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FOREWORD

Rising costs and tightening margins are giving cause for concern to many. At such difficult times it is attention to detail that can have a significant effect on overall business efficiency and this is no less so within the farming industry. Now is not the time to experiment; rather stick with the proven methods and techniques and try and do the job just that little bit better.

Several of our members have gained recognition for a job well done. Malcolm Castle of the Hannah Institute received the Association of Fish Meal Manufacturers Research Award for the contribution his work has made to applied animal nutrition; David Martindale of Todholes received the BOCM/Silcocks Award for his outstanding dairy farm enterprise; Jim Clark of Dunrod won the BGS Scottish Region Silage Trophy and obtained a very commendable fourth place in the UK finals; and James Logan, Powis Mains achieved a most creditable double by winning the Friesian Championship at Ingleston for two years in succession. To these members many congratulations. Undoubtedly attention to detail has helped them reach the high standards which they have achieved.

Why is it the moment the forage harvester enters the field gate the heavens open! At the time of writing this foreword the unsettled weather in the West is causing considerable delay in silage making for the second year in succession. Yields generally are described as fair to good, so the cold easterly winds in April have somewhat tempered the early growth encouraged by the milder winter weather. The influence of weather on silage making is further discussed on pages 12 and 31 in this Journal.

The Societies take this opportunity to welcome the new Principal of The West of Scotland Agricultural College, Professor J M M Cunningham and the new Director of The Hannah Research Institute, Professor M Peaker and we are particularly pleased that they have expressed their interest in the activities of our Societies by accepting Honourary Membership.

Finally, we again record thanks to our Advertisers for their continued support and thank Mrs N Lennox, Mrs N Barkess and Miss E Mitchell for typing the Journal scripts.

Ronald D Harkess - Editor

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PROFITABLE MILK FROM GRASS

Dr F J Gordon

Agricultural Research Institute, Hillsborough, N. Ireland.

A joint meeting of the SWSGS with the South West Scotland branch of the Farm Management Association, Lochview Motel, Castle Douglas, 30 October 1980.

In stressing the need to exploit the potential productivity locked up in our grassland, the speaker outlined a target for all dairy farmers to aim at.

The consistent production of 12.5 tonnes dry matter per hectare was most essential. This is equivalent to 148,000 megajoules of metabolisable energy (ME) which would cost in excess of £1500 if brought on to the farm as purchased concentrates. A Friesian cow yielding 5500 litres per lactation needs 51,000 MJ of ME and so 0.34 hectare should produce the total feed for one cow for the year if maximum efficiency was attained.

How far we can move towards this level of production depends on how well the grass is grown, the efficiency with which it is grazed or conserved and the level of supplementary feeding used.

In terms of growing the crop, grass requires good soil conditions particularly in terms of adequate drainage and liming. The proper type of grasses must be sown and in this country that means perennial ryegrass. Also the crop must be fed with adequate levels of N, P and K. The response to N is still sufficiently large to justify many farmers increasing their nitrogen use. Looking at the area required to graze 50 cows, 14 ha is adequate with 150 kg N per ha, 11 ha with 300 kg N and 9 ha with 450 kg N. In these days of tightening margins it would be unwise to look for savings by cutting nitrogen input.

For efficient utilisation of grass in the grazing season the two key factors are stocking rate and grazing system. Many fields could carry more stock particularly where a good grazing system is used. Rotational grazing is the best approach as it can stand up to the vigours of intensive stocking rates better than set stocking.

Silage making - The speaker stressed the need to make sufficient silage. Too many make excuses for not making enough and so justifying their purchased feed bills! Better fertiliser use and higher nitrogen levels can enable bigger crops of silage to be cut and can also enable a larger area to be cut as the grazing area can be restricted when grass growth is vigorous in spring. The type of swards for conservation preferred in Ulster were leys sown out for around 7 years duration. Permanent pastures put under the stress of high N and frequent cutting have tended to fail primarily because so few good grasses were present.

The number of cuts and length of regrowth interval has been studied and when taken on to economic considerations the 3 or 4 cut systems have invariably been better than a 2-cut system. The following data illustrate this point.

Table 1. Milk production from three silage systems.

Number of cuts/year	2	3	4
Growth interval (weeks)	10	7	5
Milk yield (l/day)	22.7	24.9	26.3
Silage eaten (kg DM/day)	9.2	10.0	10.7
Silage yield (t/ha DM)	10.1	9.4	8.2
Area to feed 100 cows, 180 days (ha)	16.4	18.8	23.6
Increase in milk value over 2 cut system (£)	-	3680	5884

In the above example concentrate intake was the same for each group. Although a further 2.4 or 7.2 hectares were required to provide for the higher quality silage from the more frequent cuts, a move at least to the three cut system was fully justified. Certainly other costs are incurred when harvesting additional areas but even if allowing for a contractors charge of £37-45 per ha, additional costs in the region of £1800-2000 are still adequately covered by the additional milk returns.

The effect of numbers of silage cuts on fattening beef production has also been examined.

Table 2. Beef production from two silage systems.

Number of cuts/year	3 cut		2 cut	
Silage yield (t/ha)	50		52.5	
Concentrates feed (kg/day)	0	2	0	2
Silage eaten (t in 150 days)	5.0	4.3	4.4	4.0
Carcase gain (kg 150 days)	65.9	88.6	39.1	70.4

The carcase gain in the 3 cut, 2 kg concentrates system was 88.6 kg whilst that from the 2 cut, 2 kg concentrates was 70.4 kg. This represents a difference of £30 per animal. Certainly fewer animals could be kept on the 3 cut system. The difference in intake is about half a tonne but where silage can be obtained for £15 per ton it could be profitably bought in. Hence for £7.50 one can produce £30 beef making £20+ on the transaction.

The influence of cutting interval not only reflects in animal performance but can also effect the sward. In an experiment where a three-year-old sward was available, three cutting systems were applied for a further two years.

Table 3. Effects of cutting interval on sward composition.

Number of cuts/season	2	3	4
Cutting interval (weeks)	10	7	5
Weed grass (%)	50	15	0

The main weed grass was creeping bent which thrived under the infrequent harvesting system but was eradicated after two years of intensive cutting

Another technique involved in silage making is the wilting of grass prior to ensiling. An experiment was undertaken to examine this aspect and is shown below.

Table 4. Effect of wilting on milk production.

Length of wilt	None	Short	Long
Dry matter (%)	18	25	45
D value (%)	68.7	67.2	64.3
Silage eaten (kg/d)	9.1	9.4	9.7
Milk yield (l/d)	24.1	22.7	22.7

All cows received the same level of concentrates and the liveweight of each group of cows was similar at the end of the winter. Hence whilst wilting can speed up harvesting, reduce effluent flow and perhaps save additives, it will not produce more milk per cow and indeed it may even lead to lower production. Similarly the degree of chopping failed to improve performance per cow in a one year trial with 100 cows where double chopped and precision chopped silages were fed *ad lib* along with 7 kg of concentrates per day.

This all leads one to ask if the sophistication that has gradually crept into our silage systems is really necessary. Perhaps we should be looking for simplicity and reduce the chances of expensive breakdowns and high machinery costs.

The Hillsborough system - Silage is made from early and mid season perennial ryegrass swards. Three harvests are taken, the first on the 20-30 May, the second six weeks later in early July and the third seven weeks later in late August. After this there is still time to reseed the ley or apply extra nitrogen for late grazing. Since the same land is used for silage production each year any autumn reseed is best sown by early September to ensure good productivity in the following year. Fertiliser use on silage totals 315 kg N per hectare, applied for cuts one to three at 125, 100, 90 kg respectively. Silage swards are mown then picked up without a wilting period. Formic acid is applied to all silage and the pit is filled and sealed as quickly as possible.

Dry cows which are gaining 0.7 kg LW per day do not require steaming-up. Cows calving in spring (Jan-March) consume about 50 kg of silage per day (20% dry matter) and gain about 0.9 kg per day. The target liveweight at calving is 600 kg. Autumn calving cows are fed grass or silage only. Concentrates are never fed till after calving, so the system is dependent on good quality silage.

Considerable work has been undertaken to study the effect of level of concentrate feeding on milk production. More time seems to be spent asking advisers and computers what should be fed instead of asking the cow! In an experiment to try and offset this omission, autumn calving cows were offered five levels of concentrate feeding in conjunction with *ad-lib* silage of 67D value. The data are presented below.

Table 5. Effect of level of concentrate feeding on milk production.

Concentrates per day (kg)	3.6	5.2	6.6	8.2	9.5
Concentrates per lactation (kg)	610	865	1120	1375	1570
Milk yield per lactation (l)	5140	5390	5740	5682	5768
MOC (£/cow)	501	500	509	471	455

A computer study would invariably suggest around 1.5 t concentrates per cow but the above margin over concentrates (MOC) suggest that the cows think otherwise and the best margins were obtained with around 1 t per lactation. It is important to again stress that good quality silage was fed in these trials. Certainly if silage was scarce moving up from 600 to 1120 kg concentrates would save about half a tonne of silage per cow.

A similar study with spring calving cows (January to March) suggested around 0.6 ton of concentrates per lactation gave the best economic result.

There is much debate concerning the way in which concentrates are allocated - flat rate feeding or adjusted according to yield. This was examined using autumn calving heifers and the results were as follows.

Table 6. Feeding concentrate to dairy cows.

System	Reducing amount	Level feeding
Concentrates per day (kg)	8.2 to 4.5	6.4
Concentrates fed (kg)	1120	1120
Silage (t)	7.6	7.6
Winter milk (l)	3259	3273
Lactation yield (l)	4864	4886

The simplicity of flat rate feeding therefore has much to commend it and other observations with the January to March calvers produced similar results. Certainly the cows did not seem to care by which method the concentrates were offered.

The spring calving cows are most likely to be able to make the best use of grass. At Hillsborough the dry cows receive the poorer silage (63D) *ad lib* and no concentrates. Calving commences on 1 January and is 60% complete by the end of that month and 90% complete by the end of February. After calving all cows (or heifers) receive 7.3 kg concentrates per day. Mating commences on 23 March irrespective of calving date. Do-it-yourself AI is used for 6 weeks then a bull is used as a sweeper. 2% are culled as barren cows. The cows are rotationally grazed at 5 to 6 cows per hectare the lower stocking rate being in late season. Concentrate feeding stops 10 days after grazing starts but on 1 October around 1 kg per day is fed till the cows are dry. They are finally housed in October/November and no milking is undertaken during December.

The output from the Hillsborough spring calving herd is summarised in Table 7.

Table 7. Output from Hillsborough herd.

Time of calving	1978	1979
Stocking rate (ha/cows)	0.34	0.36
N level (kg/ha)	400	375
Concentrates (kg/cow)	550	736
Milk yield (l/cow)	5346	5514

In conclusion the successful future of dairy farming depends on the production of plenty grass. This must be eaten by the stock by managing them in a good grazing system at a reasonable stocking rate. Good quality silage in adequate

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quantities must be available and nitrogen is the key to adequate crops of grass for conservation or grazing. Concentrate feeding must be kept to a minimum unless one is feeding super high yielding cows. Finally use as simple a farming system as possible in order to minimise overhead and maintenance costs.

Discussion

The Hillsborough cows received only silage and concentrates. Many alternative products available on the mainland are just not available in Ulster. The silage is now easy-fed in a feed passage. Previously self-feeding was practised but the need to feed different silages to different groups of cattle for experimental work necessitated the change. The change in feeding system did not influence milk production so if a self fed system is working satisfactorily, there should be no rush to make a change.

The losses in direct cut or wilting systems will be similar because 5 to 7 per cent of the dry matter is lost in the effluent or lost in the field during wilting. Wilting can affect the regrowth of the sward particularly if prolonged to 3 or 4 days. Delay in clearing the field and applying further nitrogen can reduce the second crop by 10 per cent. (The silage effluent is fed to pigs. It is collected in butyl rubber stores and 4.5 litres replaces 0.34 kg meal and saves around £3 per pig).

Most of the silage is in the 18 to 21 per cent DM range. The blanket use of additive is to ensure good fermentation. Even at the present cost of additives it is still worthwhile. The rate is kept at a standard 2.3 litres per tonne and is not varied in order to keep things simple. In a normal silage season there is probably less and 20 per cent of the time when the applicator could be switched off.

The D value of the silage is 66-67 on average. The lower values are of the order of 63D. The first cut tends to be poorer in a bad year but frequently the second cut is higher than expected. Usually cuts 1 and 2 are ensiled in the same pit. Cut 3 is kept separate. At feeding the autumn calvers start off on cuts 1 and 2 then move onto cut 3 towards the end of the winter. The spring calvers are fed in the reverse order. This year the silage throughout the calving is disappointing with many at 63D with 18 per cent dry matter, so more concentrates are likely to be required. Last year the silage was wet and the milk board paid out the lowest quality bonus ever which was undoubtedly due to the poor silage. Wilting grass for silage has failed to improve milk quality over five years of trials.

The silage system is planned well ahead e.g. tonight I can tell you next years cutting dates - 20 May, 6 July and 24 August. We use a 3 metre mower and pick-up within half an hour with a precision chop harvester. The dampness of the grass is guaged in the morning and provided it is not bucketing rain a start is made. We do not sheet up at night but do try to fill the pit quickly and final sealing is undertaken with care and the top sheet is weighted down with tyres.

The soil type is fairly heavy boulder clay and we have a rainfall of around 900 mm per annum. The early grasses run to head in mid May but care must be taken not to cut too early otherwise the regrowth will be stemmy. For example if Aberystwyth S 24 or Cropper is cut around 25 May very few seed

heads should appear in the regrowth. Ryegrasses are sown pure and the 3 cuts per year aids the persistency of the sward unlike the two cut system. Apart from the nitrogen levels already mentioned P and K are returned in the slurry which is applied early in the year or after the first cut. A compound with 6 per cent P and K also ensures adequate P and K.

The concentrate fed has 18 per cent crude protein and is a home mix. Some experiments have indicated that 21 or 22 per cent can improve milk yields. It would still be relatively cheap to use a 20 per cent protein compound feed. Experiments with high energy feed have proved to be disappointing as response in yield did not repay costs. Protein content remains important even when feeding high levels of cake per lactation i.e. 1.5 t per head. To increase the protein from 16 to 18 per cent should only cost about £2 per tonne but usually energy is also increased and compounders ask an extra £12 per tonne.

All spring calving cows have been fed on the flat rate system for six years. We have still to clarify the situation with autumn calvers yielding 5500 litres. Heifers calve at 2 years old and both the herds are self contained. We have no calving troubles provided the heifers are *at least* 500 kg. Calving at three years old is not an economic proposition. Condition scoring at calving is around 3 in the autumn and 2.5 in the spring. Over the last five years the percentage replacements have been 21 in autumn and 17 in spring. The limited time over which AI is used may mean breeding from some lower yielders but calving index is very important. A cow which slips back each year is no good.

Paddock or some form of rotational grazing is a must for spring calving cows. For autumn calvers this may not be the case. Magnesium is supplied to all cows in the drinking water. Formerly pastures were dusted with calcium magnesite. Magnesium can be fed in the cake but some cows will not eat it and others consume too much.

SWSGS SILAGE MAKING SURVEY 1976-78

Dr R D Harkess

The West of Scotland Agricultural College

A report on the survey undertaken in conjunction with the SWSGS silage competition 1976-78.

The results of each year of the survey have been published in previous issues of Greensward (No 21, 22 and 23). In order to collate the results for the three years, data were recorded on punch cards and then put through the computer at Auchincruive. The objective of the survey was to try and isolate which factors had a significant effect on silage quality as measured by D-value. The computer was also programmed to pick out the information from each of the four counties within the SWSGS area.

The questions asked on the survey were as follows:-

1. Date of N application
2. Rate of N application
3. Rate of slurry application
4. Date of cut
5. Weather at cutting
6. Wilting period
7. Type of forage harvester
8. Length of chop
9. Type of additive
10. Rate of additive application

A total of 146 silages were submitted for the competitions, of these 132 were from clamp silos and 14 were from tower silos. The general results include all silos, but the comparison of the best 10 and poorest 10 silages in each year is related to first cut clamp silages only.

The first year of the survey 1976, was particularly difficult, whereas 1977 and 1978 were good years and Table 3 on page 30 summarises the weather statistics in each year.

General results Table 1 presents the average quality of the clamp and tower silages for the first cuts and regrowth cuts.

Table 1 Analyses of clamp and tower silages

	First cuts		Regrowth cuts	
	Clamps	Towers	Clamps	Towers
pH	4.31	4.57	4.40	4.45
DM%	26	40	29	38
CP%	17	17	16	16
OM%	90	90	90	90
NH_3 N%	12.6	10.8	10.8	9.1
D	66	65	62	64
ME	10.4	9.2	9.2	8.8

As would be expected tower silages had a higher dry matter content and slightly higher pH values than the clamp silages. Tower silages also had a lower

ammonia N content. The D-values were fairly similar, with clamps having a slight edge over towers with the first cuts but the position was reversed for regrowth crops.

No positive link-up could be found between pH or DM content and ammonia N content and perhaps the widespread use of additives has masked any such effect. However, trends were detected from four of the factors recorded.

Table 2 shows that D-value was better where organic matter (OM) contents were 90% or more and this confirms the recommendation to endeavour to keep soil out of silage grass. The DM contents also were higher with the higher OM levels, suggesting the possibility of additional contamination in wet conditions when soil is more likely to adhere to the herbage.

The weather ratings at time of cut are presented in Table 3. A low rating ie. 1-3 indicates poor weather (wet and dull) whilst a high rating of 8 or more indicates that good weather prevailed at time of harvest.

Table 2 Organic matter content and silage quality

OM Content (%)	<86	86-88	88-90	90-92	>92
DM%	24	26	25	30	31
D value	60	60	64	67	68

Table 3 Weather rating and silage quality

Weather rating	1 & 2	3 & 4	5 & 6	7 & 8	9 & 10
DM%	22	21	25	28	31
D value	62	61	63	67	67

The better weather has resulted in higher DM contents and better D-values and this ties in with the remarks on page 31.

The third factor illustrated by the survey is the association between date of cut and D-value. Table 4 is split for first cuts before end of June and re-growth crops (mainly second cuts). Delay in cutting has reduced D-value and increased DM contents. Regrowth crops did not produce as good D-value as those obtained from first cuts. Although DM contents were high, this feature is most likely due to the fact that both 1977 and 1978 were good years weather-wise.

The effect of prolonged wilting on silage D-value and DM content is shown in Table 5. Clearly minimal wilting to achieve a suitable dry matter should be the aim if D-value is not to be lost.

Table 4 Date of cut and silage quality

(a) First cuts

Date of cut	up to 30 May	31 May - 9 June	9 June -19 June	19 June -20 June
DM%	26	25	35	30
D value	68	65	64	64

(b) Regrowth Cuts

Date of cut	29 June - 9 July	9 July -19 July	19 July -29 July	after 29 July
DM%	32	30	28	31
D value	63	63	63	61

Table 5 Wilting time and silage quality

Wilting time (hrs)	up to 24	24-48	48-72	over 72
DM%	25	31	28	36
D value	65	65	63	62

The survey fails to show any influence of date and rate of N application, slurry use, type of forage harvester and chop length on silage D value. 95% of silages had been cut with a precision chop forage harvester. 82% of silages were chopped to 50mm or less and only 6% were greater in length than 75mm. The use of silage additives, however, suggested an improvement in quality by raising the D-value from 63.6 to 65.4 D.

Comparison of top ten and bottom ten silages Data have been summarised to compare the analyses of the top ten and bottom ten first cut clamp silages over the three years of the survey. Of the chemical analyses, only D value and ammonia N content showed large differences. The top ten silages averaged a D-value of 69 with 9.6% ammonia N, whilst the bottom ten averaged 62 D with 16.8% ammonia N. Why this should be so is perhaps answered from the survey returns which show the average date of cut of the best silages to be 27 May whilst that of the lower quality silages was 6 June. The higher ammonia content of the poorer silages suggests some undesirable fermentation patterns and it is interesting to note that whilst 87% of the top silages had an additive applied, only 57% of the poorer silages had received an additive. Where additives were used, the top group received 15% more additive than the lower group (2.3 litres compared with 2 litres per tonne). There were no detectable differences between top and bottom silages in terms of slurry use, level of fertilizer, weather rating, wilting, and type of silage machinery.

Regional differences Table 6 summarises silage quality in the four counties during the three years of the survey. Kircudbrightshire members have produced consistently good silage with the Ayrshire folks not so far behind. Wigtownshire comes at the bottom of the league and why this is so is not clear from the survey; perhaps it is because Wigtownshire has the highest stocking rate of the four counties (see Table 1, page 17) and requires larger bulky crops to keep their stock satisfied! In terms of date of cut Dumfriesshire and Kirkcudbrightshire averaged 21 and 22 May respectively, Wigtownshire the 30 May and Ayrshire 4 June, so perhaps Wigtownshire was a little late in cutting date considering it's southerly latitude.

Table 6 County participation and silage quality

County	No. of entries	No. in top 10	No. in bottom 10	DM (%)	CP (%)	NH_3N (%)	D-value
Ayrshire	38	9	7	28	17	11.8	66
Dumfriesshire	27	4	8	25	17	12.7	64
Kircudbrightshire	49	16	6	27	17	11.2	66
Wigtownshire	32	1	9	28	15	13.0	63

Conclusions The interpretation of a survey of this type is fraught with difficulties and generalisation is always a dangerous business. Whilst an endeavour was made to draw out why good and poor silages were made by isolating particular aspects, silage making involves many variables interacting at the same time. The survey did not take account of several other aspects of silage making, such as field treatment or use prior to the silage crop, type of grasses, type of clamp silo, time taken to fill the silo, use of a cover during filling and for the final sealing of the silo.

Date of cut and keeping the silage herbage clean were shown to be important and length of wilting also. Weather, of course, is all important and is the one factor outwith our control. When adverse conditions prevail, that is probably when the M factor (Management factor) has a significant impact on silage making. The D value of the top ten clamp silages was 67, 71 and 70 and of the bottom ten 58, 66 and 64 respectively for 1976, 1977 and 1978. So whilst the good makers did loose 3-4 units of D in the poor year (1976) the bottom group lost 6-8 units of D and have therefore not been able to master the poorer weather conditions as well as the leading silage makers.

It would seem that the key to successful silage making is to adhere to the well known 'Golden Rules' and to pay attention to detail at all stages of the silage making progress. (See page 32)

The society is indebted to David Paterson of the Agronomy Department and to David Arnot, the College Statistician, for help in preparing the data and writing the computer programmes. Also, a thanks to all the silage competition entrants for completing the survey cards and to the past President Tom McCreath who was the instigator of the survey.

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A DAY VISIT TO KINCARDINESHIRE

A day outing of the CSGS to Mains of Catterline and Gossesslie, 13 May, 1980

At Mains of Catterline members were particularly impressed by an ambitious land improvement scheme where a vast number of large stones were being 'harvested' by Knerveland machinery. The area had been ploughed with a prairie buster and then levelled with an H-beam. After a pass with a triple K cultivator the stones were windrowed and mechanically lifted into trailers. A trailer load was being lifted every 20 metres and 5 tractors and trailers were needed to keep the lifting machinery on the move. Mr. Jacobsen was contacted more recently and is pleased to report that the reseeding has been outstandingly successful and he intends to tackle the rest of the hill in the present year.

Equally impressive was the standard of grass management on the arable ground where a 'clean grazing' system had been adopted. Ewes with lambs were grazed at 25 ewes per hectare and 350kg of nitrogen was applied. Mr. Jacobsen commented that the main problem of systems of high stocking was the inflexibility. On the day of the visit the farm was suffering severely from drought and the stocking rate needed to be reduced.

There were 3 distinct cattle enterprises - outwintered sucklers, inwintered sucklers and fattening cattle. The fattening cattle were averaging 1.5kg per day LWG from silage with 2.3kg of barley and Romensin. All finishing cattle had been implanted with Finaplix.

Gossesslie too had many points of interest. The dairy herd of 190 cows was zero grazed and fed a complete diet. The winter ration included beet pulp, soya, fishmeal, draff, barley and minerals. 1kg of cake was fed in the parlour as an enticement. The yield of 5850 litres was very impressive with the zero-grazed grass allowing a stocking rate of 10-12 cows per hectare early in the season. Cows were grazed conventionally following first cut silage. Average nitrogen use was 440kg per hectare.

Other enterprises included bull beef, dairy replacements, barley, potatoes, turnips, bulbs and strawberries. Although 100 hectares of barley was grown, Mr. Wilson relied on contracting for combining and grain drying.

The above farms proved to be outstanding examples in an area renowned for the quality of farm management and the Society is indebted to Mr Angus Jacobsen of Mains of Catterline, Stonehaven and Mr Allan Wilson of Gossesslie, Laurencekirk, for showing members round their farms. - B M Simpson

A GEOGRAPHICAL NOTE ON GRASSLAND IN THE WEST OF SCOTLAND

G E D Tiley

Agronomy Department, Auchincruive

A resume of the grassland area and its type in the CSGS and SWSGS areas.

The West of Scotland Agricultural College advisory area comprises eleven former counties in the south-western and west central part of Scotland. The area is contained substantially within the Central, Strathclyde and Dumfries and Galloway Regions and is approximately one-third of the total area of Scotland.

Geology and climate have been the most important factors affecting the present-day landscape and soil conditions. The three main geographical divisions of the area based on the underlying *geology* are:-

1. Highland, the steep and rocky land of the west coast, Argyll and West Perth north of the Clyde-Forth valleys. The rocks are very hard and difficult to weather and have resulted in steep mountainous country.

2. Central Lowlands, the Clyde-Forth valleys, where the geology is a mixture of Old Red Sandstone and other easily weathered rocks. This has led to more undulating land with fewer rock outcrops. This division is dominated by the large Glasgow conurbation.

3. The Southern Uplands, occupying much of southern Scotland, and lying south of the Central Lowlands. The underlying rocks are generally more easily weathered than in the Highland area and have given rise to a more rounded type of upland.

Climate - The climate of the West of Scotland is typically moist and oceanic, under the influence of westerly winds from the Atlantic ocean, with rainfall well-distributed throughout the season and high humidities. Moving eastwards across Scotland the Atlantic influence decreases and the climate is of a progressively drier, more 'continental' type. The Gulf Stream raises winter temperatures in the south-west peninsula and near the western coasts and islands. Increasing altitude leads to lowered temperatures, increased exposure and higher humidities and rainfall. Annual rainfall varies from as low as 750mm (30 inches) on the coasts and islands to around 1500mm (60 inches) in the uplands and more than 2500mm (100 inches) in the West Highlands. Early summer droughts are possible on sandy and gravelly soils in the lower rainfall areas.

Soils - Soil types are complex and variable throughout the area. This is due not only to the interplay of geology and climate variables but also to the added complication of deposits of clay, rocks etc. from the Ice Age. Local drainage factors have a great influence on resulting soil type. Thus the better drained mineral soils are forest brown earths, which become dark gleys with poor drainage. The worst drained and wettest areas have over the centuries developed a surface layer of peat, which is thickest in the deep

Table 1: Grassland areas and livestock populations for the West of Scotland
(From: June, 1980 Census returns, by courtesy DAFS. Edinburgh.)

County	Total area of farmland (000 hectares)	Proportion of farmland (%) under				Livestock numbers per hectare of farmland	
		Rough grazings	Enclosed grass				
			Crops	Permanent *	Temporary	Total sheep	Total cattle
A) "HIGHLAND"							
Argyll	598	93	0.7	2.4	2.3	1.1	0.1
Arran	33	88	0.9	5.8	5.8	1.1	0.2
Dumbarton	48	71	4.0	13.9	7.1	1.8	0.5
West Perth	188	78	8.7	6.2	5.3	1.6	0.2
Total	867	88	2.6	4.0	3.4	1.3	0.2
B) "CENTRAL"							
Bute	12	58	7.5	15.0	22.5	1.3	1.1
Clackmannan	12	58	16.7	12.5	10.8	1.8	0.4
Lanark	166	50	8.4	21.2	18.0	2.0	0.8
Renfrew	39	44	8.5	29.7	16.7	1.4	1.1
Stirling	91	58	9.0	17.9	12.9	1.9	0.6
Total	320	52	8.9	20.8	16.2	1.9	0.8
C) "SOUTH-WEST"							
Ayr	222	49	7.0	25.0	17.0	2.1	1.1
Dumfries	217	57	7.0	16.8	17.6	2.7	0.8
Kircudbright	149	55	5.4	19.4	16.9	2.5	0.9
Wigtown	104	43	9.1	21.2	24.4	1.8	1.2
Total	692	52	7.0	20.6	18.3	2.3	1.0
TOTAL:	1879	69	5.3	13.0	11.0	1.8	0.6

* (over 6 years)

peat ('mossy') areas. It is important to realise that the trend towards difficult, acid soils can be reversed in time by drainage, application of lime and improved management.

Agriculture and grassland - The northerly latitude and short growing season combined with the westerly climate create difficulties for cropping which is concentrated in the more favoured parts of the Central Lowlands and Solway coastal strip. Conversely the moist climate and extended summer daylength are well-suited for the growth of grass. This is borne out in the Census Agricultural Statistics for the area (courtesy D.A.F.S., Edinburgh) in Table 1. A comparativley small proportion of farm land is cropped (5%) compared with nearly five times this area (24%) under enclosed grassland. Rough or 'hill' grazings occupy a major proportion (69%) of farmed land in the West of Scotland. This is in addition to some 400,000 ha of forested land. Just over half of the enclosed grassland is regarded as 'Permanent' (more than six years old). In England and Wales, rough grazings figure less prominently though the proportion of permanent grassland is much greater (75%).

Nearly half of Scotland's sheep and cattle occur in the West College area. Overall populations of cattle and sheep per hectare for each County are given in the Table. Proportions of rough grazing, crops, enclosed and permanent grass are also indicated. The more favourable conditions for grassland and stock production in the 'South-West' counties and the comparative difficulties of the 'Highland' counties are clearly shown in these figures.

The 'Central' group of counties corresponds to the area covered by the Central Scotland Grassland Society, whereas the 'South-West' group covers the membership area for the South-West Scotland Grassland Society. These areas are dominated by dairying and stock-rearing enterprises. Grassland management both for summer grazing and winter conservation is of a high standard on many farms. The activities of the two Societies seek to maintain or improve these standards of management and as far as possible to spread them to all farms, with the aim of exploiting more fully the tremendous grassland potential in West Scotland.

MEET THE CHAIRMAN

SWSGS : STEWART JAMIESON, KIRKLAND, CLOSEBURN

Six years ago, Stewart ended a very successful academic career and returned home to Thornhill in Dumfriesshire. His years away from home took him to Glasgow University and an Honours degree based on Animal Husbandry. From there he went on to the Grassland Research Institute at Hurley where his research work earned him the degree of Doctor of Philosophy.

Understandably Stewart wondered how he would settle down to practical farming when he came home but this has presented no problems, and the transformation from an academic to a farmer has been greatly aided by his wife Frances and three daughters.

The two farms of Kirkland and Rosehill extend to 180 hectares. There are two dairy herds of 110 and 120 cows - mostly Friesians but still a few Ayrshires at Kirkland. Some barley - about 28 hectares is grown annually and the rest of the farm, which is for silage or grazing, is manured very liberally to provide the heavy stocking policy. Heifers are calved soon after reaching two years of age.

As a spin off from his years at Hurley, Stewart thinks and acts very positively about grassland. As he says 'this is an area with an ideal climate for growing grass so let's try and make the most of it'. Cows are set stocked and many of the young cattle are on the leader/follower system. About 52 hectares are cut each year for silage and perhaps 8 hectares for hay.

Stewart has a real interest in cattle which he regards as a hobby as well as a business. The two herds will increase in size and the Friesians are being graded-up to pedigree status partly to 'make a penny' and also because he has a genuine love of nice cattle.

The dairy cows are well housed in two comparatively new units both incorporating easy-feed centre passages. One unit is at present being extended to increase cow numbers from 110 to 150. Young cattle winter on high level slats. Silage is made in modest earth walled silos.

Parallel with his academic career Stewart played amateur football at the highest level reaching two National Amateur Cup finals with Queens Park in his Glasgow days and Slough Town while at Hurley. His main interests now-a-days are playing golf and watching sport.

Stewart readily acknowledges the influence his father and various tutors have had on his career - they were all enthusiastic about Agriculture. Basically a very modest person, Stewart has the qualities of a fine chairman for the Society and is always ready to put his ideas into practice. - J. Thorburn

THE VALUE OF WHITE CLOVER IN GRASSLAND FARMING

Dr P Newbould

Hill Farming Research Organisation, Bush Estate, Penicuik.

A meeting of the SWSGS in the Milton Park Hotel, Dalry, Kirkcudbrightshire, 20 November, 1980.

Factors which limit grass shoot production and yield include radiation, rainfall, temperature and nutritive supply, especially nitrogen. In examining the availability of these factors at an *Agrostis/fescue* site situated 200 m above sea level it was found that there was sufficient sunlight (radiation) each year to produce up to 10 t DM per hectare but rainfall and temperature were only sufficient for 7.5 t and 5 t dry matter per hectare respectively. Available nitrogen in the soil however limited production to only 2.5 t dry matter per hectare.

So nitrogen is one of the key factors in grass production. In the hill situation, phosphate in a form available for the plant can also be in short supply. However there are large quantities of both these nutrients tied up in the soil and Table 1 illustrates the amounts in one hectare of a hill sheep system.

Table 1. Quantities of nitrogen and phosphate above and below ground level in one hectare of a hill sheep system.

	Nitrogen (kg / ha)		Phosphate (kg/ha)	
SHEEP	6		5	
PASTURE				
green	43		9	
dead	27		7	
litter	37		7	
		114		28
GROUND LEVEL				
living roots	50		9	
dead roots	15		5	
SOIL				
inorganic	30		907	
organic	9845		3733	
microbes	40		5	
fauna	20		7	
		10000		4666

As can be seen there are huge amounts of nutrient elements locked up in the soil complex which only slowly become available for plant use. Good soil management (drainage, liming, fertilisation) can help to release these, by

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COMPETITIONS

CENTRAL SCOTLAND GRASSLAND SOCIETY

3rd Annual Silage Competition 1981/82

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

9th Annual Silage Competition 1981/82

The silage competition will continue for a further year. Some changes in the scoring and judging procedures are to be introduced as a result of suggestions and discussion following last years competition and the experience gained in the BGS Regional and National competitions. Details will be sent to all members in due course.

6th Annual Hay Competition 1981/82

As for previous years entries will be judged entirely by chemical analyses 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.

encouraging microbes and bacteria in the soil to break down the organic matter. Nitrogen is necessary to encourage this process and can be supplied from the fertiliser bag, at a price, or it can be supplied from clover, particularly white clover, in which atmospheric nitrogen is fixed by bacteria called *Rhizobia*. These bacteria grow in nodules on clover roots. Recently better strains of *Rhizobia* have been bred and clover seed can be inoculated with these before sowing especially if clover is being established on soil which has never supported clover growth in the past. Another interesting development is the discovery that there is a second micro-organism called mycorrhiza which grows partly in the clover roots and partly in the soil; this organism appears to aid the uptake of nutrient elements, especially phosphate, by the clover plant. Further research on this aspect of clover growth is in progress.

The rising cost of nitrogen and other fertilisers based on energy-hungry chemical plants is a spur to reconsider the role of clover in our farming systems both in hill and upland farming and in the more intensive lowground areas. Table 2 shows the yield improvement from three hill swards following the use of lime, phosphate and white clover.

Table 2. The utilised dry matter production from 3 hill swards (kg/ha).

Sward type	Control sward	Sward plus lime, phosphate and white clover *	% increase
Agrostis-Festuca	3400	4225	24
Molinia	3000	3800	27
Nardus	2500	3250	30

* Lime = 6.3 t ha^{-1}
Phosphate = 1.25 t slag ha^{-1}
White clover seed = 1.4 kg Aberystwyth S 100 ha^{-1}
0.8 kg Kent Wild White ha^{-1}

(after Eadie *et al.* HFRO)

Establishment - A good establishment of clover has two major attributes. Firstly, it fixes atmospheric nitrogen and the quantities involved range from 50 to 150 kg per hectare each year. Secondly, it provides a good quality herbage for our animals. The importance of these in the hill situation is very significant since it involves a low input/low output system of farming. Clover can save on the cost of fertiliser N and because of the boost to growth of grass, the stock are presented with more and better quality forage. Clover itself is high in minerals and protein content, is very digestible and so greatly improves the intake and feeding value of the diet (Table 3).

Table 3. Effect on digestibility, intake and lamb growth rates of introducing 30% white clover into *Agrostis-Festuca* pasture.

	Agrostis-Festuca herbage		
	Alone	+ 30% white clover	% increase + clover
Digestibility	73	76	4
Intake (DOM)	340	430	26
Live wt gain (g/day) *	60	110	83

* The experimental growth rates would be increased by about 70-100 g/day given the usual milk supply.

(after Eadie & Armstrong, HFRO)

The important end point of all this is a higher sheep carry and more lambs. The lambs themselves can be retained to a heavier weight which one hopes leads to improved profits. Clearly the case for the introduction of a good clover sward into the hill and marginal farm is without doubt and quite apart from the animal advantage the increased recycling of plant nutrients via the returned dung and urine leads to a build up of soil fertility. Table 4 illustrates the increases in animal output from three hill sheep farms following the establishment of some improved pasture containing 20-30% white clover.

Table 4. The effect of a small proportion of improved pasture on hill sheep production.

Location, area (period)	Sheep breed	Land improved (%)	Increase in ewe numbers (%)	Increase in wt of lamb output (%)
Sourhope, Roxburghshire 283 ha (1969-1976)	Cheviot	7	55	130
Lephinmore, Argyll 444 ha (1956-1976)	Blackface	11	120	190
Redesdale, Northumberland 162 ha (1969-1976)	Blackface	13	125	290

In order to establish white clover the soil pH level should be better than 5.5 with the actual level being dependent on soil type. Adequate phosphate and potash are required as are such trace elements as magnesium, copper, cobalt molydenum, boron, sulphur and zinc. No wonder the blast furnace basic slag was an ideal fertiliser for clover! Improved drainage which aids soil aeration is also important in encouraging clover establishment and the use of a good strain of effective *Rhizobium* is recommended. Clover must be given a chance to establish by keeping the competition from other plants in check and good grazing management can help in this matter.

Maintenance - It is difficult to maintain a good grass/clover balance in the sward for several reasons. Grass grows vigorously in the spring and autumn, whilst clover will grow best in the summer providing it has not been already checked earlier in the season. Differences in growth habit are important too, as the taller grasses can shade the more prostrate clovers. Clovers also suffer from the disadvantage that they require a higher temperature compared to grass for active growth hence their growing season is shorter. In poorer conditions, soil acidity and lack of phosphate and potash more adversely affect clovers than grasses.

In the hill situation management strategies to enable clover to contribute to sward growth are fairly well documented: a) fence to control grazing, b) match stock numbers to pasture growth. This means avoiding heavy grazing in the autumn of the establishment year and the spring of the first harvest year. Thereafter the sward should be grazed with moderate intensity. Ideally the sward should be kept at 3.5 to 5 cm in height to encourage clover, c) use the clover rich sward when quality feed has the most impact in the system such as post-lambing and before and during mating and finally d) maintain the soil fertility with lime, phosphate and potash *on a regular basis*. Around 60 kg P_2O_5 and 60-80 kg K_2O per hectare are required each year.

Dairy and beef farming - In better locations of climate and soil type, management to control the grass and clover balance can be even more critical. With these enterprises there is room to choose - forage production from grass with nitrogen, grass with clover or grass with clover and nitrogen and on many farms there is indeed a balance of all three systems. The choice is dependent on the quality of the land, finance available and the management skill of the operator. Where the present level of grassland utilisation is high then the use of even more nitrogen is possibly justified. However, if present utilisation is poor then there is need to consider such factors as a reduction in concentrate feeding, an increase in the stocking rate or the use of more clover in the swards.

There are many experimental results indicating the value of including clover in grass seeds mixtures even with higher levels of nitrogen input. For example the following table shows that it is not until fertiliser levels exceed 200 kg N per hectare that clover ceases to have a significant effect on yield.

Table 5. Effect of nitrogen level on the yield of grass and grass/clover swards.

	Nitrogen (kg/ha)			
Sward type	0	100	200	300
Grass (t DM/ha)	2.5	5.0	7.5	10.0
Grass/clover (t DM/ha)	6.0	7.0	8.5	10.0

(after Swift, ESCA)

Research work from the Hannah Institute has indicated that a good perennial ryegrass/white clover sward plus 180 kg nitrogen per year can give the same herbage dry matter and milk production as a pure ryegrass sward receiving 360 kg nitrogen - a saving in cost of 180 kg N per hectare (£60 at todays price).

In Northern Ireland the area required to graze 100 dairy cows from April to September was 45.5 hectare on a grass sward receiving 60 kg nitrogen but with a similar nitrogen level and a good grass/clover sward (in which 50% of the summer yield was clover) the area required was reduced to 27.8 hectares. Grass only receiving 350 kg N could support 100 cows on 20.4 hectares. Looking at beef production systems on S 24 ryegrass/Blanca white clover leys, the sward relying on clover received 50 kg N per hectare and produced 830 kg liveweight gain. The sward receiving 300 kg N pushed out the white clover and produced 992 kg liveweight gain. The low nitrogen/clover sward carried 3.3 animals per hectare as opposed to 4.5 animals in the high nitrogen system. Liveweight gains were 252 kg and 220 kg per animal of the two systems respectively. Hence reliance on white clover gave better performance per animal but poorer output per hectare.

Since many grass swards do not receive high levels of nitrogen nor do they contain good contents of clover there is much room for improvement and the encouragement of a good establishment of clover is very worthwhile considering. That clover-farming on all or part of the farm can and does work well in practice is ably demonstrated by members of your own Society viz. Tom McCreath from Wigtownshire and Bob Patterson from Ayrshire.

Conclusion - There are many uncertainties which will affect land use in the future. Such factors as climate, population size, lifestyle, technological change, price of land, land acts and taxation, EEC policies, foreign supplies of timber and food. All these interact with the farming scene and along with the rising price of energy and fertilisers, will compel us to look even more closely at our grassland farming techniques. Clover can certainly contribute to improved farm profitability especially in saving nitrogen and perhaps concentrates and the improved feeding value of a grass/clover mixture has been well established. Reliance on clover is not without its problems. Productivity per hectare is not so high as grass with high levels of nitrogen (8000 compared with 12000 kg dry matter per hectare). Seasonal production is different and the growing season shorter with clover. However with further research work on the basic growth of clover and especially nitrogen fixation and information of management and its interactions on clover maintenance and productivity, it should be possible to model strategies of sward use which will enable white clover to offer to the livestock industry an opportunity to farm the less intensively managed areas better and to reduce certain input costs particularly in the grazing situation.

Discussion

Considerable interest was shown in the new strains of *Rhizobia*. The natural wild strains of the bacteria do fix nitrogen but are not so active as the new types. For example, a wild strain may fix 30 kg nitrogen per hectare compared with 80 to 100 kg from an improved type. If the modules are examined closely, the most effective ones are those with a pinkish hue as seen when pinched open with a thumb nail. There is a degree of competition between the wild and cultivated strains with the wild types being the more aggressive. Good nodulation also requires adequate lime, phosphate and trace minerals in the soil. On peat land where no clover has grown before, inoculation is particularly necessary. Seed should be sown within 48 hours of inoculation.

Aerial sowing with pelleted seed has not proved very successful in Britain. Many of the swards into which clover has been overseeded in the past have been too dense to allow the seed to reach ground level. White clover is sensitive to drying and if pellets become wet and are then dried out the seeds either fail to germinate or the young plants dehydrate. However on more open swards in wetter areas and where stocking levels can be increased to trample in the seed, oversowing of unpelleted seed can lead to successful establishment. Grazing should continue during the year of sowing and clover will become more evident in the second and third years from sowing.

In order to retain a good clover content and to encourage nitrogen fixation, the sward must not be grazed bare hence the suggested ideal height of sward is around 3 to 7 cm tall. The application of artificial nitrogen especially in excess of 90 kg per hectare will discourage the nodules from fixing atmospheric nitrogen so there is need for careful management to obtain a balance between nitrogen use, clover content, stocking rate and severity of defoliation. There was some dubiety concerning the influence of dung and urine patches on the growth of clover but it was suggested that any check would be only of a temporary nature. In a high rainfall area it was necessary to ensure that adequate potash was available either as artificial fertiliser or as that contained in slurry. The possibility that the new varieties of large leaved clovers have a sensitivity to trampling was raised. This could be due to their more fleshy stolons but there did not appear to be any scientific evidence on this matter.

The last three years had been poor for good clover growth and one contributer indicated that stocking rate had only been maintained by ensuring that grass/clover swards were supplemented with Italian ryegrass adequately supplied with fertiliser nitrogen. Reliance on clover generally meant stocking rates of 2 cows instead of 2.5 cows per hectare. However, for spring calving herds and where the weather conditions, particularly temperature, were ideal then the clover system does do very well.

Clover seed sales have slumped from 6000 t in 1953 to 1600 t in 1976. Over this time overall nitrogen use has increased by nearly twenty fold and livestock numbers have doubled. None the less recent surveys have shown that in permanent pasture nitrogen use has been poor and the swards themselves are deficient in clover, so the management of many swards has fallen between the two stools. With the tightening margins it is necessary to consider how all the grassland can contribute to the farm economy and it is likely that in many situations greater cognizance of the value of clover could help in improving the biological efficiency of some less intensively used swards without adding to the ever spiraling variable costs.

EFFICIENT FERTILIZER SPREADING

In a recent ADAS survey, 71% of fertilizer spreader operators had received no training on the use of the spreader and up to 60% of the machines were found to be applying fertilizer outside the normally accepted standards. In these days of stringency and with the rising costs of fertilizers it is obviously important to ensure that this farm operation is carried as efficiently as possible. Fertilizer spreaders should be serviced regularly and worn or corroded components replaced. For example, the ADAS survey found that one-third of the disc broadcasters had corroded or bent vanes and about half of these required immediate replacement. Somewhere between 60 and 80% of the variable costs in growing a grass crop are attributable fertilizer charges, so there is every incentive to ensure that this input cost is carefully controlled.

DAY VISIT TO LANARKSHIRE

A day outing of the CSGS to Gaindykehead and Ryden Mains on 20 November, 1980.

Gaindykehead is well known to many members as the home of Jim Brown's herd of Holstein Friesians. Ryden Mains is perhaps less well known, but the quality of Jim and Alex Bartlett's fattening cattle will be well remembered by the members who attended this visit.

Following the Annual General Meeting, the evening discussion period was opened by James Walker-Love, Head of Animal Husbandry at Auchincruive. Mr Walker-Love praised both farmers for the obvious quality of stockmanship - in particular, the cattle were clean and contented with no signs of ailments such as feet troubles which often accompany high production stock.

Starting with Gaindykehead : the whole 59 hectares is sown with long term leys and carries 100 dairy cows plus followers; 30 hectares are cut twice for silage and all grass receives 300 kg N per hectare; the cows are 60% Holstein and 40% Friesian; silage is augmented by a wide variety of feeds and an out-of-parlour concentrate feeder is in use. Mr Walker-Love asked about the outlets for Holstein bull calves and if any importance was placed on milk quality.

In reply Mr Brown said that the average BF% had been 3.62 in the last four years. He had never culled for low butterfat but agreed that he might have to reconsider this policy if he is to successfully sell pedigree stock to the English market. Bull calves from Gaindykehead are sold at Lanark market and are nearly all bought by Continental buyers for veal production. Mr Brown admitted that Holstein calves have to be pushed fairly hard, eg in a barley beef system and slaughtered at an early age.

Mr Brown was convinced that easy-feeding is superior to self-feeding and the current policy is to self-feed until there is enough room to put a tractor and loader into the silo. The cows are then easy-fed along a barrier sited across the silo entrance. In each of the last four years the changeover from self-feed to easy-feed has resulted in an increase of 200-300 litres in the tank. This system particularly benefits the 2 year old heifers.

Apart from silage the main feeds are barley, maize gluten, sugar beet pulp and dairy cake. The cows had recently changed from 18% C.P. to 16% C.P. cake and there had been a slight increase in yield. Magnesium is included in the cake all year round and every cow is injected 4 days before the expected calving date. Following this policy there has not been a single case of hypomagnesaemia in the last five years.

Asked about grazing systems, Mr Brown said that he had tried most and was now on 3-4 day paddocks. On the 4th day the cows are put on to the next paddock and then brought back to clean up.

Turning to Jim Bartlett, Mr Walker-Love commented that he was most impressed by the quality of stock and the environment of the Masstock slatted building. The tight stocking density was essential for clean cattle.

Mr Bartlett explained that Ryden Mains had been purchased to function as a

'waste disposal unit' for the vegetable by-products of the Company's processing interests. Two cuts of silage are taken from 27 hectares and the target yield is 1000 tonnes. The Masstock unit can hold 300 cattle of around 300 kg and these are fed silage 'ad lib' supplemented with either carrots, potatoes or onions depending on availability.

Mr Walker-Love's only criticism of this unit was in the marketing of the cattle which were sold in batches through normal livestock auctions. "With such well-finished cattle there should be a case for selling on the hook on a forward contract basis". Mr Bartlett was, however, well pleased with the present system and is content to accept the market rate. - B M Simpson.

SILAGE - SPEED IS OF THE ESSENCE

Quality silage is all about timing - not magic. A fully equipped contractor who knows his job can outpace most farm teams - 57 hectares cut and carted in 6 days, including a 40 hour wilt. Extend the logic and you finish by calling in the contractor for most of the big outside jobs. There are no breakdown worries or delays.

It happens on this farm (145 hectares, 185 cows, with a lactation yield of 6,800 litres and milked three times per day) where £75 per hectare is spent annually on contractor charges. Savings include £5,000 interest, £6,000 in depreciating silage machinery, £3,000 in depreciating cultivation machinery, £6,500 plus a house for labour otherwise needed at peak working times and £4,000 in money not needed for concentrates. The money saved can be used for land improvement, drainage etc. The stockmen are left to get on with the job they know best and they can even take a summer holiday.

(A farm manager talking to "Farmers Weekly", 19 December, 1980).

SWSGS SILAGE AND HAY COMPETITIONS 1980-81

A meeting of the SWSGS at the Embassy Hotel, Newbridge on 5 February, 1981.

SILAGE COMPETITION

Judge: Alf Walsh, Rex Paterson Memorial Trust.

Judge's remarks:

The judge reported that 6 of the top 16 silages were withdrawn at inspection but each one of the top ten farms did have silage for inspection. Most farmers had remarked that their silage had fed far better than they at first feared and perhaps the high palatability was linked to the acceptable level of ammonia nitrogen in these top silages (8-10%). This suggested a satisfactory fermentation despite inclement weather conditions at harvest time. (See Table 1 for the silage analyses).

Although harvesting in wet conditions was encountered by most entrants, none of the silages had obvious soil contamination and only a few had top waste. However, several of the silos did have a degree of shoulder/side waste. The care taken by several of the finalists in sealing the silo was praised by the judge - nightly sheeting and the use of up to 3 or 4 sheets for the final sealing was clearly doing a good job. The high standard reached in this sealing activity was outstanding in the judge's experience.

The final skill was to use this good quality silage to produce meat or milk and to put faith in the quality product. Very often such faith wavered when it came to the final test. Another major factor influencing profitability is stocking rate. Where this low, it is probably easy to make sufficient high quality silage but in good grass growing conditions, a stocking rate of 2½ cows to the hectare should be attainable along with the judicious feeding of supplements in accord with the stage of lactation.

The inspection points awarded by the judge are given in Table 2. The winning silage maker was Alex Irving of Largs and the runner up was David Martindale of Todholes. J & W Carson of Conchieton were third and I D Houston of Torkatrine was fourth. The prize donated by Michael Milligin for the best entrant who had never been on the competition prize list was awarded to J McColm of Cairngarrock. Plasti-Covers Ltd., Irvine donated vouchers for the first three prize winners.

Dr R D Harkess: Silage qualities, 1976 - 1980

The distribution of silage D-value among the competition entries is given in Table 3. There were no silages in the very good class (ie. D-value of 70 or more) for the first time since 1976. 31 per cent and 67 per cent of silages were in the good and medium group respectively. These figures were similar to the previous year, 1979, and considerably poorer than in 1977 and 1978.

The hot day conditions in April and May encouraged grasses to produce their flowering tillers early and indeed 1980, when S24 perennial ryegrass reached 50% ear emergence on 16 May, was the earliest since recording started at Auchincruive in 1963. This early maturity and the delay in cutting to enable

Table 1 1980/81 Silage Competition : Analyses and Marks

Rank	Code	% DM	% CP	D value	Ammonia N as % total N	Marks/85
1	WS3	30.2	19.1	67.1	10.8	75.60
2	KS13	24.3	18.6	69.1	10.9	75.28
3	KS6	24.5	16.7	68.8	10.3	74.33
4	WS6	33.3	14.5	67.0	10.2	72.35
5	DS11	26.2	20.3	64.0	9.4	70.45
6	KS1	21.5	15.8	69.4	8.2	68.70
7	KS2	22.8	16.7	68.3	11.9	67.88
8	KS7	22.2	15.1	68.7	9.4	67.45
9	WS7	34.0	14.2	64.9	10.8	67.40
10	WS5	24.2	19.6	65.6	11.9	67.28
11	DS9	24.7	14.0	66.0	9.6	67.05
12	KS3	21.6	17.0	67.7	9.4	65.85
13	KS8	23.4	14.5	65.0	9.4	62.45
14	WS4	25.4	16.4	63.8	16.7	61.48
15	AS1	22.5	15.3	64.3	7.4	61.10
16	KS14	19.6	19.0	67.0	9.3	60.53
17	WS16	24.8	11.2	63.2	7.5	60.48
18	DS10	22.5	15.9	62.8	8.6	57.80
19	KS9	19.5	13.8	67.0	7.8	57.20
20=	WS12	31.0	11.7	60.3	9.8	56.45
20=	DS6	20.3	15.3	64.2	5.7	56.45
22	WS1	23.4	15.7	63.7	16.1	56.02
23	WS9	23.2	10.8	63.8	9.2	56.00
24	AS3	47.0	12.3	60.0	10.9	55.63
25	DS7	22.6	14.6	62.7	9.9	55.57
26	KS4	19.3	14.5	65.5	6.6	55.30
27	WS13	35.5	11.3	59.3	8.3	55.17
28	WS11	26.2	13.1	59.0	11.1	54.28
29	AS4	44.1	9.0	61.0	11.1	54.18
30	KS5	19.6	13.0	65.9	8.4	54.00
31	KS20	18.7	18.5	65.6	11.9	53.53
32	KS19	21.3	15.3	62.7	9.3	53.47
33	WS15	22.5	17.7	63.6	20.5	52.28
34	WS8	23.1	12.2	60.9	9.6	51.05
35	WS10	22.3	12.9	61.3	11.1	49.43
36	KS11	20.6	13.9	64.7	16.5	48.93
37	AS2	19.8	14.3	62.9	10.6	48.15
38	KS16	20.1	15.0	61.8	13.6	45.15
39	DS1	17.5	11.7	62.9	8.1	41.67
40	WS14	19.6	16.8	62.5	21.1	41.48
41	AS6	30.2	7.3	56.5	8.2	41.35
42	DS4	20.5	10.5	60.2	10.6	40.70
43	DS3	17.8	12.3	61.8	10.3	39.17
44	DS5	20.2	11.7	59.5	15.4	36.15
45	WS2	18.6	13.6	60.0	14.8	35.50
46	KS15	18.4	16.7	57.9	15.5	33.38
47	KS18	16.3	15.2	60.4	14.2	32.60
48	KS17	18.9	16.0	58.5	20.2	31.60
49	DS2	16.0	12.5	62.3	16.8	31.00
50	KS12	17.5	14.2	62.2	24.2	30.70
51	DS8	18.9	23.8	57.6	39.2	27.45
52	AS5	21.2	9.7	57.4	26.3	24.50
53	KS10	17.2	19.5	58.0	35.3	24.00

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

Awards	Farm	Marks Analysis (85)	Marks Inspection (85)	Total
Milligan Prize	J and J McColm, Cairn-garrock, Drummore.	75.60	60.0	135.60
	R M Wallace, Balmangan, Dundrennan.	75.28	58.5	133.78
1st and Trophy	A Irving, Largs, Tywnholm.	74.33	76.0	150.33
	J A Horberry, Low Culgroat, Stoneykirk.	72.35	63.0	135.35
	R D Armstrong, Sorbie, Garlieston.	67.28	52.0	119.28
2nd	D I Martindale, Todholes.	67.05	76.5	143.10
4th	I D Houston, Torkatrine, Dalbeattie.	65.85	72.5	138.35
	R Ramsay, Lodge of Kelton.	62.45	73.0	135.45
	Lady K P Moore, Newlands, Prestwick.	61.10	63.0	124.10
3rd	J and W Carson, Conchieton, Twynholm.	60.53	78.0	138.53

Table 3 Silage qualities 1976-80.

CLAMP SILAGES

Quality	D-value	% of total in each group 1976	1977	1978	1979	1980
Very good	>70	0	18	17	3	0
Good	65-70	18	48	57	30	31
Medium	57-64	64	34	20	64	67
Poor	<57	18	0	6	3	2
Mean DM %		22	29	28	22	22
Mean Volatile N %		13	11	12	15	13
*Rainfall (mm)		79	28	21	60	73
*Sunshine (hrs)		137	326	268	169	205
No of entries		43	57	35	37	53

*For period 14 May - 16 June.

the grass to bulk must account to some extent for the lower D values recorded.

Dry matter content was on average 22 per cent, which reflects the wet conditions at silage making time. The average ammonia N at 13 per cent was higher than the suggested target of 10 per cent or less, but only 3 of the top silages failed to reach the target level.

The weather statistics for the Auchincruive Meteorological Station for the time period 14 May to 16 June for the five years 1976-80 are also given in Table 3. The driest years, 1977 and 1978, had high sunshine records and were the years of the best silage qualities. 1980 was particularly wet, but unlike 1976 which also was a wet season, the hours of sunshine were much higher (205 compared with 137 hours). This higher incidence of sunshine may partially explain the satisfactory performance reported by many farmers on the wetter silages. Grasses were likely to have been higher in carbohydrates from the dry sunny months of April and May and much of the rainfall did not occur until late May and June - just as the forage harvesters reached the field gates! Also an increased use of silage additives was apparent and these two factors, carbohydrates and additives have given rise to a satisfactory fermentation which encouraged intake, despite the wetter nature of the silages. It is possible also that these factors prevented D-values from being lower than at first feared due to early maturity, delayed harvest and effluent losses.

HAY COMPETITION

The very poor hay making season of 1980 has reduced the entries in this competition to six. 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 was awarded for the best overall hay was presented to Mr R D Clark, Glenluce.

Table 4 1980/81 Hay Competition : Analyses and Marks

Field cured hay

Rank	Code	% DM	% CP	D value	Analyses marks/90	Visual marks/10	Total marks/100
1	WH1	82.7	14.3	54.4	51.75	8	59.75
2	DH1	82.1	9.8	56.0	45.65	8	53.65
3	KH3	82.5	9.4	55.2	43.45	7	50.45
4	KH4	84.2	9.3	52.9	38.65	7	45.65
5	KH2	80.2	8.6	52.1	34.50	7	41.50
Cold or warm air blown hay							
1	KH1	77.2	6.6	56.2	37.20	8	45.20

INNOVATIONS COMPETITION 1980

South West Scotland Grassland Society.

Winner 1980 Messrs J Biggar, Grange, Castle Douglas.

Messrs Biggar submitted the following idea:-

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"We have constructed a simple device attached to the hydraulic lift arms of a tractor whereby a 1" round hole is punched in the side wall of the tyres allowing the water to escape".

"This is a simple attachment requiring the tyre to be placed between two pieces of steel plate one of which has a 1" piece of round shaft welded to it with a hole of similar size opposite. Operation of the lift arms punches out a clean hole. We punched all our tyres this year and found a great improvement on working conditions".

The winner received an inscribed tankard which was kindly donated by UKF Fertilisers Ltd.

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VISIT TO INGLESTON

A visit by SWSGS to Ingleston Farm, Irongray, Dumfries, 12 May, 1980

On a sunny dusty day the Society visited Jock Rome's farm at Irongray. This farming enterprise extends to 400 hectares on three adjoining farms and ranges from 25-200 metres above sea level. There are two dairy herds totalling 270 cows which are grading-up Friesian cows with an average lactation yield of 6,000 litres. Heifer's are calved at two years old and do-it-yourself AI is used. The suckler herd comprises 160 head and consists of Angus x Friesian and Hereford x Friesian cows. These are crossed with Charolais and Limousin bulls. A bull beef enterprise using Friesian calves has been given a trial run.

Silage is cut twice from 80 hectares and a further 40 hectares are available for hay. The silage is stored in outdoor clamps with earth walls and barn hay drying facilities are available. One of the dairy units uses easy-feed, the other is self-fed. The grazing system does not follow a rigid pattern in order to allow some flexibility among the three farms on the unit. So set-stocking and strip-grazing are both used as and when appropriate.

Farm buildings are of some interest, the dairy cows are housed in a high level slatted cubicle house and high level slatted pens are used for the followers and beef stock. The suckler cows are wintered in a cubicle house. Two new herringbone milking parlours with Automatic Cluster Removal have been installed, one is a 16/16 and the other a 10/20. Jock felt that somewhere around 120-130 cows are sufficient for a one man unit.

Members visited pastures and stock both at the lowest altitude and at the 200 metre level. The exceptionally dry weather meant that farm roads were dusty and the convoy of vehicles was somewhat reminiscent of a mechanised waggon train!

The Society is much indebted to the Rome family for putting up with a three hour invasion of Ingleston by such a large party of visitors and members greatly appreciated the opportunity to visit this most interesting farming enterprise.

THE ROLE OF GRASS IN MILK PRODUCTION - RECENT IMPRESSIONS

A Walsh

Rex Paterson Memorial Trust.

A meeting of the SWSGS at the Embassy Hotel, Newbridge on 5 February, 1981.

Few in this audience will disagree with the statement that grass is the most vital element in the diet of the dairy cow. Its vital role in the profitability of dairying is less widely recognised and indeed by some seems almost to be ignored.

On average throughout the UK dairy herds, grass (and in some cases other home grown forages) provides almost two-thirds of the cows nutritional requirements while at the same time incurring only one-third of the total variable costs of cow feeding. The other one-third of the nutrition accounts for the remaining two-thirds of the costs.

This average two-thirds of cow nutrients provided by grass derives from a variety of individual situations in which the grass contribution in the diet ranges from less than 50% and up to 90%.

This range in degree of dependence on grass reflects a number of influencing factors:-

1. Inherent deficiencies of soil and climate which limit grass growth/potential.
2. Farm size considerations - which often influence stocking rate targets, thus affecting potential contribution.
3. Simple failure to exploit the growth potential of grass.
4. Grass utilisation policy - particularly the conservation aspect.

Grass production potential - It is perhaps unnecessary to go into any detail concerning the productive potential of grass or to discuss all the factors which affect yield. Suffice to say at this stage that the supply of available nitrogen is the factor which most influences the yield of a particular sward.

There is no better or more comprehensive data to quote on this than that from David Reid's work at the Hannah part of which is summarised in Table 1. These yield data were determined under a regime in which the swards were cut 5 times in the season at approximately the same growth stage.

Quite obviously grass yields at individual locations will vary according to the influence of other factors. This has been shown by other experiments, notably the ADAS/GRI/COSAC series which revealed more than 100% variation between the lowest and the highest yielding sites. Soil moisture deficit was an important factor affecting yields. What these results also showed however was that the response curve to increased N supply was similar under this wide range of conditions even though the final yield from a given level of N use was lower on the poorer grass growing sites.

Table 1. Yield of herbage dry matter in relation to level of fertiliser N use.

Fertilizer N use-kg/ha	Yield in kg per ha	
	Grass-Clover sward	Grass sward
56	7790	4371
112	9371	6087
168	10380	7432
224	10773	9293
280	11860	10537
336	12712	11333
392	13541	12622

A way of describing this situation is to say that grass growing conditions vary from 'poor' to 'very good'. Alternatively one might say that some farmers are fortunate to farm 'bigger acres' while others are less fortunate in farming 'smaller acres'. In all cases the ultimate size of the acre depends on the level of N supply - up to a certain limit, each acre can be made bigger. This limit is reached, in economic terms at about 400 kg of applied N per hectare.

Grass utilisation - In broad terms the utilisation of grass yield potential can take two distinct forms:-

(a) The provision of a smaller part of the individual cows' diet but for a larger number of cows.

(b) The provision of a larger proportion of the diet of a somewhat smaller number of cows.

Recognition of these broad alternatives gives perspective to the factors affecting the nutritional contribution from grass achieved on individual farms mentioned earlier.

Even assuming optimum N usage the farmer with 'smaller acres' is unlikely to be able to provide the same level of contribution to the nutrition of his cows as the farmer occupying 'bigger acres', assuming they have cows of similar yield and operate a similar level of stocking density.

The farmer occupying a limited acreage (of whatever grass growing potential) often finds it necessary to stock more heavily and accept a higher reliance on bought in feeds in order to operate a sufficiently large overall business.

Grass conservation policy obviously influences the level of contribution to cow nutrition in the winter period. Hay cut at the traditionally rather mature stage of growth imposes an immediate limit, while indirectly it also imposes a constraint on the full exploitation of grass yield potential and often infringes on the extent to which grass can contribute to nutrition during the grazing season. However it should be said that hay can provide a lot of winter cow-day maintenance requirements from each acre and in circumstances of small farm size or of tight constraints on capital, where building layouts rule out silage feeding, a hay policy might be quite defensible.

Where such circumstances exist, the constraint to initial production of grass

which a hay policy imposes may be acceptable. However it is difficult to understand any other self-imposed curtailment to the initial production of grass. On farms with a silage making policy there are few if any justifiable reasons for failing to exploit the growth potential of grass.

In other words to grow the fullest economic yield of grass should be the first objective and only then to debate its most economic utilisation in terms of whether it should be employed to:-

(a) Provide a smaller percentage of the individual diet of a larger number of cows, or

(b) A higher percentage of the requirements of fewer cows.

Forage quality considerations increase with movement from (a) to (b).

The effect of utilisation on grass yield - It is well known that utilisation practises exert an influence on herbage yields. Too frequent defoliation depresses total seasonal yield as well as the yield at each individual defoliation.

In general it can be said that three defoliations over the whole growing season would probably lead to the highest dry matter yield, but, because we grow grass for livestock consumption we accept a compromise between herbage yield and quality for the simple reason that mature herbage is difficult to utilise.

In the grazing situation we have grown to accept that herbage arising from a 2½-4 weeks period of growth offers the best prospects of supporting animal performance and at the same time of being effectively utilised. It seldom occurs to us that this frequency of defoliation is detrimental to the attainment of maximum dry matter yield or that in so doing we might be wasting land by requiring a rather biger area per cow.

Herbage growth stage at cutting, or the number of cuts to be taken over a given total growing period within a season has given rise to much more debate and controversy in the field of grass conservation than has arisen in the grazing aspect.

A sound reason for this greater concern is that in conserving grass we superimpose an area of costs (labour, machinery, storage) which do not arise with grazing - thus the impact of factors which depress yield tend to be magnified. Yield depression is most readily seen to reflect in either:-

(a) The need to increase the conservation areas, or

(b) Suffer a constraint on cow numbers, or

(c) Resort to buying in more supplementary feed (whether bulk or concentrates).

Grass and cow feeding - We are all familiar with the effect of herbage quality on the daily yield of cows at grazing. It is therefore not surprising that most experiments which have pursued the examination of silages of different growth stage and quality through the feeding phase have also found that milk yields are favourably influenced by the younger cut material.

From a series of trials over a period of years Malcolm Castle at the Hannah has calculated that each unit increase in the D value of silage resulted in an increase in milk yield of 0.25 litre per cow per day. One must interpret that this assumes no change in the level of concentrate input.

It can be extraploited from this that the benefits of a move from say 64 D to 67 D silage in a herd of 100 milking cows over a winter period would be:-

$$100 \times 180 \times 0.25 \times 3 = 13500 \text{ extra litres}$$

$$13500 \times 12.5\text{ p} = £1687 \text{ extra income}$$

We have already recognised that the higher quality of option leads to a reduction in silage yield, meaning either less per cow or fewer cows so this simple financial appraisal is inadequate.

But in many farm situations the full growing potential of grass remains under exploited and any silage yield deficit which would arise from a higher quality target is capable of being counter balanced by the use of more N per acre. Table 2 summarises the data on stocking rate and nitrogen usage levels on on farms in ICI's Dairymaid scheme in 1977-78 and 1980 in England and Wales.

Table 2. Stocking rates and N use levels.

	1977/78			1980		
No. Herds	1507			1850		
Stocking rate cows/ha	% of farms	Actual Av. cows/ha	N use/ha kg	% of farms	Actual Av. cows/ha	N use/ha kg
Up to 1.80	23	1.58	230	9	1.57	208
1.81-2.20	46	1.99	285	45	1.98	284
Over 2.2	31	2.41	316	46	2.48	389

These data show that in 1980 more than half of the herds were stocked at under 2 cows per hectare and that nitrogen usage levels scope for rectifying silage yield deficiencies which would arise from the adoption of silage quality improvement targets.

Stocking rate, or cow carrying capacity is also affected by two other factors, namely cow yield and the level of concentrate input per cow. Assuming comparable growing conditions and similar levels of N use, a measure which more readily provides a basis for comparing herd efficiencies is that of feed rate per litre. The three groups of herds in Table 2 (1980) did in fact have similar feed rates.

It has never been any secret that, assuming the existence of cow yield potential, the attainment of satisfactory yield depends on a sufficiency of energy being available. The ME system has done a great deal to clarify this position - or at least to make it more widely understood.

Since we also recognise that there are limits to the daily dry matter intake capacity of cows, it becomes clear that the poorer the overall quality of the diet the lower is the daily intake of energy and thus milk yields are decreased on low quality diets.

Critics of the high dependence on grass approach to cow feeding base their criticism on the depression in yield which occurs as the grass component of the diet is increased.

If we assume ME values of 12.5 for dairy cake and 11.0 for grass and conserved grass (as an average over winter and summer) then the proportions of these two components can be expected to vary the overall diet quality and thus also the average daily energy intake.

This situation is compounded by the fact that as overall diet quality falls so does the dry matter intake. Again it is not surprising that milk yields are depressed on low quality diets.

The contents of Table 3, drawn from the ICI Dairymaid service, clearly illustrate this effect of milk yield depression from an increase in dependence on forage energy (rolling average, 12 months ending November 1980).

Table 3. Input/output of herds relative to their level of dependence on forage energy.

No. Herds	Av. No. cows	% ME from forage	Av. yield per cow - litres	Conc's per litre - kg	Stock rate cows/ha	Margin over Feed & Forage costs Per cow	Per ha
60	109	83	4622	0.16	2.15	415	890
446	104	73	5106	0.24	2.12	413	878
1019	109	65	5490	0.30	2.16	408	880
367	117	56	5765	0.36	2.25	392	881

Despite achieving an increase in yield of 1143 litres and £159 extra sales income per cow, the highest yielding group were no better off in net terms than the lower yield group of herds. On a margin per hectare basis they had no more with which to pay their fixed costs.

A very similar picture is revealed by an Exeter University Study in 1978-79 of 75 herds in south west England. The results of an examination of group performance on the basis of concentrate input per cow are presented in Table 4.

Table 4. Exeter University Study 1978-79. Examination of herd performance by concentrate input per cow.

No. Herds	Av. No. cows	Conc. Input tonnes/cow	Conc. Input kg/litre	% ME from grass	Yield/cow litres	Margin over conc. costs Per cow	Per ha
5	59	0.68	0.18	76	4464	398	809
26	71	1.28	0.27	68	4812	366	744
35	84	1.75	0.32	61	5430	380	800
8	81	2.24	0.38	52	5824	371	705

The attainment of an extra 1360 litres per cow by the highest concentrate input group compared with the lowest input group was insufficient to compensate for the extra concentrate costs incurred.

It might be inferred from these two sets of data that there is condemnation of efforts to achieve an increase in yield per cow. This is by no means the intention.

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SCOTS TIMOTHY SEED GROWERS ASSOCIATION

Hon. Sec. D. Arnott, South Kirklane, Stirling, FK9 4AN

Provided an increase in yield is achieved economically in terms of concentrate use - which broadly speaking means without an increase in the overall average feed rate per litre, one can expect that an increase in yield will lead to an increase in margin.

Food costs and margins - Two factors are mostly responsible in practice for the general failure of margins to increase with increases in milk yield. These are:-

1. The relative costs of ME in forage and in concentrates.
2. The poor rate of milk yield response to concentrates - especially in the presence of good quality forage.

ME costs A number of separate bodies have calculated the costs of ME production in grass in its three main forms, grazed, as silage and as hay. The results of these various calculations are remarkably similar and place the relative costs per megajoule of ME as follows:-

	Cost of ME index
Dairy cake	100
Barley	70
Grazed grass	20
Grass silage	33
Hay	40

These grass energy costs include apportioned fixed costs i.e. labour, machinery, rent etc.

It can be seen from this index that changes in the source of energy for the overall annual nutrition of a cow can have a marked effect on the total costs of feeding her. This can be illustrated, again using the index approach:-

% of annual energy derived from forage*	Indexed cost per MJ of total diet
50 (50% from dairy cake)	100
75 (25% from dairy cake)	71

* based on assumption that half annual grass dry matter is consumed as grazing and half as silage.

This comparison implies that the farmer employing a high forage diet can afford to accept a 15% lower yield per cow and still break even with his neighbour. And this calculation includes the fixed costs of grass production.

Response to concentrates - The recognised requirement of ME to produce a litre of milk at 4.0% BF is 5.3 megajoules. This amount of ME is supplied in 0.5 kg of 'standard' dairy cake (12.5 MJ per kg DM) as fed. Therefore in theory each kg of cake fed should produce 2 litres of milk.

Taking account of total dry matter appetite, each kg of concentrate DM fed displaces some of the forage DM which would otherwise have been consumed - thus the net gain in intake is minimised. And the nearer the quality of the forage dry matter to that of the concentrates replacing it, the smaller is the net gain in energy intake.

This phenomenon is reflected in practice, by the poor rate of response to additional concentrate feeding which has been identified by various statistical studies and by a number of research workers. Such studies indicate that the rate of response to concentrate feeding is more of the order of 1 litre of milk for each kg of concentrates fed and furthermore the higher the level of concentrate feeding the poorer is the response.

Since the cost of a kg of concentrates is roughly equivalent to the value of a litre of milk it is not surprising that higher yields attained via heavy concentrate oriented diets do not give rise to worthwhile increases in margins. In short, many milk producers are swapping 12.5 pence worth of concentrate for 12.5 pence worth of milk.

Stocking rate and margin per hectare - It would be incorrect to suggest that stocking rate is not an important factor influencing margin per hectare. Its influence is widely recognised but it should be pointed out that if stocking rate increase necessitates a substantial reduction in the potential contribution which forage can make to dairy cow nutrition, thus leading to a marked increase in the use of a more expensive source of ME, then the potential benefits of this stocking rate increase can be heavily eroded.

The ability under superior grass growing conditions to maintain more animals without detriment to the grass contribution to total diet energy requirements per cow is a factor which should be borne in mind in inter-farm or inter-territorial comparisons.

The appraisal of stocking density increases should also take account of the interest charges incurred by an increase in capital input.

Conclusion - There is no single feeding system which can be said to be best for all circumstances.

Individuals display particular skills and are better than their neighbours in one aspect or other. In some it is in growing and utilising grass - in others it is their ability to pursuade cows to respond more economically to concentrates than the average. Such individual skills compensate for weakness in other areas while at the same time providing the exception to the general rule.

Bearing in mind such differences in individual skill and recognising the high level of expertise necessary in either of the extremes of dairy cow diet source as exemplified by (a) over 85% energy derived from forage, or (b) less than 55% energy from forage, the area between 65 and 80% energy from forage is that which offers most people the best prospects.

Beyond 80% places undue emphasis on a high degree of perferction in grass management which is vulnerable to season to season variations. Below 60% dependence on forage energy introduces the eroding factor of higher energy costs.

Both extremes in their way introduce an element of weakness in the employment of capital. In the case of high forage energy dependence, undue depression of milk yields will raise the capital/interest cost per unit of production. In the case of high concentrate dependence the erosion of margins also means that earnings on capital are weakened, especially if high stocking rates owe a lot to increased concentrate usage.

How does the farmer with 'smaller areas' fare? while he should stretch his acres to their optimum through the use of nitrogen he cannot economically overcome the natural constraints which exist. He cannot expect to compete in stocking rate terms with his friends occupying better land, because to do so via the use of expensive sources of food will erode his margins and diminish his return on capital.

Discussion

The winner of the Silage Competition was asked to say a few words. Alex Irvine commented that now he had a more open mind concerning silage dry matter content. Usually his target was around 40%, but following two years of difficult weather and producing silages in the dry matter range of 22-25% his cows have milked particularly well. One lesson learned was that prolonged wilting will reduce quality (D-value). However, every effort should be made to eliminate effluent and this means aiming for a dry matter of 25-28%. Alex stressed his belief in using an effective additive to ensure a good fermentation and the absolute necessity for thoroughly sealing the pit and weighting down the top sheets. (These latter factors greatly impressed the judge).

Some discussion then followed on the use of nitrogen, a level of 130 kg nitrogen per hectare for the first cut, followed by 110 kg for each succeeding cut 'was about right' said the judge. Where total N use was less than 200 kg for the season, the yield/quality argument was not relevant because maximum use of N was not being made. Slurry N certainly added to the supply of this nutrient, although where slurry was applied before Christmas much of the N would be lost by Spring. Indeed the overall nitrogen in a grass system can be nearer 500 kg per hectare if allowance was made for bagged fertilizers, slurry, clover N and mineral N released by the soil.

The presence of rotted grass at the base of a silage crop indicated wastage and was particularly bad when high N use was followed by late cutting. If the farm policy was to produce low D-value silage, then the amount of N applied should be cut back. In 1980, due to the dry conditions in April and May there was a considerable carry over of early nitrogen to the second crop and this produced big second crops which frequently lodged and rotted at the base. Rotted grass has a much reduced D-value.

Concentrate feeding also featured in the discussion. The reasons why many fed increasing concentrates with no apparent advantage (especially to cows and grass) was a lack of faith in the nutritive potential of grass and also the belief that one litre of milk was obtained from each 0.5 kg of concentrates fed; quite often this figure was nearer 1.5 kg of cake. This is not to say that concentrates should not be fed. Indeed, many do feed at high levels and are doing well, but it requires a good degree of management skill to do this profitably. Quite often it's the smaller units where the man who feeds the concentrates also pays for them, that do particularly well. Where forage quality is good there is less need for lead feeding. The administrative control of concentrate feeding depends on the calving system and is certainly easier where block calving is practiced. Flat rate feeding is also more easy in this situation. Where calving is spread, there is the likelihood of overgenerous feeding of concentrates to those cows that dont really need the feed.

DAY VISIT TO AYRSHIRE

A day outing of SWSGS to Changue and Chalmerston on 22 January 1981.

Changue (the Stevenson family) Mr Robert Stevenson welcomed members to Changue and prefaced the tour of the steading with a potted history of the farm. The Ayrshire herd was established in 1866 and in 1936 the family partnership entered into the retail milk market. This is now a major enterprise, with milk distribution extending over a large part of South Ayrshire and even beyond.

There are four farm units within the business extending to some 368 hectares. Changue, at an altitude of 200 metres above sea level, carries 180 Ayrshire cows with an average lactation yield of 5,500 litres. The unit 2 miles distant from Changue is a hill sheep farm carrying 380 Blackface ewes and the 40 hectares of inbye grassland is used for summer grazing of young cattle. 20 miles away a 72 hectare unit is used for grazing cross ewes and young cattle, finishing lambs, and also for the production of hay and barley.

Only a 4 month grazing season has been possible at Changue during the last two years. Rainfall is 1100 - 1300mm per annum (45-50") so poaching is a major problem. The cows are set stocked in order to encourage a thick sole to the sward and back-end grazing by lambs along with moderate N use throughout the year helps to keep a tight sward. Grazing swards receive around 225 kg N per hectare per annum.

Slurry is mainly applied to silage areas. Silage ground receives 125 kg N, 40 kg P_2O_5 and 75 kg K_2O per hectare for the first cut and 100 kg N, 30 kg P_2O_5 and 60 kg K_2O for the second cut. Because of the short season it is important to obtain a good heavy crop at the first cut and silage quality is usually in the range of 62-64 D. The silage is easy-fed and draff is also available. Out of parlour concentrate feeding has been recently installed with the Alpha Laval computer control dispenser offering the daily ration over a 24 hour period.

Swards are renewed by direct reseeding in May or June. For grazing leys a Castlehill type mixture is used (perennial ryegrass, timothy, meadow fescue and white clover). For silage swards the mixture is based on intermediate perennial ryegrass, timothy and white clover (Scotsward) which seems to be quite suitable for 2 silage cuts per year on the wet cold conditions at Changue.

Members visited the pasteurisation, washing and bottling plant at Changue as well as inspecting the livestock housing facilities.

Chalmerston (the Strathearn family) Chalmerston extends to 56 hectares (with a further 28 hectares rented for summer grazing) and is around 95 metres above sea level. Two main enterprises are beef and poultry. Approximately 90 calves are reared from September to January and a further 70 are bought-in by March to give 160 for turn out onto grass. Of these 40 will be sold fat off the grass and the remainder fattened through the winter period to make 450 to 600 kg live weight.

The poultry unit consists of 9,000 hybrid Warren Brown hens and 3,000 young birds. All eggs produced are sold retail and the outlets require 3,500 dozen eggs per week. Incidentally, cracked eggs are fed to the calves!

All feed is home mixed and the concentrate mixing plant is home designed and built.

Cropping includes 12 hectares barley, 20 hectares for first cut hay, the second cut being ensiled and 60 hectares are used for grazing. Poultry manure is spread on both cut and grazed fields all summer, but cattle slurry is applied only to silage fields. In addition to these organic manures grazing receives a further 90kg N per hectare and the hay and silage swards receive around 200kg N over the season.

Grass fields are reseeded after two years of barley with a general purpose mixture of the Cockle Park type (Field Master) which is used for both grazing and silage. Because of the clay subsoil and rainfall, backend grazing is limited, but 100 Blackface hoggs are wintered to control grass growth in late autumn.

During the afternoon members were given the opportunity to inspect the poultry housing, the egg packing station and the slatted high level cattle house with its easy-feed passage system.

Members of the Society were most appreciative of a particularly interesting day in Ayrshire and extend to both the Stevenson family and the Strathearn family a sincere thanks for the kind welcome given to them at Changue and Chalmerston.

AN AFTERNOON VISIT TO AYRSHIRE

An outing of the CSGS to Brocklehill, Ayr, 5 August, 1980

The Society was fortunate to have the opportunity of visiting the home of the famous Pant herd and is indebted to Mr Rennie and family for their kind hospitality.

Members expecting to see good grassland management were not disappointed and Mr Rennie stressed the importance of a good quality silage. An interesting point was the fact that no compound fertilizer has been applied to grassland at Brocklehill in the last 19 years. Lime and phosphate are applied at reseeding and only nitrogen is applied thereafter. Soil levels of phosphate and potash are monitored by regular analyses.

The cows, of course, proved to be the highlight of the visit and the size and quality of conformation were most impressive. The average yield is in excess of 6,500kg with moderate inputs of concentrates indicating a high level of grass utilisation. - B M Simpson.

CENTRAL SCOTLAND GRASSLAND SOCIETY

SILAGE COMPETITION 1980-81

A meeting of the CSGS in the Stuart Hotel, East Kilbride, 29 January, 1981.

Judge Mr George Skinner, Strathorn, Pitcaple, Aberdeenshire.

The judge remarked on the high standard of silage making set by the short-listed farmers and that he had enjoyed his whistle stop tour through the counties of Lanarkshire, Renfrewshire, Perthshire and Dunbartonshire. His inspection marks had ranged from 44 to 73 and had resulted in Mr Jim Clark of Dunrod being placed 1st, Mr Sandy Bankier of Fernishaw gaining 2nd and 3rd places and R & M Young of St. John's Kirk via Mr Blair Hill gaining the 4th place.

The judge then presented the SAI cup to Jim Clark as winner of the competition for 1980/81; he also handed over the other awards including that for the best new entrant to Jim Clark and for the most improved silage to Mr Willie Black of The Orchard. Table 1 lists the analyses marks for all competitors and Table 2 gives the inspection marks and the final placings of the short-listed silages.

Following the presentations, a panel was formed comprising Messrs. Clark, Bankier, Hill and the judge, with Mr Basil Baird in the chair.

Each panel member was asked to give a comment on his silage making activities. Mr Clark stressed the need for rolling the swards in the spring, the use of a mower conditioner (Lely) for a fast wilt, the need to avoid prolonged wilting and then to be geared up to haul and fill the silo as quickly as possible. At Dunrod they used a fore-end buckrake for filling the silos. 26 hectares were cut twice and a third cut was also taken from a smaller area.

Mr Bankier also agreed on the need to roll silage fields and suggested if left too late, rolling could retard growth rate. Two swards were put into one after twelve hours wilting (using PZ Graspa) and a nylon rope was looped through the tines of the rake to prevent any broken tines from finding their way into the harvester. Up to 24 hectares were cut ahead at the start. Silage was filled into the silo on the wedge principle and sheeted each night. Sheeting was cut to roll across the pit and not along it's length and the lighter weight involved aided handling and lifting. The top sheet, as at Dunrod, was weighted down with bales. Finally it was important to get back into the field with the fertilizer barrow as soon as possible. 35 hectares were cut twice, plus a third cut from 24 hectares.

Mr Hill used a mower conditioner with tines in place of rollers (Taarup) and rowed-up with a Kuhn rake, preferred for its more gentle action. 150 hectares were harvested at first cut, silage making being undertaken by a co-operative with a New Holland 892 forager with its own engine. Trailers were the ten ton double axle type for stability on slopes. Like the others he too used an additive which was applied when the crop was very wet or very dry, but switched off if conditions were good. Mr Mills rated freedom from molehills in the sward and speed of operation as two key factors.

Talking Farming with FARMERS

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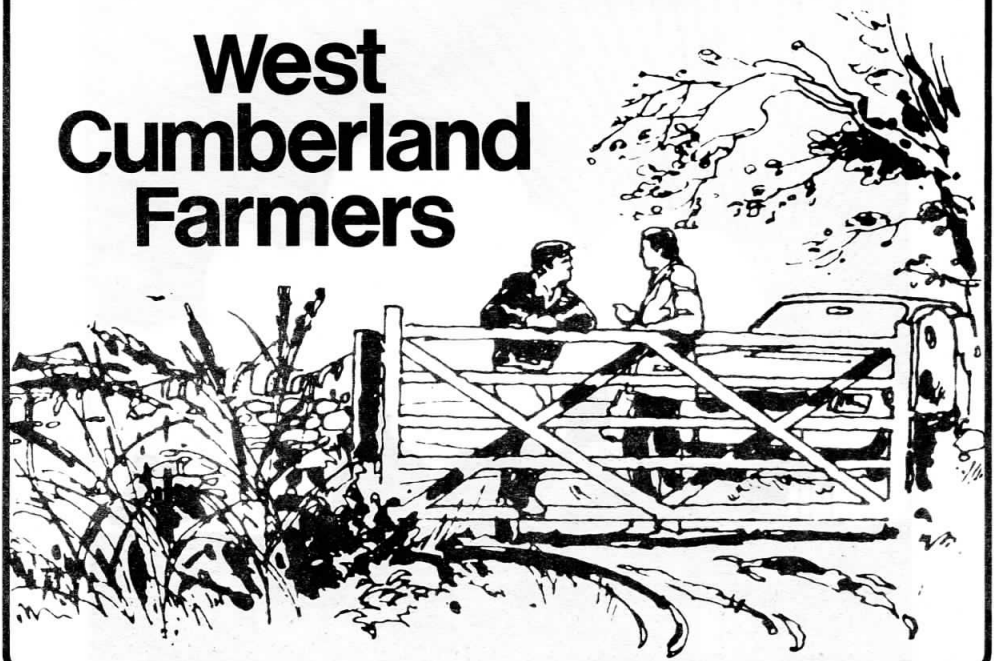

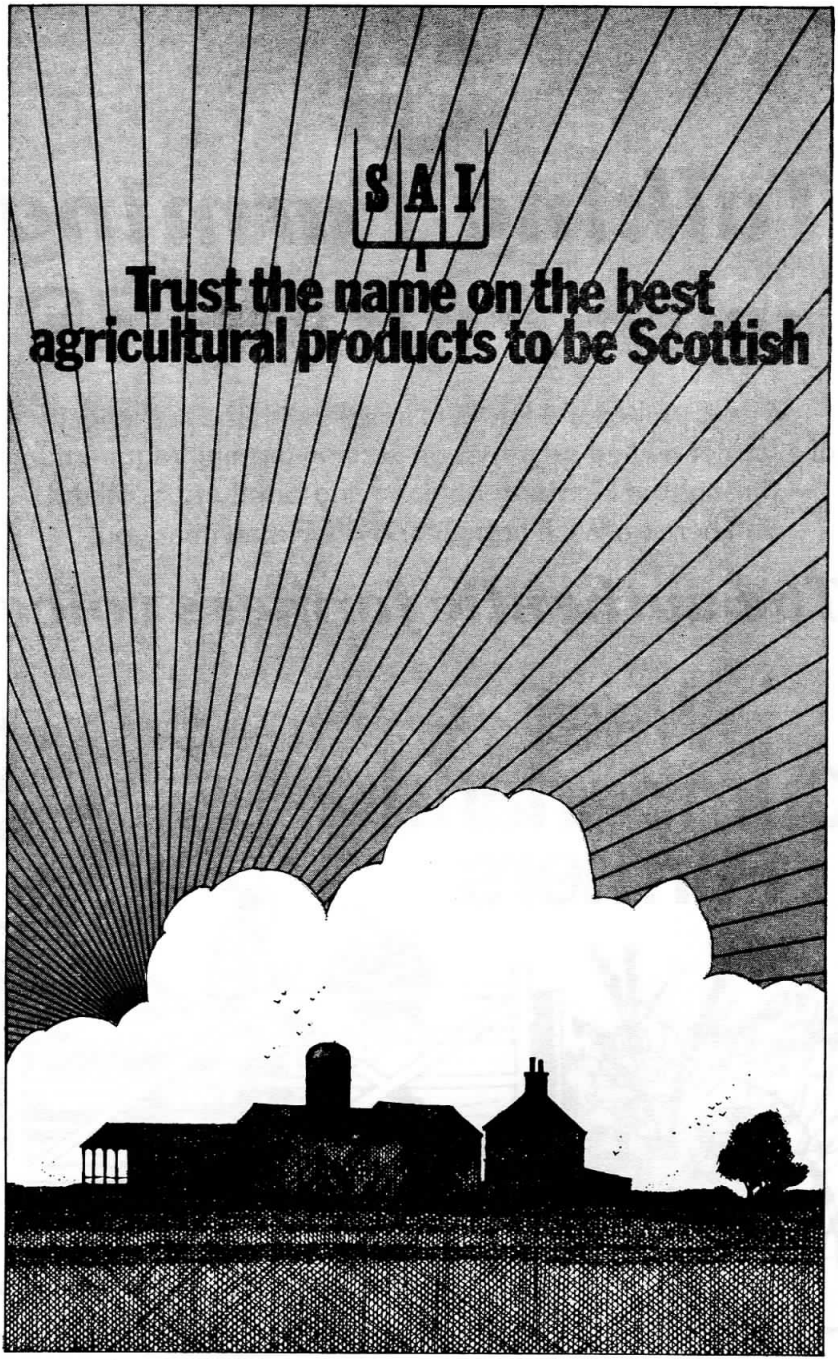
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Table 1 1980/81 Silage Competition : Analyses and Marks

Rank	Code	% DM	% CP	D value	Ammonia N as % total N	Marks/100
1	CP15	25.5	18.1	67.9	10.1	93.62
2	CL7	22.1	17.0	67.9	9.0	87.95
3	CP36	31.6	15.2	66.3	10.5	85.72
4	CL11	29.0	14.0	64.4	9.7	79.20
5	CL8	21.6	19.5	64.6	9.0	77.80
6	CS37	25.0	15.9	63.6	11.9	77.27
7	CL12	22.2	15.5	63.5	9.4	74.20
8	CL24	23.8	17.3	62.2	15.5	71.27
9	CP22	23.3	14.6	61.9	9.6	70.55
10	CL4	21.7	15.7	62.3	11.2	67.65
11	CL27	23.7	13.7	61.8	13.8	67.50
12	CL13	26.4	10.4	61.9	10.8	67.50
13	CL2	21.8	16.3	61.9	11.5	67.37
14	CL26	22.9	15.2	61.1	11.4	66.70
15	CL30	20.9	18.5	64.8	18.3	65.42
16	CP16	20.1	16.5	62.6	11.9	65.12
17	CL21	22.1	14.2	61.7	13.3	64.07
18	CL25	22.5	16.6	60.5	13.3	63.57
19	CL35	19.5	15.0	62.2	8.6	62.35
20	CL17	17.9	14.5	63.4	12.0	59.95
21	CS32	21.2	15.5	59.6	12.2	57.65
22	CS5	19.7	16.9	61.3	19.0	55.30
23	CL28	22.3	12.0	59.5	15.2	54.35
24	CL9	22.4	11.7	59.8	17.2	53.70
25	CL33	27.8	11.8	62.9	7.7	53.10
26	CP23	17.4	14.8	61.9	15.1	52.17
27	CS6	19.1	13.1	60.5	14.1	51.27
28	CL19	21.5	16.2	60.9	21.1	48.82
29	CL20	19.9	16.3	59.9	26.8	45.15
30	CL1	18.5	17.2	59.0	25.3	40.97
31	CL18	16.4	17.6	57.8	17.7	38.22
32	CL29	19.0	15.4	58.9	29.4	37.15
33	CS31	18.6	17.6	58.4	37.3	36.30
34	CL3	18.2	22.4	54.2	19.9	33.07
35	CL10	18.3	17.2	57.0	36.2	30.95
36	CL34	19.4	10.9	53.5	24.9	25.22
37	CL14	16.3	16.8	55.6	31.5	21.35

The judge George Skinner, then commented on his system which employed a forage waggon. He cut 36 hectares for first cut and 26 hectares for second cut. Two swards were tedded into one after 12 hours and he found the Lely enabled him to produce a flat wide sward which ideally suited the forage waggon. Although farming beef, he kept the aims and objectives of making quality silage as much in mind as the dairy farmer. Growing beef stock needs quality silage if they are to grow at an acceptable rate. With three men he could carry 15 to 20 tonnes per hour, but was fortunate in that the haulage distance was never more than half a mile and along good roads. An aside comment was that his rainfall was considerably lower than the 1750mm (70") which fell on the competition winner's farm.

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

Awards	Farm	Marks Analyses (100)	Inspection (75)	Total (175)
1st and Trophy	J Clark, Dunrod, Inverkip.	93.62	73	166.62
2nd	S Bankier, Fernieshaw, Cleland.	87.95	65	152.95
	Messrs Westlers, Culty-braggan, Comrie.	85.72	48	123.72
4th	R & M Young, St John's Kirk, Symington.	79.20	56	135.20
3rd	S Bankier, Fernieshaw, Cleland.	77.80	63	140.80
	A Waugh, North Bankhead, Avonbridge.	77.27	57	134.27
	R & M Young, St John's Kirk, Symington.	74.20	59	133.20
	J Paterson, Garrionhaugh, Garrion Bridge.	71.27	45	115.27
	R Howie, Drumfork, Helensburgh.	70.55	44	114.55

Other prizes

Best new entrant : J Clark, Dunrod, Inverkip.
Most improved silage : W Black, Orchard, Bellshill.

Discussion

The first question asked about the date of commencement for silage making. Both the winner and the runner-up started on 28 May, the judge on 1 June and the St John's Kirk group cut over the period 9-23 June.

The problem of enforced hold-ups due to inclement weather was also discussed. One view was that too long a delay means falling quality so cutting must proceed and an additive should be used. If conditions are wet swaths should be rowed-up to shed water and the comment was made that a wet good silage is better than a dry bad silage! The chances of getting four good days is greater than a good week, so operators should be ready to go when the break comes and many now clear 8 hectares or more in a day. Another panelist listened to the weekly weather forecasts broadcast each Sunday for guidance. If a hold-up in filling was inevitable it was important to sheet-up at night, waiting to the next morning was too late. Extra rolling of precision chopped herbage was not necessary as plenty of consolidation took place during filling, particularly if the wedge approach was used. Once an area of the silo was full and sealed, the sheet should never be removed for further rolling. The winner commented that grass is less likely to rot in the pit than in the field if weather was bad, so every effort should be made to ensile what is lying cut.

Turning to seeds mixtures most panelists used ryegrass, timothy type mixtures. Remarks made included - avoid tetraploids on conservation leys- ask the seedsman for a highly productive mixture - if it proves inadequate he needn't come back!; up to three quarters of the swards were intermediate or late

types and only a few contained early ryegrasses to enable a start to be made; generally, management is more important than mixtures. The judge was experimenting with a cocksfoot, red clover mixture undersown in forage peas.

How much settlement occured in the finished silage seemed to depend on the fineness of chop and compaction received during filling. If the chop length was in the region of 6-50mm there would not be much settlement. The ease of handling short chopped material both as fresh herbage and as silage and the degree of compaction both in the trailer and silo were important factors in speedy silage making. Generally the settlement seemed to be between 150 and 450mm on a 2,500mm depth of silage.

Panel members were asked 'what of the future?'. Mr Clark did not intend to increase his stock carry, but would endeavour to improve individual animal performance. Mr Bankier had recently obtained extra land and had increased cow numbers from 85 to 125 so there would be no further expansion until a return was obtained from the enlarged herd. The current system which has worked well would not be changed. Finally, Mr Hill thought his change would be in type of beef cattle possibly moving to Hereford x Friesian calves. The market is for a 300kg dead weight carcass, with only a small amount of fat. Also some barley ground may be dispensed with and interest was being shown in zero grazing in order to overcome worm burdens to increase stocking rates.

SILAGE MAKING TIPS

George Dobson, Manager of the ICI Dairy House Farm lists the following factors as important sources of loss or wastage during the making and storing of silage. All are within the control of the farmer.

1. Contamination with soil and manures.
2. Grass loss during loading and carting.
3. Losses from dumping grass on dirty concrete or silage bunker pads.
4. Inadequate sealing and covering of silo walls and tops.
5. Grass left uncovered overnight during filling
6. Tearing of the silo covers during autumn and winter.
7. Waste at emptying and feeding.

(from 'Farmers Weekly' May 1, 1981).

GOOD GRASS VARIETIES AND MIXTURES

Andrew Hunnable

National Seed Development Organisation

A meeting of the CSGS in the King Robert Hotel, Stirling, 4 March, 1981 and of the SWSGS in the Galloway Arms Hotel, Newton Stewart, 5 March, 1981.

Mr Hunnable introduced the audience to the activities of the National Seed Development Organisation (NSDO) with an audio-visual presentation. The main aim of NSDO is to organise the multiplication and the marketing of varieties of plants bred in UK plant breeding stations. Grass varieties are bred at Aberystwyth and the NSDO based at Cambridge.

Mr. Hunnable was quick to agree that some of the older varieties bred in Wales had not been suited for Scottish conditions due to low winter hardiness. The more recently bred tetraploids are more frost resistant, as a result of the anti-freeze effect of their higher levels of soluble carbohydrate.

The advantages claimed for tetraploid ryegrasses are: higher palatability, better frost resistance, high leaf to stem ratio giving higher digestibility, higher animal intakes, improved disease resistance and drought tolerance.

Mr. Hunnable then went on to explain some of the characteristics of the hybrid and Italian tetraploid varieties available from the NSDO.
Sabalan is an Italian ryegrass suitable for a two year sward. It heads on the same date as RVP Italian and can be relied upon to yield a large bulk of first cut silage.
Sabrina is a tetraploid hybrid ryegrass with better persistance and allowing an expected 3 year sward life. In trials comparing Sabrina with RVP, the grazing animals showed 8% higher DM intake and 18% higher live weight gain on the Sabrina.
Sabel is a tetraploid hybrid ryegrass producing a heavier yield of first cut silage and is more suitable for grazing.
Augusta is another tetraploid hybrid ryegrass suited to an integrated silage/ grazing system. The expected sward life is 3-4 years.

The above varieties are all described as winter hardy with Augusta and Sabalan being the most hardy. Mr. Hunnable stressed that a mixture of diploids and tetraploids should always be sown and the varieties mentioned above all mix well with RVP Italian ryegrass.

Management

Post emergence management - After 5-6 weeks (three tiller stage) the sward should be lightly grazed or topped. In autumn the swards should be grazed down to about 5cm and should not receive nitrogen at this time. New leys should then be rested throughout the winter.

Grazing management - A tetraploid hybrid ryegrass should always be included in a grazing mixture and in order to obtain the best response the stocking rate

should be matched to grass growth. If the spring flush is under-utilised the sward will degenerate. In rotational grazing systems, around 50kg of N should be applied after each grazing preferably in a compound fertilizer. Again autumn nitrogen applications should be avoided.

Cutting management - When cutting these tetraploid grasses the cutter bar should be sufficiently high to leave a stubble of 7cm. The claimed advantages for this higher stubble are; faster regrowth, better persistance, drought tolerance, faster wilting, less mechanical damage, less soil contamination.

Seed mixtures - Because tetraploid varieties contain more moisture and also tend to give a more open sward and less aftermath regrowth, they should be blended with diploids. For example, a short term ley of 1-2 years should contain 60% hybrid tetraploid plus 40% diploid Italian ryegrass. A medium ley of 2-4 years, 30-60% hybrid tetraploid plus diploid perennial ryegrass and this mixture is suitable for cutting and grazing. Medium to long leys of 4-5 years for grazing and cutting should have around 30% hybrid tetraploid plus 70% diploid perennial ryegrass. For leys longer than 5 years a blend of diploid and tetraploid perennial ryegrass plus timothy and white clover and containing up to 20% of a hybrid tetraploid provide a suitable grazing mixture. Where the long ley is required, the later perennial ryegrass Perma is particularly suitable.

Current work at Aberystwyth

There is considerable interest in a Swiss perennial ryegrass which is three weeks earlier than Aberystwyth S24. Its main features are early growth, quality and persistance. In a cold year it is claimed to outyield S24 by 50% and it is also as persistant as the late perennial ryegrasses. The high number of tillers produced make it ideal for grazing and even after heading, herbage quality is maintained with a D-value some 2 units higher than S24.

The most recent late perennials include Ajax, which is at present being assessed by the NIAB and Mascot. Mascot does not produce such high yields but its high digestability and animal intake levels give rise to high animal output per hectare. Siriol is a grazing type.

Long term objectives being considered at Aberystwyth include the breeding of varieties with more erect leaves which enable better light interception and also breeding for reduced respiration rates. These features should enable grass plants to better exploit their environment and produce higher yields.

- B M Simpson

DAY VISIT TO WIGTOWNSHIRE

A day outing of the SWSGS to North Cairn and Galdenoch, 6th May, 1981

North Cairn (the Lightbody family) This farm carries a herd of 200 pedigree Ayrshires plus followers. The herd averages 5,900 litres per cow. The high stock carry has necessitated all 93.5 hectares to be sown to grass of mainly perennial ryegrass, timothy and white clover types mixtures. Fertiliser input is 272 kg N, 51 kg P_2O_5 and 97 kg K_2O per hectare plus the cattle slurry. In an attempt to save on purchased fertilisers, an effort is being made to better integrate the use of slurry into the manuring programme.

The stocking rate is 2.66 cows per hectare and the cows are set stocked except at first turn out on early grass when they are strip-grazed (turn out this year was 6th April). Silage is easy-fed and some 1400 tonnes are made each year. Concentrate use is 0.29 kg per litre milk or 1.72 t per cow and MOC is £567 per cow.

Galdenoch (the McMaster family) Beef and sheep are the main enterprises on this 324 hectare farm. 250 suckler cows are crossed with Charolais and Simmental bulls and the 300 cross ewes are put to Suffolk and Texel tups for fat lamb production. 38 hectares are cut for hay, 16 hectares are sown to turnips and 36 hectares of barley are grown. The remainder of the farm is grassland which is difficult to manage due to very variable soil conditions. These range from highly organic soils with rocky outcrops to sands and gravels. Long term leys of the Castlehill type are used with extra clover seed added. In order to encourage clover, fertiliser N is kept low but phosphate and potash are used generously.

These two contrasting farms provided the Society with a most enjoyable and constructive day out. Members were particularly impressed by the superb Ayrshire cattle at North Cairn and the transformation that the grassland reclamation had brought about at Galdenoch. To Ian Lightbody and Allan McMaster sincere thanks for their kind welcome and for taking Society members round their farms.

BRITISH GRASSLAND SOCIETY WINTER MEETING

A short report of the winter meeting held in London, 3 December, 1980

The British Grassland Society always arranges its winter meeting in London (at the Zoo!) to coincide with Smithfield week. The meeting in 1980 was entitled "Supplementation and the effective use of grassland for dairying". There were three main review papers on this theme given in the morning session by Fred Gordon, V. Østergaard, a visitor from Denmark and lastly by the BGS President, A.S. Christensen, also a Dane now dairy farming near Oxford. All three speakers emphasised the great importance of the maximum use of high quality grassland and conserved forage in profitable milk production.

Dealing with the spring calving herd, Fred Gordon concluded that no supplementation was required in the dry period or while at pasture. 7kg of concentrate was optimum in the post-calving indoor period, while further research was required to determine the best levels in late lactation which coincides with autumn/early winter.

Mr. Østergaard emphasised the importance of forage quality on voluntary intake by the autumn calving herd. In particular a high crude protein content (17% of the dry matter) was desirable for high yielding cows. Mr. Christensen urged farmers to have more confidence in their grass in increasing profitability. He spoke of the methods used to reduce concentrate usage on his own farm and stressed that attention to detail in all aspects of herd management contributed to overall profit. The afternoon programme contained 12 short papers presented in two simultaneous sessions. These were mainly summaries of a variety of recent studies at research stations, agricultural colleges and ADAS EHF farms.

All papers will eventually be published in the BGS Journal, Grass and Forage Science.

During the course of the meeting, Dr. Fred Gordon, who spoke to the South West Society last November, was presented with the BGS Grassland Award for his outstanding contribution to the knowledge of grassland utilisation. - G.E.D. Tiley.

EVENING WALKS

Evening walks organised by local committee members of SWSGS, summer 1980.

Kircudbrightshire	:	Rainton, Girthon, Gatehouse of Fleet by courtesy of J Finlay Esq (31 July).
Ayrshire	:	Hannah Research Institute, Ayr by courtesy of Prof J Rook (7 August).
Dumfriesshire	:	The Park, Annan by courtesy of A Douglas Esq (12 August).
Wigtownshire	:	Barnultoch, Lochans, Stranraer by courtesy of P J McCraig Esq (13 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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