, Perthshire. 1964/5.
Robt. M. Yuill Jr., The Burn Farm, Quarter, Hamilton, Lanarkshire. 1964/5.
James A. Minto, Coulterhaugh, Biggar, Lanarkshire. 1964/5.
A. Robertson, Auchafours, Toward, Dunoon, Argyll. 1964/5.
J. Gellatly, The Mains, Menstrie, Clackmannanshire. 1965/6.
W. Caldwell, Mid Gartocharn Farm, by Alexandria, Dumbartonshire. 1965/6.
A. Pollock, Cashley Farm, Buchlyvie, Stirlingshire. 1965/6.
A.J.K. Laing, Pollock House, Glasgow, S.3. (Renfrewshire). 1965/6.

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Campbell C. Watson, College Office, 8 St. Mirren Street, Paisley.
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Professor D.S. Hendrie, Principal, West of Scotland Agricultural College, 6 Blythswood Square, Glasgow C.2. (Glasgow City 5211).

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I.V. Hunt, Grassland Husbandry Department, West of Scotland Agricultural College, Auchincruive, Ayr (Annbank 234).

GUEST SPEAKER AT ANNUAL GENERAL MEETING
of the South West Scotland Grassland Society

## LOW COST PRODUCTION

Rex Paterson

I would not like anyone to be deceived by imagining that I can tell them how to make profits. I make mistakes like other people. The problem is to find out where and why these occur.

### Starting to farm in Hampshire

Returning from Canada where things were no better than in Britain, I had the desire to introduce New Zealand methods into British dairy farming.

When I started in Hampshire in 1927 nobody wanted farms and many were vacant. You could have any farm you wanted if you were prepared to take it off the landlord's hands. Rents were seldom more than £1/ac. I even found difficulty in finding the owner of one farm and took possession of it! Such farms were neglected and overgrown with bushes, weeds and rabbits. They were so badly farmed and equipped that I had the good fortune to start from scratch.

A dealer taught me quite a bit. He bought hay and heifers in Scotland, brought them down to Reading and gave me what he couldn't sell. He let me have a farm for 3 years on condition that I paid him at the end of that time. We fenced and watered it and stocked it with cheap Irish or Ayrshire heifers. Once the war started we began cropping. I changed over from the movable Hosier bail to the fixed bail with the cattle still outside. We developed a rotation of cropping during the war of 3 years grass/kale/barley and back to grass. Yields were always low but we managed to make the crops pay.

After the war, we cut back on our grain acreage although grain appeared to be more profitable. More of the movable bails were fixed. Finally, in recent years we returned to all grass, with 120 acres to each 60 - 70 cow herd. Grain is still grown but on separate areas.

### First Results from Recording

We began measuring our grassland in the war and have continued over a very long period. We kept records of the grazing and silage on each field. All our results are expressed as cow-days. They showed us that each seed mixture had a characteristic yield. For example, timothy gave 200 days feed per acre, and short rotation

ryegrass (H.1) about 150 days. Each ley fell in yield a bit year by year but after the third year began to pick up again.

When forage harvesters arrived we cut the swards closely and our perennial ryegrass swards began to yield better than other types of sward. As long as they were kept well grazed and reasonably tight they gave as much as other fields. On our Welsh farms we improve our pastures merely by fertiliser and heavier stocking.

Milk Yields

Over the years we never averaged much above 600 gallons yield. The herds individually varied quite considerably - some up to 900, some down to 450 gallons with no relation to the type or level of concentrates which were being fed. This puzzled us.

We used to record individual cows but gave it up after a while and stick to whole herd records. We kept track of the length of lactation and found out quite a lot from that. For example, cows which calved in the autumn had a longer lactation than cows calving after March. Some cows yielded 600, some 900 and some 450 gallons but the differences had no relation to concentrate feeding.

The Average Fall in Milk Yield

Although individual animals might vary, the yield of the herd as a whole, with the younger and older ones included falls at about 4 lb. per cow per month from October to March. Then it rises at the rate of 2 lb. per cow per month for a short spell in the spring and then falls again at the same rate for the rest of the year. Fig. 1 shows how this happens through the year.

If you multiply the number of cows in milk by 4 lb. you have the rate of fall you can expect from your herd each month. Corrections for changes in cow numbers should be made. Compare these calculated curves with the actual curves. If yields are falling away from the line something is wrong; if yield rises above we wonder why.

Using the Charts

All the data collected is set up on charts where we can see the effects of level of concentrates and of other feeds, hay or silage. We can recognise the different fields being grazed or

what date silage was cut. When cattle come on to spring-sown grass the yield jumps above the line. As long as the silage or kale is of reasonable quality the line doesn't vary much through the winter.

This yield line represents the expected yield and top limit of a herd of cows, you cannot push it up. You cannot alter it. The only time when you can improve things is when the cows calve. The line may start at 5 or 6 gallons or only $2\frac{1}{2}$ but, during the lactation, the loss in milk between the time the cow calves and the end of the lactation is about 3 gallons. Changing the level of concentrates does not affect this fall. It is said that you should feed before the cows calve to steam up; perhaps this is right, but when I talk to research people to find out what we should do, opinions are confused.

Concentrates Unprofitable

Concentrates seem to give no response but after more effort we found a small response. We examined every published record from colleges, research institutes and the Milk Marketing Board. Well over 200 herd records were set out on a graph. All herds that had been fed 5 cwt. feed per head went into one group; 10 cwt. feed into another group; 15 cwt. feed and 20 cwt. feed into further groups, and we saw the effect of increased feeding on the average yields of each of these groups. Fig. 2 shows how this is done. We found a rising line showing increased milk with increased feeding.

This was not 4 lb. to the gallon as taught in our textbooks but 14 lb. to the gallon. The 4 lb. per gallon figure can be obtained if the whole of the cows yields are divided into the concentrates. Our method is to compare the difference in yields between groups with the difference in feed level. If you carry the line back from 5 cwt. feed to the NO feed line the yield comes out at 650 gallons. This is the yield with no feeding at all. In actual practice we have had 700 gallons with no feed. At 5 cwt. you will get an average of 690 gallons and at 20 cwt. feed, an average of 810 gallons, which is the Milk Marketing Board national figure. Thus, 15 cwt. feed gives 120 gallons of milk, about 1 cwt. gives 8 gallons, or 14 lbs. per gallon.

At both top and bottom end there can be a range of something like 400 gallons.

## The Effect of the Stockman

Our different stockmen had characteristic yields, whatever their level of feeding and whatever herd they had. If we took a man who had a high level of skill and a high yielding herd and put him in charge of a poor yielding herd, it would be raised to his level of yield within a year or two. We have moved men from one herd to another and one farm to another. We don't know what should be done about this, it is a problem which someone here at Auchincruive may be able to answer. I was told that they had the same problem in New Zealand when I visited Ruakura (The Animal Production Research Station).

## The Cost of Extra Feed

In our experience and that of many other people, there is no particular merit in feeding more feeding stuffs beyond a certain point unless they are sufficiently cheap. It all depends on the cost of the feed. At 32/- per cwt., the food for milk costs 4/- per gallon. At 24/- a cwt. then your extra gallons would only cost you 3/- each for food and you would get near to a profit. It is said that with concentrate usage you can carry more stock. Using Milk Marketing Board figures, 10 tons extra feed is needed before you can carry one extra cow. If yield could be raised at the start of the lactation by feeding then the story might be a bit different.

I have been conscious of our low levels of yield. We do not make as much money as some people but our costs are less. I would like to get a high yield but only if the extra cost is profitable.

There may be a time when feeding is profitable. Possibly before calving, possibly immediately after calving. Maybe before turning out in the spring. The problem is when to start and when and how to cut the feed down.

The complexity can be illustrated by our experience that cows fed concentrates through the winter gave less summer milk without concentrates than cows which were fed little or nothing through the spring before going out to grass.

When I was in Southern Ireland I met Dr. Walsh doing a very good job at Fermoy. Given no concentrates, his herd averaged 550 gallons. Cows calving in the spring went down in yield. As the grass grew their yield rose and then went down later in the summer time. As grass was short he felt he ought to feed some concentrates. He fed half the herd with concentrates and half none. He gained only 8 gallons for every cwt. fed.

Figure 1. The Average Fall in Milk.

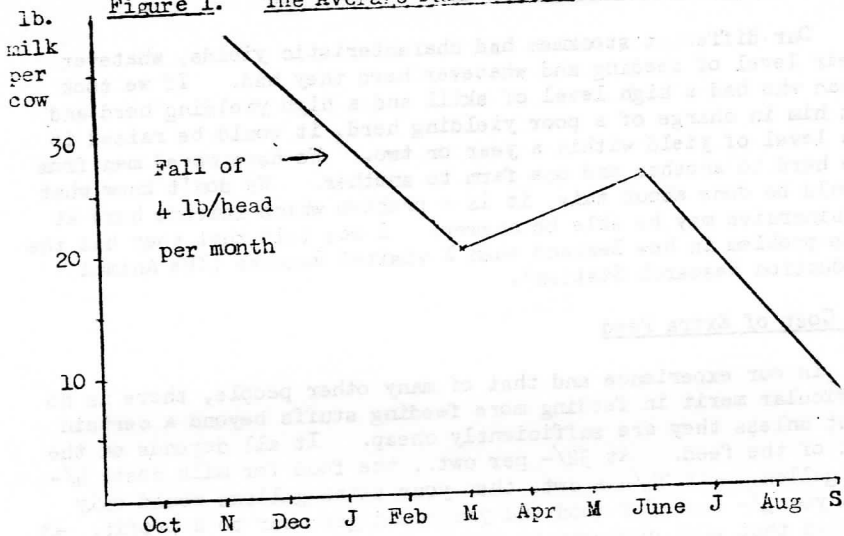
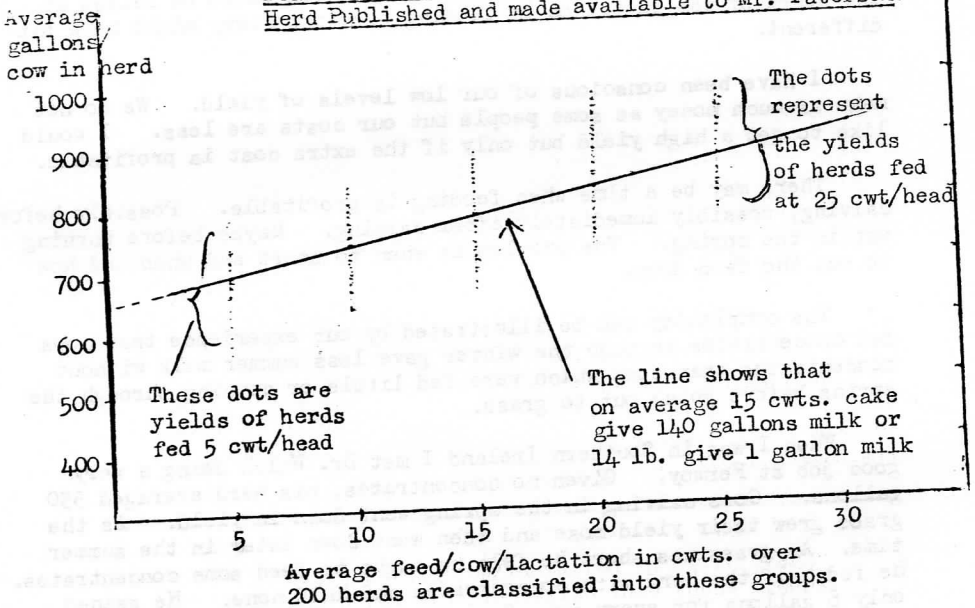



Figure 2. The Average Effect of Concentrates Using Milk Marketing Board Figures plus those of every College, Institute etc. Herd Published and made available to Mr. Paterson.



From a casual study of the figures on our charts, the high yielding herds are fed a lot of concentrates, the low yielding ones are not getting so much. One could therefore reason that more concentrates must be fed to bring yield up. I dispute this. I think that in these good herds it is the owner or stockman who is responsible for good results and can afford more feed. High yield comes first and it is the skill of the stockman that gets the results not the feed.

Grass Production

In New Zealand, much work has proved that heavier stocking by itself will increase production by about 12%. Rotation grazing combined with heavier stocking will give about 22% increased production. There is far more scope to increase profitability by learning more about stocking rates than extra feeding.

The two most important costs are the costs of concentrates and labour. I have given you my opinion about concentrates, now about labour. If you adopt some of these new highly skilled methods and do not get high yields you merely run into higher building and labour costs than may be necessary. We use small abreast parlours, four stall x four machine or six stall x six machine. We have one man to cut and deliver all the silage required by two herds. That grass has to be put into a silo by the man doing the milking. We build a fairly wide outside stack. We do not cover it but roll down tightly and get a good seal on top. If the grass is cut young enough we get such a good seal that the water will evaporate rather than penetrate. We have our own ideas of the shape of this silage clamp. We don't like a high silo because waste is caused when cattle eat away at the lower face, and the top edge tumbles down. We limit ourselves to 5'6" high and that means a silo mass with a big top surface. Provided we roll it well, the losses by decay are less than the wastage from silage falling down at the feeding face.

We aim at uniform silage by grazing the first growth in turn and taking silage from second growths, which will then be well staggered through June and July.

Discussion

Q.1. I wonder whether Mr. Paterson would agree that his failure to get a reasonable response to additional feeding is that he is not giving it at the right stage of lactation? Particularly I feel he should get his cows out to grass in the spring with better yields. Many of the cows seem to be going out to grass giving 2 gallons or even less.

A.1. That is something which we still have to find out - we are trying out different patterns of feeding and I think the most promising time for extra feed is around calving. When the cattle are fit and there is plenty of good grass, it is a puzzle to know how much you should feed, when you should start and when stop.

Q.2. With the land values of £200 - £300 per acre that Mr. Paterson has today, is he quite happy at the returns he is getting per acre?

A.2. My land did not cost that and I am not satisfied. If all the herds could do as well as the good ones we would be well away. As long as I have some of these herds too low I am a long way from being satisfied.

Q.3. I would like to refer to the statement about response to feeding stuffs. It seems to me that one of the fallacies in the figures is that the cows are not individually recorded, therefore you have no means of building up the yield potential of each cow. If they are not individually fed it means they are all being given the same amount of feeding stuff in the bail, some low yielders may be getting too much.

Also, regarding your figures, you say that cows should produce 650 gallons without any feeding stuff at all. With our feeding today of 17 cwts/cow we expect at least 950 gallons. Therefore at 950 gallons, we get 300 gallons extra for 17 cwts. feeding stuffs or 6½ lb. per gallon. Most of this is produced in the winter months. The extra milk is worth £45. The feeding stuff, mostly home produced is not going to cost much over £20 per ton and therefore 17 cwt. is maybe worth £20 - £22 which seems to give an excellent return of about £45.

You said that the yield of cows not fed during the winter months comes up more rapidly when the cows go to spring grass. I agree, but the additional milk in the spring is worth only 2/- per gallon whilst the milk they lost by not feeding in the winter is worth 4/- per gallon.

A.3. Within my own results I have had some herds which have given up to 950 gallons on very little feed. When you quote 950 - 1000 gallon yields at 17 cwt. feed, the indication is that you have a good stockman. If you take the mean of all the results that are published by the Milk Marketing Board etc., the mean result gives 650 gallons on zero feeding of concentrates. Our Friesian herds give this so we are something like the average. You can't assume that your herd with your stockman will give

the 650 gallon average figure. The only way you can find out what your zero level is is by trying to establish the effect of dropping your concentrates on average milk yield. You would then find that your zero level would be considerably higher than 650 according to the value of your stockman.

The other way is to accept my figure of 14 lb. to the gallon and find out what your zero level would be from this. I think you will find it comes to about 800 gallons.

Q.4. I would ask Mr. Paterson how his solids and butterfat test out since we are now paid for quality in milk.

A.4. We average from Friesians not far short of 12.6 and we run very much about the average on total solids. Maybe with our low yields, the solids are less diluted.

Q.5. I think the most interesting observation was that level of milk yield is determined by the stockman. Can you analyse a little further what is 'goodness' in a stockman?

A.5. I want a good old-fashioned placid cowman. He must be really keen on his job. The bright young fellow who seems very keen and gives you a good impression is often the one who cannot get the milk whilst the rather slow older fellow can.

Q.6. Could you tie this into agricultural education?

A.6. We have had inexperienced boys and people from outside the industry who have been perfectly good. Some of my 700 gallon yields have been from people with no previous experience so I just don't know what can be done in regard to training. I am in favour of a good general education for everybody. When it comes to specialisation I find it difficult to say what I would like to have a fellow who was coming to work for me taught. The skills that I want in handling stock are not taught. They are learnt on the farm but I think it is possible to teach young men how to be economical of labour. But how can you teach 30 to 40 youngsters such things except on the job. I often find myself rather at cross purposes with some of the things which are said at the N.F.U. regarding training young people today. I don't believe in filling their heads too full of things which may be unnecessary.

Q.7. May I just follow on the question of labour and ask, does Mr. Paterson have a difficulty these days in securing labour, whether good or otherwise?

I would also like to ask just what sort of wastage he has in his various herds. Is this percentage related to the type of stockman he employs?

I cannot sit down without mentioning something on concentrates and I would like to say that we (Animal Husbandry Dept., Auchincruive) would go 100% with Mr. Paterson as far as concentrate feeding during the grazing season is concerned. As far as the winter is concerned, I think we are living in two different worlds. He seems quite happy with 650 gallons. With good fodder and silage a cow should manage 2 gallons. If the cow is in a fit condition when she calves, he will get another gallon or 1½ gallons. Under his circumstances, he may be right enough. Unfortunately we have heavier overheads for buildings etc. and need more milk.

A.7. Re. employees, perhaps I am in a more favourable position because I am well known. If I advertised for a tractor driver or relief milker I would get no replies. For a skilled stockman, I get 50 and more replies. The type of man we get is the general stockman who has been brought up to it. Sometimes the fellow who has been to an Agricultural College who realises that he is not going to get a job as Farm Manager applies. We get them from all walks of life, even from overseas. If we are not prepared to pay good wages and provide a house then we would be in trouble. Everyone thinks that farm workers want a five day week or weekends off — we do not find that. Our stockmen prefer to milk 7 days, so long as they have the time off during the week that they need. If they want an afternoon off, they will arrange for another chap they trust to do their work rather than have a relief man. We like them to work a seven day week. These are important features and I think we are mistaking the character of the stockman if we think he wants weekends off.

Re. wastage, we had a good deal of trouble from hypomagnesaemia in Hampshire. We came to the conclusion that this was due to putting potash on our grass in the spring. On our Welsh soils with more vigorous clovers we do not get the same trouble with hypomagnesaemia and continue to use potash. It caused us a good deal of loss, 2% deaths, 6% cases. Following that, we had milk fever, which we think is due to phosphate deficiency on our high calcium soils. We are trying to remedy this. Over-all, our replacement rate is about 2½%, lately it looks more like 20%. We expected more trouble on our low feeding. We slipped into later calving and that decreased our yields. We have been debating among ourselves when cattle should calve. In Wales, where the cattle are outside, they are dry from November till January or February so we are definitely on

early spring calving and that seems to suit the soft ground. In Hampshire, we used to aim at October calving but have moved it back. One of my friends got his calvings back to July and he decided this was the best date. There is the question of getting the cattle in-calf. Calving date can have some effect on the replacement rate.

Re. concentrate overheads, I do not think that necessarily follows. If we can get 650 gallon worth £100 from a cow on zero concentrate feeding the important thing is to see how little land you can carry each cow on. Some people get £150 from a cow but perhaps they may be spending £100 on concentrates. In many regions the net income after paying for feeding stuffs seems to come back to the same figure on a lot of farms. Between £80 and £85 seems to be a fairly common figure. Extra production gives no more profit and can lead ultimately to a lower pool price.

Q.8. I am interested to know whether Mr. Paterson pays a bonus for the stockmen who get over a certain gallonage from the cows.

A.8. We pay £16 for a seven day week to do the essential work. Any other work is paid for at full overtime in the evening and lower rates during the day. In addition, a bonus is paid on output based on the average yield per cow of milk above a certain amount. We used not to take feeding stuffs into account. I have tried various schemes. For example, they could use the concentrates they want but for every £10 of concentrates they must produce £10 worth of milk for which no extra bonus is paid. The result was they used no concentrates at all so I asked them to feed a bit more and we would not say too much about it. They used too much and it was unprofitable to us. Finally, we decided we would allow concentrates according to our discretion and the bonus to be based on total production. The basis may be 50,000 gallons a man, we have men at 35,000 and others at 70,000. We would pay a flat bonus. Paying a bonus is, I think, essential.

Q.9. I wonder if Mr. Paterson would clarify one of the lines on his graphs, i.e. projected performance. I wonder if you would tell us in more detail how you actually work out these things. I presume it is for each individual herd, and can be used as an efficiency check. Is it used by other people?

A.9. There is more interest being taken in this method by other people now. We find it is of great interest and help. Many people keep these records themselves and come to study our records.

First you place a line on a graph representing the expected yield from your herd based on the 4lb/head/month. This might be a line for a 40 cow, 30 cow or even 10 cow herd (see Figure 1, page 9). Then week by week, the line is adjusted for new calvings or drying off of individual cows. We used a scale of 2 gallons to 1/10th of an inch vertically and 2 days horizontally. It is very rare for actual results to go above your line although this can happen.

Q.10. Can you tell us how your yields vary in the various herds in different years? Can you predict a figure for a particular herd?

A.10. You can predict when you know the calving pattern. A Welsh neighbour of mine made a prediction. He was about 1 gallon out at the end of 3 years.

Q.11. Mr. Paterson gives his cows as much grass as they can reasonably use in the summer time and as much silage as they can reasonably use in the winter time. To what extent does one lose food value by making grass into silage? Is there a big difference in the productivity of the cows on grass and silage?

A.11. In the past, feeding stuffs have been set off against grass at full value (4 lb/gallon). My figures presented today make nonsense of this practice. If you take some of the figures of yields quoted by the M.M.B. and allow 4 lb. concentrates/gallon of milk for concentrates you will be left with some figures of 550 gallons milk from grass right down to negative values from grass. This must be nonsense. Much more reasonable figures have appeared if the concentrates are debited at 14 lb/gallon milk.

Q.12. What is the difference in output of milk from a day's grazing on fresh grass as opposed to a day's grazing at the silage face?

A.12. This depends on when the cows calve. An interesting case occurs to me of a farm in Cheshire with a yield of 1150 gallons by zero grazing and low concentrate usage. Every load of grass was weighed and the cows ate approximately 160 lb/head/day. Surplus grass was made into silage. There was obviously wastage in making the silage but the same number of daily feeds was obtained from silage as from the same amount of grass. It may or may not require more concentrates to supplement silage than grass but it quite definitely does not take 4 lb/gallon. More research is needed on what stocking rate will give us most economic returns from our grass.

If you assume that the majority of farmers have little surplus labour and devise a system where they can carry as many cows as possible with that labour, that is the economical way to manage a grassland farm.

Q.13. I would like to come back to grassland management a little. There is a substantial increase by changing over to rotational grazing, and also by having separate night and day grazing. From your records you must have a very fair picture of this. You can vary milk production by changing pastures; if you keep a herd too long on one field your production goes down. When do you make the changeover? What is the treatment of the grassland of the field you have just left? What are your observations on nitrogenous fertiliser and levels of manuring?

A.13. I shall take the last question first. How much evidence is there of the weight of grass which a cow will eat at the peak of her yield compared to when she is part dry? The only experimental evidence I have found is that in New Zealand, cows have their lowest food consumption in the year shortly after calving and their food consumption gradually increases as their yield falls.

Now to come back to this other question. If you have a herd of cows and expect their yield to go down, with one man that might be 20 gallons per day and another man only a gallon or two. In the winter it will be less than in the summer. It is going down all the time in the summer and you must not blame the field. It is just a normal lactation curve. Some of my friends cut down to 2 acres in the paddock for 100 cows as a day's grazing. I would like to hear other opinions on how tight grazing should be. I don't believe it matters how tight you graze, it would seem obvious that cows short of feed should go down faster but do they? We have 6 acres for 60 - 80 cows. That seems to us the best compromise. The New Zealanders say 14 - 17 paddocks on a farm is good enough, I don't know. We start the season by grazing in rotation then go through the majority of fields cutting for silage, having started early enough so that we shall have fresh grass for grazing early in June. If we have left a little too much grass we cut again and we repeat this again later in the season.

In Wales, we use a moderate amount of nitrogen and heavy P & K. In Hampshire we have tried to get clovers and cannot get them. We abandoned the attempt and use more nitrogen now.

Q.14. We keep cows for profit. What is the bracket of profit per cow on Mr. Paterson's farm?

A.14. Not very good. Let us put it this way. We would be glad if we could get a margin of £20 per cow. Some people get about £30 per cow, depending on how many acres it takes to keep a cow. It should be at least £20 a cow. We are not good, we have some herds good and some bad.

Q.15. With an overall margin per cow, what rent per acre is Mr. Paterson charging?

A.15. We reckon one acre of grass costs us about £18 an acre and include a charge of £4 for rent.

Mr. R.W. Montgomerie proposed a vote of thanks and said that he was very interested to hear that along with his low cost feed production he believed in clover where it is natural to the land. He was sure if the dairy industry had adopted Mr. Paterson's method we would be getting a great deal more for our milk than we were getting today.

Fertiliser Facts. 1. Types of Phosphatic Fertilisers

| | % phosphate ($P_2O_5$) | units/ cwt. | Net cost/ cwt. | Net cost pence/lb. citric sol. $P_2O_5$ |
|---|---|---|---|---|
| Superphosphate | 21 | 21 | 10s 1d | 5.16 |
| Triple Superphosphate | 47 | 47 | 22s10d | 5.20 |
| Basic Slag | 12) 80% | 9.6 | 4s 9d | 5.25 |
| " " | 18) soluble | 14.4 | 6s 2d | 4.60 |
| Ground Mineral Phosphate | 29% | 29 | 6s 9d | 2.5 |
| Compounds (see page 38) | | | | |
| 23 : 10 : 11 | 10 | 10 | 24s11d | 26.7 |
| 6 : 15 : 15 | 15 | 15 | 18s 1d | 12.9 |

Note The value of a particular form of phosphate depends on the type of soil and crop to which it is applied. Superphosphates contains the most readily available phosphates and are particularly useful for new sown seeds. Ground Mineral (or Ground Rock) Phosphate is the least valuable type since it is useless on soils which have been well limed or are naturally high in lime. Basic Slag contains little water soluble phosphate but plenty of citric soluble phosphate which for plant purposes is just as good. All phosphates turn into insoluble forms shortly after they are applied.

# CENTRAL SCOTLAND GRASSLAND SOCIETY

## 2nd Annual General Meeting

The meeting comprised three parts. In the afternoon, visits were made to Warrenhill Farm, Thankerton (Mr. W. Fleming) and to Coulterhaugh Farm (Mr. J. Minto). The business meeting was held at Toftscomb Hotel, Biggar after a grand tea. Finally, Dr. R.D. Harkess opened a discussion based on the farm visits and the general topic of Conservation.

The enthusiasm of members is evidenced by this marathon meeting which lasted from 2 o'clock in the afternoon till 9 o'clock at night and particularly if one considers the long distances travelled by members.

### 1. Warrenhill Farm

The focus point was Mr. Fleming's haymaking system. The process consists of mowing and partly conditioning in the field. When the hay is almost made it is baled, built into a Dutch barn leaving a tunnel at ground level into the centre of each bayfull. A Lister drier blows into this tunnel for 48 hours, during the day-time only. The air is slightly heated by the engine heat, but not more than 2-3°F. The Lister drier depends on pushing a larger volume of air (30,000 - 40,000 cubic feet per minute) through the hay. So long as the air is drier than the hay it will collect a little moisture on its way through. Mr. Fleming is wise not to continue drying through the night. Night air, especially in the West of Scotland, is likely to be well loaded with moisture and would make hay moister not drier.

Forty-eight gallons of oil were burnt by the drier to cure 20 tons of hay making the cost about 4/- per ton for fuel. About 200 tons of hay were made in the year providing plenty for the farm and a little extra for sale.

Hay crops of around 4 tons were harvested using 3-4 cwts. per acre of compound. Some samples analysed at the Chemistry Department, Auchincruive, had a digestibility of 56% and a Starch Equivalent of 33%. These were low values but higher than the vast amount of hay made in the West of Scotland. This was Mr. Fleming's third year at haymaking with this drier and he had reduced the normally worrying process of haymaking to a few simple rules. This was not an attempt to make super-hay, such as a batch Barn drier can produce, but to simplify normal haymaking. Making better quality hay would involve earlier cutting with a lighter yield per acre, picking it up moister. It would be essential to blow warmer air through for a longer period.

The livestock would not be short of fodder from the vast barn of hay, huge silo and clump of roots.

The byres and cattle were spotlessly clean and fresh looking. The afternoon rations of each of the 72 cows was already weighed out into black rubber buckets set into mobile rack.

The farm statistics were as follows:-

Livestock 73 cows, 120 young cattle, 300 lambs for fattening.

Cropping Barley 28 acres, Oats 26 acres, Swedes 10 acres, Hay 45 acres, Silage 30 acres, Grazing 159 acres. Total Farm Acreage 298. A further 80 acres of grazing land was rented.

## 2. Coulterhaugh

Mr. Minto was apologetic for the general untidyness of his farm. The contrast with Mr. Fleming's farm was certainly striking but the two farms had a distinctly different emphasis. Warrenhill looked to the quality of the pedigree stock and a good frame was an essential part of the picture. The emphasis at Coulterhaugh was on the greatest production at the lowest cost and trimmings were an extravagance.

The farm figures were as follows:-

| | | |
|---|---|---|
| Livestock | Milk cows 90 | Young dairy cattle 74 |
| | Bulls 2 | Bullocks 14 (bought in June) |
| | Cross ewes with lambs 10 | Gimmers 30 (bought in August) |
| | Blackface hoggs wintered 63 | Feeding hoggs 55 |

Cropping Barley 18 acres, Oats 40 acres, Silage 94½ acres (mostly cut twice), Grazing 52½. Total Farm Acreage 205.

Grass Silage. The main winter feed was made of as high a quality as possible. This last season the cut grass had been wilted but unfortunately the product was only 18% dry matter but had 17% crude protein.

In former years, 26% dry matter was obtained without any special wilting but the crude protein content was rather lower at 13½%. Wilting had been impossible this year. After 2 hours, the rain came and Mr. Minto had picked the crop up quickly. Next year he would allow 6-8 hours.

No additives were used, the crop was harvested with a three man/three tractor unit, one at the reaper, one at the forage harvester after wilting and one at the silo. The total farm staff was only 2 men, a lad and Mr. Minto. Two silos were built, backing on to each other to give just enough feeding face for 75 cows, and the second face for the dry cows. The first silo contained a total of 630 tons (allowing about 8 tons per head).

Crop Store. The largish acreage of oats was unusual and retained because, contrary to most other farmers' experience, it yielded well, certainly more than barley. Mr. Minto often harvested 2 tons/acre and had reached 45 cwt/acre.

Many farmers are putting up these tower silos for storing grain. The basis is to store grain directly from the combine, whilst still moist. Grain with 30% water could be stored but 20-24% was more usual. This last harvest the grain had been drier than necessary and in fact could have been bagged.

The gain in the system is earlier clearing of fields, pressing on with threshing, saving on bags, easy transport of grain to the silo, easy mechanical feeding.

When moist grain is piled up, it begins to ferment and give off carbon dioxide gas. Normally the process would continue until the whole crop was lost.

When the moist grain is stored in a sealed silo, the gas produced in fermentation cannot escape and eventually acts as a preservative to prevent any further fermentation. In this state, the grain can be preserved indefinitely. The grain must be carefully used. Mr. Minto draws off about 3 tons a week, keeping the rest sealed. The grain must be mixed straight away to the balance needed. The cows are given a ration made up of 6 cwt. Rolled Oats

1 " Grain Balancer

$\frac{1}{4}$ " Fish Meal

fed at 4 lb/gallon after the first gallon through the winter together with the self feed silage. Very little bought feed is used. Only 6 tons had been delivered since March. Mr. Minto put a very low value on cake which he called Seed Crushers Waste. His mixture was fed to a maximum of 22 lb. at 11 lb. per feed.

One questioner wondered how the cows could manage this quantity during their turn at the Parlour. The answer was that during the 5 minutes milking plus 10 minutes waiting and washing there was plenty of time to put away this top ration.

The cows were loose housed, but the unit had been set up before cubicles and resulted in rather dirty cattle.

Nevertheless, the result of the enterprise was high yields (824 gallons/head sold) at low cost and at high efficiency in terms of labour.

No doubt Mr. Minto will get round to tidying the whole thing up some day but not until he can spare time from his wide services to the farming community (College Governor, Young Farmers' Clubs etc.).

## Conservation

Dr. R.D. Harkess

Hay and silage are conserved by applying one of two processes to grass. Silage is pickled whilst hay is dried. A basic requirement of silage making is exclusion of air, by rolling and creating a seal of grass, or by using an airtight container. Rolling is much easier when the grass is fairly moist, but this does not necessarily mean that wet grass makes good silage. Grass can be too wet when the silage will have a foul smell. Where grass is wilted, air exclusion by rolling becomes more difficult and at the same time more important. Haylage represents the conservation of very dry grass and it would be impossible to exclude air from this material by rolling. It is essential to use other means to exclude the air, namely a sealed silo. Mr. Minto's silage was too wet and had a pH of 5 suggesting an unsuitable type of fermentation. Haylage can have a pH 5.0 and still be good. The fermentation is responsible for some loss of feeding value, necessary in order to produce the lactic acid which is the prickly medium. The fermentation is also responsible for the rise in temperature and the acidity of the silage.

### Types of Hay

Distinctions should be drawn between three types of hay.

Firstly, Field Cured Hay, whether cured on tripods or in bales had to be cut and made when the weather was suitable and not when the grass was in peak condition.

The chances of getting 3 dry days in succession was 1 in 50 whilst the chance of getting 2 days was 1 in 10. There was thus every inducement to clear hay as quickly as possible whilst a dry spell lasted.

Secondly, Conditioned Hay, (as made by Mr. Fleming with a Lister drier) resulted in better, quicker, more certain processing of hay, cut at the normal haymaking times (around the Highland Show dates). There was less risk of spoiling the hay but no inducement to go in for super hay quality.

Thirdly, Barn Dried Hay, allowed one to cut hay just a little earlier when quality was higher and pick the grass up with a fairly high moisture content and complete the curing process safely in a barn.

Two types of barn dried hay were produced at Auchincruive. Firstly, a very high quality, using 15,000 cubic feet of heated air per minute made in small batches of 8 tons. Secondly, a hay midway in quality between Mr. Fleming's and the above by using 30,000 cubic feet of unheated air per minute in a storage barn of 50 tons capacity.

Losses. Some loss was inevitable during curing but each method of conservation had its own level:-

| | |
|---|---|
| Pit silage | 25-30% |
| Wilted silage | 18-25% |
| Haylage | 15-25% |
| Barn hay | 12-30% |
| Field hay | 25-50% |

Quality of Grass

Digestibility is one of the major aspects of grass quality. It remains fairly high, 80% or more in young spring grass until the grass flower heads start to show. From this date, around mid-May, the digestibility falls by $\frac{1}{2}$ unit per day, right down to about 40% in mature grass in July. New sown leys maintain their high level digestibility later than old leys. A Timothy/Meadow fescue mixture can be left for cutting late in June and still have high digestibility.

Yield and Quality

During the fall in digestibility, crop growth is proceeding at its fastest. The ideal is to cut the crop when it is giving its biggest yield at the quality level required. Letting the crop grow to the highest yield and the easiest curing stage will result in hay or silage of the lowest quality. This might not be suitable for even maintenance without some supplementation.

Quality and Intake

The main effect of digestibility occurred when digestibility was below about 70%. The amount eaten by stock was reduced and the rate of eating slowed down.

An example of how this works is shown below for 2 samples of hay.

| | | Sample 1 | Sample 2 |
|---|---|---|---|
| A. | Type of Hay | Early cut | Late cut |
| B. | Digestibility of Hay | 63% | 56% |
| C. | Amount dry matter eaten (intake) | 26 lb. | 23 lb. |
| D. | Quantity of nutrients in dry matter eaten. (B multiplied by $\frac{C}{100}$) | 18 | 13 |

Mr. Fleming's hay was similar to sample 2 in analysis and could be expected to provide maintenance + 1 gallon per day.

Questions were put to Mr. Fleming, Mr. Minto, Dr. Harkess by members.

Q1. Did the % digestibility referred to by Dr. Harkess apply to the total dry matter or to the carbohydrates?

A1. Total dry matter.

Q2. Mr. Morrey's lecture to the South West Scotland Grassland Society would be recalled when he said "that he preferred knitting to barn drying as a hobby". Were people wasting time in thinking of barn drying? An article in 'Scottish Agriculture' (Wilted Silage or Barn Dried Hay - by Andrew Howie, Scottish Agriculture Vol. XLIV, 1964, pp. 84-89) reports on a comparison between wilted silage and barn dried hay. Surely it was unfair to compare silage cut early with barn dried hay cut over a month later and produce conclusions. Hay for barn drying should be cut early.

A2. Completely unfair and ridiculous.

Q3. (A comment by Mr. Godley of the Electricity Board). Culpin, director of Drayton Experimental Farm, Warwickshire (N.A.A.S.) reported a true comparison between barn dried hay and silage which had been cut at the same time. The cost per lb. of starch equivalent was cheaper for barn dried hay.

Q4. Why cut both barn dried hay and silage on the same dates? If the date chosen was the optimum for hay, it would be too late for silage making and not making use of the fact that silage could be made from much younger grass than could be used for hay. As a result of early silage cutting, it was possible to come again and take far more silage cuts than hay cuts. What was the difference between leafy grass cut in July (second cut) and first grass in June?

A4. Second growths could be almost as high in feed value as first growths. Mature grass cut for hay could have a low digestibility

but it was still possible to make barn dried hay from grass in early ear which was at its peak in nutritive value. Leafy second growth could therefore be very little if any better than such herbage made into top grade barn dried hay.

Q5. What was Mr. Fleming's objection to using nitrogen for his hay fields?

A5. Nitrogen is used on Mr. Fleming's hay fields in the form of complete compound fertiliser at 4 cwts. per acre. The objection is to using straight nitrogenous fertiliser which leads to hay which cannot be cured nor baled satisfactorily.

Q6. What were Mr. Minto's difficulties re. wilting and what would he do next year?

A6. Wilting silage was very difficult and had been made more difficult by his choice of very young grass with the hope of getting really top quality. His intentions were to make even better silage, try using earlier grass and continue to attempt to wilt. Further opinions on this subject were that it was wrong to make silage too young and some earing should be allowed in the interests of easy wilting, good fermentation and obtaining top yields.

Q7. This last statement is rubbish. The ideal material was <u>High dry matter leafy grass</u>. Anyone who practises self-feed silage must make colossal amounts of silage, and must start making silage as soon as he can get out to the field. If starting is delayed until first ear emergence, then the whole crop will be away and over mature.

A7. If silage is made from one type of grass such as Italian rye-grass, this is very likely to happen, but where a colossal amount has to be made, some staggering of making should be arranged by using early and late swards and by grazing some of the first flushes (see Rex Paterson, page 10).

Q8. I can't afford to wait for ear emergence. Silage making is part of my grazing plan. When the stock come off, the grass regrows for silage making. The cows would catch up with me if I waited too long.

Q9. What experience was there of cutting a silage crop with a forage harvester and passing it straight back on to the ground for wilting to be collected later?

A9. If the grass was short, it would blow away. The forage harvester can't make a good job of short grass it tends to turn it into balls of mush.

Q10. Runcie finds mowing followed by a crimper to be the best preparation for wilting.

Q11. What about consolidation of wilted silage? Wasn't it rather difficult.

A11. Definitely. If allowed to get too dry it would bounce a tractor up and down like a mattress. It was important to top a silo of wilted grass with wet unwilted grass which could be rolled to give a seal.

Q12. Mr. Fleming seems a contented man, not apparently keen on extracting the last ounce from his soil. Is he satisfied with his level of production?

A12. No one is satisfied. My cows average 1100 gallons.

Questions and answers became rather confused but definitions of barn dried hay, the relation between staff numbers and possibilities of winter forage production, fertiliser levels were dealt with before the meeting closed and votes of thanks were made to all who had contributed. I.V. Hunt.

Fertiliser Facts. 2. Types of Nitrogenous Fertilisers

| | % N (Nitrogen) | Units N/cwt. | lbs. N/cwt. | Net cost/ cwt. | Net cost pence lb. N. |
|---|---|---|---|---|---|
| Sulphate of Ammonia | 21 | 21 | 23.5 | 12s 6d | 6.4d |
| Nitrochalk | 21 | 21 | 23.5 | 14s11d | 7.6 |
| Nitroshell | 23 | 23 | 25.8 | 15s 2d | 7.1 |
| Nitram | 34.5 | 34.5 | 38.6 | 20s 7d | 6.4 |
| Nitrate of Soda | 16 | 16 | 17.9 | 17s 2d | 11.5 |
| Urea | 46 | 46 | 51.5 | | (9d) |
| Compounds (see page 38) | | | | | |
| 23 : 10 : 11 | 23 | 23 | 25.8 | 24s11d | 11.6 |
| 16 : - : 16 | 16 | 16 | 17.9 | 18s10d | 12.6 |
| 6 : 15 : 15 | 6 | 6 | 6.7 | 18s 1d | 32.4 |
| Liquids | | | | | |
| | No. of gallons ≡ 1 cwt. Sulphate of Ammonia | | | | |
| Gas Liquor | 1.8 | | 120 | | (6.4) |
| Anhydrous Ammonia | 82 | | $2\frac{1}{2}$ | | (5) |

Note Nitrogen in Urea, Gas Liquor and Anhydrous Ammonia are not as effective as other sources. The net cost of effective nitrogen could be increased by 10 - 20%. All three can also reduce yields by 'Scorch'.

# SOUTH WEST SCOTLAND GRASSLAND SOCIETY

Report of Proceedings at the 3rd Annual General Meeting at New Building, Auchincruive, Ayr, 16th November, 1964.

The Chairman, Mr. D.B. Jamieson, opened the 3rd Annual General Meeting of the Society.

1. Minutes

The minutes as published in Journal No. 4, were approved and signed.

2. Matters Arising from Minutes

None.

3. Chairman's Report and Outline of Programme

Mr. Jamieson reported that the Society again had a very successful year and was in a sound position financially. We had successful meetings at Kilmarnock and Castle Douglas, both of which were very well attended and interesting. The weather was against us at the spring meeting and, although greatly indebted to our host, it was disappointing. The summer tour to Aberdeen proved to be a success. We had an enjoyable time and came back having learned a little. They had been suffering from a prolonged drought and their grass was not very good.

The Central Scotland Grassland Society, our younger brother, came into existence. There is considerable interchange of ideas and of committee members. Mr. Jamieson wished them well and assured us that not only would the farmers in their area benefit but we too would benefit in due course.

Mr. Jamieson went on to say that much talk was going on about increased population and increased production. Our population is expected to be doubled by the end of the century. This problem has to be faced. We as grassland farmers can do our bit and increase production from our grass acres by various means. The ultimate responsibility lies in the hands of the Government because although we can produce more, there is not much fun in doing so if at the end of the day it is not going to be renumerative. We are bound to be learning just a little more about how to manage our grass by membership of a Grassland Society such as ours.

Mr. Jamieson stressed that the success of the Society largely depended on the two main office-bearers, Mr. Hunt and Dr. Castle. Dr. Castle had looked after the financial side very well as was obvious from the sound financial position we were in. On the other side, Mr. Hunt had likewise attended to detail and made things very easy for the person in the Chair. Mr. Jamieson thanked both Mr. Hunt and Dr. Castle and called for a vote of thanks.

The 1965 summer tour was to take the form of a trip to Ireland. Mr. Jamieson hoped that as many as possible would support this tour which should prove enjoyable.

4. Treasurer's Report

Dr. Castle hoped that members had studied the copy of the audited accounts which had been circulated to them. He felt the accounts were reasonably satisfactory for such a young Society. We had started off with £90 and ended with £150 and at the time of speaking had £288 in the bank. As it was the beginning of the winter session we had some expenses outstanding but were still in a satisfactory position financially. Going into detail our main source of income was the subscriptions. Some members were very generous, one sent £1:1s. and another member £1:5s. so it was best to pay by bankers order. The sales of the journal were also spreading, even overseas. The major item of expenditure was printing the journal and this was well worth while. The two summer tour items did not balance showing an income of £68 and an expenditure of £52. One referred to one tour and one another. The summer tours always seemed to be on the dividing line between the financial years which made things rather difficult. The policy of the committee was that these tours should just balance, no profit was made from them.

Principal Hendrie queried the item 'Herbivaria'. Dr. Castle said that this was the 1/- journal bought from the British Grassland Society which was circulated to all members.

Mr. Cochran moved that the accounts be adopted and this was seconded by Mr. McColm.

5. Membership of Society

Mr. Hunt stated that the membership figure was 272. There had been a few changes. One or two people had moved away to England and in due course Dr. Castle would find that their bankers order had been cancelled. The membership list

of the South West Scotland Grassland Society would be published in No. 5 of the journal which is being printed. The Central Scotland Grassland Society list was published in No. 4 of the journal. The journal took a long time to be printed and therefore the membership list might not be strictly accurate. New members were always welcome and members were encouraged to bring friends to our meetings in the hope that they might join eventually. Mr. Hunt then outlined the programme fixed to date:-

| | |
|---|---|
| 17th December. | A meeting on 'Conservation' would be held at Thornhill. This would be a discussion meeting, the speakers being Mr. Robt. Lammie, Mr. T. Clark and Dr. David Reid. |
| 16th February. | A meeting on 'Grazing Management' would be held at Castle Douglas. This would cover grazing management on both low ground and hill land. Speakers had not yet been selected. If any member particularly wished to speak on this occasion would they get in touch with the Kirkcudbrightshire committee members. |
| Spring Guest Speaker. | A.S. Foot from the N.I.R.D., Shinfield, Reading, would speak on 'Feeding the Dairy Cow'. |
| Spring Tour. | The tour centre would be North Ayrshire. |

Mr. Jamieson stated that he was open to any suggestions from members about the programme for the forthcoming year.

6. Elections

Under the Constitution four members were due to retire and therefore there were four vacancies on the committee. We had received four nominations, one from each county, who were duly elected.

Retiring Members

| | |
|---|---|
| Ayrshire | - Mr. R.W. Montgomerie, Lessnessock, Ochiltree. |
| Dumfriesshire | - Mr. J.C. Ballantyne, Tinwald House, Dumfries. |
| Kirkcudbrightshire | - Mr. N.P. Maclaren, The Leaths, Castle Douglas. |
| Wigtownshire | - Mr. F.R. Evans, Penkiln, Garlieston. |

New Members

| | |
|---|---|
| Ayrshire | - Mr. A. Reid, Diddup, Saltcoats. |
| Dumfriesshire | - Mr. T. Hamilton, Briery Hill, Lockerbie. |
| Kirkcudbrightshire | - Mr. J. Finlay, Rainton, Gatehouse. |
| Wigtownshire | - Mr. A.S. Jupp, Bailliewhirr, Whithorn. |

Mr. F. Evans stated that he believed we were allowed to continue with the same Chairman and Vice Chairman for two years and he proposed both these men should carry on. Principal Hendrie seconded these two elections.

Mr. Jamieson thanked Mr. Evans for his kind words and stated that Mr. Montgomerie and himself would do their best for the Society.

Mr. Jamieson moved that Mr. Hunt and Dr. Castle be re-elected. This was unanimously agreed with.

7. Any Other Business

Principal Hendrie wondered if a note of thanks could be sent to Miss Hughes who audited the books.

Principal Hendrie also brought to the attention of the meeting the invitation from the B.G.S. that one or two members of the Society should attend the Winter Meeting in London at the end of the Smithfield Show. The committee were prepared to pay a proportion of the expenses incurred, up to £15 in return for a report for the journal.

Ye 'Middlesex Method' for Ye Quicke Driede Hay

1st day If cut before 9 a.m. spread and turn and rake it into single windrows and then into grass cocks before nightfall.
2nd day The first days mowing is shaken out into straddles 5-6 yds. wide, turned into double windrows and made into bastard cocks before nightfall.
3rd day Shake out again and it will be fit to carry by afternoon.

This method is only suitable in vicinity of large towns such as London (?) where labour is plentiful.

The main points to remember:- 1. Keep the hay moving, 2. Never let it lie exposed for long in swath or windrow, 3. Never open the rows or cocks in the morning before the dew is off. Journal of Agriculture, Vol. 3, 1832, p. 363.

# CENTRAL SCOTLAND GRASSLAND SOCIETY

Minute of Second Annual General Meeting held at Toftcombs Hotel, 26th November, 1964.

## (1) Chairman's Report

The Chairman expressed satisfaction at the very large number of people who had attended the Annual General Meeting. Well over 100 persons visited the two farms in the afternoon and some 85 persons were present at the Business Meeting.

Mr. Gilmour reported on the year's activities as follows:

(a) The Society had been formed on 29th July, 1963, following a visit of interested farmers to The Burn Farm, Chapelton, Lanarkshire (Mr. Robert Yuill).

(b) The first winter meeting had been held on 6th November, 1963 in Glasgow and was addressed by Professor Cooper, Dean of Agriculture, Newcastle University, who dealt, amongst other things, with the problems associated with the density of stocking on grassland. This meeting was attended by about 100 members.

(c) On 17th February, 1964, Professor Hendrie, Principal of The West of Scotland Agricultural College, spoke to the Society in Stirling and this meeting also attracted about 100 members.

(d) The first series of farm visits was held on 14th May, 1964, in the counties of Stirling and West Perth. Members responded extremely well to this tour, 110 being present, and the farms visited were of particular interest to members of the Society. The Chairman asked that Messrs. Broadfoot and Malcolm should be thanked particularly for their work in arranging this tour.

(e) At the invitation of Dr. J.A.B. Smith, the Society visited the Hannah Dairy Research Institute on 3rd June, 1964, where the results of grassland research and other facets of experimental work were shown to members. 100 members took part in this visit.

(f) 26th November, 1964 - farm visits to Warrenhill and Coulterhaugh, followed by the Annual General Meeting.

(g) The Chairman also intimated that an agreement had been reached with The South West Scotland Grassland Society whereby members of each Society were most welcome to attend the functions of the other. Members of the Central Society had taken full opportunity of this reciprocity and had attended several of the meetings of The South West Scotland Grassland Society. This spirit of co-operation was of particular value.

(h) The Chairman reported that the Committee had met in Blythswood Square on five occasions.

(2) Report on Membership

The Secretary reported that at 26/11/64 membership stood at 218, made up as follows:- Argyll - 11, Bute - 9, Clackmannan - 3, Dumbarton - 7, Lanark - 94, Perth - 17, Stirling - 11, Renfrew - 30, Technical - 36.

(3) Treasurer's Report

The Treasurer submitted a statement of income and expenditure for the year ending 30th September, 1964. This statement should be read as part of this Minute. Mr. Waddell pointed out that although the financial affairs of the Society were in a satisfactory position, one major account, that of the printing of the Journal "Greensward", had to be met and it was also pointed out that stationery, postages, telephone expenses were likely to increase in the following year. The accounts had been audited by Mr. Stewart of the National Commercial Bank of Scotland in Lanark and Mr. Waddell suggested that for the future, the Society should be prepared to make an honorarium to Mr. Stewart for carrying out this work. On proposal by Mr. Andrew Paterson, seconded by Mr. Elder, it was agreed that a sum of 3 guineas should be offered to Mr. Stewart.

The statement of accounts was adopted on the proposal of Dr. Laing, seconded by Mr. McFarlane.

(4) Election of Committee

The Secretary reported that in accordance with the Constitution, four Committee Members were due to retire and that nominations for new Committee Members had to be submitted to him in writing not later than 1st October and supported by two members. Four nominations, duly proposed and seconded, had been received. The retiring members were - Major Tullis, Mr. Elder, Mr. Howie and Mr. Paterson and the new members were Mr. Golightly, Mr. Laing, Mr. Caldwell and Mr. Pollock. These new members were declared elected.

(5) Election of Office-Bearers

The Chairman, Vice-Chairman, Secretary and Treasurer were re-elected by acclamation.

(6) Any Other Business

A suggestion was made that functions of the Society should be made more widely known to the general public and that the meetings should not necessarily be confined to members. The general opinion of the meeting was that the Society existed primarily for the benefit of members and that those who wished to avail themselves of the facilities offered, should take it upon themselves to become members.

The Business Meeting closed with a vote of thanks to the Chairman.

Following the Business Meeting, Dr. R.D. Harkess, Grassland Husbandry Department, The West of Scotland Agricultural College, Auchincruive, was invited by the Chairman to open a general discussion on grass conservation, with particular relevance to the systems practised at Warrenhill and Coulterhaugh. Following Dr. Harkess' paper a very full discussion took place and the meeting closed at 8.45 p.m.
J. Waddell.

Fertiliser Facts. 3. Types of Potash Fertilisers

| | % $K_2O$ | units $K_2O$/ cwt. | Net cost/ cwt. | Net cost pence lb. $K_2O$ |
|---|---|---|---|---|
| Muriate of Potash | 60 | 60 | 20s 9d | 3.7 |
| Compounds (see page 38) | | | | |
| 23 : 10 : 11 | 11 | 11 | 24s11d | 24.3d |
| 16 : - : 16 | 16 | 16 | 18s10d | 12.6d |
| 6 : 15 : 15 | 15 | 15 | 18s 1d | 12.9d |

## Discussion Night at Thornhill, Dumfries

### CONSERVATION

James Walker-Love chairing the meeting considered conservation the keystone to farming in the South West of Scotland. He introduced the speakers.

1. Tom Clark, New Mains, Kirkbean, Dumfries - Traditional haymaking.

Twenty years ago, there was no haymaking problem. The traditional method was used throughout Scotland. Perhaps there was no super hay, but neither was there any bad hay. Now, every hay crop is different, with farmers hopping from bales to stooks in the field for months. The only common feature is dissatisfaction with results. Associated with the increase in pick-up baling we have mouldy hay and Mycotic Abortion.

The basic trouble has been trying to fit haymaking into mechanisation rather than trying to mechanise haymaking. The pick-up baler is a false step and should be corrected by going back to the 1 ton heap in the field. It is easier to move 1 ton of hay from a heap than several small bales each with its costly length of twine. There are five ways of spoiling hay.

(a). Late cutting.

(b). Overworking.

(c). Baling too early.

(d). Leaving it out too long.

(e). Carting in too early.

At New Mains, we depend on a machine no longer manufactured - a Rotobaler, which has been a great success since we bought it 8 years ago.

Advantage of Rotobaler

(a) The bale (of 70 lb. weight) is weatherproof and can be left in field to mature in situ. If weather turns wet it only needs a $\frac{1}{4}$ turn of the bale.

(b) The bales store more densely than the square bale.

(c) Can be used by small staff too busy to be going back over the bales.

(d) The machine is slower than other systems but adequate for the rest of the small staff.

(e) It picks up a larger swath than other balers and produces 4 bales a minute or 5 tons/hour. The latest pick-up balers will do 11 tons/hour.

Handling the bales may be awkward in winter. Where a big swath was picked up the bale opens out easily but where a thin swath was picked up, a knife may be needed to cut it open.

2. Robt. Lammie, Lowdrummore, Wigtownshire - Haylage.

Mr. Lammie has used a Cropstore silo for three seasons. His sons were the prime movers, coming back from Smithfield one year full of enthusiasm and with samples of the product.

The programme at present:-

(1) Cut with ordinary mower.

(2) Crimper. To reduce moisture by half.

(3) Cock Pheasant puts 2 or 3 rows into 1 swath. Its special virtue is that it leaves the stones on the ground. Other turners pick up stones, roll them in swath and lead to broken chopper knives.

(4) Koala Star Pick-up chopper.

(5) Blown into Ferguson Tip Trailer with silage sides.

(6) Offload into dump box which feeds the grass to a 'Kool' blower driven up a 9" pipe.

(7) Spread uniformly in silo by Badger-Thompson spreader.

50/60 tons a day can be brought in with a team of 3 men and 3 tractors. One picks it up, one runs backwards and forwards whilst Mr. Lammie Sr. watches the tower end and keeps things moving.

Careful costs over two years and allowing depreciation of whole plant over 10 years work out at £4 per ton in the trough (includes growing the grass).

3. Dr. David Reid, Hannah Dairy Research Institute, Ayr.

Hay or silage can never be better than the grass from which it is made. The quality depends on the cutting management, seed mixture and manuring. I propose to deal with cutting management. Two variables affect the quality.

(a) The frequency of cutting, i.e. the length of rest period between cuts.

(b) The closeness of cut or stubble length.

Frequency of Cutting

All experiments at the Hannah Institute show that the more often grass is cut, the lower the yield per acre.

e.g. Cut 4 times at 6 week intervals - yield is 83 cwt/acre.
6 " " 4 " " " " 68 "
12 " " 2 " " " " 28 "

The times when these cuts were made are selected on a time basis and bear no relation to the crop.

In another series of experiments grass was cut every time it grew to 6/8 inches high or every time it grew to 14" tall (it was then just flowering). The first gave 76 cwt/acre whilst the taller grass gave 88 cwt/acre.

Immediately after a crop is cut the regrowth is slow for about one week.

With frequent cutting, there are more such slow growing weeks and a slower average growth rate for the whole season.

So much for the yield, but quality is also affected. Increased frequency of cutting gives better quality. Thus we have a relationship between low yields and high quality.

The ideal balance is to choose the stage when the ear or flowerheads are just emerging from the grass shoots.

This material is too leafy for making hay by traditional methods but may be possible by the newer methods. One important asset is that the stage often coincides with the best haymaking weather.

Closeness of Cutting and Yield

Cutting a sward closer has given 20-40% higher yield of dry matter. A normal farm reaper can cut down to 2½" whilst a flail cutter or gang mower can cut down to 1". The average yields cut to 2½" have been 47 cwt/acre whilst cut to 1" the yields have been 63 cwt/acre dry matter. This increase is equivalent to the increase which could be obtained from 5 cwt. Nitrochalk/acre. After 5 years of such cutting treatment, ryegrass swards have shown no deterioration.

The herbage as harvested can be leafier and have more clover in it. The recovery of the sward after close cutting is not affected by either dry weather or level of fertiliser nitrogen used. Thus a clovery sward or a heavily fertilised grass sward are equally affected.

The usual farm type reciprocal mower can't be set to cut at 1" but the forage harvester can. One hitherto unresolved question is whether the flail action or the reciprocal action mower has any effect on the results.

The only experimental comparison has been between a lawn mower and an Allen Reciprocal knifed grass cutter. The mower leaves the tips of cut shoots torn just like a forage harvester. The lawn mower kills out swards within three years if not fertilised.

So far the type of mower doesn't seem to be important. The dying back of shoot tips after cutting with a forage harvester has often been noted but after all, the grass doesn't re-grow from the tips of cut leaves but from their bases.

Discussion

Q.1. Is it true that if grass is cut too closely, its rate of recovery is slowed down? Is quick grazing down less severe than slow grazing? How far is quality affected in a horizontal silo compared to a tower?

A.1. Growth rate of closely cut grass is slower than laxly cut grass for 6-7 days. Then it is faster because close cutting increases the number of tillers (shoots) to give a thicker sward. The quality of silage is unaffected by type of silo. The main factor is the stage of growth at which the herbage is cut.

Q.2. What information is there on the suitability of polythene lined pits for dry silage or haylage making instead of expensive towers?

A.2. Polythene is extremely useful for any type of silage. Used extensively for overnight stops in towers and for finishing off a pit silo.

Q.3. Does a polythene sheet keep the temperature of wilted material down?

A.3. Yes.

Q.4. I have noticed how contented Mr. Lammie's cows are in his loose house. Is this due to the silage or to the housing?

A.4. Experience is short, but the moisture content seems to affect the intake. Where silage has 35-50% dry matter, the cows seem more contented, lie longer. I have not noticed any effects on milk yield but there must be an effect. It is noticeable that cows on high dry matter silage amble to the milk parlour whilst those on the ordinary silage rush through.

Q.5. Is there any difference in quality from top to bottom of the Haylage tower, caused for example by greater pressure on the bottom half?

A.5. No. The bottom half has been cut earlier and therefore is better grass. There are layers of good and bad silage even in a Haylage tower. So far, comparisons of high and low dry matter silage have been inconclusive. The rate of passage through the animal is different. For example, it takes a cow less time to satisfy its appetite on high dry matter silage but it has plenty of time anyway.

Q.6. What is Mr. Lammie's feeding programme?

A.6. I expect maintenance and 2 to $2\frac{1}{2}$ gallons (M + 2 to $2\frac{1}{2}$) from the haylage and check the quality once a week. I adjust the feeding to the analysis. As quality rises, I reduce the concentrates and vice versa, using either $2\frac{1}{2}$, 3 or 4 lb. concentrates per gallon of milk above $2\frac{1}{2}$ gallons. Formerly I used various brands of concentrates but last season only homegrown barley mixed with 1 cwt. in 10 cwt. fish meal.

In 1963, my over-all winter feeding was at 0.5 lb. per gallon bought feed plus 0.6 lb. homegrown barley. Milk yields averaged 900 gallons.

I am favoured by a short winter from November to 1st March and thereafter strip graze.

My total winter silage and hay production and summer grazing comes from 178 acres. The 1st cut silage comes from 60 acres, the second from that 60 plus another 50 acres, some of which is made into hay. Last year 2000 bales were made. Toppings from grazing fields are made into pit silage. Last year I made 150 tons. I seem to get more feed per acre in winter than I do for summer grazing. The towers can cost anything from £4000 to £11500. Difficult to see where one could break even on such an expenditure. The capital investment must be offset by saving labour. When I took over this farm my staff was 14, now it is 2 men + 2 sons and myself. One important requirement, must have good low ground before embarking on this scale of investment.

Q.7. What are the advantages of the rotobaler?

A.7. The main one is the low risk under bad weather conditions. There is a very small contact between the bale and the ground and no necessity for building special stooks. They discolour more easily since the exposed area is higher.

Mr. A.B. Hall of Moniaive proposed the vote of thanks. I.V. Hunt.

Fertiliser Facts. 4. Compounds

In the above sections 1, 2 and 3, the compounds have been valued on the basis of a single nutrient. This is because many farmers apply a compound as an alternative to a straight fertiliser.

The proper use of a compound is where all the constituents are necessary for growth or for maintaining soil productivity. Full valuation of such compounds is shown below.

| | % nutrient | units/ cow | Net cost/ cwt. | Net cost/lb. nutrient | Cost of equivalent straights/ cwt. |
|---|---|---|---|---|---|
| 23 : 10 : 11 | 44 | 44 | 24s11d | 6.1d | 22s 5d |
| 16 : - : 16 | 32 | 32 | 18s10d | 6.3d | 15s 7d |
| 6 : 15 : 15 | 36 | 36 | 17s 1d | 5.4d | 15s11d |

## MANURING OF GRASSLAND

There was a large attendance at the meeting of the Central Scotland Grassland Society held in the West of Scotland Agricultural College, Glasgow, on 18th January, 1965, when the topic was "Manuring of Grassland". The speaker was Mr. I.V. Hunt, head of the Grassland Husbandry Department of the College and Secretary of the South West Scotland Grassland Society.

In his lecture Mr. Hunt gave an excellent summary of current scientific knowledge on the manuring of grassland, and of the implications of this knowledge in practice, particularly with regard to the all-important question of profitability. His main theme could be summarised as - fertilisers are expensive enough without applying more of them than is really advantageous.

The object of fertiliser application, as stated by Mr. Hunt, is to supply the plants with sufficient quantities of the essential elements to promote maximum growth. On the small farm this allows income to be increased through carrying more stock on the same acreage, while on the large farm profit can be increased by substituting low cost grass for expensive concentrates. Whatever the aim, however, it is essential to utilise the increased grass yield efficiently.

It is still difficult to give precise advice on the types of fertiliser to use and the amounts to be applied on a given field because so many interacting factors, such as management, weather and soil type, have to be considered. Until all the problems have been solved by experiments the farmer and his adviser must, in Mr. Hunt's words, "proceed as they always have by 'guess, gamble and gullibility'".

In Britain the most effective fertilisers for increasing grass yields are those containing nitrogen. Phosphate, potash and lime will increase yields on soils deficient in these nutrients. However, once requirements of these fertilisers have been satisfied increasing their rates of application of these fertilisers will give no greater yields, and in fact could be harmful and certainly unprofitable. Nitrogenous fertilisers cannot give high yields until deficiencies of phosphate, potash, magnesium, and other plant nutrients have first been made good.

Mr. Hunt gave it as his view that the theoretical maximum yield, which it was possible to obtain from grassland, was about 15 tons of dry matter per acre, which represents a carrying capacity of 3 cows per acre over the year. This of course assumes absolute perfection

in management and manuring, since the maximum yield so far obtained in plot experiments has been about 7 tons of dry matter per acre. On the farm it should be possible to obtain about 5 tons of dry matter per acre using 150-200 units of nitrogen, or about 2½ tons using clover only. However, even these yields, representing a carrying capacity of one cow to 1 or 2 acres over the year, are unrealized on many farms.

The amounts of potash present in the grass plant suggest that this nutrient is as important as nitrogen. Potash applications are particularly important where high yields are sought through heavy nitrogen dressings. Under grazing conditions 90% of the potash in the consumed grass is excreted by the animal, but this return of potash to the pasture is patchy and should be evened out by the use of potash fertilisers. On a mown sward potash is being carried off in the cut herbage, and potash applications are essential if grass yields are to be maintained.

In Mr. Hunt's opinion the relationship between potash applications and the incidence of grass staggers was still open to debate. However, he showed that potash definitely reduced the magnesium content of herbage and this might in some circumstances contribute to staggers. To counteract this he suggested the omission of spring potash applications, the use of magnesium limestone, the feeding of magnesite, and the sparing use of slurry in the spring because of its high potash content.

On the subject of phosphate fertilisers Mr. Hunt suggested that ground mineral or rock phosphates are only of value on wet, acid soils. Some types of basic slag might be of similar value, or even superior, to superphosphate, but the low grade, low solubility slags could be less effective than rock phosphate.

Mr. Hunt later illustrated the principal themes of his lecture by means of coloured slides. With these he also demonstrated the variations which can occur in fertiliser response with the date of application, date of cutting or grazing and with the species or variety of grass in the sward.

The meeting concluded with a lively discussion in which many members participated.

In answer to a question on the quantity and dates of application of nitrogen fertiliser for maximum profit on a dairy farm on average land, Mr. Hunt recommended that 90-100 units of nitrogen should be applied in the spring for the early bite or silage. This should be followed in early June after silage-cutting by a dressing of 60 units, with a further 60 units applied in mid-July or later.

Where phosphate or potash are deficient the early June dressing should be applied as a compound containing, in addition to the nitrogen, 60-80 units each of phosphate and potash. Later in the discussion Mr. Hunt suggested that these nitrogen rates should be reduced when the pasture consisted mainly of timothy or meadow fescue. These grasses reach maximum yield at a lower nitrogen rate - probably around 90 units per dressing - than do perennial and Italian ryegrass.

There was considerable debate on the question of the minimum period which should elapse between applying nitrogen fertilizer and starting to graze the pasture. Mr. Hunt quoted the results from one of his experiments in which 23 days elapsed after a mid-April nitrogen dressing before the response, in terms of pounds of dry matter per 1 lb. of nitrogen applied, was sufficient to cover the cost of the fertiliser. Removal of the herbage earlier than this resulted in wastage of nitrogen, and, even on the 23rd day, only very moderate yields were obtained. These results refer to one year only, and the response to nitrogen applied in the spring can, of course, vary considerably with the weather conditions prevailing.

The suggestion that nitrogen is lost by leaching in a cold wet spring was largely discounted by Mr. Hunt. In his opinion leaching losses would only be serious if nitrogen fertilisers were applied early in the winter. He had some evidence of an apparent nitrogen loss in late March through early growth being frosted, but he suggested that the nitrogen was in fact retained in the soil and utilised by the grasses later in the season. In an average spring nitrogen is absorbed by the plant more quickly than it can be lost by leaching.

Several questions were asked regarding S.170 tall fescue, which Mr. Hunt mentioned briefly in his lecture. On low ground the prime advantage of this grass is its earliness, for it can make considerable growth when the temperature is too low for Italian ryegrass. However, its palatability is low, and, on low ground, it could only be used for silage or for wintering young stock, but it grows well on poor, wet, acid soils and can be most productive on the hills or on wet land. Under such conditions it is fairly palatable to sheep, particularly in mixtures with timothy or meadow fescue. The unpalatability of tall fescue might be corrected by crossing it with Italian ryegrass, as some plant breeders are attempting at present.

The final topic in the discussion related to the reliance which can be placed on soil analysis as a guide to planning a fertiliser programme. Mr. Hunt suggested that soil analysis figures could be used to decide on the amounts of phosphate and potash required to

correct deficiencies on a field which had received little or no fertiliser in the past. However, the phosphate and potash figures cannot be relied on in subsequent years, and application rates should be determined by studying plant growth and animal health. The lime requirement figures in a soil analysis appear to be the only consistently reliable ones. D. Reid.

## FROM THE COLLEGE LIBRARIAN

The following publications are available on request to the West of Scotland Agricultural College Library, Oswald Hall, Auchincruive. It is not necessary to ask for the title but merely to give List No. (7) with Publication No.

1. Hunt, I.V. Comparative productivity of herbage varieties on upland peat (In J. Brit. Grass. socy. Vol. 19, No. 1, 1964).
2. Hunt, I.V. New developments in chemical ploughing (In Scottish Agriculture, Summer 1964).
3. Hunt, I.V. Screening stocks of Scots Timothy (In Notes for Timothy Growers, No. 6, July 1964).
4. Hunt, I.V., Alexander, R.H. and Rutherford, A.A. The effect of various manuring practices on the magnesium status of spring herbage (In J. Brit. Grass. socy. Vol. 19, No. 2, 1964).
5. Frame, John. Utilised starch equivalent (U.S.E.) (In Scottish Agriculture, Spring 1964).
6. Frame, J. and Hunt, I.V. The effect of companion grass and seed rate on the productivity of a tall-fescue sward (In J. Brit. Grass. socy. Vol. 19, No. 3, 1964).
7. Grassland Husbandry Department. Techniques for hill land improvement. 1964.
8. Bland, B.F. and Dent, J.W. Animal preference in relation to the chemical composition and digestibility of varieties of cocksfoot (In J. Brit. Grass. socy. Vol. 19, No. 3, 1964).
9. Armstrong, D.G., Alexander, R.H. and McGowan, Mary. The use of in vitro digestibilities of dried grasses for the prediction of their energy values for ruminants. (In Proc. Nutrition society, Vol. 23, No. 2, 1964).
10. Waterson, H.A., Craig, J. and Joice, R. Evaluation of herbicides for the control of couchgrass, Agropyron repens (L) Beauv. (In Weed Research, Vol. 4, No. 3, Sept. 1964).
11. Grainger, John and Kennedy, R.R. Temperature distribution and performance in balloon-sheet soil steaming (In Hort. Research, Vol. 4, No. 1, 1964).
12. Grainger, John. Health in the greenhouse (In Royal Caledonian Hort. Socy. Journal, 1964).
13. Page, E.R. and Dainty, J. Manganese uptake by excised oat roots (In J. exper. botany, Vol. 15, No. 45, 1964).
14. Page, E.R. The extractable manganese of soil. (In J. Soil science Vol. 15, No. 1, 1964).
15. Moon, F.E. and Hymas, Gillian K. Variations in the composition of apple leaves and the errors associated with sampling. (In J. Sci. Fd. Agric. Vol. 15, No. 4, 1964).
16. Wilson, A.L. To dose or not to dose. (In Scottish Agriculture, Winter 1963/64).

## LETTERS TO THE EDITOR

From a Wigtownshire Farmer

Perhaps you will comment on the following in the grassland society's next journal:-

1. Agricultural scientists say that to get high total solids in milk, cows must have an adequate intake of fibre. They also say that, amongst the agricultural grasses, cocksfoot is the most fibrous and least nutritious. Will having a significant proportion of cocksfoot in a pasture assist in producing milk of good compositional quality?

2. Is it possible for grass seeds to lie dormant on the soil throughout the first winter after sowing and begin to grow in the spring following?

Answers to Question 1

1. The statement is not strictly correct. Agricultural scientists do not associate high total solids with an adequate intake of fibre. However, agricultural scientists do say that a ration must have a reasonable amount of fibre to ensure a normal butter fat percentage. This in terms of fodder means a minimum of 8 lb. in the daily ration. We do not say, however, that to double the fibre the total solids will be increased — there is no proportional relationship involved as far as fibre is concerned.

Briefly the other nutritional factors influencing milk composition are:-

A. Ration short of starch, (a) through under-feeding.
(b) poor quality roughages.

B. Indigestion.

Clearly from all this it can be illustrated that while the fibre in cocksfoot may well safeguard the minimum level necessary, through late cutting and poor digestibility the total solids can be depressed by as much as 0.6% on some occasions. J. Walker-Love.

Fibre content and feeding value of cocksfoot. Cocksfoot is not necessarily the most fibrous of grasses, indeed as seen in the following table its crude fibre content is similar to that of timothy and perennial ryegrass. The roughness of cocksfoot is associated with the hard silaceous dentations on the leaf edges and it is probably this feature which reduces its acceptability to livestock.

| | Cocksfoot | Per. ryegrass | Timothy | Meadow fescue |
|---|---|---|---|---|
| Crude fibre (%) | 21.1 | 20.5 | 21.0 | 20.8 |
| Dig. dry matter (%) | 74.3 | 76.2 | 75.9 | 75.6 |

Time of cutting influences both crude fibre content and digestibility of dry matter. The information in the table was obtained from swards cut throughout the season at the grazing stage and it will be seen that cocksfoot was less digestible than the other grasses. Experiments at Hurley and elsewhere have shown that cocksfoot is from 2 - 6 units less digestible than ryegrass when at a similar stage of growth.

Little information is available on the nutritive value of 1 lb. of digestible feed from cocksfoot or ryegrass. From experiments of my own, where cows were fed daily with 18.3 lb. digestible organic matter from cocksfoot and 17.1 lb. from ryegrass, the milk yield per day was 30 lb. and 26 lb. respectively. It seems therefore, that lb. for lb. of digestible feed, there is little difference between these two grasses. R.D. Harkess.

Does a cocksfoot sward increase butter fat? When cows are offered cocksfoot they usually eat less, due to the effect of its rough texture and lower digestibility. Hence milk yield is likely to fall. In the feeding experiment mentioned above, the intake of cocksfoot was reduced to 13.1 lb. per day and the milk fell to 24 lb. per day - a reduction of 21 per cent. Butter fat rose from 3.65 to 4.91 per cent, S.N.F. was 8.67% and 8.44% so total solids were raised from 12.3 to 13.4. To the question "will cocksfoot improve butter fat percentage" the answer is yes but it does this by decreasing total milk yield due to a lower feed intake and leaving a more concentrated product and not by increasing fat production as such. Incidentally when ryegrass intake was similarly reduced B.F. also rose so that restricted feeding of a very palatable grass is likely to have a similar effect to that of a voluntary reduction in intake on a less acceptable grass.

Although fibre is recommended for maintaining butter fat it must be remembered that only digestible fibre is of use for this purpose and that herbage should not be allowed to reach maturity in the belief that this older fibre is of greater value - it will be much less digestible and will act mainly as gut fill. R.D. Harkess.

Summary of factors affecting milk quality. P. Shaw, writing in the Journal of the Institute of Corn and Agricultural Merchants (I.C.A.M.) on 'Prospects for the Dairy Farmer' summarised the factors affecting fat level in milk as follows:-

A. Factors which lower fat %

1. High yield.
2. Early lactation.
3. Warm weather.
4. Long intervals between milkings.
5. Advancing age.
6. Disease.
7. Fibre deficiency.

B. Factors which cause either low or high fat %

1. Heredity.
2. Individuality of animal.
3. Food composition, especially oil content.
4. Drugs and hormones.
5. Breed.
6. Strain of cow.
7. Time of the year.

C. Factors which tend to raise fat %

1. Low yield.
2. Advancing lactation.
3. Cold weather.
4. Short intervals between milking.
5. Early age.
6. Efficient milking.

Answer to Question 2

2. A brief answer to this question would be - yes - it is possible for grass seeds to lie dormant over winter and then grow in the spring, but it depends upon what is meant by the term "dormancy".

Generally grass seed will have some low capacity for germination when still quite immature. Germinability decreases until the seed is ripe, when seed of our common grasses will germinate if given suitable conditions.

All seeds require water, air and a reasonable temperature to commence germination. These conditions are usually adequately fulfilled except for short spells of frost in winter and drought in early summer. So, when grass seed is sown or undersown then it starts to germinate within a few days.

Wild grass seed usually ripens in the summer, is dispersed and mostly germinates in autumn, overwintering in the seedling stage. All the grass seed will not germinate at the one time - this is a built-in insurance against the effects of a severe weather change, ensuring survival of the species.

High germinability, however, is one of the features of bred varieties of grass. Approximately 90% of this seed will germinate shortly after sowing.

Usually grass is sown along with a cereal nurse crop in April or on to the cereal seedlings. Because of the shading effect of the nurse crop, the grass remains in the seedling stage through the season until after the nurse crop is harvested when the grass, no longer shaded, grows more rapidly and becomes really established before onset of winter. If, however, the cereal nurse crop lodges badly then the undersown grass may be killed off. Mechanical damage by machinery during a wet harvest can also severely check the seedling sward.

Direct re-seeding of grass is best carried out in August. The seed germinates and develops in the mild autumn weather into small but hardy plants which will grow away rapidly in the following spring to produce a productive sward.

So, if grass seed is sown in one season, even in late autumn, it does not remain dormant but germinates and overwinters as small seedlings. The slow growth rate of these seedlings during the winter compared with the rapid growth at onset of spring accounts for the apparent "dormancy" period. I.V. Hunt.

From a Renfrewshire Member

During 1964, I purchased a crimper, under the impression that I could cut hay earlier and make better quality hay. It was cut early in 1964, crimped and baled within 48 hours. The analysis of the hay was disappointing with a crude protein content of only 5%. The herbage was mainly ryegrass taken in the first year from a permanent seeds sow-out. In previous years figures of 8 - 10% crude protein have been usual.

Has the crimping anything to do with the drop? What is the crude protein content of various grasses? Would manuring have any influence?

Answer

Information on the factors affecting the crude protein content of hay is available amongst the data collected from various experiments conducted at Auchincruive and other research centres.

(a) Effect of date of cut and rate of Nitrochalk applied on Crude Protein content of Italian ryegrass.

| | | Date cut | |
|---|---|---|---|
| | | 22nd May | 9th June |
| Units/acre N Applied | 31 | 14.1% | 9.3% |
| | 62 | 15.9% | 10.6% |

Note that with 31 units of N the crude protein content fell by 4.8 units from 14.1% to 9.3% in 18 days. Doubling the N fertiliser increased the crude protein content slightly by 1.8 units on 22nd May and by 1.3 units on 9th June. The fall was quite as severe between the two dates with the higher level of N fertiliser.

(b) The effect of nitrogenous fertiliser on field cured hay.

Dr. F. Moon, Head of the Chemistry Department at Auchincruive has published much on the nutritive value of hay and in an article in the Journal of Agricultural Science, Vol. 44, pages 140-151, he shows the range of % crude protein in hays given no nitrogenous fertiliser from 4.3 up to 10.8. Treatment with 3 cwt/acre nitro-chalk (46 units N) raised the crude protein range of these various hays to 5.6 and 14.4.

(c) The effect of type of grass on % C.P.

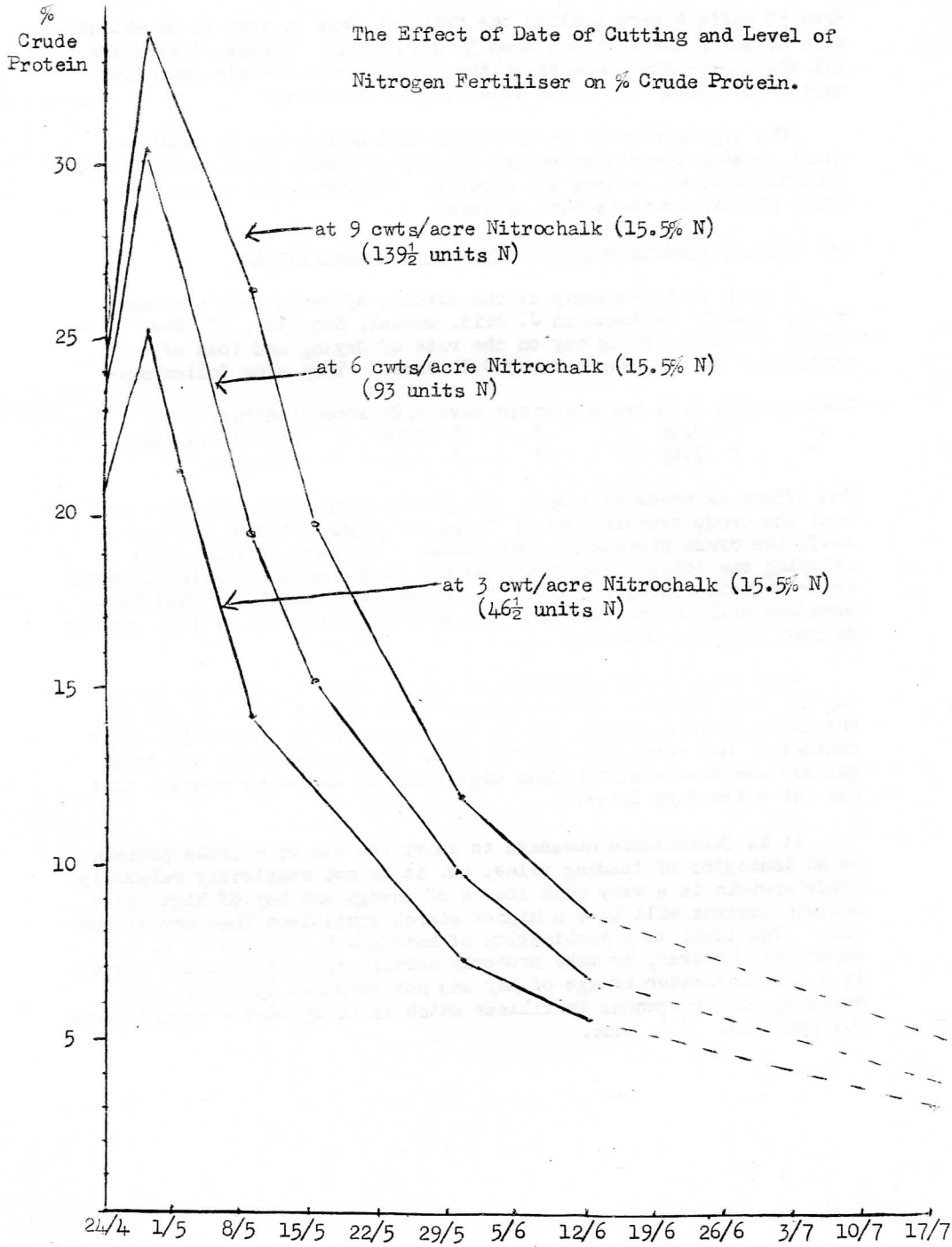
In an article published in the Journal of the British Grassland Society, copies of which are available from me on request, are listed the % crude protein in 27 different varieties and species of grass cut at the date most suitable for hay making, i.e. just when they are showing their anthers from the flowers. These ranged from 6.4% for timothy (cut 11th July) up to 9.5% for rough stalked meadow grass (cut 4th June). Some of the ryegrasses which probably figured in your hay (the questioners) namely S.24 or Ayrshire, produced hay stage grass with just 6.5% crude protein cut on 4th June. When you mention that your hay was cut early it was probably even later than this and likely to have as low or lower crude protein content.

(d) The effect of date of cutting and heavy levels of nitrogenous fertiliser on crude protein content.

This data is prepared from a recently completed experiment, the full report of which has not yet been published.

The possible changes can be seen from the accompanying graph, (page ).

During the time when hay is made in the West of Scotland, i.e. 12th June to 17th July, grass given 9 cwt. nitrochalk (140 units N) which no farmer would dream of doing shows a fall from 8% down to 5%.




The Effect of Date of Cutting and Level of Nitrogen Fertiliser on % Crude Protein.

at 9 cwts/acre Nitrochalk (15.5% N) (139½ units N)

at 6 cwts/acre Nitrochalk (15.5% N) (93 units N)

at 3 cwt/acre Nitrochalk (15.5% N) (46½ units N)

When 93 units N were applied the fall was from 7% down to 5% whilst with 46 units the fall was from 5% down to 4%. These figures are all shockingly low compared to the 12-16% crude protein sometimes quoted for really top grade field tripod cured hay.

The big difference is of course that modern hay is made from quick growing ryegrasses whilst the hay of former days would be made from mixtures of grasses and clovers. Clovers have much higher crude protein contents than grasses.

(e) Effect of mechanical treatment of % crude protein.

A very useful summary of the effects of mechanical treatment on hay quality is found in J. Brit. Grassl. Soc. Vol. 18 "The effect of conditioning hay on the rate of drying and loss of nutrients" by J.C. Murdoch and D.I. Bare. They show following:-

| | | | | | |
|---|---|---|---|---|---|
| Herbage with | 7.7% | crude protein gave | 9.9% | after | tedding. |
| " " | 7.5% | " " | 7.1% | " | roller crushing. |
| " " | 7.8% | " " | 7.2% | " | crimping. |

The effect is never certain. If quicker drying prevents loss of leaf the crude protein content rises, if shaking knocks off the leaf, the crude protein content falls. If there is rain after crimping the soluble carbohydrates may be washed out leaving a higher crude protein content. The effects are not dramatic as will be seen and will not account for the generally low crude protein content of your recently made hay.

What then is the advantage of making early hay or barn dried hay for that matter. The advantage to be looked for lies not in the crude protein content but in the digestibility and in the sugar content. Hay which has only 9% crude protein cut young and dried quickly can have a much higher digestibility and sugar content than hay cut a few days later.

It is fashionable nowadays to decry the use of % crude protein as an indicator of feeding value, but it is not completely valueless. Crude protein is a very rich source of energy and hay of high crude protein content will have a higher starch equivalent than hay of low C.P. The ideal is a combination of both % C.P. and % D. It is important, however, to make properly certain that the % crude protein is a real indicator of age of hay and not produced by a late top dressing of nitrogenous fertiliser which is to my mind a rather wasteful practise. I.V. Hunt.

# EXPERIENCES IN RESTORING THE POWHARNAL OPENCAST COAL SITE, MUIRKIRK

T.G. Brownlie.

## Early Successes and Failures

During the past 20 years very large areas of agricultural land in this country have been requisitioned by the National Coal Board for the extraction of coal by opencast methods and reinstated for agricultural use. Within recent years the standards of both physical and agricultural restoration have been improved to such an extent that many farmers will now admit that their land has not suffered in the least from its experience. Cases can in fact be quoted where poorish land has actually been improved. However, in the early days of opencast working, during and just after the war, the various parties involved in this work had only a limited experience of the techniques which had to be employed to ensure a satisfactory restoration with the result that the eventual restoration was very disappointing in many cases. These sites were characterised by a hard pan soil surface comprising clay and grey bind with a high content of stones and boulders. The herbage, after some early promise, usually deteriorated to a thin stunted sward of limited productivity. The worst of these sites are mainly restored hill land where clearance conditions for the working of the site were generally less imposing although some arable sites do fall into this category. Ploughing and reseeding such land is seldom an attractive prospect to the farmer in view of the high cultivation costs and the possibility of further failure. It is mainly for the advice of farmers unlucky enough to be saddled with land of this nature that these notes are recorded. They outline (the Department of Agriculture's) experience with a site which was very badly restored from a physical point of view.

## Powharnal Opencast Coal Site

The Powharnal opencast coal site is situated on the farm of Nether Wellwood lying about four miles to the south-west of Muirkirk in Ayrshire. In its former condition the land lay at an altitude of 750' - 850' on a moderate to steep slope with a northern exposure. The soil was predominately a deep acid peat with small pockets of drier black loam while the herbage, typical of a wet hill area, consisted of sheeps fescue, Yorkshire fog, bent, rushes and drawmoss. The land was used as a downfall from higher heather hills for a heft of 100 Blackfaced ewes and provided 20 in-calf dairy heifers with about one-third of their summer grazing requirements. The site was requisitioned in 1947 when stripping of the topsoil materials took place. The terms of the working contract stated that sufficient

topsoil should be conserved to replace a 9" layer of topsoil but it was found impractical to remove and store the peaty topsoil in wet conditions. Eventually the final topsoil material replaced in 1950 consisted of a compacted overburden of the worst type comprising of rock, shale and puddled fireclay. This fireclay is very similar in character to the "blue clay" with which farmers of heavy land will be familiar. The site was reasonably well graded and only a limited amount of ponding was evident after settlement of the restored surface had taken place. Agricultural restoration of this land which extended to 35 acres was postponed until the adjoining Powharnal extension site extending to 20 acres on this farm had been restored physically since the working of the latter site prevented access to the original Powharnal site. This was an advantage insofar as the 7 years of weathering served to improve the texture of the fireclay particles of the soil. The land was so compact that no erosion took place despite the absence of vegetation.

First Attempts at Restoration

It was eventually decided to attempt agricultural restoration in 1957. It seemed a waste of time and money to make the effort at all but statute decreed that the land should be restored for agricultural use and so the attempt was made without much hope of success. Ploughing was out of the question on account of the large amount of stone and rock in the top layer of soil. Heavy discs were selected as the implement most likely to break the concrete like surface and produce some form of tilth. After discing which only proved to be a token cultivation, a grass seed cleanings mixture was sown at the rate of 56 lbs. per acre. This mixture contained mainly timothy with Italian ryegrass, perennial ryegrass and white clover in lesser amounts. The seeds were sown in July and moist conditions throughout the summer and autumn helped to establish a thin sole of grass and clover. For the next three years in spite of the costly assistance of generous applications of artificial fertilisers a losing battle was fought to maintain a covering of herbage which one day might be productive. It became increasingly obvious that the sward was bound to degenerate on such a barren soil.

Success of Oversowing

In 1960 an experiment of oversowing white clover seeds on the adjoining Powharnal extension site was showing signs of success and it was decided to adopt this technique on the original Powharnal site. This proved to be the turning point in the agricultural restoration of this site. In April 1961 a seeds mixture containing 3 lbs. of white clover and 10 lbs. of perennial ryegrass per acre

was oversown on the site after harrowing. The clover seeds were inoculated with nitrogen fixing bacteria because it was thought that the lack of vigour in the existing clover plants might be due to the lack of the right strains of nitrifying bacteria. Two tons of ground limestone and 3 cwts. of concentrated compound fertiliser per acre were sown at the time of seeding. (The land had been treated previously with adequate phosphate). Several weeks of wettish weather led to a very satisfactory braird of grasses and clover although many of the ryegrass seedlings appeared to die out during a period of drought in May.

Development of the Sward

During the past three years the white clover has dominated the sward which has thickened out considerably. The chief grass constituents are now Yorkshire fog, perennial ryegrass and meadow grasses. Timothy and cocksfoot are only found in isolation although they at one time were quite plentiful. The quality of the pasture is variable but it is noticeable that the areas containing the most clover also show the better growth of grasses, indicating that the clover plants must be fixing adequate atmospheric nitrogen to sustain a healthy growth of grasses. Over most of the site the sward has been clipped short by the sheep but the ungrazed herbage in the vicinity of cattle droppings has the typical look of a well managed clover ley growing on normal soil. The only undesirable constituent of the herbage is moss which is now showing some signs of establishment. The presence of the moss is probably due to the wet surface conditions which have prevailed almost continuously over the past two years aggravated by the increased moisture holding effect of the improved herbage in conjunction with the impervious soil. It is also noticeable that the improved herbage extends across the site in 12' strips separated by thin bands of clover-free impoverished herbage. This phenomenon has a simple explanation. When the seeds were sown in 1961 a marker could not be used because the ground was so hard and the contractor had to resort to the less accurate expedient of following marker poles placed at each end of the site. Inevitably complete cover was not possible but this error served to underline the success of the venture.

Present Position

The physical nature of the soil has improved to a certain extent and the top two inches of soil now contains a considerable amount of organic matter while root penetration into the fireclay soil compares favourably with that in a normal clay soil. It is also significant that the site has received no fertilisers of any

kind since the inoculated clover seeds were sown. Nevertheless the land is quite definitely more productive now than it has ever been since it was requisitioned despite the fact that the residual effects of the generous applications of fertilisers which it received from 1957 to 1960 must have diminished.

The heft of ewes is 90 strong compared with 100 before requisition but the same number of young cattle is carried. Mr. Anderson, the farmer, confirms that they are doing well and that he would restore the number of sheep to 100 if he could be certain that the site would graze well enough during a dry year. While it is true that the land droughted badly in the absence of regular rainfall a few years ago, it must be pointed out that most of the rain ran off the impervious surface before it could be absorbed. This will not happen to the same extent now since the herbage itself will retain the moisture long enough for it to be absorbed by the soil which itself has become more porous with the increased root development. The productivity of the land could be improved further by the sowing of more grass and clover seeds on the areas presently deficient in clover and by controlled grazing which of course would incur the cost of fencing. At this stage there is every indication that the pasture has been restored permanently to at least its original value capable of playing its full productive role on this hill farm with perhaps the occasional assistance of dressings of lime and phosphate to maintain a balanced nutritive environment.

The Department's experience with this site has demonstrated very clearly the great value of the biological manuring agency of the clover plant in the maintenance of fertility in a basically infertile soil. However, there are strong indications that the successful growth of clover on a restored opencast coal site deficient in the original topsoil and its microflora would be dependent on the inoculation of the clover seeds. The necessary inoculant (costing only 6d. per lb. of clover seed) can be obtained from the seeds merchant supplying the seeds mixture and it is an easy matter to mix it with the clover seeds at the time of sowing.

# VERY MUCH REGRET

A.B. Hall

Farmers who hint that they are interested in buying something are usually swamped with shiny brochures and catalogues and pestered by uninvited salesmen and representitives until eventually they are compelled to dig deeply into their pockets for the wanted product. Where, however, a product of little value is sought little enthusiasm is roused as happened in the following (true) incident:

A surface seeding project is planned .....
Technical advice is obtained .....
Dept. of Agr. approval is granted .....
Liming and slagging is carried out .....

As "good heavy seed cleanings" are recommended, inquiries are made for a supply of these suggesting several named strains of the most suitable grasses. Many hundreds of tons of such screenings must have been produced after the 1963 harvest, bad though it may have been, but rather than put it on the market it is disposed of elsewhere. Several months after receiving replies from numerous seed 'specialists' it is interesting to recall what they had to say:-

(a) 'We very much regret that we are unable to send you.....' 6/12/63

(b) 'It is with regret that we cannot offer you seed cleanings .....' 13/12/63

(c) 'Unfortunately, we are not in a position to supply.....' 14/12/63

(d) 'We will have cleanings from ..... but not from ..... ' 16/12/63

(e) 'Regret to say that we have no seed cleanings left' 16/12/63

(f) 'We do not supply seed screenings of any variety..... We do not think it is a desirable practice to sow screenings under any circumstances' 24/12/63

(g) 'Regret that we are not able to supply any screenings....' 24/12/63

(h) 'Sorry to say that at this time we have no grass or clover screenings.....' 30/12/63

(i) 'It is regretted that we are not able to specify any particular variety.....' 13/2/64

(j) 'Very much regret that we have nothing suitable. In fact we do not encourage this practice.....' 14/2/64

(k) 'We regret that we do not have any available.....' 19/2/64

(l) 'But very much regret however that we do not supply seed screenings' 26/2/64.

If time was no object and stamps were free some of these 'experts' would have received a reply reciprocating their paternal advice concerning this 'practice' and suggesting that they were out of touch with current technical know-how and experience and that if they consider themselves in the top twenty* they should get 'with it'.

Rather than be completely defeated some firms offer (at a price) special bargain mixtures regardless of soil type, rainfall, altitude and general suitability for the job in hand. These were:-

1. 'heavy screenings ..... oddments of mixtures left over .....'

2. 'very light blowings .....'

3. 'our Cleanings Mixture .....'

4. 'good yearling S.143 Cocksfoot'.

This not inconsiderable correspondence took from December - February with only one offer of some of the required screenings and so in the end the 'good yearling' was backed as its starting price was $\frac{1}{3}$ that of catalogue prices but whether it proves to be a winner remains to be seen.

What is certain is that 12 firms had a potential customer at hand and that all but one of them (a Scottish firm) thoroughly irritated him by their indifference and lack of interest. One possible deduction is that the seed trade is doing so well with the tremendous enthusiasm being put into better grasses that it is not in their interest to supply a byproduct to the would-be hill improver. It is perhaps of little wonder that 26 million acres are still covered by medieval grasses.

Where there is demand, supply will follow. Is there a demand for seed screenings by the upland members of the Grassland Societies? If so, why not demand louder or co-operatively? After all, the customer is always right - when circumstances suit!

Seed Firms

| | |
|---|---|
| Number able to partially satisfy demand | 1 |
| " offering alternative mixtures | 4 |
| " " nothing | 7 |
| Total number of firms asked for seed screenings | 12 |

* 3 have Royal Appointments.

Editors Note

A leaflet on 'Seed Cleanings' reprinted from 'Scottish Agriculture' can be supplied on request. Just this last week (February), a sample of seed cleanings available for transport cost only (about £1 per cwt.) was tested at the Grassland Husbandry Department and gives a useful hill land cover of Yorkshire Fog, Ryegrass, Meadow fescue, Timothy, Red and White Clover sown at 28 lb. per acre or 5/- per acre!

FROM 'THE STANDARD' 2nd MARCH 1885.

1. The incidence of foot-and-mouth in Germany resulted in the banning of trade from German Ports and a strong editorial plea for a slaughter policy to contain the spread of the disease in this country.
2. An interesting experiment at Crewe Sewage Farm on the costs of silage feeding:-
   (a) Food of 2 cows in 14 days
   1130 lb. silage at 9s./cwt.
   312 lb. hay at 3s./cwt.
   68 lb. turnips at 5d./bushel
   168 lb. oats at 3s./bushel
   } Total cost of food £1:6:3d. Yield of milk 1007 lb.

   (b) Food of another 2 cows
   No silage
   656 lb. hay at 3s./cwt.
   420 lb. turnips at 5d./bushel
   168 lb. oats at 3s./bushel
   } Total cost £1:10:4d. Yield of milk 917 lb.
3. The Directors of the Dairy Supply Co. do not think there is any likelihood of their country being flooded with cheap Dutch milk as has been rumoured. Dutch milk was poor, and would have to be 'pickled with chemicals' if it was to stand the transit. The danger of importing disease is also borne in mind.
4. The 'Farmers Alliance' (?N.F.U.) was against a proposal to nationalise tithes and use the tithe money for educational purposes.

Sent in by a member.

# THE CENTRAL SCOTLAND GRASSLAND SOCIETY

## OUR FIRST CHAIRMAN - GEORGE M. GILMOUR

J. Waddell.

It is indeed fitting that the first Chairman of our Grassland Society should have a farm which, except for a few acres of potatoes grown for seed, is entirely in grass. Extending to just over 140 acres, divided between two holdings, but farmed as one unit, West Crosshill in the Parish of East Kilbride carries a dairy herd of 90 cows and 100 followers. The dairy herd at present comprises 24 Friesians, 24 Jerseys and 42 Ayrshires, the milk from the Jerseys being bottled on the farm and sold as Certified Channel Island milk in Glasgow. The herd is housed in the traditional West of Scotland byre. In addition to the dairy herd, 50 cross ewes are kept for early lamb production, being tupped with either a Suffolk or a Dorset Down. To complete the stocking, there is also a small pig fattening unit.

West Crosshill, at an elevation of 700 ft. is situated in an area where the soil varies very much in character, with areas of clay, loam and peat. It is naturally wet with fairly late springs and early winters and is thus most suited to the production of grass. Last year the 140 acres, apart from grazing the dairy herd in paddocks, (the young stock are mostly grazed away from home in summer), produced over 300 tons of silage and 50 tons of hay. The grass on the farm is a mixture of short-term Italian ryegrass leys, longer term leys and some leys which have been down for over thirty years. All the fields receive dressings of fertiliser each year, the more intensively manured ones receiving up to 10 cwt. of Nitro Chalk per annum.

Twelve acres of heather overlying peat were drained in the early 1950's, ploughed and reseeded. While the new sward was rather slow to establish, it is now much more productive than the original heather.

So much for the farm.

Mr. Gilmour was educated at Hutchesons' Grammar School and at The West of Scotland Agricultural College. After a period in the Services, he commenced farming in partnership with his late father and uncle and is now farming on his own account, there having been Gilmours in West Crosshill for over two hundred years.

His late father was one of the founders of the East Kilbride Dairy Farmers and was latterly the Managing Director. Apart from being Chairman of our Grassland Society, his part in public affairs

is considerable, being immediate past-President of the Lanarkshire National Farmers' Union, Chairman of the Central Scotland Milk Recording Society and holds positions in the Glasgow Agricultural Society, East Kilbride Farmers' Society, National Farmers' Union Mutual Insurance Society Ltd., and the Council of the National Farmers' Union. His main hobbies are shooting and curling and in addition to being a founder member of the East Kilbride Young Farmers' Club, is always willing to undertake the many demands on his services still made by the Scottish Association of Young Farmers' Clubs.

Fertiliser Facts No. 5

The following analyses of the Farm Slurry were made by the Chemistry Department:-

| Year | No. of Samples | N % | $P_2O_5$ % | $K_2O$ % |
|---|---|---|---|---|
| 1963 | 9 | 0.224 | 0.092 | 0.214 |
| 1964 | 10 | 0.238 | 0.090 | 0.200 |

On this basis, the approximate amounts of N, $P_2O_5$ and $K_2O$ supplied (i.e. gross chemical analysis; not "available" plant nutrients) can be stated as follows:

| Rate of Application gallons | N units | $P_2O_5$ units | $K_2O$ units |
|---|---|---|---|
| 2000 | 40 | 16 | 43 |
| 3000 | 60 | 24 | 64 |
| 4000 | 80 | 32 | 86 |
| 5000 | 100 | 40 | 107 |
| 6000 | 120 | 48 | 129 |

Note For nitrogen an adequate "rule of thumb" calculation is:-

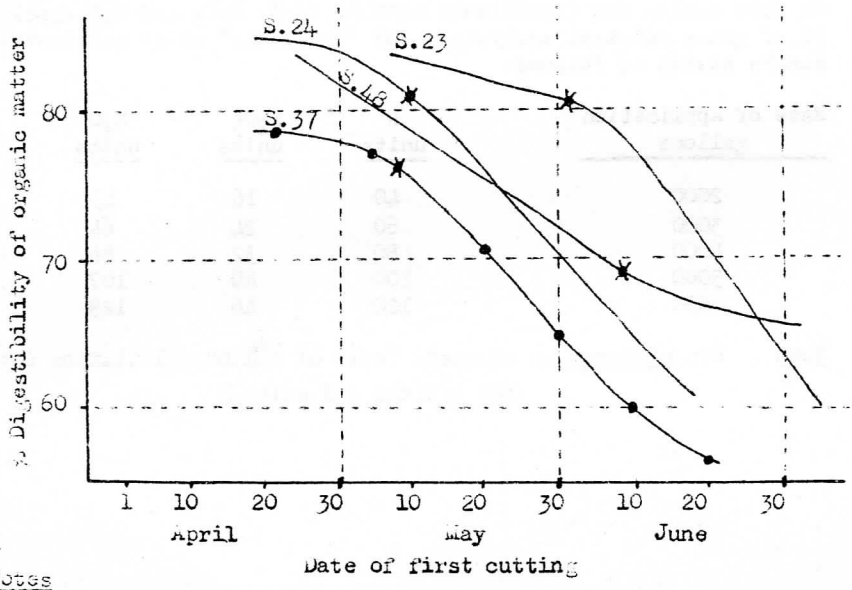
100 gallons = 2 units N

## CHARTS AND DIAGRAMS No. 1

John Frame

Lecturers and writers are making more and more use of charts and diagrams to illustrate important principles of grass growth, effects of manuring, changes in grass quality, livestock output etc. These charts are intended to show at a glance what is happening, whether grass is responding to fertilisers, what changes in quality are taking place and whether there is a relationship between different kinds of treatment.

The most widely used diagram is the one used to illustrate the two-humped seasonal production of grass (see No. 3 of the journal, p. 7, J.S. Morrey's talk). The diagram chosen for special treatment in this number shows the Changing % Digestibility of the Organic Matter of 4 Common Varieties of Grass. These curves originated at the Grassland Research Institute, Hurley, Nr. Reading, where they were first demonstrated by Mr. Frank Raymond, Head of the Biochemistry and Animal Nutrition Division and his co-workers.




Notes

X approximate date of first emergence of the ear from the leaf sheath.

• sampling dates from which S.37 curve was constructed.

The digestibility of the organic matter content of first growths of S.23, S.24, S.37 and S.48.
(after Raymond and co-workers, Hurley).

The scales

Two scales are shown.

The vertical scale at the left hand side shows percentage digestibility of the organic matter from 50% up to 90%. Each dotted horizontal line is a change of 10%. The horizontal scale along the base of the diagram shows the dates of cutting. Each vertical dotted line represents a change of a month.

The curves

Four curves are shown representing the changes in % digestibility of S.37 cocksfoot, S.24 perennial ryegrass, S.23 perennial ryegrass and S.48 timothy. These are based on determinations of the digestibilities of these grasses at various dates throughout the spring and early summer.

How the digestibility was determined

(a) Grass of each variety was cut at intervals throughout the spring and placed in cold store until the test could be undertaken.

(b) When samples of the grasses of different ages had been collected the digestibility of each sample was estimated by feeding known quantities to sheep kept under standard conditions. The composition of the grass as fed was known in terms of its dry matter content, organic content, crude protein content etc.

(c) The dung was collected, weighed and analysed. The amount of dung subtracted from the amount fed gives the amount digested. This is then expressed as a percentage. Organic matter incidentally is merely the dry matter of the herbage excluding the minerals. (The digestibility of the dry matter, of the crude protein and of other constituents can also be determined in this way).

The curve for S.37 cocksfoot could be prepared from the following results shown by dots along the line in the diagram.

| Date of sample | 22 Apr. | 4 May | 20 May | 1 June | 10 June | 20 June |
|---|---|---|---|---|---|---|
| % digestibility | 78 | 76 | 71 | 65 | 60 | 56 |

Each dot represents the % digestibility at a particular date, e.g. the first dot represents the point where the 78% digestibility horizontal line crosses the 22nd April vertical line.

These dots joined up give the curve of digestibility of S.37 cocksfoot.

Although digestibility wasn't measured for the grass every day, it looks as if one can assume that the line between each dot represents the digestibility of the grass between the sampling dates.

The curves for each grass represent the digestibility of each grass from its young leafy stage to its mature flower stage.

Learning from the curves

(1) The digestibility of each grass starts off at a fairly level digestibility and then takes a plunge downwards.

(2) S.24 ryegrass and S.37 cocksfoot have the same shaped curves but the S.24 ryegrass has a higher digestibility than the cocksfoot at each date.

(3) The digestibility of S.48 timothy falls less steeply than the S.37 cocksfoot and S.24 ryegrass.

(4) The late S.23 ryegrass holds its digestibility later into the season than S.37 cocksfoot, S.48 timothy or the early S.24 ryegrass.

(5) For S.23, S.24 and S.37, the rapid fall in digestibility occurs as soon as flowering occurs but in the case of the S.48 timothy the digestibility starts to fall earlier than flowering but is slower after flowering.

Prediction from the curves

It is possible to predict the digestibilities of the grasses under various conditions.

Thus, for example, by drawing a line along the 70% horizontal line, the dates when each grass has this digestibility can be found out by dropping a vertical line down to the date scale at the base at each point where the 70% horizontal line passes through a curve.

From this diagram 70% digestibility would be reached by S.37 cocksfoot on May 22nd, by S.24 ryegrass on June 2nd, by S.48 timothy on June 8th and by S.23 ryegrass on June 21st.

## 96. RESPONSE OF GRASSLAND TO NITROGENOUS FERTILISER IN THE WEST OF ENGLAND

by E.R. Armitage and W.G. Templeman, I.C.I. Ltd., Jealotts Hill.
J. Brit. Grassl. Soc., 19, pp. 291-297.

Results from 6 years experiments on the use of Nitrochalk (N/C) at varying levels on pure grass and grass/clover swards are reported. The trials were carried out in Somerset (36 inches rain, 1600 hours sunshine) and nitrogen application ranged from 45 to 804 units per acre per annum. The response to N on pure grass swards appeared to be economic up to 313 units N (16 cwt. N/C). Higher applications gave a small response where fields were cut but not when grazed. Applications greater than 36 cwt. Nitrochalk caused a decline in yield. On a per cut basis the authors suggest 46-62 units N (2-3 cwt. N/C) is sufficient and no value was obtained by increasing this (see note).

On mixed grass/clover swards N was applied up to 768 units (38 cwt. N/C) per acre per annum. As N application rate increased the clover content of the sward declined in both grazed and cut swards although the timothy/meadow fescue retained 23 per cent clover regardless of level of N when grazed. It is suggested that the urine return may have retarded grass growth. Maximum production was obtained from 357 units N (18 cwt. N/C) on the grazed sward and 446 units N (22 cwt. N/C) on the cut sward.

In another experiment, seasonal application times were studied, N being applied early or early + mid season + late season or early + late season. It was thought that N could be used to stimulate early growth and let clover produce the summer grass. However, although early N produced an extra 3 weeks growth the annual yield from swards treated in this manner was little better than those given no nitrogen. In each instance, better results were obtained from split dressings.

It is concluded that it is easier to maintain good grass yields by the use of N since production from fertilisers is less dependent on climatic conditions than is the production from clover fixed N.

R.D. Harkess.

Note: At Auchincruive it has been found useful to use up to 100 units of N applied in March for early production, this being followed by 40 - 60 units for each succeeding crop.

## 97. SOME FACTORS AFFECTING THE INTAKE OF ROUGHAGE BY SHEEP

by J.C. Murdoch, N.I.R.D., Reading.
J. Brit. Grassl. Soc., 19, pp. 316-320.

An increase in silage dry matter from 21% (unwilted) to 30% (wilted) resulted in a mean increase of 44% in dry matter intake, i.e. from 2.35 to 3.38 lb. D.M. per head per day. The intake of the unwilted silage was improved by 24% when time of access was increased from 3 to 24 hours per day, i.e. from 2.62 lb. to 3.45 lb/head/day. Such a fact may be of importance in stock feeding where the silo face or trough space is limited. Similar results have been obtained in trials involving dairy cows (see J.S.W. & C.S. Grassl. Soc., No. 3, page 57).

In a hay feeding trial early hay with a digestibility coefficient of 74% was compared with later cut hay with a digestibility of 62%. The intake of the better hay was 21% higher, 2.84 lb/head/day instead of 2.36 lb/head/day, than the less digestible feed. However, in a silage feeding trial using feeds of 79% and 76% digestibility the higher digestibility feed was slightly lower, this undoubtedly being due to its lower dry matter content.

This series of experiments emphasises the value of early cut forage for conservation for sheep or cow feed and also that some degree of wilting say to 28-30% D.M. greatly improves feed intake.

R.D. Harkess.

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## 98. STUDIES IN CALF MANAGEMENT. IV. THE EFFECT OF REARING AT PASTURE OR INDOORS ON THE GROWTH AND DEVELOPMENT OF THE BEEF ANIMAL

by D.T. Chambers and F.E. Alder, Hurley.
J. Brit. Grassl. Soc., 19, pp. 321-329.

Twin steer calves of various beef type animals (pure and cross breeds) were split into groups to be reared indoors and outdoors. Autumn and spring born calves were used. Spring born calves reared outdoors were fed milk substitute to 12 weeks of age then received grass only to 27 weeks. After this they went on to their winter rations of hay, silage and cereal mixtures. The spring born calves reared indoors received ad lib. hay along with milk substitute to 4 weeks, calf nuts to 12 weeks and rearing nuts to 20 weeks. Thereafter they went on to a similar winter diet as above. At no time did they receiv grass.

Autumn born calves fed indoors received a similar diet to the spring born calves and the outdoor group while able to pick herbage throughout the winter also received a full feed similar to the indoor group. After the stock reached 52 weeks of age all were fed the same.

Results indicate that treatments had little effect on time taken by the cattle to reach slaughter condition or on carcass conformation. However, there were differences in liveweight and body weight measurements at intermediate stages. Spring born calves receiving no supplementary feed lagged behind their indoor fed twins at the 6 to 18 month period but at slaughter (28 months) there was little difference in body size or carcass weight.

Autumn calves whether reared indoors or outdoors remained similar throughout their lives. However, this would be expected since both groups received full feeding.

When indoor calves were introduced to pasture in spring they lost considerable weight. Even when autumn calves had both received similar winter feeds, those that had been allowed an autumn on the pasture showed no such losses. Possible reasons for this have been put forward as (a) the outdoor calves had a longer rumen capacity and so ate more grass hence preventing loss of weight due to changes in gut content, (b) a more desirable type of rumen flora was present in outdoor reared animals which enabled earlier and more efficient use of the spring herbage. The authors suggest that unless a way be found of eliminating this loss on turning-out it may be questionable if beef cattle reared indoors or even on a moderate plane of nutrition should be allowed out to grass.

From the data presented it is clear that maximum use can be made of grass for rearing with a probable reduction in feeding costs. Unfortunately no cost data are presented.

R.D. Harkess.

Note: A further article on outdoor calf rearing is also presented in this volume of the J. Brit. Grassl. Soc., 19, pp. 425-428 and similar conclusions are drawn but again no costings are presented. Previous papers in this series have been reviewed as follows:-

Pt. 3. The rearing of autumn born calves at pasture. Research Review No. 5, Journal No. 1, page 13.

## 99. THE EFFECT OF COMPANION GRASS AND SEED RATE ON THE PRODUCTIVITY OF A TALL FESCUE SWARD

by J. Frame and I.V. Hunt, Auchincruive.
J. Brit. Grassl. Soc., 19, pp. 330-335.

Much interest has been taken in the possible use of tall fescue in the West of Scotland. This paper reports a trial in which S.170 tall fescue was sown at 10, 20, 30, 40 and 50 lb. per acre alone and with 3 lb. timothy, 4 lb. cocksfoot and 6 lb. perennial ryegrass. Results indicate that in pure swards no yield advantage was gained from sowing more than 30 lb. per acre. The establishment of the tall fescue fell from 22 to 10% as seed rate was increased.

Since tall fescue swards tend to be rather open the addition of a companion grass may aid in reducing the ingress of unsown species. Adding a companion had little influence on total herbage yield although the addition did influence the yield of the tall fescue component. For example ryegrass was very aggressive and halved the tall fescue yield. Cocksfoot and timothy were progressively less competitive but both still significantly reduced the tall fescue yield when compared to production from the pure fescue sowings.

One of the major characteristics of tall fescue is its capability of perennial early spring growth and it is for this purpose that attempts have been made to exploit it. Care must be taken that added companions do not alter this valuable feature. In these trials it was found that the presence of timothy, cocksfoot and ryegrass even at the low seed rates used in this trial progressively reduced early growth as recorded at the first cut of the season.

In concluding the authors suggest that 30 lb. tall fescue with 3 lb. timothy (and possibly 1 lb. white clover) makes a palatable sward with little reduction in early growth and total sward productivity. The inclusion of meadow fescue may also improve uniformity of grazing and overall sward palatability.

R.D. Harkess.

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## 100. GRASSLAND MANAGEMENT AND MILK PRODUCTION AT THE HANNAH INSTITUTE 1956-1962

by M.E. Castle and J.N. Watson, Hannah Institute.
J. Brit. Grassl. Soc., 19, pp. 343-348.

This is a report on the system of grassland farming followed at the Hannah over the past 6 to 8 years. Every endeavour was made to be as self sufficient as possible, a minimum of concentrated feeding being purchased. This, of course, demands the production of quality grazing and conserved herbage and the use of nitrogenous fertiliser. N was applied at 36-54 units per acre in early spring, 27-36 units twice during the summer and then 18-27 units in late summer for autumn grazing. A small area which had 25% clover in the sward received no N.

The result of this policy has led to a stocking of 87 cow equivalents (cows, dry + young stock) on 130 acres of which 112 acres are grass and the remainder barley. The oat crop has been cut out since more and cheaper S.E. is obtained from barley. In 1962, the milk yield per cow was 945 gal. or 380 gal. per acre. Concentrate feeding over the whole year was 1.8 lb. per gal. The margin per cow (milk sales less purchased feed) was £129, the cost per cow for concentrates being £13. Overall output in 1962 was 27 cwt. U.S.E. per acre which is quite satisfactory from the use of 105 units per acre of N.

Over the period under review a record was kept of the average cost of production per ton S.E. for several crops as follows (£/ton).

| | | | |
|---|---|---|---|
| Grazing | 11.7 | Barley | 18.0 (11.6)* |
| Hay (field) | 24.2 | Oats | 21.5 (16.0)* |
| Silage | 28.0 | Fodder Beet | 30.5 |
| Dried Grass | 38.9 | Dairy Cake | 47.5 |

* with deduction for deficiency payment.

The higher cost of silage is likely due to the fact that this is based on silage fed to the stock. The cheapness of barley should be noted especially if the deficiency payment is deducted from cost of production.

Over the five year period of the study, yield per cow increased from 820 to 945 gals, acres per cow equivalent fell from 1.79 to 1.53 and net farm output rose from £56 to £61 per acre. These improvements have been brought about largely by efficient grassland utilisation rather than by increased N fertiliser which was nearly the same in 1958 and 1961. Such results clearly show the value and cheapness of grass as a cow feed and that reasonable production can be obtained such a minimum reliance on bought feed. Over the grazing period (April - October) no concentrates were fed except for 4 weeks in early spring when cereals were used as a magnesite carrier and in autumn for steaming up. During the winter, hay and

silage was supplemented by home grown cereals while higher yielders received some bought feed in addition.

The system adopted at the Hannah has apparently paid off and shows how well managed grassland can aid in reducing milk production costs.

R.D. Harkess.

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## 101. AN INVESTIGATION INTO THE MERITS OF INTENSIVE ROTATIONAL GRAZING

by J.B. Ruane and T.F. Raftery, Univ. College, Dublin.
J. Brit. Grassl. Soc., 19, pp. 376-380.

Production from a rotational paddock system of 20 one acre paddocks was compared to that from a two paddock system of 9 and 11 acres grazed alternately. The stocking rate used was the same in both systems being around 1.2 cows per acre for the grazing seasons of 1960-62. The two systems proved to be very similar in output in terms of cow grazing days, milk per cow per day and milk per acre. Since stocking rates were similar and cows used were not high yielders (2.5 gal. per day) such a result could be expected where grass never became truely limiting. In 1961, a midsummer drought did not affect the rotationally grazed group whereas stock had to be removed from the extensive two field system.

However, in order to control grass in excess of the needs of the cows, dry stock were drafted in and out as required. Also if even further herbage control was necessary, silage cuts were taken. In both these two factors the rotational system outyielded the extensive two field system and in the final analysis 35% more U.S.E. per acre per annum was obtained from paddock grazing.

This experiment serves to illustrate the flexibility and better utilisation of grass with a rotational system in that it can be grazed by extra stock or cut for silage without upsetting the production of the main dairy herd.

Although low yielding cows were used and the paddocks were smaller than practicable (1 acre), the principle of the system would apply to higher yielding herds and to larger fields rationed by means of electric fences within.

R.D. Harkess.

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## 102. THE FEEDING OF SUPPLEMENTARY CONCENTRATES TO DAIRY COWS GRAZING GOOD PASTURE

by M.E. Castle, A.D. Drysdale and J.N. Watson, Hannah Institute. J. Brit. Grassl. Soc., 19, pp. 381-386.

| | Control | Fed Group |
|---|---|---|
| Lactation yield (gl.) | 985 | 1025 |
| Lactation length (days) | 272 | 283 |
| Summer yield (gl.) | 540 | 615 |
| Concs. fed per head per summer | nil | 11.8 cwt. |
| Concs. fed per gl. | nil | 2.1 lb. |
| Milk sales less concs. fed per cow | £101 | £88 |

The above information was obtained from trials during the grazing seasons of 1960 and 1961 in order to find out if it was economic to feed concentrates to dairy cows on good leafy well managed pastures and to see if such feeding improved the final lactation yield. The small differences obtained in milk production and lactation length between the bag fed and grass only groups were not mathematically different. Of greater importance is the lower return per cow where concentrates were fed, milk sales less concentrate feeding being £101 and £88 for the control and fed group respectively. This difference of £13 per cow over the complete lactation is of economic significance and is largely due to the concentrate feeding at pasture which obviously has not paid its way.

The cattle used in these grazing trials (April to October) were spring calvers yielding 50 lb. milk per day at the commencement of grazing. Since no economic gain was obtained from feeding such highly productive cows there must be no value in feeding autumn or winter calving cows when provided with good grass during the summer months.

The authors stress that the grass on offer was not specially grown or prepared and that the recorded cows grazed with the remainder of the 55 cow dairy herd. Results obtained obviously reflect a high standard of sward management and only leafy herbage, which in terms of protein and fibre was very constant from May to October, was offered for grazing while excess to these requirements was consumed.

R.D. Harkess.

## 103. THE GROWTH OF LAMBS AT PASTURE. III. GROWTH POTENTIAL

by R.V. Large and C.R.W. Spedding, Hurley.
J. Brit. Grassl. Soc., 19, pp. 412-418.

The purpose of this experiment was to note how fast lambs could grow when given ideal grazing management on a creep feeding system with and without concentrate supplementation. Lambs were weaned on 17 June and 1 July respectively for the two systems. Every endeavour was made to eliminate intestinal worms and faecal egg counts showed that this was almost entirely successful. Both single and twin lambs were used and the following results were obtained.

| | | Days to slaughter | Liveweight (lb.) | Gain/ day (lb) | Killing-out % |
|---|---|---|---|---|---|
| Creep feed only | Singles | 120 | 91.5 | 0.65 | 49.5 |
| | Twins | 134 | 90.5 | 0.60 | 47.3 |
| Creep & Concentrates (42 lb/head) | Singles | 99 | 99.8 | 0.87 | 51.7 |
| | Twins | 110 | 95.0 | 0.75 | 51.2 |

Lambs were drafted for slaughter at 90-100 lb. liveweight (23 June and 25 August). Where concentrates were fed they were offered ad lib. for the first month then at 1 lb. per day till mid July. Thereafter rolled oats were offered at a similar level. It will be noticed from the table that single lambs reached slaughter weight more quickly than the twins and that all lambs fed supplements grew more quickly than the no concentrate lambs. The killing-out percentage of the fed lambs was greater than the grass only group. The overall result was slightly more carcass meat from the feeding of 42 lb. concentrates plus some 10-50 lb. rolled oats and also earlier marketing which of course can greatly influence the selling price.

The noted daily gain was very satisfactory but the authors conclude that more research work is necessary before making general recommendations. The experiment was run from April to August 1959 using half bred ewes with Suffolk cross lambs. This particular year was warm and fairly dry and no doubt ideal for rapid lamb growth.

R.D. Harkess.

## SOUTH WEST SCOTLAND GRASSLAND SOCIETY

### MEMBERSHIP

A full list of members of the South West Scotland Grassland Society was printed in the last number of the journal. The following are the changes since 1st September, 1964.

| | |
|---|---|
| Total numbers as on 1st September | 273 |

New members as on 1st September

J. Blackley, Berscar, Closeburn, Dumfriesshire.
T.G. Brownlie, Dept. of Agriculture, 39 Miller Road, Ayr.
J. Crawford, Dowhill, Girvan, Ayrshire.
H.A. Crawford, Drumbeg, Turnberry, Ayrshire.
I. Gilmour, Humeston, Maybole, Ayrshire.
T.C. Gray, Turnberry Lodge, Girvan, Ayrshire.
W.K. Letheren, (British Basic Slag), The Poplars, Houghton, Carlisle, Cumberland.
J. Marshall, Auchenleck, Auchencairn, Kirkcudbrightshire.
J.J. Watson, Burnock Mill, Ochiltree, Ayrshire. 9

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| | | |
|---|---|---|
| Less: Removed out of district | 3 | |
| Resigned | 1 | 4 |
| Total membership on roll | | 278 |

# CENTRAL SCOTLAND GRASSLAND SOCIETY

## MEMBERSHIP

A full list of members of this Society is issued in this number of the Journal.

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HENDERSON, A.B., The Hotel, Isle of Gigha.
McCONNACHIE, John M., High Dalrioch, by Campbeltown.
McVICAR, Fergus, Formenter, Benmore, By Dunoon.
ROBERTSON, A., Auchafour, Toward, Dunoon.
RODGER, A.G., Ballimore, Otter Ferry, Argyll.
TROTTER, R., Gruinart, Islay.
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Bute (9)

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McALLISTER, J., Kerrytonlia Farm, Rothesay.
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REID, W., Quogach Farm, Rothesay.
RENFREW, J.F., Cranslagloan, Rothesay.
ROBERTSON, A., East Colmac, Rothesay.
SIMPSON, C.D., Barnauld Farm, Rothesay.
SIMPSON, N.D., Largievrechtan, Rothesay.

Clackmannanshire (3)

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BAIRD, B.N., Floors, Eaglesham.
BAIRD, W. Craig, Floors, Eaglesham.
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YUILL, J., 11 Rawhead, Biggar, Lanarkshire.

Total membership of Central Scotland Grassland Society 10/3/65, 224.

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