GRASSWARD

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FOREWORD

Both Societies have had another very active year with some most interesting talks and farm visits. As a result, our Journal is somewhat longer than usual but hopefully none the less readable.

The continued interest in grass conservation is particularly noticeable both in the talks and the ensuing discussion sessions. Effluent control, the efficiency of various additives and big bale silage making have been the main talking points. At the time of writing, the weather looks as if it will enable a better first cut silage making time than the previous two years. High sunshine hours and low rainfall should improve the carbohydrate content of grasses and in turn lead to a higher D value and improved silage fermentation.

Slurry disposal is also causing some concern on intensive units and the debate on clover nitrogen versus artificial nitrogen continues. A recent paper has suggested that it would take a 20-30% increase in the price of nitrogen relative to product prices before a reduction in current artificial nitrogen levels could be considered as a practical feasability on most farms.

With possible EEC legislation and the Wildlife and Countryside Act bringing further environmental considerations to bear on farming activities, it is necessary for our industry to take cognizance of the 'non-farming' lobby. Whilst farm business considerations must be given high priority, most farmers wish to conserve the countryside environment equally as much as the non-farming community find it a pleasure in seeing a tidy countryside and the wildlife associated with it. If only more would take their litter home with them!

On the other hand certain recent EEC activities have given the industry some additional income via improved product prices; whilst remaining thankful for small mercies, further improvements in prices and a reduction in interest rates are necessary to enable the real value of farm incomes to improve. The first article in this issue of Greensward discusses grassland use in the dairy sector and highlights the importance of good grass and stock management when striving to maintain profitability.

We again record our thanks to our Advertisers for their continued support and thank Miss E. Mitchell for typing the Journal manuscripts.

Ronald D. Harkess - Editor

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* *It is with much regret that we record the death of Andrew Paterson on 30th January, 1982.*

PROFITABLE GRASSLAND USE

E.D. Sargent

Economics Division, The West of Scotland Agricultural College

Meeting of the SWSGS in the North West Castle Hotel, Stranraer, 4 March, 1982.

The grassland 'story' and certainly the principles of grassland management, should be known by heart by you all but the title of this talk 'Profitable Grassland Use' is perhaps a nonsense! Grassland is only one component among all the resources used on the farm. To optimize grassland use while, at the same time, falling down on other aspects of running the farm e.g. making mistakes in capital investment, would be pointless. Survival in farming in the long term demands that all the resources are used profitably.

This paper outlines some of the major changes in the dairy farming business and how these have influenced farm size and financial performance. Finally, some remarks on grassland management - are we really as good as we like to believe or is there room for improvement?

Farm Size

The minimum economic size of farm business is likely to increase in the years ahead. 40 years ago, the average herd size in the SMMB area was 31 cows (Table 1). This size of herd averaging about 2500 litres a cow would produce a reasonable standard of living for a farmer, his family and his employees. In England, the average herd size was 15 cows.

In 1960 the average herd size in the SMMB area was 39 cows, averaging about 3432 litres. Herd size in England and Wales had increased to 21 cows. By 1972 herd size in the SMMB area was 61 cows averaging 4010 litres and in 1981 it was 82 cows averaging about 4546 litres.

Table 1. SMMB area - the average herd size and production.

Year	Average herd size	Average yield per cow, litres	Total herd production, litres
1942	31	2500	77,500
1960	39	3432	133,848
1972	61	4010	244,610
1981	82	4546	372,772

These average figures conceal the fact that there is a range about the average and even today nearly 30 per cent of herds in the SMMB area have less that 60 cows. Indeed, according to the 1981 census, 10 per cent of herds have less than 40 cows.

The falling numbers of milk producers is also worth noting. In the SMMB area the number has declined from 7,700 in 1942 to 2,820 in 1981. Over the last 20 years an annual decline of 2-3 per cent was regarded as 'normal'. But between 1978 and 1981 the rate of loss was just under 5 per cent a year - reflecting the deterioration in the economic circumstances of dairy farmers over the 3 year period.

Despite falling numbers of producers and a general downward trend in dairy cow numbers since the 1950s, production per cow has increased sufficiently to offset this. Total milk production in Scotland reached an all-time record of nearly 1,300 million litres in 1978/79. It has fallen since then because of adverse weather. Though this is a brilliant record of increasing productivity the fact remains that many dairy farmers have disappeared from the scene, mainly because their businesses have been too small to generate enough profit for them to keep going. The survivors have had to aim for increasing output from a bigger business i.e. a large herd.

Some dairy farmers have taken the EEC 'Golden Handshake' and left dairying to go in for other types of farming. But some have left farming altogether, joined by those from other sectors who can no longer keep up with the rat race. It is more difficult to identifv trends in other sectors of agriculture because the statistics are not nearly as detailed and the basis of calculation changes periodically.

It is possible, however, to look at trends in the years from 1968 to 1978. In that period almost 4000 full-time farmers were lost to the industry in Scotland and the trend continues. Though many of these people would have had no chance of making enough money to survive in business they are real people, and their families - not just numbers. The industry and the whole rural scene is the poorer for those who have left.

Why Larger Units?

The size of the minimum economic unit is increasing and the following four reasons are mainly responsible:

1) With better education and mass communication peoples' aspirations are much higher in terms of the material things in life. They want more of these and that costs money.

2) The technological revolution in agriculture has resulted in farms being less self-sufficient for the resources used. Farmers are now much more dependent on outside supplies than they were in the past e.g. for power, fuel and machinery. Technological advances in fertilizer and feed formulation, in disease and weed control all imply the purchase of resources from outside the farm. Larger machines need bigger businesses to justify their purchase.

3) Inflation and the fall in the purchasing power of money has always been with us. In the 1970s the inflation rate 'took off' and reached a level of over 20 per cent a year. Fortunately, over the past 2 years it has been under some control. Inflation is probably the biggest enemy the farmer has. Unfortunately, in farming, profits have not kept pace with inflation and so farmers who stand still financially are bound to be worse off. If they are to maintain, let alone improve, living standards they have to increase output, profitably.

The effect of inflation at different levels of farm costs is shown in Table 2.

Table 2. Effect of inflation on total farm costs.

Total farm costs	Inflation rate				
	10%	11%	12%	15%	20%
	Increase in costs - 1 year				
30,000	3,000	3,300	3,600	4,500	6,000
33,000	3,300	3,630	3,960	4,950	6,600
61,000	6,100	6,710	7,320	9,150	12,200
66,000	6,600	7,260	7,920	9,900	13,200
86,000	8,600	9,460	10,320	12,900	17,200

The levels chosen reflect average total costs (including award wages for farmer and wife's labour) for actual farms in the base year 1980.

£30,000 represents the average total costs on a sample of hill farms in 1980. Average stock carry was 970 ewes.

£33,000 is the average total costs in 1980 for:- small livestock with arable farms (55 ha): small dairy farms (45 cows on 37 ha): upland farms (230 ha carrying 76 suckler cows, 96 other cattle, 292 ewes, 271 lambs and hoggets).

£61,000 represents total costs on medium sized dairy farms with 77 cows on 64 ha.

£66,000 represents total costs on larger livestock with arable farms (124 ha).

£86,000 represents total costs on larger dairy farms (103 cows on 117 ha).

The escalation in costs for one year is bad enough as shown in Table 2 but the compound effect is frightening, Table 3.

Table 3. Compound effects of inflation on costs. 11% compound over 3 years,

Base year	After 1 year	After 2 years	After 3 years	Extra costs due to 3 years inflation
30,000	33,300	36,963	41,029	11,029
33,000	36,360	40,360	44,800	11,800
61,000	67,710	75,158	83,425	22,425
66,000	73,260	81,319	90,264	24,264
86,000	95,460	105,961	117,671	31,671

The 11 per cent inflation is slightly less than current levels and is the level which the pundits forecast, optimistically perhaps, to prevail until 1984. Don't forget this includes a charge for the farmer and his wife's manual labour.

Remember that product prices are also increasing. However, increases in product prices do not fully recoup cost increases, so farmers still have to find ways of becoming more technically efficient in order to fill the gap. Pressures on the small farm are particularly difficult.

4) Interest rates are not included in the total costs shown in Tables 2 and 3 covering inflation. They affect all sizes of farms but effect the small farm most severely in terms of cost per animal or per hectare.

The ultimate limiting factor on all farms is the size of the farm itself. Few farmers have the opportunity to buy more land. When land does come on the market it costs far more than can be justified by its earning power. Such land can be bought by farmers whose existing property is unencumbered by debt. The cost of the extra property can in these cases by spread over both the new and the existing land.

For most farmers the answer must be to increase output within the existing boundaries and to maximise, economically, production per hectare.

Where to Spend Time and Money

John Cherrington recently quoted a French landowner who said; "The only farm investments to be countenanced are in land and livestock which can grow into money. Buildings crumble and machinery rusts away".

In view of land prices this is not accepted in its entirety. But remember the Golden Rule: 'Give priority, in spending money, to those inputs which will have a *direct* effect on the quantity (and profit) of the products sold. Avoid investments where financial return is doubtful or delayed'. Using this precept we can establish priorities for expenditure in descending from high priority to low priority as follows: livestock, fertilizer and lime, feed, seed, contractors, land, drainage, property repairs, new buildings, new machinery, extra land.

Note the high priority to which expenditure on grass growing has been accorded. Indeed grass literally does grow into money, as the French landowner said, *provided it is utilised efficiently.* OVER THE YEARS AMPLE EVIDENCE HAS BEEN PRODUCED TO SHOW THAT GRASS IS A CHEAP FOOD AND IT IS KNOWN THAT IN TERMS OF PROFITABILITY, STOCKING RATE IS OF CRITICAL IMPORTANCE.

The key factors in the profitability of various enterprises can be summarised thus:

Dairying:- yield per cow: stocking rate: purchased feed use: milk prices.

Sheep (Lowland and Good Upland):- lambing percentage (number reared): stocking rate, lamb value at sale.

Store and Finishing Cattle:- growth rate: stocking rate (summer finishing): feed use and costs: buying/selling price.

Product prices are largely outside the control of the farmer, though quality still counts. Of those factors that are under his control, stocking rate is a common theme to all enterprises. Emphasis must be on high stocking with PRODUCTIVE animals e.g. milking cows. Too many farms carry too many replacement stock. Stocking rate on its own is not enough, it has to be linked with high performance per animal.

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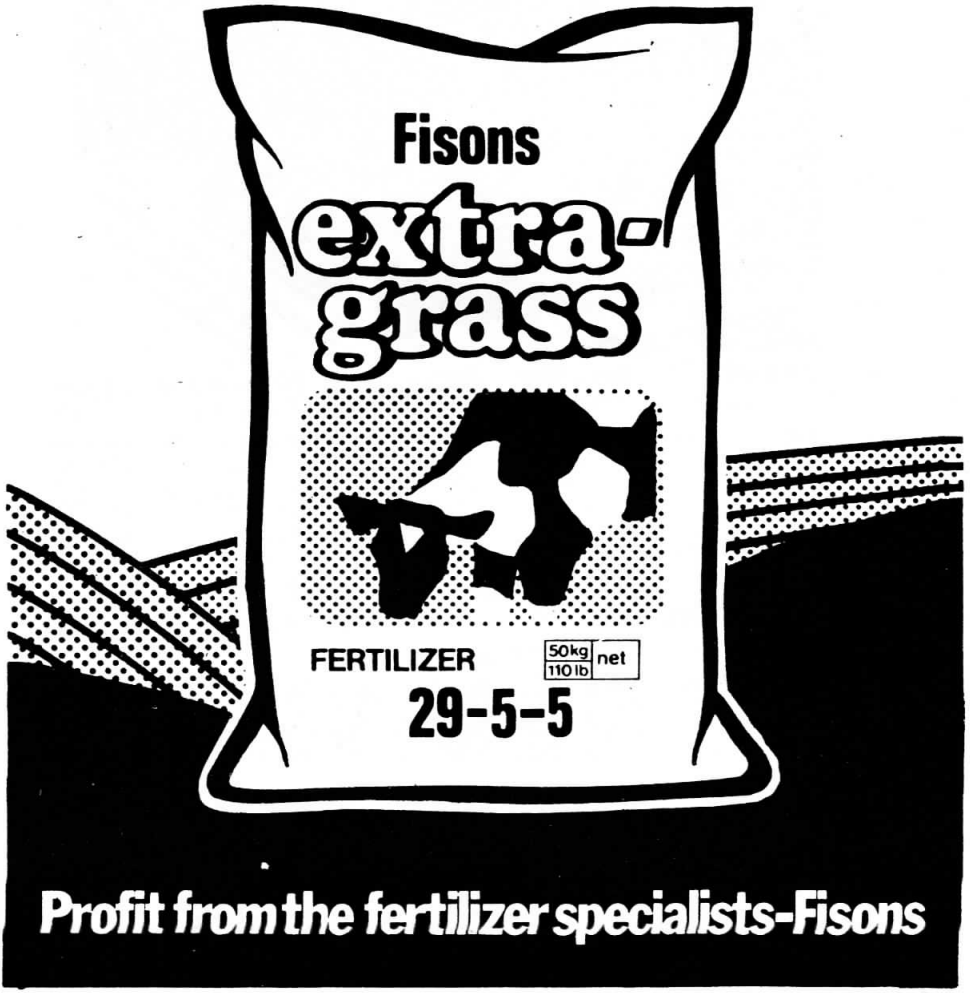

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Lessons from the Milk Production System Investigation (MPSI)

A farm scale development scheme for 'above average' dairy farmers, has been operated by the West College for the last 10 years. Profitability has been judged on the basis of Gross Margins - a somewhat dangerous thing to do in the light of increases in fixed costs (farm overheads). However, Gross Margins will suffice for illustrative purposes here.

Over the years we have consistently found that yield per cow, stocking rate and nitrogen use have had a major influence on Gross Margins. High average yield per cow is associated with high Gross Margins per cow and per hectare, despite heavier use of concentrates (Table 4).

Gross Margin per hectare is the most useful of the financial measures quoted because it combines together the efficiency of the cows with that of the utilization of available land (stocking rate). Though the top yield group used the highest level of concentrates per cow, the concentrates fed per litre were no higher than the lowest yield group at 0.31 kg per litre and were lower than in the other two groups.

Table 4. Relationship between average yield per cow and other factors - 184 farms 1980/81.

Herd yield		Concentrate usage per cow		M.O.C.*	Gross Margin	
Range	Average	per year	per litre	per cow	per cow	per ha
litres per cow		kg			£	
4500 & under	4087	1264	0.31	379	275	603
4501 - 5000	4752	1544	0.33	441	331	715
5001 - 5500	5245	1698	0.32	482	372	820
over 5500	5946	1852	0.31	552	442	989

* M.O.C. = margin over concentrates

The critics of high yield with high concentrate use argue that the extra litres of milk are dearly bought. If we make a crude calculation, comparing the herds averaging 5946 litres with those averaging 5245 litres, the highest yield group obtained an extra 701 litres and fed an extra 154 kg of concentrates. Each extra litre required 0.22 kg concentrates. The difference between the top and bottom yield groups was 1859 litres and the extra concentrate used average 558 kg. Each extra litre required 0.33 kg.

It isn't as simple as this - the higher yielding herds would use more fertilizer and feed more silage. But the point is that one cannot accuse the top yield group of overfeeding concentrates.

High *stocking rates* are associated with high Gross Margins per hectare (Table 5). The difference in average Gross Margin between the group with the lowest stocking rate and that with the highest stocking rate amounted to £372 per hectare.

Table 5. Relationship between stocking rate and gross margin per hectare - 184 farms 1980/81.

Stocking rate		Gross margin per ha
Range	Average	
cows per grass hectare		£
under 2.00	1.81	618
2.00 - 2.25	2.14	786
2.26 - 2.50	2.38	843
over 2.50	2.71	990

As nitrogen use increases so does: stocking rate, milk yield per grass hectare, the amount of ME obtained from forage and Gross Margin per hectare (Table 6).

Table 6. Relationship between nitrogen use and other factors - 184 farms 1980/81.

Nitrogen use per grass hectare		Stocking rate	Milk yield per grass hectare	UME per ha from forage	Gross margin per ha
Range	Average				
kg		cows per ha	litres	GJ	£
under 200	158	2.12	10143	54	710
201 - 249	226	2.16	10913	57	764
250 - 299	275	2.23	11572	62	819
300 and over	344	2.34	12223	66	860

Bearing these relationships in mind, another question arises: *Does it pay to go for a high output with high input system or for a lower output with lower input system?* Each year we divide our sample of cooperators into four groups, on the following basis:

The farms are first placed into groups according to whether average yield per cow is above or below the 'mid-point' for the sample. Those above this mid-point are termed 'High' yielding herds; those below the mid-point are termed 'Low' yield herds.

Both of these groups are then placed in the category of either 'High' or 'Low' stocking rate, depending on whether they are above or below the mid-point. This gives us four groups of combinations of yield per cow and stocking density. The results for 1980/81 are shown in Table 7.

Table 7. Effect of yield combined with stocking rate - 184 farms 1980/81.

Item	Unit	Average yield per cow: High	Average yield per cow: Low	
Yield	litres per cow	5664	4534	
Stocking rate	cows per grass ha	2.47	2.44	
Concentrate use	kg per cow	1837	1440	
	kg per litre	0.32	0.31	
Nitrogen use	kg per ha	277	262	High stocking rate
Gross Margin	£ per cow	411.1	321.6	
	£ per ha	1005.0	760.3	
Ave. herd size	cows	117	103	
Yield	litres per cow	5593	4538	
Stocking rate	cows per grass ha	2.03	1.94	
Concentrate use	kg per cow	1757	1433	
	kg per litre	0.31	0.31	
Nitrogen use	kg per ha	267	225	Low stocking rate
Gross Margin	£ per cow	406.2	313.1	
	£ per ha	821.3	596.7	
Ave. herd size	cows	114	94	

Gross Margin Analyses

The High Yield/High Stocking (High/High) group could possibly be described as the high input/high output group, though some may think that an average yield of 5664 litres per cow per year is not particularly high. The average yield of 5664 litres was obtained with a stocking rate of 2.47 cows per grass hectare. Average concentrate use per cow at 1837 kg was highest for all four groups but concentrate use per litre, at 0.32 kg, was only 0.01 kg higher than the other groups. These farmers had the highest average nitrogen use per hectare but it was not markedly higher than the Low Yield/High Stocking group or, more surprisingly, the High Yield/Low Stocking group (High/Low). One would expect that the heavier stocked farms would tend to use appreciably more N. Indeed, College recommendations for intensive Nitrogen use are for 375 kg on grazing ground and 300 to 360 kg for silage, depending on the number of cuts. The group averages indicate that *there is still considerable untapped potential in grassland management.*

In financial terms, the High/High group had the highest Gross Margin per cow and per hectare. Gross Margin per cow was £5 higher than in the High/Low group and Gross Margin per hectare at £1005 was £184 higher.

Compared with the Low Yield/High Stocking group (Low/High), Gross Margins for the High/High group were higher by £89 per cow and £245 per hectare. In terms of Gross Margin per cow and per hectare, the High/Low group performed better than the Low/High combination by £85 per cow and £61 per hectare.

The Low Yield/Low Stocking (Low/Low) combination had the worst performance of all groups. It is worth pointing out that the average yield of this group happens to be only 7 litres below the annual average milk yield per cow for Scotland in 1980/81! Every year since 1972 the various analyses have come up with the same relationships, despite the vicissitudes that the dairy industry has passed through since 1972, and the result indicates that a high input/high output combination pays off - or does it?

Net Margin Analyses

Because the results have been presented only to the Gross Margin stage, no account has been taken of so-called 'fixed' costs (some people call them farm overheads). These costs, according to terms and definitions, include manual labour charges for employees and the farmer and his wife, machinery and power costs, rent and rates, property repairs and depreciation and miscellaneous costs such as accountancy fees, telephone, postage, etc.

The term 'fixed costs' is entirely misleading because during inflationary times no cost is fixed. Indeed, so-called fixed costs have been rising more rapidly than variable costs in recent years. It might be better to describe them as 'unallocated' costs, though this is not a widely accepted term.

Fixed costs have been omitted because there is a limit to the amount of record keeping that our MPSI farmers are prepared to do. The collection of data by College staff would impose further burdens on an already stretched work force and then there is the problem of allocating these costs to different farm enterprises. For example, one would need to share the costs between the milking herd, the young stock enterprise, cereal crops and so on.

Despite these problems the critics have a valid point. Are the fixed costs of a high input/high output system so high that the financial advantage at the Gross Margin stage is wiped out?

Since 1980 we have looked at a smaller sample of dairy farms where we have recorded and then allocated fixed costs (Table 8). This is part of the Milk Net Margins Investigation which covers a representative sample of farms not associated with the MPSI survey. The range in fixed costs on the farms in this sample was from £317 per hectare to £873 per hectare - so these costs can clearly have a major impact on profitability.

Average yields in the four groups are about 400 to 500 litres below the MPSI average. Yield per cow in the two 'low yield' groups is well below the average of 4545 litres in 1980/81 for the SMMB area.

The main point to note is that the High/High combination still pays the best, as it did in MPSI, followed by the High/Low group. Fixed costs in the High/High and High/Low groups were £623 and £515 per hectare respectively. The Low/Low group was substantially lower at £499 per hectare. But output was obviously low in this group and they ended up with no profit.

The result of the Low/High group was most interesting. This group had the highest average fixed costs, about £50 per hectare above the High/High group and £158 per hectare above the High/Low group. However, output was obviously still low and this group made a loss.

Table 8. Effect of yield combined with stocking rate, including fixed costs allocation, 1980/81.

Item	Unit	Average yield per cow		
		High	Low	
Yield	litres per cow	5202	4144	
Stocking rate	cows per grass ha	2.42	2.38	
Concentrate use	kg per cow	1851	1549	
	kg per litre	0.36	0.38	High stocking rate
Gross Margin	£ per ha	825	604	
Fixed costs	£ per ha	623	673	
Net Margin	£ per ha	202	-69	
Yield	litres per cow	5163	4039	
Stocking rate	cows per grass ha	1.86	1.78	
Concentrate use	kg per cow	1832	1291	
	kg per litre	0.36	0.32	Low stocking rate
Gross Margin	£ per ha	625	499	
Fixed costs	£ per ha	515	499	
Net Margin	£ per ha	110	0	

How did these results acrue? Was it a case that they had built up cow numbers very quickly and not had a chance to cull for yield. Or, and more likely, was it a case that these people were geared up for high stocking and high yield but their management just wasn't good enough to get them there? Obviously, low yielding herds can get into real trouble in this way.

It should also be remembered that by 'accounting conventions' interest payments are not included in fixed costs. This means that any interest has to be deducted from the Net Margin. There is an enormous variation in the interest between farms, expressing it on a per hectare basis is a useful way of looking at it.

From the available evidence it would still seem that high input/high output systems aiming for high yields and high stocking rate, are likely to lead to higher profits provided that strict control is exercised over fixed costs and the amount of borrowed money invested in the business. This is an area where those concerned in monitoring dairy herd performance have to do much more to help farmers appreciate the impact of both fixed costs and interest charges on profitability.

A lot of commentators appear to think that, by definition, high input systems necessarily incur heavy capital expenditure in buildings, equipment, micro-electronics and machines. This is not necessarily so and farmers can go a long way in improving performance by the judicious use of feed and fertilizer and certainly by making better use of grass and grass products. This need not mean more buildings, machines, etc.

The one important factor that is so obvious it shouldn't need stating is the overall managerial ability of the farmer in every aspect of running the business. That is where improvement is required.

Grassland Management

Thirty years ago there was tremendous enthusiasm for grass and grass products engendered by good research and by the pioneering efforts of ICI to demonstrate on commercial farms, the potential, in both physical and financial terms, of well managed grass.

In May 1957 a survey was carried out by the English MMB on 989 herds. Only 8.5 per cent of these herds fed grass alone in that peak month for grass growth and quality. About 90 per cent of the herds were feeding concentrates in the last week in May, the main reason (given by 2/3 of the farmers who fed them) being to supplement the quantity or quality of grass. Among the herds in which concentrates were fed, approximately 1½ lb of concentrates were fed per gallon of milk produced - that is 0.15 kg concentrates per litre.

Similar results were obtained when the survey was repeated in 1958 and 1959. Indeed the proportion of herds fed on grass alone dropped to under 5 per cent in 1959. An interesting sidelight on these results was that 10 per cent of the farms fed concentrates to assist in 'tying up' cows in the byre and 20 per cent fed concentrates to 'encourage let down' of milk.

On MPSI farms in 1980/81, during the month of June, 1980, out of 184 herds, only 22 farms (12 per cent of the sample) fed no concentrates in June. Of these 22 farms, 7 were in the North and 15 in the South of the College area. The average level of concentrate feeding was 0.12 kg per litre. (Compare this with the average of 0.15 kg for May 1957).

Remembering that MPSI herds are above average, little progress seems to have been made in the past 25 years in managing summer grazing! Admittedly, herd yields are higher but the pundits claim that spring grass can produce 27 litres of milk per cow per day.

The standard lactation curves produced recently by the English MMB indicate that most cows should be able to produce their full potential from grass in early June except for: cows with a lactation yield of 8000 litres and calving from December to May inclusive: cows with a lactation yield of 7000 litres and calving from February to May inclusive: cows with a lactation yield of 6000 litres and calving in April and May. According to the lactation curves, animals in these groups would require supplementation with concentrates in June.

Does it pay not to feed concentrates in June? We can get some clue by looking at Table 9. Herds feeding no concentrates in June had lower yields per cow in the summer 6 months - 338 litres per cow less than heaviest concentrate feeders.

Over the summer 6 months, May to October inclusive, the heaviest concentrate feeders fed an extra 407 kg of concentrates to obtain this extra 338 litres of milk. Each extra litre cost 1.2 kg of concentrates. At a concentrate cost of £120 per tonne, feed would cost 14.4p to produce 1 litre worth about 12.72p (at 1980 prices). So heavy feeding of concentrates in summer didn't pay.

Table 9. Concentrate feeding in June 1980.

	Concentrate/litre (kg)					
	Nil	0 -0.049	0.050 -0.099	0.100 -0.149	0.150 -0.199	0.200 + over
No. of herds	22	11	46	40	35	30
Cows	107	77	111	108	106	109
% Dry	18	20	17	17	17	17
Yield/cow - summer	2256	2325	2463	2505	2551	2594
(litres) - winter	2716	2325	2573	2614	2556	2721
- year	4972	4650	5036	5119	5107	5315
Conc./litre - summer	0.13	0.14	0.17	0.20	0.23	0.27
(kg) - winter	0.41	0.47	0.45	0.43	0.44	0.43
- year	0.28	0.29	0.31	0.32	0.34	0.35
- June	-	0.03	0.08	0.12	0.17	0.24
UME/ha (GJ)	64	60	61	61	60	57
% UME from forage	62	63	61	60	58	53
Cows/ha	2.26	2.13	2.14	2.15	2.20	2.24
N/ha (kg)	300	249	246	257	260	248
% summer milk	50	56	53	52	53	51
MOC/cow (£)	491	446	475	476	457	470
GM/cow (£)	368	351	369	376	349	357
GM/ha (£)	822	757	792	815	774	802

Yield per cow in the winter 6 months for the herds feeding no concentrates in June was high, possibly reflecting skill in making and feeding silage. These herds also had the highest production of UME per hectare, the highest contribution of UME from forage, highest stocking rate and highest N use. They also had the lowest % of summer milk the highest MOC and the highest Gross Margin per hectare. These factors indicate that good grassland management pays.

Table 9 doesn't tie up with the earlier one showing a combination of yield and stocking rate where the High/High combination gave a Gross Margin per hectare of £1005. This is because the sort-out of herds is done on a different basis. It is however worth noting that the High/High group fed 0.14 kg concentrates per litre in June, the High/Low group fed 0.12 kg and the Low/High group fed 0.11 kg. The Low/Low group averaged 0.12 kg per litre in June.

What about silage, does it pay? A series of regression equations on MPSI data has shown that there was a very strong correlation between yield per forage hectare and Gross Margin per hectare.

If a farmer was a silage feeder this was worth an extra 826 litres per forage hectare but when sorted according to D value of silage no clear cut relationships were found. Only in one year out of the last 5 has it been able to demonstrate that increasing D values are associated with higher yield per cow and high Gross Margins per cow and per hectare. This is very worrying and one wonders why.

Is it because farmers lack confidence in their silage? Is it because they don't feed enough silage? Should D value be the only measure of quality? - thoughts for the agronomists to ponder.

The Future

Prospects for the foreseeable future would suggest that farmers will continue to be under-recouped for cost increases. Pressure will continue to make an even better job. The figures quoted suggest that there is certainly room for improvement in grassland management.

At the moment there is an oil glut and real energy prices are being contained. In the long term, energy prices may rise again. At the same time the increasing production of cereals allied to static effective demand may bring their real prices down. So in the long term the gap could narrow between the present low cost of well fertilized grass and the higher cost of concentrates as sources of dietary energy. But grass will remain a cheap feed for a very long time to come.

The 1981 Census of Scottish Milk Producers showed that while 60 per cent of all Scottish milk producers now feed some silages as a bulk feed in winter (compared with 49 per cent in 1978 and 41 per cent in 1975) only 20 per cent rely entirely on silage or haylage. Over 50 per cent of farms still make hay. Yet the advantages of silage over hay have been preached to farmers for 30 years! Now it may be too late, because for a man contemplating a switch to silage, the costs can be substantial, particularly if it has to be financed from borrowed money.

A study by the College last year showed that machinery and running costs alone could cost between £23,000 and £26,000 inclusive of interest, over 5 years for a farm making between 22 and 33 hectares of silage a year and using a two-cut system. Add on the costs of a silage clamp and feeding facilities and you are into big investment.

Some farmers may therefore have 'missed the boat' in making an economical switch from hay to silage. They will need to put more effort into making better hay but they may still 'miss out' on improved yield per cow and per hectare.

Even the replacement of existing silage machinery is one that has to be approached with caution because of the cost. Farmers may need to rethink the timing of replacement machinery.

The 'grassland story' is well known: the ball is in the farmers court to do better - and McEnroe tactics of blaming the linesman and referee won't help you to win - your own skill is what counts at the end of the day, just as McEnroe's skill is what really wins him his matches.

Discussion

The discussion mainly centred round the problems of cash flow and the higher interest rates. Money was cheap in 1978 when interest was 9% but the rise to 20% in 1980 did much to upset farm accounts and investment plans. Cut backs were necessary but these should be well thought out as it could be counter-productive to reduce fertilizer, lime and feed inputs at the expense of say buildings, machinery or vehicles.

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SLURRY DISPOSAL

A meeting of the SWSGS at the Royal Hotel, Cumnock, 4 November, 1981.

'Slurry disposal from the farmers point of view' J. Rome, Ingleston, Irongray.

The appearance of the slurry problem was likened to unemployment - it has been caused by economic pressures and as a result of a series of decisions taken over the years. For many, the 'slurry worry' is now threatening the entire farming system. The expansion of a livestock enterprise, whilst perfectly feasible financially, may be impractical due to slurry handling and disposal problems.

Those with slurry should try and make constructive use of it in order to replace some purchased fertilizer. To make best use, slurry should be used during the growing season when nutrients can be quickly taken up by plants. Ideally, apply slurry in March or April for silage ground and before the leaf is longer than 10-12 cm. Ground conditions often limit the time when slurry can be spread.

At Ingleston with up to 1½ million gallons of slurry and the likelihood of perhaps only two weeks of reasonable ground conditions, a compromise is reached by applying 22 m^3 per hectare in January or February followed by a further 22 m^3 in March or April. Heavier applications are applied to stubble fields prior to ploughing. Slurry left over is applied for second cut silage but in a dry area, summer application can be a nuisance since it may not be washed into the soil.

The slurry is deliberately kept liquid to aid handling and spreading and also because it is less inclined to stick to the grass. Every effort must be made to completely empty each slurry store at least once a year.

Overhead and colour slides were used to illustrate the slurry storage and handling facilities at Ingleston.

'Pollution Control' Dr. M.R. Evans, Microbiology Department, Auchincruive.

All too frequently slurry is considered as a nasty smelling nuisance that needs to be disposed of. Usually slurry is regarded as a valueless by-product and is disposed of by transferring it from one inconvenient place to, hopefully, a less inconvenient place without much regard to all the consequences of this action.

Potentially slurry is a valuable reservoir of organic matter, major plant nutrients and trace elements. Each year large quantities of energy and vast sums of money are spent on fertilizer. This is incorporated into soil and a substantial proportion of the nutrients are recovered in the crop. The crop is then consumed by our animals or ourselves and within a few hours about 60-70% of the nitrogen, 50% of the phosphate and 80% of the potash is excreted. It then ends up in slurry on a farm or in domestic sewage.

Because energy for fertilizer production and transportation has been relatively cheap and because of the large benefits obtained from the use of fertilizer, the environmental consequences and long term cost of not recycling nutrients have been largely overlooked. Recycling will not eliminate the requirement for fertilizer, but will reduce waste and hence costs.

Apart from being wasteful, present practices give rise to a number of pollution problems. When animal excreta is collected as a slurry, microbial fermentations produce a number of gases. These largely remain dissolved until the slurry is agitated, or if a volume of silage effluent is suddenly mixed with the slurry, when they are released to the atmosphere above the store. In confined conditions such as those where slurry is stored below a slatted floor, the sudden release of these gases can cause asphyxiation or poisoning of stock. One of the toxic gases, hydrogen sulphide, requires special mention since at low non-toxic levels it has a distinctly offensive odour. At higher levels the ability to smell the gas is rapidly fatigued so that at lethal levels hydrogen sulphide is effectively odourless.

With storage of slurry in outdoor tanks the danger of toxic gases is much reduced, but the problem of creating an odour nuisance is often increased. This is also a problem during land spreading.

In England and Wales there have been a number of successful prosecutions against farmers for creating an odour nuisance as defined in the Public Health Act 1936. This Act does not apply to Scotland where the most recent legislation is the Public Health (Scotland) Act 1897, which specifically excludes the odour from farm manures. There are, however, strong pressures to standardise the regulations throughout the EEC and no doubt legislative controls on odours from animal wastes will soon apply to Scottish farms.

When slurry is spread onto land there are obvious problems of taint, scorch and disease risk to grazing animals. Slurry from fattening pigs and poultry often contain high levels of copper and zinc, while sewage sludge in addition to copper and zinc contains a variety of other metals. Many of these elements are potentially toxic if ingested in sufficient quantity by grazing stock.

Most of the slurry, is, however, soon drained into the soil. Here large applications of organic matter can cause deoxygenation and acidity, thereby reducing soil fertility. Most of the heavy metals remain held in the soil, so that with repeated slurry or sludge addition, their concentrations increase and are likely to ultimately reach dangerous toxic levels. Repeated excessive additions of potash (K_2O) will also result in its gradual build up in soil and can eventually lead to problems of hypomagnesaemia in grazing animals.

When large volumes of slurry or sludge are applied to land some of it will reach a water-course through surface run-off or land drainage. This can result in deoxygenation of the water which kills fish as well as other aquatic life. There are also dangers of disease spreading to consumers of the water down-stream. Nitrogen and phosphate can also be leached from soil and lead to a condition known as eutrophication, when the level of nutrients in the water encourages algal blooms, again destroying the water's value for amenity or supply purposes.

It would be foolish for agriculture to ignore these problems in the hope that they will go away. If it does, then non-agriculturalists will draw up the rules. This is already beginning to happen, for example Humberside have issued their own code of practice for effluent management, which includes farm wastes. The Department of the Environment has published guidelines for sewage sludge disposers which in the opinion of specialists in the Scottish Agricultural Colleges don't provide adequate safeguards for the future productivity of agriculture - a view supported by most other nations in Western Europe.

What should agriculturalists do about these problems? The Scottish Agricultural Colleges have published a number of advisory leaflets on these problems (see page 21) which are freely available and the advisory service is always willing to discuss individual problems.

With regard to the control of odour nuisance, the simplest solutions involve careful siting of new buildings, tanks etc. Confine spreading to times when it is least likely to give rise to complaints, avoid windy days, weekends, public holidays etc. Use equipment which spreads slurry down onto land rather than distributing it in a fine aerosol high into the air.

Careful timing of application of slurry to land minimises risks of taint and scorch problems. Preventing grazing for at least 21 days after slurry spreading minimises risk of spread of disease.

Similarly, attention to timing and quantities applied at each dressing will ensure maximum recycling of nutrients. Consideration to the rates of addition of potentially toxic elements and adherence to College advice will avoid the longer term destruction of soil as a place to grow food crops.

The stocking densities should be restricted to maximum rates for the total area of land used for slurry application. To avoid the accumulation of potash, rates below 3 cows/ha and 800 hens/ha are reasonable limits unless the land is used for intensive silage production when these limits could be doubled. With fattening pigs a limit of 38 animals/ha must be considered to avoid a too rapid accumulation of copper in the soil.

The problem of water pollution is partly under legislative control with the Rivers (Prevention of Pollution) Scotland Acts 1951, 1956 and the Water (Scotland) Act 1946. The former Acts make it an offence to discharge any effluent to a stream without the prior consent of the appropriate River Purification Board. The Water Act empowers water authorities to impose bylaws for the catchment of specified waters. However, when slurry utilization is incorporated in the farm fertilizer programme, and when the additional guidelines contained in the Colleges publications are adhered to, problems of water pollution would normally be minimised.

For the future, other waste treatment systems are under investigation and development. These include anaerobic digestion, which recovers a proportion of the energy contained in the organic residues of slurry as methane gas to be used for heating or the generation of electrical power. Aerobic treatment eliminates odour nuisance and liberates substantial heat, some of which can be conserved and used. Both processes, however, produce a treated slurry which still contains all the plant nutrients and which requires recycling back to soil. Further into the future it is possible that more of the slurry constituents will be recovered as microbial protein and recycled in animal feeds.

'Slurry Handling' W. Davidson, Mechanisation Adviser, College Office, Ayr.

Factors which contribute to the problems in slurry handling are often related to poor feed barrier or cubicle design, to excessive water dilution from uncovered concrete areas, roofs or leaking water bowls. The leakage of silage effluent from joints in floors or walls and from earth walled silos is all too frequent.

Slurry storage compounds, unless well designed, suffer from access difficulties, leakage, crusting and vegetative growth which makes management difficult. Above-ground silos allow for better management provided crusting and water dilution are kept under control. Below-ground storage is not without difficulty and various systems of circulation and mixing have been tried.

Agitation of above-ground stores is effected by tractor or electric pumps with jetting nozzles, larger stores requiring more jetting points. More recently propeller type agitators and bubbler systems have been introduced for agitation in-store. All stores should be completely emptied once a year to prevent crust build up.

Mechanical slurry scrapers are now widely used for solid passages or under slats where they particularly suit building conversions. The range of current models are more reliable and adaptable than earlier models with a selection of blades and drive arrangements.

Field equipment available ranges from simple open-topped tankers, through vacuum tankers to self-fill tankers. The main improvements have been in wheel equipment to allow greater loads or use in adverse conditions. Alternative methods of discharge allow for side delivery, high or low discharge, soil injection or irrigation. Developments in pump irrigation have been mainly in relation to hose reel machines which have severe limitations on undulating ground.

Slurry separation systems are currently attracting little attention because of the relatively high cost involved.

An interesting series of slides illustrated the main points of this talk.

'Discussion Opener' J. Watson, Creoch, Ochiltree.

The value of slurry, especially as a source of phosphate and potash would seem to be a sensible way of saving on purchased nutrients and which in turn could have a useful effect on farm finance. However, in agreement with the first speaker, the consistency of the slurry seems to be very important. Every effort should be made to empty the store as soon as possible and little and often application would seem to be the best way to exploit the nutrient content of the slurry. Fertilizers and organic manures are complimentary to each other. At Creoch various attempts at diluting slurry at the rates of up to 1 part slurry to 9 parts water have been tried. Water is applied immediately before emptying and dilution does reduce the odour nuisance as well as causing less grass leaf pollution in the fields. Of course there has to be a balance between dilution rate, the ability to handle the quantity of slurry involved and the ability of the land to take the mechanical and hydrostatic loadings involved. Preferably rainwater or some other free water source should be available since metered water can be too expensive. However the question of what degree of dilution to use is still an open question.

Discussion

Following on the question of dilution, the panel agreed that cost of transporting excessive water was prohibitive. At Ingleston 10-20% of water is added to the store and well mixed, this then flows easily and so aids handling. The more dilute product is also less likely to smother the grass and hence encourage docks. In warm conditions thick slurry will lie on the surface and the nitrogen, in the form of ammonia, will be lost. Generally a wet spell after the application gives the best result. In terms of quantity to apply, this will depend on soil type and slope of ground. The amount applied must be restricted to what the soil can cope with without run-off. The application to frozen or snow-covered ground does increase the risk of surface run-off.

Slurry nutrients respond in a similar manner to bagged fertilizer as far as soil temperature is concerned. Applications in February or March will give a response from the nitrogen which is in ammonia form. Indeed nitrates can be reached from the soil more rapidly than ammonia. On the other hand if conditions are dry and hot the ammonia is lost to the atmosphere before it is washed into the soil and indeed negative results have been recorded where high rates of thick slurry have been applied in summer.

The actual nutrient and financial value of slurry will depend on its degree of dilution. 15 m^3 of a 1:1 dilution slurry contains approximately 16,6 and 30 kg of N, P_2O_5 and K_2O respectively. The value of this in terms of nutrients is approximately £14. Long storage time can reduce the nutrient content especially of nitrogen in the ammonia form and particularly so if there is much agitation. Other nutrient losses are small and some of the lost ammonia N can be replaced by organic N in the slurry. 100 dairy cows over a 30 week winter will excrete up to 2.1 tonne of N and at a value of 35p per kg this is over £700. If the value of the 0.6 tonne of P_2O_5 and the 2.3 tonne of K_2O is added the total value of the winter slurry would be in excess of £1500.

On the separation of the liquid and solid constituents of slurry, the solids would need to be covered otherwise they would just get wet again. The liquid part, with 4-6% dry matter would certainly flow without causing blockages but again this would have to be stored. The cost of separators, stores, pumps etc. could exceed £10,000. So whilst separation is feasible it is expensive. There is also the practical problem that the liquid fraction would have a higher plant nutrient content than the solid fraction.

On the comparison between slurry and farmyard manure, the straw in the latter would aid aeration but in the grassland situation where organic matter is going back into the soil anyway, this is of less significance. Certainly composted materials could be considered as less toxic and less acidic. An interesting comment made was that on dairy farms where the cattle had been disposed of and slurry use discontinued, soil fertility levels were declining.

Scottish Agricultural Colleges Publications

Odour in Agriculture (1980) No. 57.
Handling and utilization of animal wastes (1980) No. 16.
Silage effluent - its collection and disposal (1982) No. 19.
Disposal of sewage sludge on agricultural land (1981) No. 76.

CENTRAL SCOTLAND GRASSLAND SOCIETY

SILAGE COMPETITION 1981-82

A meeting of the CSGS in the Stuart Hotel, East Kilbride, 21 January, 1981.

Judge Mr. Michael Milligan, Culvennan, Castle Douglas.

Entries for this year's silage competition totalled 53, a very satisfactory response considering the poor weather conditions which had plagued silage makers for most of the 1981 summer. The Society are most indebted to Michael Milligan for judging the competition particularly so, when he accepted the task at short notice following the indisposition of the appointed judge.

In his opening remarks, the judge suggested that entrants should endeavour to have sufficient silage at the time of judging to ensure a valid assessment. Also if possible, samples for analyses should be drawn from that area of the pit likely to be open at inspection time. Attention to these factors would make judging easier for the judge and fairer for the farmer.

On recapping on the scoring system and outlining what he was looking for, the judge reminded members that sealing efficiency and freedom from waste accounted for 25 marks. Efficient sealing is so important and still too many pits throughout the country lie exposed with sheeting torn. Good sealing must involve the use of a side sheet down the full depth of the silage. Each side sheet is then drawn over the silage and sealed along the centre of the pit. A further sheet may be used to cover these sheets and then the whole area must be weighted down with tyres or bales.

Uniformity of the silage (5 marks) meant a similar colour and appearance from top to bottom of the silage face and this is best achieved with fast filling. Smell (5 marks) should be non-clinging, a good silage really has a pleasant smell, something that evaded a lot of silage made in 1981!

Effluent control was worth 15 marks. If the effluent was collected safely the award was 12 marks. Only where effluent was collected and actually utilised nutritionally would full marks be awarded. For example, one farmer in the south used straw to absorb the effluent and so improved the nutrient value of the straw to an ME approaching 9.

Handling efficiency was worth 15 marks and the technique was as important for self-feed as the easy-feed systems. Barrier use and its control of the face and the method of cutting and carting were the main features examined.

Finally there were 10 discretionary marks for the judge to award for efficiency of use and overall impression.

The judge then commented on the top four silages and announced his marks (see Table 2).

The winning silage was entered by Mr. J. Clark of Dunrod with second, third and fourth places going respectively to Mr. S. Bankier of Fernieshaw, Mr. J. Blackwood of A. Smith and Partners, Ardgairney Farms and Mr. A. Hope of Nether Skellyhill.

Table 1. 1980/81 Silage Competition : Analyses and Marks

Rank	Code	% DM	% CP	'D Value'	Ammonia N as % total N	Marks/100
1	CP50	23.7	15.6	67.5	9.6	84.2
2	CL16	22.4	16.1	64.6	8.9	75.4
3	CL44(T)	37.4	10.5	63.8	6.6	72.3
4	CL3	22.3	10.6	65.3	8.6	72.2
5	CL22	29.3	12.7	62.9	9.3	69.1
6	CL37	29.4	11.5	61.9	6.1	68.1
7=	CS21	23.5	12.4	62.9	9.3	67.3
7=	CL26	20.6	16.0	62.8	9.7	67.3
9	CL5	25.3	12.6	61.9	9.1	66.2
10	CP9	21.2	17.0	61.2	7.7	66.1
11	CS24	30.6	13.4	60.3	6.5	64.8
12	CL29	23.2	14.3	61.9	11.4	63.8
13	CL15	23.0	13.3	61.0	8.0	63.3
14	CL40	26.8	14.5	61.1	11.9	62.9
15	CP32	19.7	16.2	62.3	11.8	62.7
16	CL47	24.2	11.3	61.7	10.3	62.3
17	CL13	19.1	18.2	61.3	10.3	61.8
18	CL11	19.6	15.1	61.8	11.1	60.6
19	CL35	21.8	11.1	61.0	7.8	60.1
20	CP33	22.2	13.1	60.6	9.1	60.6
21=	CL14	18.7	14.6	61.0	7.1	59.9
21=	CL31	24.5	8.9	61.2	9.1	59.9
23	CL43(T)	33.2	10.3	60.1	8.7	58.9
24	CL10	23.0	13.1	59.7	8.7	58.5
25	CL36	23.6	11.7	59.9	9.6	58.1
26	CS20	17.9	14.6	62.2	11.9	57.1
27	CS19	29.0	11.5	59.3	9.8	56.6
28	CL28	22.2	15.2	61.0	16.1	56.3
29	CL46	22.9	12.8	60.7	14.6	55.2
30	CS23	27.5	12.4	58.8	11.0	54.8
31	CP48	17.8	18.0	61.6	15.7	54.7
32	CS7	22.8	13.2	58.5	11.1	52.4
33	CS6	21.8	12.6	60.0	14.8	51.6
34	CL45(T)	27.9	13.9	59.5	18.6	50.8
35	CL52	20.6	13.9	59.6	14.7	50.6
36	CL53	16.9	16.9	62.1	18.6	50.4
37	CL39	24.1	12.8	58.2	14.2	49.3
38	CL4	20.9	11.1	57.9	10.0	47.7
39	CL25	16.9	14.1	59.5	13.3	45.1
40	CS42	20.6	12.1	58.0	14.9	43.8
41	CL30	16.6	12.6	58.5	10.3	43.0
42	CS1	20.7	10.3	57.4	13.5	41.7
43	CL12	19.7	13.8	56.3	13.7	40.4
44	CP8	18.6	15.4	58.5	19.8	40.3
45	CP49	18.6	14.9	58.7	24.4	35.8
46	CS2	17.9	15.2	57.7	22.0	34.1
47	CL27	17.3	20.9	58.7	30.5	30.7
48	CL51	17.7	12.2	54.4	15.3	29.3
49	CS41	19.4	12.9	55.8	21.9	29.1
50	CL34	18.2	16.1	57.0	33.9	25.5
51	CS18	17.8	15.7	54.9	24.4	23.7
52	CS17	17.6	16.3	55.9	33.8	21.2
53	CL38	17.5	16.3	55.3	40.2	17.2

Although judged on analyses only, the best new entrant, Mr. R. Wiseman, High-parks, and the most improved silage and Mr. T.W. Brown, Muirhouse were both in the top nine and hence were inspected by the judge who included comments on their systems in his remarks.

The judge presented the prizes to all successful competitors and expressed his thanks to the Society for the kind hospitality offered during his tour of inspection.

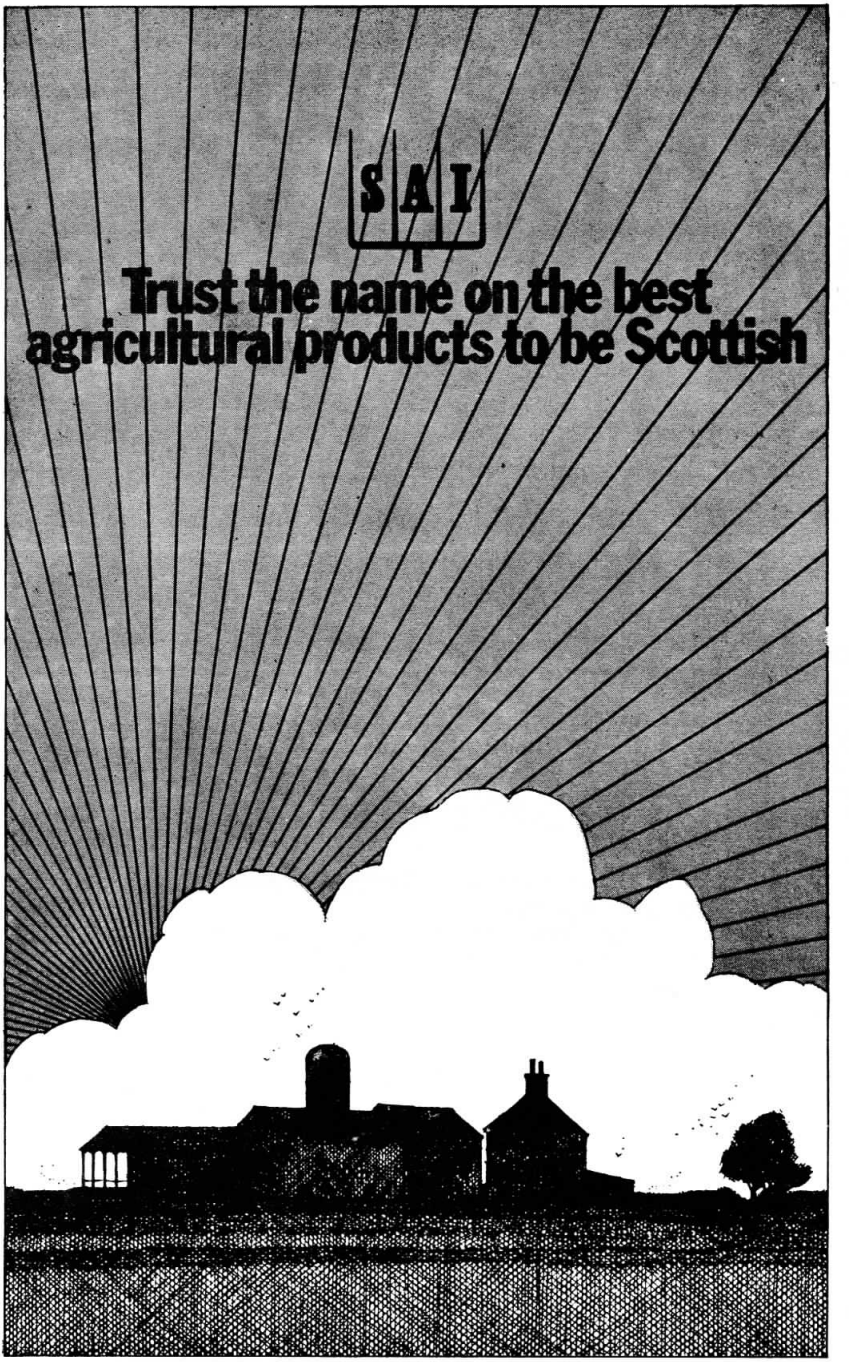
Table 2. Short list for judge's visit (in order of analyses).

Awards	Farm	Analyses (100)	Marks Inspection (75)	Total (175)
1st and Trophy	J. Clark, Dunrod, Inverkip.	84.2	65	149.2
2nd	A. Bankier & Son, Fernieshaw, Cleland.	75.4	59	134.4
	R. Wiseman, High Parks, Hamilton.	72.3		
	J. Baird, Nether Affleck, Lanark.	72.2		
4th	A. Hope, Nether Skellyhill, Lesmahagow.	69.1	56	125.1
	R. & M. Young, St. John's Kirk, Symington.	68.1		
3rd	A. Smith & Partners, Ard-gairney Farms, Kinross.	67.3	59	126.3
	T.W. Brown, Muirhouse, Libberton, Carnwath.	67.3		
	R. & M. Young, St. John's Kirk, Symington.	66.2		

Other prizes

Best New Entrant: R. Wiseman, High Parks, Hamilton.

Best Improved Silage: T.W. Brown, Muirhouse, Libberton, Carnwath.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J.M.L. Milligan

Culvennan, Castle Douglas

A meeting of the CSGS at the Stuart Hotel, East Kilbride, 21 January, 1981.

Following his judging of the CSGS Silage Competition, Michael Milligan addressed the Society and outlined his philosophy on the use of grass and grass products for milk production. It was important to be a believer in the ability of silage to produce milk and meat and the guidelines to livestock performance are as follows:

1. Profitability of milk production is absolutely dependent on quality and quantity of forage available.

2. Concentrates must be fed as a supplement to and NOT an alternative to silage.

3. No amount of concentrate feeding will make up for a failure in silage quality.

4. Output of milk depends on intake of forage: milk quality depends on the proportion of forage in the rations.

The two bad weeks at silage time in May/June 1981 has probably cost the business £5000 due to the inability of poor quality silage to sustain milk output. This is an expensive penalty to pay for the experience of lifting grass under water!

The feeding of around 1 t of concentrate per cow does not lead to so much reduction in silage intake. However, above that level there is a direct replacement of silage dry matter by concentrate dry matter and careful consideration of the economic equation is then necessary. Maximum intake of high quality silage is therefore a worthy target and this in turn will also aid milk quality as well as milk production.

Silage Quality 1973 to 1981

Silage D values were in the range 69.5 to 75.6 D with the only relapse being in 1981 when it fell to 64.2 D. The D value is the most important assessment of silage quality and dry matter content is less significant. Culvennan silages over the review period ranged from 21.9 to 32.2% dry matter again with 1981 only achieving 18.3%. Quality of fermentation is however important and pH levels were always satisfactory within range 3.9 to 4.1. An additive is always used. Crude protein ranged from 14.7 to 20.0% with 1981 at 15.3% and ME values were 10.8 to 11.8 and 1981 at 10.2. So we do not wish to see another season like that experienced in 1981!

Value of good silage - In 1976 the cows on 67.4 D silage were producing 1900 litres per day. This silage ran out and feeding changed to 75.6 D silage left over from the 1975 crop. The milk production rose to 2200 litres per day while concentrate input remained the same.

A similar story but in reverse occurred this year. During October to November in 1980 the cows produced a rising yield from 1700 to 2100 litres per day on 71.4 D silage. This last year 1981, milk production fell from 2000 to 1800 litres per day over the same period due to the 64.2 D silage. Concentrate input was similar in both years. The decision was made not to feed extra concentrates in 1981 in order to ensure that the silage was eaten.

These figures ably illustrate the nutritional value of high D silage. It has been suggested that for each unit fall in D value, milk production falls by 0.5 litre per cow per day. So in moving from a 70 D to a 64 D silage an expected reduction in milk yield would be 300 litres per day for 100 cows and this is just about what was experienced at Culvennan.

Production data - In 1980 (year ending in September) 112 cows produced 704,000 litres of milk or 6288 litres per cow. Milk sales were £824 per cow, purchased feeds (compound cubes and draff) cost £202 per cow to give a margin over concentrates of £622. In 1981 the corresponding figures were 115 cows, 764,000 litres and 6363 litres per cow. Sales per cow were £943, purchased feeds £212 giving a margin over concentrates of £731 per cow. These are considered as very satisfactory output figures.

Silage Making Techniques

The techniques for making good silage are now well known if only we can apply them. Following the selection of the right type of grass, adequate fertilizer and spring rolling, the next important point is to cut at the correct time. Date of start is not so important but date of finishing is! At Culvennan, first cut silage is completed before the seedheads appear. This means cutting around 20-25 May to ensure the high D value figures noted earlier.

After early cutting, make it quickly. Wilting is not so important that its worth losing quality over. If weather is unsettled, 24 hours is long enough and if it is still wet after that get on with the lifting - don't delay the system.

One further pointer towards quality silage was to avoid soil contamination. Rowing-up can pick up dirt and also increase the rate of respiration in the swath. The answer is to row-up carefully and not too far in advance of picking up.

It is important to have a rapid fall in pH over the first 24 hour period in order to get a good fermentation. So if handling young high quality grass an additive is needed and Culvennan uses an acid/formalin type.

Once in the pit, sealing is very important and remember the side sheets. The sheets must be kept in contact with the silage by using tyres or bales.

The machinery used at Culvennan is a Vicon Olympus mower-conditioner, a Class Jaguar with its own engine, two Bateson trailers and an industrial loader to fill the silo. The aim was to ensile 12 hectares per day. Because of the chopping, the depth of silage and the straight face filled by the loader, rolling was minimal just before the top sheet was placed in position.

The silage is self-fed in winter but now some is offered all-the-year round. At grass the silage is placed in a self-feed trailer. In July and August the cows don't milk as well as they should mainly because grass intake is not high enough and offering silage at grass is one of the reasons why average milk production remains constantly around 20 litres per cow per day in each month of the year. Last November with the poor quality 1981 silage the average daily production fell to its lowest ever at 17.8 litres per cow.

Discussion

Nitrogen usage is around 375 kg per hectare but we don't think of first cut, second cut etc. Rather the attitude is one of conserving surplus grass, so silage can be made at any time and if pit work is good there are no problems.

The stocking rate is 0.48 hectare per cow so it is not as intensive as it might be but the aim is to go for quality silage. 9 t per cow is required and the first cut all goes into the dairy cow silo. Other silages are for beef and young stock.

All fields are interchangeable between grazing and silage and this keeps flexibility in sward management and also reduces herbage contamination and rejection. Grazing fields are strip-grazed all summer. The length of the grazing rotation is not fixed because each season is different. However on average, it works out at 20-21 days. Luckily, the buildings are at the centre of the farm so all fields can be cut or grazed as necessary. A tetraploid grass mixture is used comprising 27 kg Meltra perennial ryegrass, 7 kg timothy and 1.8 kg white clover per hectare. The seed is established by cross drilling with half the seed rate in each direction.

Cost of silage is around £15 per tonne and it does cost a bit more when using additives and adequate plastic. Allowing 9 tonnes per cow means that the silage per cow is valued at £135. For the 120 cows, 55-60 hectares are cut and the yield of the high quality product is 20 tonnes per hectare. Draff was originally fed to make up for the yield shortfall in the high quality silage. It was also an insurance, that there would be enough forage since silage is fed all the year. Certainly stopping the draff would make some savings.

Silage is self-fed behind a tombstone barrier which the speaker moved himself each day. It is moved forward by the use of levers and not pushed ahead by the tractor. This is to ensure some degree of control in the feeding and the manual movement of the barrier offers more precision. If no more than one barrow load of uneaten silage is removed each morning then the cows are receiving enough. If there is nothing to clean out, the barrier is too restrictive and the cows are not eating enough. If too much is wasted then the cows are being allowed too much access and the barrier is held back slightly the next day.

The silage fields are not cut too close. The lower basal herbage has a poorer D value and close shaving leads to a slower rate of recovery. Slurry is not applied to silage ground once regrowth has started in order to avoid contamination of the following silage crop. This means that it must be applied within four days of cutting. Slurry is used up to the end of February on silage fields when it is likely to be washed off the leaf. Slurry is not applied to grazing areas.

Only liquid fertilizer is used on the farm. If slurry has been used the silage ground received 120 kg N but if no slurry has been applied, N level is raised to 135 kg per hectare. The nitrogen must be on by 1 April because after that date there is the danger of dry weather. There is no hurry to fertilize the grazing area because there is adequate good silage. 80 kg N is applied for the first grazing and 50 kg N for the second grazing, thereafter a compound is used. Since there is a flexibility in utilization, the decision is made at time of fertilizer application whether the fields are to be cut or grazed.

The liquid N does not cause scorch. Formerly this was the case but the newer sprayers with the coarser droplet size have overcome the scorch problem. The sprayer holds the equivalent of 2.5 tonne of fertilizer and the system is very suitable for larger and flatter fields. The choice of the system was to enable a

greater accuracy of fertilizer use, if you wished to apply 25 kg N per hectare that is what goes on!

Direct injection was tried and it was a complete flop. It messed up the fields even with rolling after and the response over the whole year was not so good. Liquid fertilizer does not give a faster regrowth and therefore has no benefits in performance or price, only in handling and accuracy.

Concentrate feeding is spread throughout the day via out-of-parlour feeders and there would appear to be a place for flat rate feeding. The problem of insufficient silage may be eased in some instances by carrying 10 less cows and encouraging the remainder to do better off higher quality silage. However, there is still a lot of room for improvement in our overall grassland management.

BOOK REVIEW

'THE BIOCHEMISTRY OF SILAGE' by P. McDonald.

Published by John Wiley & Sons, London, 1981, 226 pp. ISBNO 0471 27965X. Price £16.

Peter McDonald of the Edinburgh School of Agriculture plays a leading role in UK Research and Development into the biochemistry of ensilage. Whilst the title of the book sounds heavy going, in fact it is a very readable book for anyone interested in successful silage making. Although some sections do contain reference to complicated biochemical reactions such is the applied nature of the script that these can be glanced over without upsetting the understanding of the principles and techniques of ensuring a good silage fermentation. The first chapter is an 'introduction' to and history of silage making and defines the basic principles and methods of storage. Chapter 2 discusses suitable 'crops for silage' and Chapters 3 and 4 describe 'the effect of plant enzymes on respiration and proteolysis' and 'the role of the lactic acid bacteria'. The growth and development of butyric producing clostridia and other micro-organisms which may or may not be useful, are described in Chapters 5 and 6. The influence of oxygen and water on ensilage, two very important aspects over which the farmer has some control, are thoroughly reviewed in Chapters 7 and 8. The final three chapters cover 'silage additives' (the largest chapter) 'losses during ensilage' and 'the nutritive value of silages' all very practical topics.

For those wishing further details, each chapter concludes with a substantial list of references to the data reviewed in the text. Whilst this book is primarily written for those engaged in agricultural research and advisory work, many practical farmers would find it interesting reading if they could borrow a copy: at £16 it is hardly a text for the farm office. R.D.H.

FACTORS AFFECTING THE PROTEIN LEVELS IN MANX SILAGE

J. Harris

Secretary, Manx Grassland Society

An extract from the Manx Grassland Society Newsletter No. 4, January, 1981.

Not many years ago, protein content was the only criterion on which silage quality was judged. Now we know better (!) and think of 'D' value, and the various factors affecting silage intake. But protein content is still important, especially where the farmer is trying to get the maximum out of a home grown ration and particularly so with young cattle and fattening cattle. Dairy cows in fact are better on a 16-18% protein ration (with a good proportion of undegradable protein) regardless of the silage protein content - *if economics allow.*

The main reasons why silage always has a higher protein content than does hay, include (i) hay is cut at a more mature stage (ii) normally only half the nitrogen is applied to hay compared with silage (iii) leaf loss, probably very important, is less with silage.

Table 1. The crude protein content of Manx silage and hay, 1977-81.

	Silage Protein %	Hay Protein %
1981	12.1	8.5
1980	12.6	9.0
1979	13.0	8.5
1978	12.8	8.3
1977	12.7	7.2

The factors affecting protein content of silage are:-

Season - for instance 1979, high proteins as grass was very leafy at cutting after a very late spring. In 1980, a lot of leafy young grass followed the spring drought in the North and much of this found its way into later cut silages.

Grass type - early ryegrasses and Italians (especially RvP) tend to be low in protein - cocksfoot, legumes and late ryegrasses are much higher. We aim to investigate this further on our plots this year.

Fertilizer - increasing levels of fertilizer N raise grass protein content.

Plant maturity - grass protein content falls quickly after the optimum time of cutting: this time tends to be the same for each grass variety every year, but sometimes there's a lot of bulk by then, and sometimes not. If not, then the farmer almost invariably sacrifices protein for bulk - the protein level tends to drop faster than the 'D' value as the crop matures.

Fermentation - very high protein levels tend to be associated with a poor, butyric fermentation, though it is difficult to distinguish cause and effect.

On the Isle of Man the vast majority of silages are sampled every year and it is possible to build up a pattern of protein results. Over the last 5 years silages from 120 farms can be grouped as follows:-

Consistently high protein (14% crude protein or over)	- 15 farms
Consistently low protein (10.5% crude protein or under)	- 10 farms
Inconsistent results (high, low and medium)	- 7 farms

It follows that most other farmers consistently produce medium protein silage, and in only very odd years will some of these make high protein and others low protein silage. So many farms are between 11-13% protein every year - which is to be expected, as the same grass is being ensiled by the same people with the same skills, at as far as possible the same time in the year. That this average of 11-13% protein is a good deal lower in the Isle of Man than for many other areas, is a combination of many factors such as; more IRG and early ryegrasses: more leys, less permanent grass: more unreliable weather at the desired time of cutting: less suitable conditions for later cuts, and so more preoccupation with a big first cut yield: various factors (labour availability, road closures etc.) affected by the T.T. Races: more cases of grass in the right stage but not sufficient yield for an economic crop.

Silage Protein Levels

High Protein Silage Farms

1. Farms in relatively early areas (north and west, and at low altitudes) cut consistently early - starting around 21st May and finishing by 1st June. A lot of care is taken in the choice of grass mixture, and silage making is a quick operation. 4 farms - 17 high protein silages out of a possible 20.

2. Farms in later areas in the middle of the island, starting silage making in late May and early June, and making a lot of silage quickly. 4 farms making about 2000 tons of 1st cut - 14 high protein silages out of 20.

3. Farms deliberately using mixtures based on later ryegrasses, or without cocksfoot cut early enough to be leafy. Later ryegrasses, cut early June, 2 farms - 7 high protein silages out of 10. Cocksfoot, cut late May/early June, 2 farms - 5 high protein silages out of 10.

4. Two farms in an area of heavy land in the south of the island, consistently producing fairly high protein (6 out of 10) silages from mid June cuts - presumably bottom grasses and clover giving high protein bulk once the soil warms up.

Inconsistent Silage Farms

1. Sometimes high protein, sometimes low, sometimes medium: 4 farms cutting about 3000 tons of first cut - 6 high protein and 4 low protein out of 20. The big factor here is the long period of cutting. Although silage making starts quite early (early June) it continues for much of the month. In some years protein content declines very quickly indeed from 1st June, in others (late seasons) it keeps up reasonably well. Use of different seeds mixtures would help a lot here.

2. Another group of three farms - 4 high proteins and 4 low proteins out of 15 all in relatively early areas, but not always able to "hit it right" due to dependence on a contractor.

Low Protein Silage Farms

1. Five farms in early areas with grass cut in early/mid June. In this situation the protein content of the grass seems to "go off" amazingly quickly, particularly with conventional mixtures. Although mostly finished by the third week in June, these 5 farms made 14 lots of low protein silage out of a possible 21.

2. Four farms in rather later areas, where bulk is a big consideration (no second cuts here). One constant factor was that all of these farms were on south facing slopes and grass which may have grown slowly up to mid June, matured very quickly thereafter. 15 low protein silages out of a possible 20.

3. Silage made in rather late areas, cut when convenient, July in most instances. Although containing a fair amount of upland grass, these five farms made 17 low protein silages out of 24.

To sum up, farms are pretty consistent in the protein level of the silages they make over the years. So much so that in many cases an analysis probably is not really necessary! There certainly isn't any geographical reason for this but rather a difference in priorities. It is important to be aware of how quickly grass crude protein levels can decline after the optimum time of cutting.

KEY POINTS FOR BIG BALE SILAGE

R.D. Harkess and D. Howat

The West of Scotland Agricultural College

1. Preferably use perennial ryegrass swards but most types of herbage can be baled.

2. Apply at least 80 kg N per hectare plus appropriate phosphate and potash before 1st April or 6-8 weeks before cutting.

3. Cut at the correct time for the type of grass grown and the quality of silage required.

4. Avoid soil contamination by spring rolling and correct setting of the harvesting machinery.

5. Prepare a uniform rectangular swath to match the width of the baler: put two swaths into one.

6. Wilt for as short a period as possible to achieve 30-40% dry matter in the grass.

7. Produce a dense even cylindrical bale to aid stability in stacking: 10-15 wraps of twine will be necessary.

8. Prepare the storage site properly: a hard core or firm pad free from sharp projections: keep storage area away from rubbish tips and hedgerows.

9. Transport, bag, stack and seal the bales on the same day as baling.

10. Use good quality bags free from tears and holes: 500 gauge bags should give 2-3 years use if handled properly.

11. Ensure bags fit over bales snugly. Do not overstretch the bags.

12. Double tie the neck of each bag to ensure an airtight seal.

13. Stack the bales tightly together.

14. Net the sack and weigh down the net to prevent wind damage.

15. If vermin control methods are necessary use barrier baiting.

16. Remove bags carefully from store in order not to damage the bags.

17. Store used bags in a vermin-free place.

18. Use an efficient feeding system to reduce the physical loss of silage.

Attention to detail in planning, bag handling, sealing, storing and vermin control is particularly important for the success of this conservation technique.

BRITISH GRASSLAND SOCIETY - WINTER MEETING, LONDON 1981

J. Mackie

Dalfibble, Parkgate, Dumfries

"Legumes and Fertilizers in Grassland Systems" was the title of this year's Winter Meeting. In the morning, four invited speakers gave half-hour papers on the subject and in the afternoon a series of short papers covered the results of some recent research work.

The three main legumes in Britain, lucerne, red clover and white clover, were considered by each speaker. However lucerne and red clover, though giving yields equivalent to grass fertilized at 300 kg N/ha, are essentially conservation crops and don't appear suited to a wetter, colder more northerly climate. White clover would appear to offer the greatest scope for grassland in the south-west.

The first paper by J. Morrison (GRI) looked at the potential forage production of legumes. It also considered yield variability and its causes. Given a vigorous white clover content in the sward, the yields from clover/grass swards are similar to a grass sward fertilized with 200 kg N/ha (i.e. about 7.5 t DM/ha). Generally the production of white clover/grass swards is lower, less reliable and more unpredictable than production from fertilized grass. This variation may result from the effects of weather and diseases on the clover content. A major factor is poor establishment due to sowing too deep, too late or by adding N to the seedbed. Clover growth is slower than grass in the spring but more vigorous mid-season. Therefore this paper suggests there may be a place for strategic N applications on a white clover/grass sward in early spring and draws attention to the need for more care in establishing clover.

Professor J.F.D. Greenhalgh's paper reviewed recent work on the value of legumes in grazing systems. He pointed out that legumes were once valued for their protein and mineral content. Today their nutritional superiority over grasses is due to the higher levels of rumen undegradable carbohydrates and protein. Lambs on pure white clover or lucerne swards showed gains of 300 g/day compared with gains of up to 200 g/day on white clover/grass swards and less on grass alone. Beef cattle on legume/grass swards showed a 10% improvement in weight gains over similar cattle grazing grass. No trials on dairy cows were reported. Gains from mixed swards were obtained where the clover comprised 30-50% of DM. Interestingly one experiment highlighted the variability of clover when the content fell from 40% to 4% of the sward in one year. The increase in legume content in ruminent diets would require a consideration of their effect on meat flavours, the danger of bloat in cattle and the oestrogenic effect in sheep. The last point can be avoided by keeping ewes away from clover swards around mating time.

The third paper from G. Newman, Timberscombe, Somerset looked at some practical examples of legume feeding. In his introduction he noted that legumes continued to supply the bulk of forage requirements in developed countries where "cheap" nitrogen fertilizers were not available. In Mr. Newman's experience bloat need not be a problem where good husbandry and good fences allowed control of the stock and access to a palatable long fibre was made available. Bloat wasn't thought to be a problem when dairy cows continuously grazed clover swards. He

suggested that white clover was of value in maintaining pasture quality during mid-season thus ensuring the levels of intake essential for high liveweight gains. Dairy farmers with potash-rich slurries find their ryegrass/clover swards becoming clover dominant after 2-3 years.

The fourth and final paper of the morning was presented by J.S. Brockman and B.M. Camm of Seale Hayne College. It examined the factors affecting the value of legumes in grassland systems and identified areas where legumes could profitably replace fertilizer N. The compromise of grass and clover/grass swards took account of the lower stocking rates expected when using clover and included a value for the interest gained from capital saved with lower stock numbers. Savings on fixed costs were assumed in the dairying example. Within the examples, dairying, 18 month beef and sheep, three levels of grass utilization were considered (70%, 60% and 50%). Summarising the figures shows a Nett Loss varying from £136/ha (70% utilization) to £70/ha (50%) for dairying, £38/ha to £12/ha for beef and £13/ha to £-1/ha for sheep when changing to a grass/clover sward. The efficient farmer has the most to lose by changing to legumes. Even at higher N prices the authors considered that it was still worthwhile buying fertilizers to make existing fixed investments productive. A higher price would not probably encourage higher herbage utilization. Only in the long term with continuing high real interest rates is it thought likely that there will be a gradual move towards legumes and lower stocking rates.

Unfortunately the last paper didn't consider the improved nutritional value of legumes and subsequent improvements in the performance of livestock. This would have made legumes more attractive. There is a paradox attached to the use of legumes that may prevent a greater swing towards their inclusion in grassland. Legumes require a positive attitude in management and utilization if they are to realise their potential yet it is the least efficient farmer that should be considering them.

There is surely a case for developing a legume better suited to a colder climate and which like the long petioled varieties of white clover, is more competitive in a grass sward. Nitrogen yields from legumes are unlikely to increase as it is the rhizobia not the plant itself that fixes atmospheric nitrogen. Plant breeding is a long term business with no fixed scale for producing results. Legumes still seem to be unreliable and unpredictable and require a greater level of management than their potential seems to justify. In the meantime it would seem that a better understanding of the factors affecting the variability of clover in mixed swards is needed. An experiment quoted in the first paper highlights another area requiring investigation. A Blanca/S 23 sward given 100 kg N/ha in the spring gave yields equivalent to an S 23 sward with 400 kg N/ha. Therefore given the growth characteristics of present clovers how should they be managed to achieve high yields.

During the afternoon a total of 12 papers were offered in two simultaneous sessions. One paper added to the present controversy surrounding silage analyses. ICI at their Jealotts Hill Research Station fed a group of nine Friesian cows solely on silage from calving in mid-January to turnout in late April. Comparison of the energy requirements (for maintenance and production) with the energy allegedly supplied (from silage and liveweight losses) showed a shortfall in supply of 13 MJ a day out of a total requirement of 176 MJ. It was suggested that this was due to an overestimation of the value of the silage. If that shortfall had been made up with, say, 1 kg/day of concentrates it could have cost £25-£30 over the winter feeding period. Consider that spread over a 100 cows and an accurate method of analyzing silage appears to be essential.

During the course of the meeting Edwin Bushby was presented with the BGS award for 1981 in recognition of his outstanding contribution to grassland farming.

The South West Scotland Grassland Society sponsored this visit to the BGS Winter Meeting. Legumes versus fertilizer is an old argument but it was interesting to keep in touch with it.

MEET THE CHAIRMAN

SWSGS : ROBERT RAMSAY, LODGE OF KELTON, CASTLE DOUGLAS

On leaving school at fifteen, Robert came home to work with his elderly father and quickly took over the running of the farm. He has always been keenly interested in agricultural developments and has built on his thirty years of good practical farming by studying the agricultural press, attending farm walks, open days, etc. Now the 105 ha farm carries 140 dairy cows plus followers.

The Ramsay family has been at Lodge of Kelton since 1884, almost one hundred years as tenants on Threave Estate, now owned by the National Trust for Scotland. Previously, they were farming at Cauldstanes, Fenwick in Ayrshire where they are reported to have been among the first silage makers in Scotland. Silage has featured at Lodge of Kelton for many years, possibly before the 1914-18 war, and there is still evidence of white glazed tiles from an early tiled silo. Robert continues to be an enthusiastic silage maker with 68 'D' silage being his annual quality target.

Originally only high yielding commercial Ayrshires were kept but now there are a number of Friesians being graded up to pedigree status. Milky cows have always been Robert's objective, without concern over the finer breed points, and getting bulls to meet this objective has been a major problem. To this end, top A.I. bulls have been used. It is a predominantly autumn calving herd whose current average yield is 6,350 litres using 1,880 kg concentrates with an MOC of £675. Grass remains the key to success and grass production starts with early nitrogen application in late February most years. However, one of the most serious limitations to early grass production is the flocks of Greylag geese which graze the farm each winter and spring. The fact that the farm is on a wildfowl reserve limits effective action for control!

Robert's success is in no small way due to the support of his family - particularly that of his wife Ann - calf rearer, and general worker when required, as well as housekeeper and mother to their three children; Jane, a bank clerk in Castle Douglas; Jim, now working at home and Fiona, still at primary school.

In addition to his farming activities Robert is involved with the NFU - last year as a member of the Dumfries and Galloway Executive Committee. His other interests included the Castle Douglas Round Table of which he is a past chairman, and he is now involved with the local Rotary Club. The garden and a few hives of bees occupy what little remaining spare time he has. In the immediate future, re-alignment of the A75 Euro-route is going to mean the permanent loss of some land and the temporary loss of 8 hectares while the work is in progress. Despite this Robert will continue to be an active participant in our Society meetings. - M.J. Wrathall.

GRASS AND SUPERGRASS - FOR SUPER PROFIT

E. Bushby, O.B.E.

Watson Hill, Egremont, Cumbria

A joint meeting of the SWSGS and the Stewartry Discussion Society in the Ernespie Hotel, Castle Douglas, 19 January, 1981.

The speaker started farming at Watson Hill in 1949 with £700, 2 cows, 1 horse plus implements and a loan of £300 to buy a grey 'Fergy' and a plough. Until 1954 it was a traditional West Cumbrian farm with a mixture of seven enterprises, including 25 Dairy Shorthorn cows and followers as well as growing roots, potatoes and oats. Since then, apart from a 10,000 bird poultry unit, milk production has been the main enterprise and the whole acreage has been devoted to grass.

The Diary Shorthorn herd was quickly changed to Friesians, with all replacements purchased. In a search for genetic improvement, contract rearing of home-bred calves was started in 1965. At the present time, the heifer calves are home reared. In 1972 Holstein heifers were introduced and the herd is now predominantly Holstein with most of the cows being in the herd book.

The farm physical and financial data presented on page 42, show why this farming business has earned the admiration and respect of grassland enthusiasts throughout the UK and led to Edwin Bushby being awarded the coveted British Grassland Society's Award in 1981, the first farmer to be so honoured.

The Farms

Watson Hill farm is 67 hectares, mainly rented and situated on the western coastal plain of Cumbria. At a height of 107 metres it is exposed to strong coastal winds. Annual rainfall is around 1,000 mm and is evenly spread throughout the year. The soil is medium, free draining loam. Conditions for grass production are good, and both early and late grazing by the dairy cows is normally possible. The farm now carries 133 milking cows.

Low Walton farm extends to 81 hectares, approximately a mile from Watson Hill and was purchased in January 1974. Due to woods and steep banks, the farm has only 65 ha effective farmland. This additional land allowed calves and heifers to be reared at home instead of away on contract and so helped to improve the quality of the replacement stock for the Watson Hill herd, and to build the nucleus of the new herd at Whangs. A wide span all purpose building was erected to house the young stock and is the hub of the farm. The building is ideal both for stock and labour.

During the development phase on this farm, a small herd of some 40 Holstein heifers was milked in a double standing byre. Not only did this allow the development of the nucleus of a new herd, but it also raised the output of the farm well above the level that could be achieved from young stock alone. As young stock numbers increased it was necessary to erect another new building to house them all. In 1978 a new, wide span building was erected to hold 96 young stock in cubicles. A silo adjacent to this building holds three cuts of silage from approximately 25 ha. This silage is then trough fed. The surplus young stock will be sold off from there.

Whangs Farm is 40 hectares and adjacent Watson Hill and was purchased in January 1976. Since then, a great deal of management time and staff effort has gone into developing a 100 cow dairy herd on the farm, using as a nucleus the young herd of 40 third-calvers, previously milked at Low Walton. The herd moved here in June 1976 and was joined by 60 freshly calved, home-bred heifers. Except for major structures, the new cubicles, silo, dairy, parlour and roads have been built by farm labour. Since 1976, the performance of this herd has already reached that of the Watson Hill herd.

Each of these farms poses its own problems and presents its own opportunities. Experience gained at Watson Hill is being harnessed in the developments of the two new farms. The pattern of production on each farm is now established and the major modifications have been made, but it is too soon to say that all three have been completely integrated or are realising their full potential.

Farm Policy

Since 1960, grass has been the only crop grown on the farm and the dairy herd with its young stock has, for the major part of this time, been the only grazing livestock enterprise. Once the yield of the dairy herd confirmed the choice of the right genetic material, replacements were reared from the herd. Subsequently these formed the nucleus of the herd at Low Walton. When the policy of specialisation was adopted, the poultry enterprise was retained as a subsidiary enterprise. It has been expanded and three environmentally controlled houses at present contain 8,000 laying hens. Each house is served by bulk feed hoppers and is cleaned mechanically into a slurry tank. The slurry is normally applied to grassland which is to be reseeded.

All three are run as one unit and the labour force comprises Mr. Bushby, his two sons and five men. One man spends the majority of his time with the poultry, while another is based at Low Walton. Over recent years, the labour force has been maintained at a level that allows all essential jobs to be carried out with full consideration to timeliness and still leaves enough time to carry out all but the most major structural items of maintenance and construction.

The current cropping and stocking (December, 1981) is as follows: temporary grass 122 ha; permanent grass 49 ha; roads, woods etc. 17 ha; dairy cows 260; young stock 320.

Grassland

The feeding of the herd revolves around the grass crop. Maximum utilisation of grass throughout the growing season, both in grazing and the production of large quantities of high quality silage, is the key to the profitability of the dairy enterprise. This demands careful management attention to grass production from early spring right through to late summer.

The grassland at Watson Hill has been intensively managed and treated as a crop for many years. As a result, stocking density has gradually been increased to 2.5 cows per hectare. This increase in stocking density has been accompanied by increases in herd yield and together have resulted in very high levels of milk production per hectare.

To achieve this, a sustained sequency of high quality grass for as long a grazing season as possible is obtained from a combined area of short term and long term leys. In a normal year, grazing can take place from April to November, and in some years until December.

At Watson Hill, the short term leys form one 14 ha block, while medium to long term timothy-meadow fescue leys make up the rest of the farm acreage.

Short term leys are adjacent to the buildings and split into three sub-blocks. In the past, the leys were reseeded every eighteen months, either in the spring or early autumn, but with new varieties the period is now being extended to two years. Thus, while one block is being reseeded, the second is coming into full production and the third is reaching the end of its useful life. The autumn reseed is normally sown in the first week in September and is not grazed that year. With the application of 94 kg N per hectare it produces very early grazing the following spring, and a consequent saving in concentrate feed. This policy has been followed since 1954. For the first four years, S22 was the variety used. Since then other varieties have been used, including RvP, Combita, Lema and recently tetraploids such as Sabrina, Sabalan and Augusta have been introduced. Dry matter production (total and seasonal), leaf to stem ratio, palatability, persistence and digestibility are the factors considered when choosing grass varieties. Thus, Sabrina and Augusta have been introduced in a combination with RvP. Straight stands of RvP gave high yields with good persistency, but palatability declined in the second half of the year. The inclusion of Sabrina has overcome this problem. The RvP also helps to thicken out the bottom of the sward.

New varieties are constantly on trial on an observation basis as they become available from the Welsh Plant Breeding Station, the Cambridge Plant Breeding Institute or from commercial seed houses. The seed mixture used last autumn was 22.5 kg RvP plus 22.5 kg Sabrina or Augusta to give 45 kg per ha.

Long term leys, based on timothy and meadow fescue are equally important to the success of the farm. Seed mixtures are balanced to couple high dry matter production with persistence and have a life generally in excess of six years. A typical mixture is meadow fescue, 20.2 kg; timothy, 9.0 kg; Grasslands Manawa, 3.3 kg and white clover 1.1 kg; a seed rate of 33.6 kg per ha.

The grassland policy and the timing of reseeding of the separate blocks has the following advantages:

a) The maiden seeds help to sustain milk yields when grazed from mid-season onwards, and thus fit the calving pattern.

b) The area to be reseeded in autumn can be sacrificed if wet conditions arise during the summer grazing season.

c) The area for spring reseeding can be harshly treated in the previous autumn. It can be grazed in wet conditions and can also receive slurry throughout the winter prior to spring ploughing.

d) The Italian block is at least fourteen days earlier than the longer term leys.

Grassland Management

A clear policy of alternate cutting and grazing of all the grassland is employed throughout the season. No field is grazed more than twice in succession and all established swards are cut at least once during the season. This policy maintains the maximum palatability and digestibility of the grass for both grazing and conservation.

The quality and quantity of grass available determines the day to day management of the grassland rather than the strict adherence to any preconceived timetables. In a good spring, turn-out may be as early as February, but in a late year may not be until well into April. Full-time grazing continues until early November when cattle are housed at night. When weather conditions permit, day time grazing frequently continues until December.

Conservation: Silage has been the major form of grass conservation since 1958 and it has been self-fed since that year. Hay has been made on a few occasions when weather conditions have been very favourable. With the emphasis on quality, all cuts of silage are completed before the end of August.

Until 1964 no wilting had been practiced, but a trial with the second cut in that year encouraged a change in policy so that from 1965 onwards all the silage has been wilted. The sequency of silage operations is essentially simple: grass is cut with a Wilder 2 m flail mower and after a suitable wilt, according to weather conditions, it is picked up by a Wilder twin chop forage harvester towing a high-sided silage trailer. At the same time, an additive is applied. One man with two or three trailers, depending on the distance, ferries the trailers to the pit, and the grass is buck-raked onto the clamp. The equipment is very simple and straightforward, but allows the principles of good silage making to be followed. It has a low capital cost and is east to maintain. There is sufficient capacity to allow the first cut of 50 hectares to be cut, wilted and ensiled within a period of six days.

High quality first cut May silage is the basis of the dairy herd's winter feed. A regrowth period of five weeks is allowed before the second cut is taken in early July and similarly for any subsequent cuts. Maiden seeds are rarely cut for silage since they are better utilised in providing grazing for the cows.

An application of 125 kg N per ha is given in the form of 'NITRAM' or 'NITRO-CHALK' for the first silage cut, but other plant nutrients, particularly potash, are replaced by the use of compound fertilizer applications given after this and subsequent cuts. Silage quality varies from cut to cut, but good fermentation is achieved producing material normally in excess of 25% dry matter with pH 4.1 to 4.5. First cut material will normally provide sufficient nutrients for maintenance plus 10 litres per day once peak yields have been reached. At Whangs the silo is filled so as to allow the herd to have access to first cut silage at the start of the winter. This ensures that the best quality silage is consumed when cows are at peak yield.

Grazing: The aim is to provide sufficient high quality grass to meet the requirements of the stock over as long a period as possible. Italian ryegrass is invaluable since it provides spring grazing at least two weeks earlier than longer term leys.

Grazing is controlled by the use of an electric fence which is moved twice daily in an arc. Many of the fields are small relative to the size of the herd, and therefore grazing of a field is usually completed in three or four days. For this reason, only a few of the larger fields require the use of a back fence.

To sustain high milk yields from grass it is essential that the cows are provided with young quickly grown material. In periods of very rapid growth, any herbage which matures beyond the desired grazing stage is taken for silage. Even in the autumn the maximum growing period allowed for production of grazing herbage is three weeks. Such high quality grass permits a nutritional contribution to milk

production worth 21 litres in May, gradually declining to 14 litres in August and 11 litres per cow per day in September.

As a protection against hypomagnesaemia, pasture dusting with Agma CG80 (calcined magnesite) is carried out as a matter of routine at the higher risk periods of spring and autumn.

Water is always an important factor in any grazing system. Supplies were previously inadequate, mainly due to small trough size and limited access, resulting in cows standing about waiting their turn to drink. The problem has now been eliminated by the installation of large concrete troughs at all appropriate points on the farm.

Fertilizer Policy

High stocking density and high milk output from grass can only be achieved with a high level of fertilizer usage.

There is one fertilizer policy for all the established grass. Its objective is to provide the maximum amount of grass throughout the growing season. Italian ryegrass is used for the first grazing of the season and 88-100 kg per hectare is applied in the form of straight N in February or March. Subsequently, 80 kg N per hectare is applied after each grazing or cut until the middle of the summer. Phosphate and potash are applied in the form of 22.11.11 or 20.8.14 compound or as 'KAYNITRO' (25.0.16) as and when convenient during the season. On occasion, Basic Slag and straight potash are used. The last application of N, some 50-65 kg, is given to the whole farm between mid-August and late September to provide grazing as late as December. Last year 440 kg N per hectare were used of which 60% was applied before the end of June, to take full advantage of the period when the dry matter production response is at its greatest. This was backed up with around 50 kg phosphate and 130 kg potash.

Intensification of the grassland at Watson Hill during the 1960's was accompanied by the introduction and expansion of a poultry enterprise, eventually totalling 10,000 birds. During this period, fertilizer nitrogen usage on the grassland increased quite rapidly, reaching a level of 575 kg per hectare in 1969. The return of all the farmyard manure and the use of all the poultry slurry on the grassland appeared to be sound and no increase in the use of fertilizer phosphate or potash was thought necessary. In fact, in the late 60's and early 70's, the usage of fertilizer phosphate and potash in each case did not exceed 50 kg per hectare in any year.

Despite the generous use of these organic manures, a nutrient imbalance developed and grass growth response to N declined. This was accompanied by poor palatability of the herbage, and pastures developed a marked tendency to 'sod pulling'. Fist-sized pieces of turf became detached very easily during grazing.

In 1972, in an attempt to establish the cause of this 'sod pulling', ICI through Jealott's Hill Research Station, set up a series of trial plots on a badly affected field at Watson Hill. Potash shortage as a possible cause of the problem was investigated in a cutting trial which continued throughout 1973 and 1974. This trial involved increasing increments in potash levels up to a maximum of 250 kg per hectare per year. On visual assessment, soil and root structure were improved and at 125 kg per hectare grass dry matter production increased by 65% over the control. The trial continued thourghout 1975 to look at the residual effect of the previous three years' levels of potash application. This examination showed that even on

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plots which previously received heavy potash dressings, the residual values were low and dry matter yields were capable of being increased by further applications of potash. As a result of these trials, potash levels applied to grassland on the farm have been increased and grass growth has been better than ever with a very marked increase in palatability. It is also interesting that as the balance of nutrients was corrected, 'sod-pulling' virtually disappeared.

As palatability and intake are so closely linked it is obvious that this has had an effect on the performance of the dairy herd. It has more recently been concluded that phosphate dressings were inadequate and they too have been increased.

The Dairy Herd

Selective and breeding policy. Initially, all replacements were purchased as newly calved heifers in June and July. This gave a calving pattern which ensured peak milk production in the late summer and autumn. All animals are retained as long as they are profitable, and the average herd life is five lactations. From 1965 an increasing number of home-bred heifer calves were contract reared in an attempt to increase yields by breeding from the better cows. Strict criteria were applied to the choice of calves for rearing; top quality proven Friesian bulls were used and the dam must have produced at least 4,545 litres as a heifer and 5,000 litres in her second lactation.

With the acquisition of Low Walton Farm, contract rearing ceased and all replacements are now home reared. Now that the Whangs herd has been established, the criteria for the selection of calves for rearing will be further tightened. In 1972, 24 imported Canadian Holstein females and one bull were introduced with the object of further increasing genetic potential of the herd and increasing its ability to make the maximum use of roughage. Twelve of the females were in calf. The remaining 12 were bulling heifers to enter as replacements in the following year. These latter animals were run with the normal Friesian replacements and received the same management. During their first lactation, the Holstein produced an additional 900 litres of milk per head and they have maintained this superiority in subsequent lactations. Further herd replacements are being upgraded from these animals using Holstein semen. Currently, the herd consists of pure and registered Holsteins. Surplus heifers are now sold as available.

Calving policy and autumn milk. Calving is still concentrated in the period July to September, so that as much milk as possible is obtained from autumn grass. Heifers calve in June and most of the cows in July and August. The aim is to produce enough milk in the period July to October to cover the annual cost of all fertilizer, feedingstuffs and direct labour costs to the cows. During this period, the herd depends mainly on grass to produce peak yields as cheaply as possible. Since the peak lactation yield occurs at grass in the second half of the grazing season, the cows are also able to make the most effective use of silage during the winter.

Supplementary feeding. High quality grass, either grazed or as silage, is the basis of the ration but with high energy concentrates playing a complementary role.

The first 100 day period of the lactation when peak yields are reached are critical to the overall level of cow performance. It is at this time that the young nutritious grass from the maiden spring seeds is grazed. Steaming-up is based on these maiden seeds, but concentrate feeding is also generous in early lactation to ensure that food intake does not impose any limit on the achievement of peak yields. As the feed value of the grass declines in autumn additional concentrate supplementation is introduced.

In winter the cattle are housed in cubicles and have access to silages on an *ad libitum* basis. Regular silage analysis checks are made to provide an indication of the level of production which can be expected from it. In practice, concentrates are fed in the parlour for production over 5 litres to early lactation cows and in excess of 10 litres to longer calved cows. Economy in the annual use of concentrates depends a great deal on the availability of spring grass. The difference between an early and late turn-out can affect the average usage by as much as 0.04 kg per litre over the lactation as a whole.

The End Result

The table below summarises the output from the Watson Hill and Whangs herd for the year 1980-81.

	Watson Hill	Whangs
Physical data		
Number of cows	133	109
Dry cows (%)	13	13
Milk, litres/cow	6830	6962
Concentrates, t/cow	1.64	1.62
kg/litre	0.24	0.23
Stocking density, cows/ha	2.5	2.5
Total solids (%)	12.70	12.60
Milk from forage (1)	3026	2951
M.E. from forage (%)	71	69
Nitrogen, kg/ha	415	435
Financial data (£/cow)		
Milk sales	854	867
Total output	845	860
Concentrate costs	222	218
Forage costs	69	68
Other costs (vet, A1, bedding)	77	78
Total variable costs	368	364
Margin over -		
all purchased feed	625	632
feed and forage per cow	561	579
per ha	1404	1448

This level of performance has been developed over the years and is the result of careful herd management, successful grass production and gradual improvements in mechanisation and buildings. Its attainment is dependent on constant and careful management, but this is not an excessive burden. The critical factors are thorough forward planning, rapid implementation of decisions and continual monitoring of actual performance levels. ICI Dairymaid gives a monthly check on the progress of the major enterprise and early warning of any problems and Watson Hill has been recorded under the ICI Management Scheme since 1959.

Discussion

The good production from late autumn grass was of interest to many and the speaker attributed it to choice of good grasses and his cutting/grazing approach to field use. This ensured clean swards for autumn grazing. Timothy/meadow fescue swards and Italian ryegrass swards are very palatable. Some more had now been sown to ryegrass, timothy, meadow fescue swards as stocking rate has increased. Because of regular ploughing, new varieties and mixtures were experimented with. The flexible approach to grass utilisation gave more room for manoevre than fixed cutting or grazing blocks.

Cows were dry from mid May to mid July and because of this up to 4 dry cows could be carried in an area normally required for 1 milking cow and this freed extra sward area for second and third cut silage.

Calving was convenient to fit in during the longer summer days and was outside, hence fewer problems. By time of housing the cows were served and settled. Calving index is around 383 days and heifers calve at around 25-30 months of age.

Silage feeding is offered at nights starting late October/early November and a slow change over from grass to silage is essential to eliminate the drop in yield which occurs when abrupt changes in feed are introduced.

Lead feeding is not practiced, grass is used in summer and good quality silage in winter. Concentrates are fed only for production and after some experimentation, it has been decided to use an 18 per cent CP cake. Formerly all concentrates were fed in the parlour but now some are fed mid-day on beet pulp, parlour feeding being reduced accordingly. Basically grazing is expected to provide M + 18 to 22 kg in July/August, M + 15 kg in September/October. M + 4.5 kg are taken from silage or M + 6.5 kg from silage and brewers grains.

When the cows are housed the top yielders require two feeds of 5.5 kg per day. Out-of-parlour feeders are being looked at with interest to see if they may fit into the system. They can aid in spreading out the daily rations and avoid a labour input at such anti-social hours as lunchtime or 10 o'clock at night.

Silage swards received around 70 kg N in March then another 30 kg in April. Early grazing also receives 100 kg N per hectare. After grazing, a compound fertilizer is used for the next crop which is cut for silage. For grazing, about 80 kg straight N is applied. Over the season up to 8 grazings or cuts are taken. Prompt application after the defoliation is a 'must' for efficient N use. The gigajoules of ME produced per hectare is around 154 compared to the average value 104 for other farms in the survey.

The quality of silage varies little according to the analyses, whether it is first, second or third cut. There is a difficulty ensuring the third cut is clean but provided it is, the quality is very good. All cuts are stored in one clamp. Up to 4000 tonne is made each year and an allowance of 9 tonne per cow planned. Any silage left over is kept in reserve.

Silage pits are roofed because of the exposed sites of the farms. Open pits were used in the past but were given up for safety reasons and for workers convenience and comfort. Lifting and placing the plastic in an open pit in a howling gale did neither the silage or the men any good! Also with indoor storage, losses are reduced.

Grazing/cutting overcame palatability problems and build up of dung patches. However as the productivity of the farms has improved, increased earthworm activity has been noted and this leads to a breakdown of dung patches in three weeks or so. Sod pulling problems were eventually solved by increasing potash use and even after three years of receiving 300 kg K_2O per annum, further potash is still required in the fourth year.

Paddock grazing is the lazy man's electric fence!

The speaker felt that with ACR and a 16/16 parlour one man should be able to cope with up to 150 cows and put them through in about two hours. As to three times a day milking, the added costs and increased pressures on the staff made it most unattractive.

Slurry would gladly be given away if someone would uplift it! The costs of handling etc. meant that plant nutrients out of the bag were cheaper. Slurry was never put on grazing swards and only on silage ground when it was raining. If applied in frosty conditions it tended to kill out the grass and clover became dominant. Slurry was used on Italian swards about to be ploughed in, on sacrific fields or on fields being infilled and regraded. If a lot of slurry was on the field a turbo-tiller was used to admix the slurry and the soil before ploughing in order to prevent a slurry pan forming at plough depth. Finally a business approach to farming must be adopted: for example, if money is spent on buildings get them in use and producing quickly. Keep the dry cow numbers to a minimum, say 12%, they eat a lot and produce little. It is the attention to management detail that leads to success.

A DISPATCH TO CSGS FROM NEW ZEALAND

David Marshall

Seventeen ewes per hectare all the year round from a sniff of phosphate, perennial ryegrass and a white flowered magic plant called clover. Expressed another way that is 280 kg of sheep meat and 100 kg of wood produced per hectare for the Scottish equivalent price of £22 of Triple Superphosphate.

That is the sort of performance I have seen on farms under good management whilst working as an exchange adviser with the New Zealand Advisory Service in Gore, South Island. Add that to a minimum economic unit of 1500 ewes per man and it is no wonder that the Kiwi's can ship lambs half way round the world and still compete in the U.K. market.

Perhaps I had better explain a few background details. My visit to New Zealand is part of an ongoing U.K./N.Z. advisers exchange system and I am particularly grateful to the respective governments and the West College governors for allowing me the opportunity to observe and participate in a different agricultural environment.

Gore is 75 m above sea level about 40 miles inland from the Southern tip of mainland New Zealand and experiences about 890 mm of rain evenly distributed throughout the year. Soil types are variable but generally tend towards the lighter side and over the last 100 years have been improved from their natural infertile state. Stocking is dominated by sheep (with very few cattle) and wheat growing is often the second enterprise if there is one.

Well, back to 'green gold' which incidentally is often growing on areas worked over for the real thing in the late 19th century. Good pastures, new or old, are based on perennial ryegrass and white clover or occasionally for special short term purposes Italian, Westerwolds or hybrid ryegrass. The South Island farmer has few choices in perennial ryegrass or clover. It is effectively Nui perennial and Huia white clover. His choice comes when the seed rate decision is made and here he often sows 28 kg and 4 kg per hectare respectively.

Government research has bred the varieties available and sensibly has selected the best variety for particular conditions and then not wasted time on inferior ones. Incidently whilst Nui is not a good variety in Scotland most of the good perennials in the U.K. are inferior to Nui under New Zealand local conditions. Huia is, of course, good in both countries.

In pastures which are past their best crested dogstail, sweet vernal and the meadow grasses are very evident whilst thistles and docks are the weeds experienced. Chickweed is conspicuous by its absence.

Nitrogen on pasture is really only used for hay crops but the "Kiwi Cocky" (as he's affectionately known) is a real lover of phosphate. Long before lime is considered the "super" (phosphate) is recognised as the key to clover and the production of meat and wool. Sheep farmers do have to consider trace elements and sheep parasites but stockmanship and grass management produce the big dollars.

Everyone recognises the importance of ewe weight at tupping and weighing is a very frequent aid to management. This being an easy task with good handling pens.

As sheep now generally acquire their total annual feed from grass, stock control and matching mouths to grass production is all part of the art. Rotational grazing with permanent and temporary electric fencing ensures absolute control is achieved. Rotation length can vary according to the time of year from 10 days to 100 days and stocking rate can be up to 250 ewes per hectare for a 24 hour period. Set stocking is naturally an alternative grazing system but does not allow the meat and wood outputs quoted above to be achieved.

Observation of such production levels when surrounded by some 8 million sheep in this region alone can only be described as exciting and eye opening. It is also a pleasure to meet the large numbers of farmers here who have Scottish ancestry.

By the way I forgot to say lambing percentage is often around 110-113% irrespective of breed, grass grows nearly all the year round and the winter is 100 days!

Footnote Ian Warren from Oamaru, New Zealand is on the College staff at the Lanark office till autumn 1982 as David's exchange from 'down under'. - Editor

VISIT TO LOCHLYOCH

An outing of the CSGS to Lochlyoch, Lanark, 5 August, 1981.

The disciples of Sir George Stapledon would have been well pleased had they been members of the Society when the summer visit was made to the extensive enterprise of Messrs. James and Alec Galloway at Lochlyoch, Lanark. Not only were there ample examples of growing two blades of grass where one grew before, but much of the reclamation work lying around 300 metres above sea level now carries copious quantities of modern herbage mixtures for grazing, whilst at the lower levels some 140 hectares yielded 100 tonnes of hay and 5000 tonnes of high quality silage.

As the convoy of Land Rovers traversed the expanse of lush pasture, it was difficult to imagine the original state of the terrain. The transformation was due to draining, pioneer crops with lime and slag, and the sowing of a specially formulated long term ley mixture for these exposed conditions. With the reclamation programme being a continuing one, there were examples showing all the various phases involved. The two that were most spectacular were (a) the area that had been drained and was sown out for its first pioneer crop, and (b) the area overlooking Douglas Water that was being drained and levelled - and in some ways presented a 'moonscape'.

As for the hay crop that was being worked on a hill face with a 1 in 2 slope, many of the sceptics would not have believed the quantity and quality of the herbage being conserved, had they not been present to see for themselves. Here was an example of what can be done. Making use of all the equipment and experience built up over the years, so that more and better grass can be made available for higher stocking rates and the integration of cattle and sheep to fully use this improved production. J.D.E.

BRITISH GRASSLAND SOCIETY - SUMMER MEETING

HAMPSHIRE, 1981

J. Warnock

East Langton, Mid Calder

On arrival at King Alfred's College, Winchester we were given a tremendous welcome by our host, Hampshire Grassland Society's vice-president Chris Tozer and had a lecture on the history of Winchester by Mrs. Barbara Carpenter Turner who invited us on a guided tour of this wonderful city on Wednesday evening, which was eagerly accepted and much enjoyed.

Tuesday - travelled 6 miles to see Mr. Basil Samuel's Manor Farms and Stud, West Tisted, Alresford, managed by J.N.F. Fairey. This is a large 740 hectare arable and grass unit, 66% in cereals and the remainder in 2 year leys and showed the profitable use of grass through sheep and cattle.

20 miles to Totters Farm, Hook, an expanding family dairy enterprise. This all grass farm comprises some owned and some grazing tenancy with two dairy units of 140 and 198 cows. It is an example of how a business can be built from small beginnings as Mr. and Mrs. Ives had taken the tenancy of Park Farm in 1958 with only £1900 between them, building up the dairy enterprise and phasing out the pigs and poultry.

At M.A.F.F. Bridgets Experimental Husbandry Farm, director, Edwin Mundy, introduced some of the grassland and dairy facets of the experimental programme where animals and crops are fully recorded and where it has been shown that the use of clover can increase production at no extra cost.

Wednesday - 9 miles to Chilbolton Down Farms, managed by Harry Ridley who had invented a portable electric fence system which he demonstrated and uses for rotationally grazing sheep to increase fertility on this arable farm which grows mainly wheat and spring barley for seed.

Then on 5 miles to Hampshire College of Agriculture, Sparsholt, a dairy and arable farm also doing grass clover and lucerne trials.

After lunch the Society visited Leckford Estate, part of the John Lewis Partnership. This is a hugh estate of both arable and grass farming run by Managing Director, David Owen. It has two 180 cow dairy herds and 300 ewes and is carrying out secondary N.I.A.B. grazing trials.

Tony Monk's Rookley Farm which is all arable, growing seed crops was then visited. Seeing the care and attention put into the seed cleaning and storage process was very impressive. The primary and secondary trials on various farms and the care and attention put into cleaning and storage leaves us in no doubt that British grown seed is up to very high standards.

Thursday - departed for Darfield Farm, Stockbridge, owned by Gerald Lambert, a native of Hampshire, to see how lucerne and grass feeding of dairy cows had improved very poor land growing only 1.5 t per hectare barley 5 years ago into land growing very good winter wheat today. The lucerne is silaged but it is not an easy crop to manage.

26 miles on at Allenford Farms, Fordingbridge, Roy Shepherd has a first class arable farm with grass for fertility. This time, beef, pigs and ewes. The pigs were on a road-night system and this chalk land is ideal for it as it never poaches. The suckler cows left as good a return as winter wheat and if things get very tight, the sheep enterprise would be the first to go.

At the New Forest, Wilverley Walk we saw an alternative form of land use. The New Forest extends to 37000 hectares and is a conservation area carrying a stock of around 3000 ponies, 2000 cattle and a few pigs and sheep. A few hundred hectares were reseeded after the war to repair damage and because of ragwort infestation on the grassed areas they have allowed some sheep to graze.

The meeting was brought to a close with a dinner at which the guest speaker was Lord Porchester. Dr. Castle, the new president, thanked the hosts, hostesses and organisers for their generous hospitality and for giving us an interesting and memorable three days in Hampshire.

DAY VISIT TO BUTE

An outing of the CGSG to the Isle of Bute, 20 May, 1981.

The morning of Wednesday 20 May saw some 40 members assemble at Wemyss Bay pier-head for the Spring outing to the Island of Bute. Cal-Mac's 'Saturn' provided the 'doon the watter' voyage to Rothesay Bay in calm conditions, and on arrival the party joined the bus to travel South to Kilchattan Bay.

The Lyon family certainly had their priorities right for, prior to inspecting the hundred strong dairy herd and walking the fields, the morning hospitality of elevenses was most welcome. As well as the dairy stock on Little Kilchattan, great interest was shown in the calves which are kept to be sold fat off the farm and also the early potatoes which appeared to suit the soil and climatic conditions.

After lunch in the local hotel at Kingarth, it was on to the well known pedigree Friesian herd at Dunallan, where the ominous dark clouds were rapidly approaching and Mr. McIntyre guided the party round the dairy herd in the steading paddocks. And just in time it was, for with all the party safely under cover and inspecting the dairy and housing set-up, the skies opened and torrential rain tested the rhones and drains.

Our thanks must go to the farmers and their families who welcomed us to their enterprises and to Campbell Watson, the College Adviser, who co-ordinated all the arrangements. J.D.E.

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AFTERNOON VISIT TO LANARKSHIRE

A visit by CSGS to Rogerhill and Hazliebank, 26 November, 1981.

Traditionally on the day of the AGM two farm visits are arranged and this year the very high standard set by visits in previous years was easily maintained. Both Mr. Alec Hamilton, Rogerhill, Kirkmuirhill and Mr. Wilson Barrie, Hazliebank, Strathaven provided visits to farms where stockmanship was of the highest order, and from the intensive dairy unit at Rogerhill to the more extensive beef and sheep system at Hazliebank, there was something to interest all members who attended.

Following the AGM Mr. John Watson, farm manager at the Hannah Research Institute, Ayr opened the discussion. It was a feature unique to agriculture, said Mr. Watson, that allowed fellow members of the industry to see round one another's farms, and something which everybody concerned gained from. It had been a great pleasure to visit the farms where the stock were quiet and contented and both units, relying solely on family labour, meant that attention to detail was of the highest order.

Starting at Rogerhill, Mr. Alec Hamilton took over the unit in 1977 adding to the existing unit of Lochhead some three miles away. The enterprise now extended to 151 ha of which all but 6 ha are down to grass. A herd of 140 dairy cows with 155 young stock are carried along with a flock of 75 breeding ewes. Around 40 ha of silage are cut annually along with 8 ha of hay.

Considerable discussion had taken place during the visit on the problems of making good quality silage in the variable weather conditions experienced during the year. Dry matters had been low and pH's high and this was demonstrated on the farm visit where dry matters of the two silages were 17 and 18% and the pH's 4.6 and 4.8 respectively. Mr. Watson felt that the use of a proven additive might have helped the fermentations of the silage.

Mr. Watson also commented on the relatively high numbers of young stock carried on the farm, particularly when College economists say that they are the least remunerative enterprise. He asked whether Mr. Hamilton felt justified in keeping high numbers of young stock.

In reply Mr. Hamilton said it was his policy to keep all heifer calves and to rear them to calving heifers at 2½ years old. Bull calves were sold at 5 weeks. Because herd numbers had been built up in recent year, no calving heifers had been sold, and now that the build-up was finished relatively large numbers of replacements were still needed to maintain a satisfactory culling level. He felt that he could not carry any more stock at Rogerhill, but did not rule out the possibility of establishing a dairy herd at Lochhead. He wanted to rear his own dairy stock as he felt it made the job more interesting.

At Hazliebank, Mr. Wilson Barrie had shown members a system which was well thought out, well run, and with the minimum of labour input. Mr. Watson was impressed with the organised was things were run, and the quality of stock would have been a credit to anyone.

There were 106 spring calving Hereford x Friesian cows which were put to a Charolais bull. The cows calved outside but were in-wintered on silage, straw and liquid protein, the calves being weaned in January. The calves were sold at about 18 months old as stores when they averaged 400-460 kg. All calves were

given a copper injection. In addition to the suckler herd a flock of 200 ewes was carried, lambing from mid April with all lambs being sold fat.

Silage for the cows was made by contractor and had an analysis of 20% dry matter, 60 D value and pH of 4.0. No additive was used, and there seemed to be little problem with the fermentation.

Mr. Watson commented that he felt the ventilation of the shed where the suckler cows were housed could be improved by taking the ridge off the roof. Some calves did have slight signs of pneumonia and he felt this would help. Mr. Watson also asked whether Mr. Barrie had considered selling his calves fat rather than store.

In reply Mr. Barrie stated that he intended to take the ridge off the shed. He had considered selling his cattle fat, but this would entail keeping them on the farm for a longer period which meant a new shed. He questioned whether a new shed was justified, particularly in the present financial climate, and also when the price he was receiving per kilo for his store calves was above that of the fat price. Mr. Barrie said he had been building up his suckler cow numbers, and had originally intended as the next logical step to finish calves. But he had customers for the store calves and could get good prices so he was satisfied at present.

Discussion

Mr. Hamilton was asked about his policy for concentrate feeding and how much production he took from silage. Draff and silage were fed for maintenance plus 2.25 litres and thereafter an 18% CP dairy cake was fed at 0.31 kg per litre up to a maximum of 9 kg per day to the high yielders. All cake was fed in the parlour, and because there were no facilities, no barley was fed. Barley fed along the silage face had been tried but proved too awkward. A second hand out-of-parlour feeder had been purchased but because metal chains were hung round the cows necks, this presented problems with the electrified bar at the silage feeding face. Out-of-parlour feeders were costly but Mr. Hamilton thought he might have to think seriously about them if milk yields were to improve.

Mr. Hamilton was questioned on whether feeding draff, silage and an 18% cake did not supply too much protein. He said that the draff at the bottom of the silage pit allowed the cows to clean the silage to the floor and he felt it saved a bit on the concentrates. John Watson felt that whilst on paper there appeared to be too much protein in the winter ration, the chemical properties and in particular the degradability of the protein could not be ignored. He also said that it had been conclusively shown that higher protein levels also tended to increase total feed dry matter intakes. However he said that feeding 18% dairy cake at grass was definitely a waste of protein, and that grass should be balanced with energy and magnesium at the appropriate times.

Mr. Barrie was asked about his rations for suckler cows and spring born calves. The cows received about 15 kg silage and 0.5 kg of sugar beet pulp per day and straw with liquid protein supplement to appetite. The calves received 1.8 kg of a 13% CP compound per day with silage ad lib.

Considerable discussion also took place on direct cut versus wilted silage, and the case for using silage additives. Mr. Watson summed up the case for wilted silage by putting forward the argument that wilted silage meant higher concentrations of plant sugars giving a lactic fermentation which meant higher intakes and therefore more milk. However he said that additives could now do the job of wilting and it had been shown that cows could have higher dry matter intakes on direct cut silages and give more milk. However he advised using an additive only when everything else in the silage making process was right.

The Society is indebted to Messrs. Hamilton and Barrie for allowing members to visit their farms, and giving them such a warm welcome, and also for forming the panel along with John Watson to give such an interesting and wide ranging discussion in the evening. - Iain R. Fraser.

MEET THE CHAIRMAN

CSGS : GEORGE BLACKHALL, HILL OF WESTERHOUSE, CARLUKE

As long ago as 1952, George graduated at Edinburgh University with a first class honours degree in agriculture. For the next four years he added practical experience to his earlier studies by working as an assistant farm manager in Angus, before taking a farm management post in Fife. Always on the go, he found time for all outdoor pursuits. At one time he played football for Brechin City - it seems Brechin has never found a suitable replacement!

In 1956 he joined SAI as an adviser in Angus, then in the early sixties moved to Lanark. He developed a business management interest and established a group of farmers who kept detailed management records which he serviced with regular visits and management advice. The most significant decision of his career to date has been the purchase in 1970 of Hill of Westerhouse. He continued working with SAI until 1975, when his business interests encouraged him to branch out into private agricultural consultancy.

His farming so far has revolved around improving the pastures at Hill of Westerhouse, an upland farm rising to over 300 m. Already 60 out of a total of 104 hectares have been reseeded, the majority changed from heather to good grazing. This has allowed a tripling of the ewe numbers to 360, comprising both Blackface and cross ewes. The cattle enterprise revolves around calf rearing and selling as stores. During the development of the farm, George has been most ably assisted by his wife Mary who plays a major part in the daily running of the farm.

Although still a keen sportsman, he is now too busy to play as much as he would like. George also lists as a hobby seeing good grassland being well stocked and well used. He has been a member of the Central Scotland Grassland Society since it was formed in 1963, and is past president of the Lanark Agricultural Discussion Society. He is the sort of individual who puts a lot of effort into all he does, and with a humorous story for every occasion obtains co-operation from all around him. I.W. Taylor.

SWSGS SILAGE AND HAY COMPETITIONS 1981-82

A meeting of the SWSGS at the Ernespie Hote, Castle Douglas, 4 February, 1982.

SILAGE COMPETITION

Judge: J. David Metcalfe, Bardristane House, Gatehouse of Fleet.

Judge's Remarks

This year's competition had encouraged a good entry from the beef/sheep farmers and the tour of inspection enabled an assessment of the opportunities and values which silage has on these units as well as on dairy farms. Two upland farms were visited where it is difficult to make good silage even at the best of times. Another two farms were feeding silage to sheep as a sole diet. Only three dairy farms made the top 10 farms this year, the bad weather at silage making time having dealt a heavy quality penalty to those aiming for early cut high D silage.

The introduction of a beef/sheep award was considered an excellent idea. The dairy cow business is now a minority in south west Scotland and this year has shown how important silage is to beef/sheep systems. Probably by virtue of the poor silage making weather earlier in the year, the beef/sheep entries have featured prominently in the competition but the provision of awards for them will ensure that they are not forgotten when better silage making years favour those aiming for high D silage for dairy cows. A competition ranging over all livestock systems has much to commend it.

The judge expressed some concern at not being able to actually inspect the silage entered either because it had been used up or that the silo was yet unopened. In these cases an inspection mark was given for the silage being fed at the time of the visit but the entry was not awarded a total final mark. Four entries were in this category.

The inspection marks awarded by the judge are given in Table 2. The overall first prize and trophy went to Mr. T. McCombe of Trohoughton who also won the first beef/sheep award. Overall runner-up was Mr. J. Mackie of Dalfibble and third prize went to Mr. D.F. Culham of Boreland of Southwick who also won the second beef/sheep prize. The Michael Milligan prize was awarded to Mr. D. Lindsay of Summerhill. Plasti-cover Ltd., Irvine donated vouchers to the overall prizewinners.

Dr. M.E. Castle: Silage qualities 1977-1981

A brief summary of silage quality in the last five competitions is given in Table 3. The results for 1981 are again a reflection of the weather conditions in that year. In 1981 the silages were made under extremely wet and difficult conditions and as a result no silages were in the "very good" quality group when measured by D-value. Only 7% of the total silages were classed as "good", i.e. 65-70 D-value, which is the lowest proportion in the last 5 years of the competition. Thus most of the silages, 88% of the total, were classed as "medium". It is pleasing that only 5% of the silages were classed as "poor".

Table 1. 1981/82 Silage Competition: Analyses and Marks

Rank	Code	% DM	% CP	D Value	Ammonia N as % total N	Marks/85
1*	DS 1	25.2	16.0	66.1	11.8	68.4
2*	WS11	23.7	13.6	64.4	9.4	63.7
3	DS10	22.7	15.4	63.9	9.4	63.5
4)*	KS19	24.2	11.6	64.0	7.5	63.5
4)	KS21	23.0	12.9	64.2	8.0	63.3
6*	DS 6	22.5	13.3	64.4	8.6	63.0
7*	KS25	21.6	15.0	64.9	10.6	62.8
8*	KS26	20.9	13.3	65.2	8.9	62.7
9*B	KS27	38.3	15.0	62.7	9.9	62.5
10*	KS24	17.9	15.8	65.9	8.0	62.4
11*	KS18	25.0	11.8	63.2	8.1	62.1
12*	DS12	30.8	12.0	64.1	10.7	61.5
13	DS 9	21.9	16.6	62.7	10.0	60.9
14)*	DS 8	23.6	12.1	63.1	9.0	59.9
14)*	WS 3	21.3	12.5	63.4	7.7	59.9
16*	KS17	26.4	13.5	62.9	12.5	58.8
17*	KS13	30.7	12.1	61.7	9.9	58.5
18	WS 5	28.0	10.3	62.4	9.9	58.1
19	DS11	21.2	16.2	61.8	10.3	57.7
20	KS28	19.6	15.4	63.1	10.3	57.5
21	DS 3	19.5	14.7	62.9	9.1	57.4
22	WS 4	31.8	11.8	61.6	9.7	57.3
23	KS 2	16.8	14.6	64.3	7.5	56.3
24T	WS10	35.2	13.8	61.9	13.7	55.9
25T	WS 9	28.5	13.4	61.4	12.7	55.5
26	WS 1	33.8	11.6	61.2	11.0	55.0
27	AS 4	23.8	9.9	61.3	9.2	54.1
28	DS 2	18.2	15.5	62.0	10.8	53.9
29*	AS 8	23.4	14.2	61.8	15.4	52.8
30*	WS12	23.6	15.7	63.5	20.6	52.7
31)	KS11	16.4	13.7	62.5	6.7	51.8
31)	KS 9	16.3	15.3	63.8	10.7	51.8
31)*	KS16	35.8	10.4	61.2	13.0	51.8
34T	AS 7	25.0	13.9	59.8	14.2	51.3
35*	AS 9	21.3	13.6	62.4	15.6	51.1
36	AS 3	18.5	14.8	61.0	10.6	50.2
37	KS 3	17.2	14.2	62.2	9.9	50.1
38	KS15	23.2	8.5	60.6	10.0	49.9
39	KS 1	17.1	15.2	61.7	10.2	49.6
40*	WS 2	19.9	15.4	59.1	11.3	49.1
41	KS12	17.5	12.6	61.0	7.8	48.8
42	KS 4	18.3	10.5	61.2	8.2	48.3
43*	KS 6	20.8	13.4	59.4	11.8	48.2
44	KS 5	17.6	13.9	61.2	10.4	48.1
45	KS10	15.7	16.3	62.7	11.2	47.5
46	WS 7	21.6	11.1	59.6	11.5	47.4
47	WS 8	21.4	11.8	58.4	10.0	47.0
48	KS14	20.1	10.6	60.5	12.0	46.7
49	AS 2	19.9	14.7	59.3	14.9	45.2
50	KS20	16.9	13.9	61.5	13.4	44.3
51	AS10	17.8	16.4	60.4	16.1	43.7
52	WS 6	18.8	16.0	60.3	17.7	43.5

Rank	Code	% DM	% CP	D Value	Ammonia N as % total N	Marks/85
53*	DS 5	18.7	14.8	59.8	17.3	41.5
54	DS 4	19.5	9.9	58.0	11.0	40.9
55	KS 8	15.4	15.4	61.0	14.9	39.5
56*	KS29	18.0	13.3	60.3	18.8	38.1
57	DS 7	20.5	14.7	57.6	22.7	34.7
58	KS31	15.3	16.9	59.8	21.4	32.1
59	KS22	17.0	17.0	57.0	20.9	31.9
60*	KS 7	16.1	19.6	57.9	24.6	28.4
61	KS23	16.2	13.4	55.3	21.5	21.9
62	AS 1	17.7	14.8	52.0	34.3	17.2
63*	KS30	18.0	10.2	56.9	32.5	17.0

* = Beef/sheep entry
T = tower silage
B = big bale silage

Table 2. Short list for judge's visit (in order of analyses).

Awards	Farm	Analysis (85)	Marks Inspection (85)	Total
	D F Culham Farms Limited, Boreland of Southwick.	68.4	(76.0)	-
	R D Armstrong, Sorbie, Garlieston, Newton Stewart	63.7	73.0	136.7
2nd	J Mackie, Dalfibble, Pargkate, Dumfries.	63.5	75.5	139.0
	R Pickup, Craigadam, Kirk-patrick, Durham.	63.3	71.0	134.3
	J A Houston, Overlaw, Dundrennan.	63.3	(81.0)	-
1st and Trophy 1st Beef/Sheep	T McCombe, Trohoughton, Bankend, Dumfries	63.0	78.0	141.0
	D F Culham Farms Limited, Boreland of Southwick.	62.8	(76.0)	-
3rd 2nd Beef/Sheep Milligan Prize	D F Culham Farms Limited Boreland of Southwick.	62.7	76.0	138.7
	D Lindsay, Summerhill, Balmaclellan.	62.5	64.0	126.5
	J Prentice, Hermitage, Haugh of Urr.	62.4	(80.0)	-
	R Pickup, Craigadam, Kirk-patrick, Durham.	62.1	75.5	137.6
	D Grant, Burrance of Courrance, Lockerbie.	61.5	72.5	134.0
	I Martindale, Lands, Ecclefechan, Dumfries.	60.9	76.5	137.4

Table 3. Silage quality 1977-1981.

CLAMP SILAGES

Quality	D-value	% of total in each group				
		1977	1978	1979	1980	1981
Very good	> 70	18	17	3	0	0
Good	65 - 70	48	57	30	31	7
Medium	57 - 64	34	20	64	67	88
Poor	> 57	0	6	3	2	5
Mean DM %		29	28	22	22	21
Mean volatile N % (ammonia)		11	12	15	13	13
No. of entries		57	35	37	53	63

The average dry-matter content of all the silages was 21%, and was the lowest mean value in the history of the silage competition. Values of 22% were recorded in each of the two previous years and it would appear that if we are in a position when low dry-matter contents are to be expected then it is vital to use an effective additive. The mean level of ammonia-nitrogen in the silages was 13% as in the previous year. A standard of 10% ammonia is usually taken as indicating a satisfactory silage fermentation and there is thus some room for improvement. Eight silages had ammonia values higher than 20% which suggests that an effective additive was not used, and hence a poor fermentation, a lowered D-value and low intake would occur.

However, considering the extremely difficult year, the overall quality of the silages was satisfactory. Perhaps the greatest value of this year's competition was to indicate that some good silages could be made if the correct techniques were used. Let us look forward to better silage-making years in the future.

HAY COMPETITION

For the second year running, 1981 was a very poor hay making season. The results are summarised in Table 4 and the silage judge presented the awards as follows:-

Field cured hay - R.D. Clark, Fineview, Glenluce
Blown hay - C.L. Mason, Torrorie, Kirkbean

The BP Nutrition Trophy awarded to the best overall hay was presented to Mr. C.L. Mason, Kirkbean.

Table 4. 1981/82 Hay Competition : Analyses and Marks.

Field cured hay

Rank	Code	% DM	% CP	D value	Analyses marks/90	Visual marks/10	Total marks/100
1	WH 3	83.0	11.0	53.9	44.3	4	48.3
2	DH 1	82.6	6.9	56.6	41.3	6	47.3
3	WH 2	83.4	6.5	55.0	37.7	8	45.7
4	KH 1	83.5	6.6	53.4	34.75	4	38.75
5	WH 1	80.1	6.6	52.8	31.85	6	37.85

Cold air blown hay

1	KH 2	84.8	6.5	58.4	45.2	7	52.2

INNOVATIONS COMPETITION 1981

South West Scotland Grassland Society

Winner 1981 Jock Rome, Ingleston, Irongray

'An applicator for applying molasses to silage'. Molasses is applied from a front mounted 205 litre drum using a flexible pipe. The application is controlled by raising and lowering the end of the pipe from the tractor cab. The flow rate of molasses to suit the crop weight and condition is controlled by a gate valve. The drum is refilled from a master tank and a rubber flap is used to prevent spillage. In the field the molasses is applied to one row of grass, a second row then being rowed up over that treated and so the molasses and grass 'sandwich' is ready for lifting. The unit can apply up to 14 litres per tonne of fresh grass.

The UKF Fertilizer tankard was awarded to the winner at the annual competition evening at the Ernespie Hotel, Castle Douglas on 4 February, 1982.

(Jock's design for a molasses applicator appeared ahead of two other designs which received some coverage in the national farming press - Editor).

Competitions

CENTRAL SCOTLAND GRASSLAND SOCIETY

4th Annual Silage Competition 1982/83

Prize money for the first four places will be £25, £20, £15 and £10 respectively. In addition £10 will be awarded to the most improved analysis compared with last year and £10 will be awarded to the best analysis from a new entrant. Details will be sent to members in the summer.

SOUTH WEST SCOTLAND GRASSLAND SOCIETY

10th Annual Silage Competition 1982/83

Scoring and judging procedures will be the same as last year. Permanent trophies will be awarded to the first three places overall and to the first and second place in the Beef/Sheep section. Details will be sent to all members in due course.

7th Annual Hay Competition 1982/83

As for previous years entries will be judged entirely by chemical analysis and examination of the hay in the laboratory.

Innovations Competition

Members are again invited to submit to the committee any innovation, invention or novel idea introduced to the farm to aid the growing or feeding of grass or conserved products. There is no entry fee for this competition and the committee will decide on the merits of the entries if an award should be made.

RUMINATING OVER SILAGE

J. David Metcalfe

Bardristane House, Gatehouse of Fleet, Kirkcudbrightshire

A meeting of the SWSGS at the Ernespie Hotel, Castle Douglas, 4 February, 1982.

Today's silage makers are the beneficiaries of the hard work and experience gained by many, not least the farmer pioneers of the post-war period. A brief review of the past 30 years establishes when and how some lessons were learnt.

1950s

Silage storage in a pit in a dry bank, and with sloping sides, was common. For sites near silage fields the buck-rake was used, or if more distant, a green crop loader. Grass cut with the reaper (as for hay). Rolled thoroughly to remove air. Advised to apply molasses at 1 gallon diluted with an equal part of water and poured on as the pit fills. Cover with soil, or lime, or dung. At feeding, cut out in layers and carried to feed points.

Lessons learned - importance of removing air, not easy with long grass particularly when unwrapping the tangled mass presented by a crop loader.

- problems of soil contamination - almost inevitable with a buck-rake and covering the filled pit with soil.

- value of molasses - more as a sweetener than an improver of fermentation.

1960s

The Beeching era - plenty of cheap railway sleepers. The pit replaced by sleeper sided clamps and concrete bottoms. Advanced thinking about roofing such sites. The dramatic arrival of the Hurricane Forage Harvester. A direct-cut flail machine which popularised silage making because of speed and ease. The buck-rake retained to fill the clamp. First flirtations with self-feed systems - bed and breakfast with cows lying on top of covered silage clamps and walking down a ramp to eat at the face. Murmurings about cubicles.

Lessons learned - air must be kept out of sides as well as top - sleepers needed lining. Soon to arrive, the polythene fertilizer bag and a cheap solution.

- the automatic wilting by the old systems was not part of the Hurricane operation. Pressing on under all conditions produced wet and frequently butyric silage.

1970s

The integration of silage as a major part of converting farm buildings to 20th century needs. Design of livestock systems around silage. Some re-thinking about self-feed as feed passages added flexibility, and appealed to many considering silage. New machinery, such as the double chop, and a further advance, the precision chop established themselves. Additives, led by Add-F now available.

Advantages of the 70s - good storage conditions, wilting could be part of the system, additives available to help fermentation, polythene an aid to keep out air.

Disadvantages - the whole operation had now become one of high cost.

1980s

The conclusion of the 1982 competition judging the excellence of silage in South West Scotland concentrates the mind on what is now meant by excellence. For the sake of this competition it is an amalgam of laboratory analysis and an assessment of management skill. The skill factors are a heritage from the experience and learning process of the last 30 years. There are established MUSTS and there can be no excuse for ignoring these:-

WASTE	can be prevented - it is costly - it spoils the good silage - it creates work - not even dry beasts do well on it. A lesson learned in the era of railway sleepers.
CONTAMINATION	main causes - cut too low - mole hills, stones, and uneven surfaces. In wet conditions can be more of a problem - but contamination spoils fermentation.
FERMENTATION	Must get this right. Use of aids e.g. additives.
FEED EFFICIENCY	Should produce some 70% of a dairy cows nutritional needs and up to 100% for other classes of stock.

Current thoughts

There are new questions regarding the relative merits of some of the analysis factors. How important is dry matter if fermentation is good? What about the equation between D value and yield? These important questions are not only being raised by farmers, but also by Research and Development establishments. There is a danger that sides are being taken over such issues, and in the course of heated debates the value of such questions can be lost.

The individual silage maker has to examine his *own* needs and select the best analysis factors to suit his *own* objectives. Quality success in each case has to be measured by *attaining the selected standard*. Now to consider the choices:-

The higher the 'D' value, the greater the problem to achieve a high dry matter. The farmer who pursues 70 D could be very content with well fermented 20-22% DM silage.

Dry matter can be too high for clamp silage, but a 25% DM and a 66 D silage should be possible without additives. This may well suit the farmer who is short of land and who finds it easier to produce well fermented silage from somewhat more mature grass, and an increased yield.

The farmer with suckler cows could well settle for a still larger volume of later cut silage and accept a 60 D and a DM in the 25% range. Achieving a good fermentation under these conditions is easier, and does not need the help of an additive.

It is a 'horses for courses' situation. Backing the right horse is deciding the quality standards needed to meet the individual circumstances, and complementing by satisfying the 'MUSTS'.

There is now a hard core of knowledge and experience, some of which is a heritage from the past. If farming is to prosper in the South West of Scotland it needs the welding together of native stockmanship skills and the exploitation of grassland, and silage will remain a major keystone in systems of the future.

Discussion

The discussion opened with several questions concerning the making of 70 D silage in a bad (wet) year. The speaker suggested that early cutting, no or limited wilting and the use of an effective additive were important factors. Weather forecasts can help but silage makers should not be 'hung-up' on dry matter alone. If the conditions are poor, press on with the job and do everything possible to encourage a good fermentation by using an additive and excluding air. Tetraploid grasses do contain extra moisture but this is not sufficient reason to exclude their use. They do contain more sugar and have a higher D value than diploid varieties and good silage makers can exploit these characteristics to their advantage. On the use of additives it was suggested that there were now too many available of dubious efficacy. Price is not always the most important factor in deciding which to choose. Where quality targets were below 65 D there was perhaps less need for their use but higher quality levels, where conditions were wet, certainly required the use of an additive. Many were still attached to molasses but application difficultues still exist, however the cost of this additive has become relatively less expensive in recent years. Formic acid (e.g. Add-F) can do a good job under a wide range of conditions but formalin + acid (e.g. Sylade), if used properly can also do a first class job although the application rate is higher. The inoculant types of additive still require further testing particularly under difficult silage making conditions so frequently experienced in the west.

The quality to aim for must be directed by the type of stock being fed and the farm system as a whole. This in turn will direct how far the quality versus yield conflict will apply to any given situation. Clearly sufficient silage to carry the stock during the winter months is of high priority. Where well fermented but wet silage has been made the stock appear to eat it readily and silage pits were used at a faster rate. Simply, there was less dry matter in the pit but the livestock requirement for dry matter remained the same as for years when the silos were filled with a higher quantity of dry matter.

Increasing interest was expressed in bale silage. This is a long form of roughage and is baled once the dry matter is above that normally encountered in clamp silage (i.e. 30-50%). As a result effluent problems do not arise. It is important that time is taken to seal and store the bags properly in order to avoid damage and air leaks. Wastage due to moulding can be high if these targets are not achieved. As a technique it will be very helpful in wet areas dependent on hay - it can take off some of the pressure. Its limitations would seem to be in the quantity made on any unit possibly being limited to 500-600 tonnes of silage and for a dairy farmer aiming for large quantities of high D silage it is really not a suitable system.

Silage effluent was causing concern. Whilst wilting can help, it does not have all the answers especially in wet areas. Silo design and the proper collection and disposal of effluent must receive attention. This of course adds to the rising cost of silage making along with the increasing energy costs, rising machinery prices and generally rising costs due to inflation. However if it is realised that dairy cows can derive 70% and beef and sheep 90% of their energy from grass and silage then the cost of silage should not be grudged and provided silage making techniques are good silage will remain a very competitively priced feed.

BOOK REVIEW

'GRASSLAND MANAGEMENT' by J. Parry and B. Butterworth.

Published by Northwood Publications Ltd., London, 1981, 129 pp. ISBN 7198 25180. Price £7.50.

This book is divided into ten chapters ranging from 'varieties' and 'mixtures' to 'tiller production' and 'types of mower'. It is an up-to-date review of information gleaned from research institutes, experimental husbandry farms and the current advisory literature together with some personal views of the authors.

The chapter on 'sward maintenance' is one of the longest closely followed by that on the role of 'clover' in farming systems. Factors affecting sward 'establishment' are covered in a separate chapter which includes some remarks on direct drilling. The value of 'nitrogen' is sufficient to receive a chapter to itself, the point being made that extra N can be used either to provide more crops per year or to give bigger yields.

'Tiller production' is essential for the life and vigour of the sward. The life of a tiller ranges from 1-12 months whilst that of a leaf is from 5-10 weeks and the maximum efficiency of photosynthesis is when the leaf is 10-20 days old. The number of tillers can be expected to range between 2,000-6,500 per square metre but in a set stocked system may rise to 13,000 per square metre.

'Output per person' is obviously important and the chapter looks at different conservation systems. The final chapter carries a controversial title 'Abolish Grass' and discusses the use of treated straw rather than suggesting that all grass be ploughed up instantly.

An easily read informative book but perhaps a little expensive at £7.50. R.D.H.

MORE MEAT FROM GRASS

K. Nichol

Hospitalshields, St. Cyrus, Montrose

A meeting of the CSGS in The Royal Hotel, Bridge of Allan, 3 March, 1982.

The aim of finishing 10 fat cattle per hectare is the target Mr. Nichol has set himself, and with 850 cattle sold annually from 108 hectares of grass he is well on the way to achieving it. It is achieving the maximum output per hectare from grassland that is the approach that Mr. Nichol has adopted for his beef and sheep enterprises. In introducing his talk he maintained that grassland was the backbone of Scottish agriculture and we therefore had to find ways of making it pay. This in turn could mean changes in utilization, since arable enterprises particularly on farms in the east had tended to be more profitable than grass-based systems. In many cases cattle were kept on arable farms simply for the fertility they left in the ground, and these arable enterprises had to carry the cost of keeping the cattle. However, in the present economic climate cattle had to compete and leave a return, as did any other enterprise. Dairying had been the traditional way of turning grass into money. In preference, Mr. Nichol had always liked keeping beef cattle and working on the principle of what you like you do best, he had decided to keep beef cattle and try and make a profit out of them.

In beef fattening two factors are crucial to the success of the enterprise, namely the price you have to pay for the calf and a good liveweight gain. Fixed costs are the most crippling feature facing any business at present and therefore high output was essential. Whether liveweight gain was 0.5 kg or 1 kg per day the same fixed costs had to be carried and at Hospitalshields the speaker reckoned that an extra 0.1 kg per day liveweight gain was equivalent to an extra £30,000 additional income over the year. Any business carrying high overheads must produce maximum output.

Hospitalshields extended to some 85 ha when Mr. Nichol took over from his father in 1967. The farm was then in continuous cereals, but gradually cattle numbers were built up to 150 head by buying in 200 kg stores and selling fat. In 1973 and 1974 the size of the farm was increased to 190 ha and the system has now evolved of having about 80 ha cereals, 8 ha let potato land, 8 ha swedes for the sheep and 93 ha grass of which about 65 ha are cut to make around 3000 tonnes of silage.

Around 850 cattle are purchased, mostly as Friesian bull calves at about 8 weeks old. The system used to be geared to finishing cattle at around 18 months old in May, June and July, but there were problems with the system. The cattle were zero grazed for about 7 years but there were problems keeping up liveweight gains and the system generally involved too much work.

In 1980 some cattle were left entire and now 95% of cattle output is in the form of bull beef. Most cattle are kept on silage all the year round, although some 150 are put to grass to graze the steeper areas of the farm.

The aim is to achieve at least 1 kg per day liveweight gain throughout the time the cattle are on the farm meaning that they can be sold at 14-16 months, thus improving the cash flow. The cattle are on *ad libitum* silage and fed 1 kg of barley per day for each 50 kg of liveweight giving a total of about 1 tonne of barley per head during the fattening period. It is reckoned that the liveweight gain is about 10% better than steers and killing out has given an advantage of about 0.5%.

Management of bulls is more exacting than for steers. Bulls are not so easy to handle both on the farm and at abattoirs and groups must never be mixed. Mr. Nichol has found it best to float the cattle at night and to kill them first thing in the morning, which reduces the risk of getting dark meat. Most cattle are sold in the Midlands where there is normally a 2-3p/kg premium for bull beef. Safety is obviously of paramount importance, and cattle must always be housed on slats and never in straw bedded courts. All cattle sold off Hospitalshields are sold direct to the abattoir.

Because silage forms the basis of the diet of all the fattening cattle it is important to achieve high quality. In 1981 the silage at Hospitalshields had an ME of 10.9 MJ per kg although the dry matter varied from 17% to 26%. The aim is to make silage of 25% dry matter. Slurry at the rate of 88 m^3 per hectare is applied to all silage ground and in addition compound is applied at 112 N, 25 P_2O_5 and 25 K_2O per hectare for each cut. Grazing ground receives about 300 kg N per hectare. Silage is made in earth walled silos and wastage is kept to an absolute minimum.

Turning to the sheep enterprise Mr. Nichol stated they had originally started off as scavengers but now formed a major enterprise on the farm. About 1500 lambs are bought annually through a produce group from August to November, and grazed on the silage aftermaths before going on to the swedes. All lambs are sold fat by the end of January.

In conclusion Mr. Nichol stated that high output was the key to success and that good management was a crucial factor in meeting this objective. The success of the cattle enterprise was dependent on high quality forage and the efficient utilization of grass and grass products. - I.R. Fraser.

DAY VISIT TO KIRKCUDBRIGHTSHIRE

A day outing of the SWSGS to Cogarth and Slagnaw, 13 May, 1982.

Cogarth (the Nelson family). The farm extends to 148 ha with a further 71 ha very recently added. Basically it is an all grass farm with a little kale. 40 ha are hill grazings, 30 ha are improved rough grazings and 54 ha are permanent grazings. 20 ha are set aside for silage, 3 ha for kale and an interesting catch crop, 0.6 ha of carrots. A little hay is made if conditions are suitable.

Leys are kept down for as long as possible and comprise perennial ryegrass and timothy mixtures and conventional grazing mixtures. Additional white clover seed is sometimes oversown on established pastures. Slurry is applied to the silage land in addition to 125 kg/ha N in the spring. Grazing swards receive 75 kg/ha N. A summer top dressing of high N compound is applied where necessary and some fields are set up for late grazing.

The stock carried to utilize the herbage comprise 82 suckler cows, predominantly Aberdeen Angus x Friesian with a compact late summer calving pattern. 30 heifers are reared each year as replacements and any surplus are sold. 200 breeding ewes, Cheviot and Blackface, complete the stock carry.

Mr. Nelson largely farms Cogarth on his own and the tidy steading is laid out to enable the unit to be run efficiently and reasonably easily with this low labour input.

Slagnaw (the Campbell family). In interesting contrast to the morning visit Slagnaw is a dairy farm carrying a herd of 142 pedigree Ayrshire cows. 111 ha of the farms 174 ha are for grazing with a further 40 ha cut for silage. 22 ha of barley are also grown.

Most of the grass mixtures are based on intermediate and late perennial ryegrasses with a little timothy and clover. An interesting facet was the strength of the timothy following the wet and cold weather of March and April. Average fertilizer use on grass last year was 250 kg N, 55 kg P_2O_5 and 70 kg K_2O per ha. Stock carry is 2.19 cows per forage ha.

The cows are set stocked and average lactation yield is 6,000 litres. Concentrate usage is 0.25 kg per litre and the MOC is £699 per cow, a commendable performance indeed.

Some of the young stock are crossed to the Simmental and the farm also carries 120 Greyface ewes. During the walk members very much enjoyed the opportunity to see the very fine herd of Ayrshire cow at Slagnaw.

The Society wishes to thank the families for their most kind and hospitable welcome and for the time and trouble taken to provide members with a most enjoyable visit to Kirkcudbrightshire.

EVENING WALKS

Evening walks organised by local committee members of SWSGS, summer 1981.

Dumfriesshire	:	Kirkland, Closeburn by courtesy of W.S. Jamieson & Son (2 July).
Wigtownshire	:	Penkiln, Garlieston by courtesy of F.R. Evans & Son (16 July).
Kirkcudbrightshire	:	West Logan, Haugh of Urr by courtesy of G. Austin Hyslop (23 July).
Ayrshire	:	Monktonhill, Monkton by courtesy of K.R. Preston, CWS Ltd., (12 August).

These informal evening walks are primarily intended to stimulate discussion and interest at local level.

The Society is indebted to each of these farms for extending hospitality to members who thoroughly enjoyed the visits and greatly appreciated the trouble gone to on their behalf.

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