GRASSWARD

JOURNAL OF THE SOUTH-WEST AND CENTRAL SCOTLAND GRASSLAND SOCIETIES

No. 26 May 1983

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FOREWORD

The opening article in last year's Greensward discussed milk production. This year Robert Aitken of the West College Economics Division has given us an interesting article based on studies into what kind of beef the trade is looking for. Clearly the efficient use of grass must follow right through to the end product.

No doubt you will have heard or read of 'Money From Grass '83', a campaign sponsored by the farming press, supply trades, and advisory, research and development services in the U.K. to draw attention to the benefits that can be derived from the efficient use of grass and grass products. Local and national meetings have been held under this banner throughout this special grass year and final meetings will be held at Ingliston, Edinburgh on 25 October and at the Purcell Room, London on 7 December 1983.

It is unfortunate that the weather man had not been informed of this special year for grass farmers, otherwise he may have restrained the heavy rainfalls and cold weather that has affected grass growth throughout the country during April, May and June. Silage making has been very difficult this year as has many other cropping operations and it looks as if some areas may be short of feed supplies for the forthcoming winter. If you have been hit think things through now in order to ensure adequate provision for next winter.

This year the SWSGS celebrates its 21st year. The past Treasurer for twenty of these years was Dr. Malcolm Castle who, with retiral from the Hannah Institute imminent, was presented with a music centre from Society members. Malcolm assures us that he is going to endeavour to keep tuned in to grassland farming as well as to his new music box.

Following the article by Dr. Peter Newbould (HFRO) in Greensward No. 24 1981, he has written to say that requests for reprints have arrived from Czechoslovakia, Spain, Canada and New Guinea so we seem to be developing an international readership!

Once again thanks to our advertisers for their support and thanks also to Miss E. Mitchell for typing the manuscripts.

Ronald D. Harkess - Editor

INTERNATIONAL CODE NUMBER - ISSN-0017-4092

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WHICH TYPE OF BEEF?

Robert G. Aitken

Economics Division, The West of Scotland Agricultural College

Beef production has not been particularly profitable in the recent past. It is also true that prices (averaging 98p/kg, May, 1983) are higher than they otherwise would be, due to excess slaughtering capacity in the South West[1]. In the present climate it is no longer good enough to produce and then try to sell cattle. The buyer must be given more say.

The aim of this paper is not to say that 'better marketing' is the cure of all your problems. Rather, it is to supply some important facts about the types of finished cattle wholesalers and retailers say they prefer. In short, what types of beef get the best prices.

Beef production in South West Scotland is big business. One quarter of Scottish full-time farms producing prime beef (steers and heifers) are in the region and they contribute 96,400 out of the 554,300 cattle produced annually in Scotland. If cull cows and bulls from the dairy and beef herds are included the contribution rises substantially.

Farm Type and Methods of Finishing

Before looking at the types of cattle produced in the South West region it is worth reminding ourselves about the kinds of farms and systems of finishing used. Both of these affect the type of cattle produced.

Table 1. Sale of finished cattle in South West region and Scotland by farm type.

	South West		Scotland	
Farm type	Nos '000	Per cent	Nos '000	Per cent
Upland	49.7	57.6	104.0	18.7
Lowland livestock	17.2	17.8	194.8	35.2
Cropping	15.6	16.2	237.8	42.9
Dairying	13.9	14.4	17.7	3.2
Total	96.4	100.0	554.3	100.0

Two facts are quite striking in the above Table. Firstly, over half the finished cattle in the South West come from upland farms. Secondly, compared to Scotland as a whole, the region produces a large number of cattle from dairy farms. Taken together these two points have a considerable effect on the methods of cattle finishing.

The shorter grazing season on upland farms shows up in Table 2. Fifty-three per cent of finished cattle come out of courts even in a predominately grassland region. This means that many of the cattle will be sold at times of year when prices are higher but of course so are production costs.

[1] *South West Scotland as defined by the DAFS includes: Central, Strathclyde, Dumfries and Galloway Regions.*

Table 2. Sales of cattle in South West region and Scotland by finishing system.

Finishing system	South West Nos '000	South West Per cent	Scotland Nos '000	Scotland Per cent
Courts:				
Up to 18 months	14.6	15.1	68.3	12.3
18 - 24 months	30.9	32.0	204.2	36.8
Over 24 months	6.0	6.2	51.1	9.2
Grazing:				
Up to 18 months	6.1	6.3	30.9	5.6
18 - 24 months	29.4	30.6	148.2	26.8
Over 24 months	7.7	8.0	37.7	6.8
Cereal beef	1.7	1.8	13.9	2.5
Total	96.4	100.0	554.3	100.0

Slaughter age and method of finishing (court or grass) has an effect on the weight of cattle. Although there can be wide variation in cattle weights from all systems it is true that heavier cattle tend to come from the less intensive systems. Table 2 shows that the systems used in the South West do not differ all that much from the picture for Scotland as a whole. Care should however be taken to avoid producing very heavy or very light cattle - the proportions of up to 18 months from courts and over 24 months grazed cattle are above the national average.

The weight of cattle at a given age is also affected by breed (cross). Because of this, the weights of cattle sold vary in different areas of the South West. In the more southerly parts the dairy influence results in a higher proportion of steers sold at under 500 kg and very few above 550 kg. On the other hand, the stronger beef influence in the north of the region means that nearly half the steers are sold at over 550 kg.

Weight of Cattle Preferred

Different buyers do prefer different types of cattle. Their first choices are:

	Weight range (kg) Steers	Heifers
Independent butchers	Up to 450	Up to 450
Small wholesalers	451 - 500	Up to 450
Large wholesalers	451 - 500	451 - 500
Multiple retailers	451 - 550	Not interested

However, work carried out by the Economics Division showed buyers paid no significantly better price per kilo for cattle of their preferred weight. So what does this mean to the producer?

Although buyers do not pay more for cattle of the weight they say they want, the producer cannot disregard weight completely. The temptation to add weight subject only to the constraint of feed cost must be avoided - cattle weight is also closely tied up with other factors which do command a price advantage. In descending order these are: season of sale; conformation; breed (cross); type of purchaser; fatness.

Season of sale

Season of sale has the greatest single effect on market price. For example, the average price of 'Black Hereford' steers at Stirling varied from 92.3p/kg in Sept/Oct 1981 to 108.4p/kg in Dec/Feb 1981/82 - a difference of 16.1p/kg. To most producers a change from Sept/Oct finishing by grazing to say February finishing out of courts would not be realistic. Apart from the husbandry aspects, the economics of extra feeding, housing costs and interest on capital would reduce the net gain in price per kilo.

Breeds (crosses) Used and Prices Paid

Breed has been mentioned already in connection with its effect on cattle weights. It also has a direct effect on what buyers are prepared to pay. Before looking at which crosses command a price advantage it is worth seeing what is available.

Table 3. Proportion of each type of animal produced in South West region and Scotland.

Type of animal[1]	South West	Scotland
	Percentages	
Aberdeen Angus	9.5	18.6
Charolais	19.3	15.0
'Black Hereford'	19.9	26.8
'Red Hereford'	20.7	17.7
Simmental	2.3	2.9
Friesian	14.2	11.5
Other beef crosses	12.0	7.0
Other dairy crosses[2]	2.1	0.5
Total	100.0	100.0

Note: [1] Breed refers to sire breed of cross

[2] Mainly Ayrshires

South West production differs from the national picture. As expected there are more 'dairy types' and 'Red Herefords' but fewer Aberdeen Angus and 'Black Hereford'.

Overall, the 'breed' distribution in the South West seems to benefit the producer. Buyers almost always pay more for Charolais and 'Black Hereford' than for the other crosses. Taking Ayr as a typical market in the region the average price (pence per kg) for steers of each 'breed' in 1981/82 was: Charolais, 101.9; 'Black Hereford', 99.8; Aberdeen Angus, 99.8; Friesian, 99.5; 'Red Hereford', 98.8.

These prices relate to cattle of the same quality, specifically, EEC carcase grade U4L. There is a difference of up to 3.1p/kg available between the various types of cattle. (Note this is not due to fatness or conformation differences as these have been taken into account). In other parts of Scotland the 'Red Hereford' is not penalised e.g. in North East Scotland they often get a better price than Aberdeen Angus cattle.

Conformation and Fatness

Cattle conformation and fatness are important to buyers. To an increasing extent wholesalers specify their needs using the EEC Carcase Classification Scheme based on conformation and fatness. Since January this year deadweight prices have been reported for EEC purposes using the scheme. The cattle conformation and fatness classes quoted later in this paper are based on *visual assessments* made at auction markets using the equivalent of the EEC carcase classification.

How Classification Works

Each animal is given two scores one to represent its conformation and the other its fatness. Conformation is always quoted first followed by fatness. For example, in the grid below, an animal classed as U+4L would have very good conformation and about average fatness for cattle in Scotland.

Table 4. Classification Grid.

Lean → Fat

Conformation (Good ↑ Poor ↓)	Fatness 2	3	4L	4H	5L	5H
U+			U+4L			
U		U3				
R						
O						
O-		O-3				

Moving upwards from a score of O- to one of U+ the conformation improves. Moving along from a score of 2 to one of 5H, fatness increases. O and O- conformation cattle, irrespective of fatness, would not grade for the beef premium.

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Examples of conformation scores:

Purebred Friesians are typically O conformation.

Aberdeen Angus or Hereford cross with Friesian would tend to give R or U conformation.

The main crosses from the suckler herd are usually U with some in the R and U+ conformation classes.

Continental crosses are often U+ conformation.

Examples of fatness scores:

The fatness at a particular weight depends on breed/cross and feeding e.g. late maturing Charolais are heavier than earlier maturing Aberdeen Angus and Hereford crosses at a given fatness.

Hereford crosses tend to be in the 4L/4H fatness classes with some 5L.

Aberdeen Angus are mostly in 4H class with quite a few 5L.

Charolais are mostly 4L and 4H, with a lot of 3 and virtually no 5L or above.

What Conformation and Fatness do the Trade Prefer?

All parts of the trade want as good conformation as possible. In particular, multiple retailers want U+ conformation and fairly lean cattle (3 or 4L fatness). Large wholesalers also want lean cattle but they will accept slightly fatter 4H as well as 3 and 4L cattle. Small wholesalers and butchers prefer 4L and 4H animals. The common preference of all buyers in Scotland is for U+4L, U4L or R4L animals.

Table 5. Proportion of cattle in South West Scotland which fall into each buyer preference group.

Buyer preference	Conformation/ fatness class	Cattle Percentage
1	U, U+ 3, 4L, 4H	26.5
2	R 3, 4L, 4H	44.9
3	O, O- 3, 4L, 4H	23.0
4	Other	5.6
Total	-	100.0

Table 5 illustrates how well the conformation and fatness of cattle produced match what is wanted. Just over a quarter of the cattle sold in the South West region meet the buyers first preference specification. Improving conformation by just one class, from R to U, would take another 45 per cent, or nearly half of the cattle produced into the 1st preference. One of the main difficulties is improving the fairly high proportion of O and O- conformation cattle of dairy origin, in a primarily dairying region.

Returns to Improved Conformation

The rewards for improved conformation can be considerable and these occur irrespective of breed (cross). Taking Stirling as a typical market in the region, the gains from improved conformation based on Charolais steers in fat class 4L in 1981/82 would be:

Change in Conformation	Gain in p/kg
O- to O	7.5
O to R	4.7
R to U	3.4
U to U+	2.9

Using the above figures the gain in selling price by moving from the 2nd to the first buyer preference group (in Table 5) would increase the price of a 550 kg steer by £18.70 per head.

How Much Finish Is Needed?

In Scotland buyers accept fatter cattle than in some other areas of the U.K. As a result, the price per kg rises with improved finish up to the 4H fatness class but the amount is small - a maximum of 1.1p/kg in 1981/82, but it is likely to be less than this. Considerable price penalties may be applied to cattle in fatness classes 5L and 5H.

Type of Buyer

The type of buyer can affect the price per kg but in most cases the amount is very small. At Ayr, for example, the difference in average price paid by large and small wholesalers was only 0.3p/kg.

Possible Action by Breeders and Finishers

1. Produce as many steers as possible in the weight range 450 to 550 kg and heifers up to 450 kg. This should make the stock acceptable to as wide a range of buyers as possible. At the same time it should reduce the chance of any price penalty due to over-fatness or poor conformation.

   Make more use of a weighbridge to monitor the weight gain of cattle, particularly at grazing. At present only about half the farmers in Scotland have weighing facilities.

2. Aim for U or U+ conformation if possible. Conformation is strongly influenced by breed (cross) and to a lesser extent by fatness.

3. Choose sire breed carefully. Charolais and 'Black Hereford' cattle normally obtain the best prices per kilo but Aberdeen Angus along with Charolais, tend to produce a greater number of cattle in the better conformation classes - a better than average conformation (U) Aberdeen Angus will usually obtain a better price/kg than an average conformation (R) 'Black Hereford'. Aberdeen Angus crosses on the other hand can become overfat at the higher weights.

4. A change in season of sale may be difficult to achieve as it is affected by the supply of stores and the need for the beef enterprises to fit into the overall farm system. None the less the opportunity to take advantage of seasonal high prices should not be overlooked.

5. It is usually best to aim for an average level of fat cover represented by the 3 to 4L fat class. Most buyers would find those types of cattle acceptable.

6. In most cases it is not worth the effort of trying to gear production to a specific type of buyer.

Conclusion

It has not been the intention to try to lay down hard and fast rules as to the best type of animal to produce. If you, the producer, are more aware of 'what type of beef is required' this paper will have achieved its goal.

All the information used in this paper is derived from the recently completed Beef Production and Marketing and Auction Market Studies carried out by the Economics Division of The West of Scotland Agricultural College. The full reports listed below are available free from the Economics Division.

"The Production and Marketing of Beef in Scotland". Aitken, R.G. *et al.* Marketing Report No. 2.

"Auction Markets - Fat Cattle Sales". Aitken, R.G. and Crossley, G. Marketing Report No. 3.

SOME OBSERVATIONS ON GRASSLAND ESTABLISHMENT AND SUBSEQUENT MANAGEMENT

Dr. Allen H. Charles

Welsh Plant Breeding Station, Aberystwyth, Wales

A meeting of the SWSGS in the Embassy Hotel, Newbridge, 4 November, 1982.

The way in which grass and clover mixtures are established can affect the production of the grass crop for many years.

One of the first decisions to be made concerns seed rate and there is evidence that this could, in many instances, be reduced without a significant effect on yield. An example is given in Table 1 where a range of seed rates from 5.5 to 180 kg/ha did not significantly affect production up to the end of the 2nd harvest year. There were, however, some differences in the first few months.

Table 1. Yield of dry matter (t/ha) (After Holliday 1953).

	Seed rate kg per hectare					
Year	5.5	11	22	45	90	180
Seeding year	0.15	0.38	1.00	1.86	2.33	2.69
1st harvest year	9.67	9.62	9.31	8.54	7.88	5.05
2nd harvest year	8.41	8.34	6.28	8.61	8.59	8.76
Total	18.23	18.33	18.61	19.01	18.81	19.01

Time of sowing is also important with some species. White and red clover benefit greatly from seeding early in the year in contrast to Italian and perennial ryegrass which are much more flexible. Seeds mixtures should be modified if late sowing is unavoidable to include only rapidly establishing species. On average the two best times of seeding are April followed by July and early August. Sowings in May and June often encounter difficulties due to lack of moisture.

There is an optimum depth of sowing for each species or even for strains within a species. In general the larger seed fractions are more tolerant of deep sowing or rough tilth. The smaller seeds such as white clover and timothy benefit from sowing at depths less than 12 mm. In most instances a compromise of about 15 mm results in a satisfactory take. Under dry conditions there may be an advantage in drilling ryegrass down to 25 mm rather than broadcasting at a shallower depth.

Cereal cover crops harvested for grain are a major cause of poor establishment of undersown grass and clover. Seedlings established in this way often go into the winter in a weakened state, the swards tend to be open and liable to weed invasion. If undersowing can not be avoided then a spring variety of cereal with a short stiff straw should be used. Arable silage crops are much better for undersowing and rape sown at a low seed rate can be successful as a cover crop.

Seed Mixtures and Management

The management applied in the early stages of grassland establishment can greatly alter the botanical composition. Examples of this can be seen in Table 2 where the effect of four seed mixtures, three defoliation managements and two levels of N fertilizer on white clover establishment is illustrated.

Table 2. Percentage white clover in autumn of seeding year.

	Management					
	Frequent grazing		Infrequent grazing		Undersown	
Nitrogen Level	N_0	N_1*	N_0	N_1	N_0	N_1
Italian ryegrass						
with white clover	10	1	70	25	81	19
with red and white clover	7	4	3	5	5	6
Tall fescue						
with white clover	33	14	72	38	98	63
with red and white clover	20	10	3	9	4	7

* 58 kg N/ha in seed bed

A simple mixture of Italian ryegrass and white clover could produce a sward with a range of clover from 1 to 81% by the autumn of the year of sowing. Adding red clover and managing the sward to favour this legume by infrequent cutting reduced white clover from 70% down to 3%. Sowing a grass such as tall fescue which is slow to establish increased clover growth under all managements. Frequent grazing with sheep reduced the proportion of clover in the sward as they tended to selectively graze the legume.

Fertilizer Use

Fertilizer application should be determined by reference to soil analysis and can vary due to previous cropping. Adequate liming is important and a pH of about 6.0 should be the aim although 5.5 is acceptable on acid peat areas. Phosphate is necessary for rapid establishment and root growth and up to 100 kg P_2O_5 per hectare is recommended in a soluble form. Potash recommendations can very between nil and 125 kg/ha of K_2O depending on soil status.

Nitrogen can greatly accelerate the early growth of seedling grasses but the effect of this on clover has to be considered. The reduction in clover growth under a range of managements can be seen in Table 2 as the result of only 58 kg N per hectare in the seed bed. This can have a marked effect on yield in the following year (Table 3) under a system that depends on the legume and where the seed bed N has led to a severe reduction in sward clover content.

Table 3. Yield of hay from a ryegrass/clover ley in the first harvest year (t/ha dry matter).

	Method of Establishment		
	Without a cover crop		With cover crop
N applied in seed bed	Grazed frequently	Infrequent defoliation	Harvested for grain
None	4.02	4.51	4.06
58 kg/ha	3.80	2.71	3.74

The rapid response to management of the legume component of swards can easily be seen but equally dramatic change in the balance of grass species, varieties or even genotypes within single grass varieties can take place under the impact of variation in management applied to swards on farms. These changes are facilitated by the high death rate of seedlings during the establishment phase. Detailed work has shown that older swards can also respond in an equally dynamic manner. Due to plant breeding endeavour there are now large numbers of varieties available and it is important that the management and variety are correctly matched.

Methods of Establishment

There are a number of reasons for seeking an alternative to conventional re-seeding such as reducing costs, minimising loss of herbage, dealing with difficult land, avoiding seeding failure and reducing the germination of viable weed seeds present in the soil. Much work on one pass seeding with drilling machines in order to increase the reliability of introducing bred grasses and clovers into existing swards has been completed and some recent work on the subject is now reviewed.

A preliminary trial, on an old ley that had deteriorated revealed that there could be large differences in the initial establishment of ryegrass. Three machines were compared on hill land at an altitude of 520 m OD. The seedling count for the Moore Uni-Drill was twice as high as for the Aitkenhead Sod Seeder and a four fold increase was recorded for the Gibbs Slot Seeder with or without 'Roundup' herbicide as a band spray.

Table 4. Establishment scores from 12 methods of sowing seeds (10 = maximum within the drills).

Seedings method/drill	Peithyll 520 m OD	Pwllpeiran 45 m OD	Vallets 120 m OD
Aitkenhead	6	3	3
SIAE (Hunter)	9	7	8
Gibbs	8	6	9
Gibbs (no spray)	3	4	-
Disc harrow	4	2	-
Vredo	0	Trace	2
Moore	0	4	4
Sisis	3	2	-
Howard	3	2	7
Bettinson	-	-	7
Matco/Charter	-	-	-
Control (broadcast)	0	0	0
	Final establishment 19/2/82		Initial establishment 25/9/81

A wider range of machines was then tried at three contrasting locations (Table 4). The first of these was on a lowland farm (Peithyll) near Aberystwyth on a silty clay loam over solid rock at a head of a scree. The drainage here was good and the sward was a perennial ryegrass/white clover ley sown in 1974 which had an appreciable percentage of weed grasses in it and negligible clover. Drilling was carried out on 27 July 1981 using seven machines. A discing treatment was also included as this has been successfully used on Welsh hill land. The area had been grazed by sheep immediately before drilling and for two days afterwards in order to reduce competition from the existing sward.

The second drill comparison was at Pwllpeiran, a MAFF Experimental Husbandry Farm. The soil was 15 cm of loamy peat over silty clay loam (Hafren series) with rock at 40 cm. The area had been improved in 1975 and had subsequently deteriorated. Drilling was carried out on 28 July 1981 with the same machines used at the Aberystwyth lowland site.

On 7 September 1981, following a dry period when the soil was difficult to penetrate, eight machines were again used on an old permanent pasture on the Vallets farm near Hereford. The soil here was coarse loam over clay loam (Wotton series). Two additional machines, the Bettinson 3D and the Matco/Charter, were used at this site.

Type of Seed Drills

Rotary drills:- In this group is the *Hunter Rotary Strip Seeder* which is the commercial version of the *Scottish Institute for Agricultural Engineering's prototype* machine. This machine has four independently mounted chain driven rotary cultivators each of which is fitted with power seed coulters, two sets of blades and an articulated depth skid to control drill depth. The blades at 230 mm centres have a short turn on the end to make a 76 mm wide slot. Trash penetration is good as is the resultant tilth. The machine sows both seed and fertilizer into slots through spouts fixed at the back of the coulters. The *Howard Rotaseeder* is also in this group and is based on the standard Howard Rotavator. This machine also sows seed into a slot produced by the bladed rotors. The Sisis Contravator *Lospred* has 18 flat blades set at 100 mm intervals and the seed is discharged into the open grooves cut by the blades.

Tine drills:- The *Gibbs Slot Seeder* was developed from work done at the Weed Research Organisation. In one operation, this opens up slots about 25 mm wide and 25 mm deep, sprays a band of herbicides to kill off the sward and hence reduce competition in the immediate vicinity of the slot and sows the seed and deposits slug pellets. The *Aitkenhead Sod Seeder* has coulters which place the fertilizer below the seed and wings to break the root system of the old sward.

Direct drills:- Two of these, the *Bettinson* and the *Moore Uni-drill* are suitable for grass, clover, brassicas and cereals. The *Vredo*, specially imported from the Netherlands for the trials sows grass and clover only. Establishment within the side slots (150 mm) cut by the *Matco/Charter* prototype (only used at one location) was good but the band of turf cut out could fall back into the slot and the distance between slots was 770 mm. This machine had a succession of tines to form a tilth and cover the seed. There were large differences in establishment in the rows. The Hunter Rotary Seeder and the Gibbs Slot Seeder, purpose built after considerable research work, performed very well. The Hunter machine had the added advantage of standing up to use on rocky hill land.

Under the dry conditions at the time of drilling at the Vallets the penetration of the Bettinson was better than the Moore and this machine was in turn better than the Vredo. The penetration of the Howard Rotaseeder was good but it did tend to rip out lumps of turf. The Aitkenhead had the disadvantage of being rigid and not able to follow ground undulations.

Initial Effect on Yield

In contrast to conventional ploughing and seed bed preparation one pass seeding can be carried out without initial loss in yield. In the trial comparing seven machines on a good lowland sward (Peithyll) no significant loss in yield was recorded following the use of any of the machines except the Aitkenhead. The loss in yield with the Aitkenhead followed the use of a prototype band spray which destroyed a wide band of the original sward. The same machines were used on an upland sward previously reseeded in 1975. This time none of the machines reduced yield below that of the original sward in the first sampling carried out seven weeks after seeding.

The initial advantage of one-pass seeding over conventional ploughing and seed bed preparation was brought out on difficult hill land at 455 m OD with a gradient of 1 in 2. The yields are shown in Table 5.

Table 5. Yield of dry matter (t/ha) 10 weeks after seeding at 455 m OD.

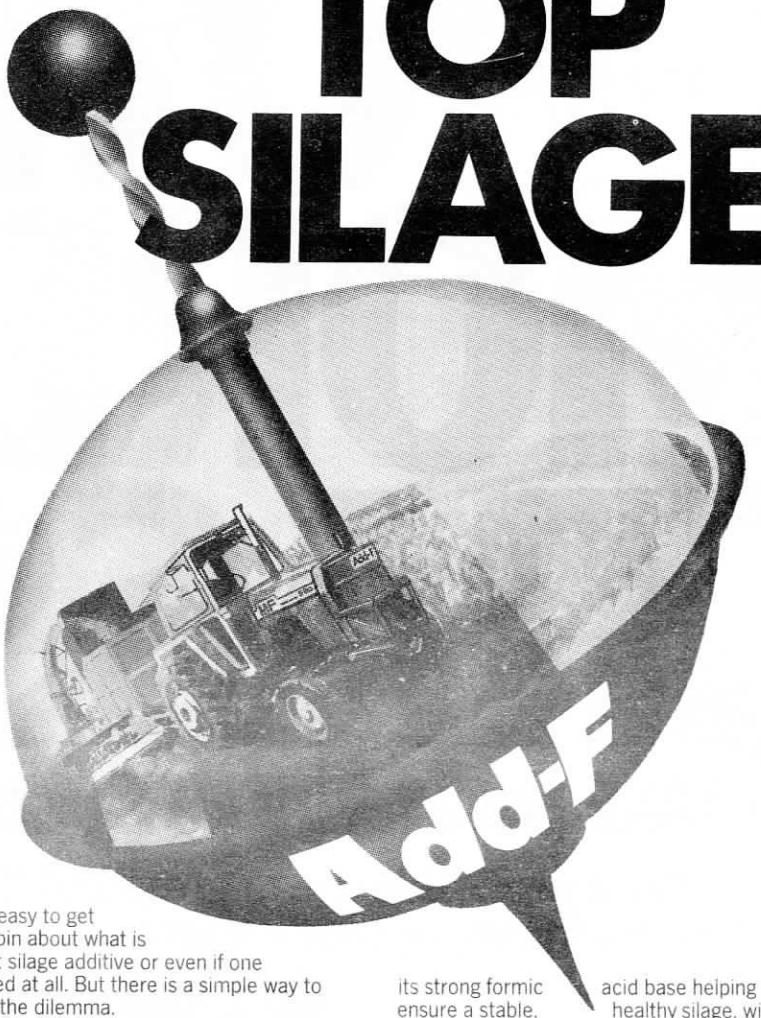
	Method of Sowing			
	Ploughing	Discing	Rotavating	SIAE Sod seeder
Yield	0.32	0.85	0.87	2.32
Relative	100	264	273	725

The SIAE Sod Seeder has proved a very effective machine for work on difficult land. The treatments listed in Table 5 were also applied at a lowland site near Aberystwyth on a seven year old ley. Again in that first 12 weeks after seeding the SIAE Sod Seeder treatment had twice as much dry matter yield than where conventional ploughing and reseeding had been carried out.

Spring growth was measured under cages from which herbage had been removed in the previous December at the Vallets. The only machines that gave a significant increase in yield over the control were the Gibbs and the SIAE slot seeder. The increase in yield was 134 and 77% respectively over that of the of the original sward. The mixture used to achieve this marked increase in spring yield was 61% Italian ryegrass, 21% late perennial ryegrass, 12% tetraploid red clover and 6% medium large leaved white clover sown at 17 kg per hectare.

Very little is known about cultivar (variety) performance under the special conditions imposed by one-pass seeding. The work at Aberystwyth has indicated that there can be quite large differences, particularly on effects on seasonal production. In one trial seventeen grass cultivars were established in an old permanent pasture using the Gibbs seeder and the range in dry matter yield showed that seasonal yield differences could be in excess of 150%. The highest yield was obtained by introducing Italian ryegrass into the sward and total annual yield was 29% higher than where the late flowering perennial ryegrass Melle had been used. It is interesting to note that this was in a permanent pasture containing 80% perennial ryegrass prior to slot seeding. Perennial ryegrass populations from permanent pasture display a considerable variation in productivity and so improvements are possible by slot seeding.

TOP SILAGE.



It's easy to get into a spin about what is the best silage additive or even if one is needed at all. But there is a simple way to resolve the dilemma.

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Slot Seeding Legumes

Perhaps the most important botanical change that could be induced in much of UK grassland both under lowland conditions and in our hills and uplands would be the introduction of a productive legume. Several very good cultivars of both white and red clover have recently become available to farmers.

Table 6. Slot seeding of white and red clover.

Cultivar	Per cent clover			Total DM yield (t/ha) 1980
	14 April	8 August	15 October	
White clover (6 grazings)				
S.100	1	47	40	8.9
S.184	1	32	27	9.0
Olwen	1	43	21	8.1
Sabeda	1	45	25	9.9
Red clover (4 cuts)				
Norseman	1	78	70	13.3
Sabtoron	4	78	77	13.2
Astra	1	91	60	12.4
Control sward	0	0	0	9.0

(After Bowen and Davies, 1981, WPBS, Aberystwyth).

As an example of what can be achieved using the slot seeding technique developed by the Weed Research Organisation can be seen in Table 6. Dry matter yields of 13 tonnes per hectare have been achieved from red clover without the use of nitrogen. This is an increase in yield of 45% compared to the original sward given the same management and fertilizer application. Red clovers dominated the sward by August of the year following seeding.

The initial management applied to both red and white clover was grazing with sheep six and nine weeks after seeding in August. All the legume plots were again grazed in the following spring. The red clover area was then fenced and cut four times to simulate conservation management. The white clover area was rotationally grazed by sheep giving a total of six grazings in the year following seeding.

One of the criticisms made of slot seeding when applied to white clover is that this legume remains in the slots and makes little contribution to the total production of the sward. In one experiment, the percentage of white clover in the sward was over 40% for three out of the four cultivars used one year after sowing. Therefore, given suitable management and fertilizer application there appears to be considerable potential for introducing both red and white clover into existing swards at a much lower cost than that of conventional reseeding.

Discussion

The discussion opened with a question on seeds and seed mixtures. Since perennial ryegrass is the key to successful grassland production, why is it that multi-species mixtures are still widely used? The speaker suggested that indecision by all, including the farmer, as to what is wanted and how the sward would be managed is largely responsible. Also the merchant is cautious because frequently he does not know the system of use or soil type to which the mixture will be exposed. However, all seeds on the market today are good, and especially so if recommended varieties are used. It is management which has to be improved in order to give young seeds a chance to germinate and establish.

Seeding rates were discussed and Dr. Charles suggested that 15-20 kg grass seed plus clover is a reasonable compromise. He had personally established a full sward with a total of 2 kg grass seed per hectare but all conditions were ideal and this would not be an on-farm recommendation. In terms of clover growth, any grass seed rate over 6 kg per hectare is likely to reduce clover establishment. So for those expressly aiming for a high clover sward the grass should not exceed 10 kg per hectare along with 2 kg of white clover. A high seed rate does offer a degree of weed control. Chickweed can be a problem where low seed rates are used. Whilst herbicides are available, many of them are very severe on young clover plants. Compared to drilling, broadcasting the seeds leaves less room for weeds to grow. With drilling, the ideal sowing depth is 12-18 mm but clover would do better if sown at a shallower depth. So broadcasting the seeds mixture should help clover establishment and is preferable in the wetter areas of the U.K. In low rainfall areas or where drought is expected drilling can give better results. The gel seeding technique, as recently introduced by Monsanto, is still in the development phase but the inclusion of pesticides, rhizobia and perhaps growth-promoting substances in the fluid, is an interesting idea. Unfortunately at the moment the technique appears a bit messy and expensive and since chitted seed is required, what happens if bad weather holds up the seeding?

Table 1 showed that low seed rates gave the same 3-year yield as high seed rates, so why the concern at the low plant population frequently obtained in undersowing? The speaker expressed some reserve on this because farmers still want a good cereal yield and yields are on the increase due to the efforts of plant breeders. Also high N input and more lodging mitigates against the seedling grasses and clovers. Even when such precautions as reduced cereal seed rates, reduced N input and early harvesting are practiced there remains the lack of vigour in the seedlings to weather their first winter and these less vigorous and more open swards are wide open to weed invasion. Arable silage removed by the third week in July is a good cover crop if conditions are dry but in wet weather problems do arise. Rape as a cover crop can also cause problems because traditionally it is grazed off too late in the year.

Winter cereals do allow early autumn seeding which is quite suited to grass but clover will suffer. The earlier in the year clover can be seeded the better. Some white clover seed can overwinter, perhaps as much as 10-15% but remember competition from established grass will be higher in the spring. Autumn sown swards oversown with white clover can work and a light grazing will trample in the seed. The ideal balance of clover is where it contributes 30% of the annual dry matter production and this means that 50% of production must come from white clover during its peak growth periods of June to August.

The need to apply correct amounts of plant nutrients is important. Phosphate is particularly important in encouraging seedling root growth and potash is required to encourage carbohydrate synthesis within the plant. The use of nitrogen in the seed-bed should be carefully controlled particularly if a good white clover establishment is required. On poor hill land 100-125 kg N per hectare may be required but if an old ley is ploughed in it may be possible to have good establishment without the need to apply further nitrogen. In most circumstances a compound fertilizer is applied and a low N type is usually satisfactory for seed bed application.

With all the care necessary in aiming to assure a good clover establishment, one questioner asked if farmers were really interested in a large white clover content in swards because nitrogen is still relatively inexpensive and with grass plus nitrogen we know what we are doing. Reliance on clover removes the ability to plan ahead. Dr. Charles agreed that reliance on clover has its snags. A good clover year is one with adequate moisture, high soil temperature and freedom from pests and diseases. The previous year can also influence current season production and swards can be inspected early in the year for the presence of clover stolons. Unfortunately one does not know early in the year what the weather is going to do but the livestock will be there and must be fed. The persistency and vigour of new clover varieties are better and extension of the growing season in autumn is possible but springtime improvement will be difficult to achieve. Research had shown, for example, that using a good strain of rhizobia, inoculation of clover seed can double the yield but it was still not possible to give a blueprint for the correct grass/clover balance. However there is no doubt about the nutritional quality of white clover and in beef/sheep meat production systems up to 20% more liveweight gain has been recorded with a good sward clover content. So in areas where stocking rates are less intensive or in low input systems such as in the hill areas, there is a strong incentive to encourage a good clover content in the sward.

THRICE CHAMPION

MICHAEL MILLIGAN of CULVENNAN, CASTLE DOUGLAS has won the Scottish Region BGS Silage Competition (1982/83) for the third time thus re-asserting his ability on the silage making scene "north of the border". Under the terms of the new BGS Competition rules, the winner now has to stand down for two years. Nevertheless, we are sure he will keep up the good work!

EFFICIENT GRASSLAND FARMING

Dr. Ronald D. Harkess

The West of Scotland Agricultural College, Auchincruive, Ayr

A report on the European Grassland Federation Meeting, Reading, September, 1982.

Over 250 delegates representing 22 countries attended a 5-day conference at the University of Reading to discuss the many factors involved in efficient grassland farming. Twelve main papers, thirty-four short papers and over fifty poster presentations plus farm and technical visits gave delegates plenty to hear, see and talk about.*

Demand for Grass Based Products

The demand for animal products is obviously important as no amount of efficient farming will pay if the end product has no market. One speaker reviewed markets in the E.E.C. up to the year 2000 - milk and milk powder, demand stagnant: beef and veal, only a very slight rise in demand: sheep meat, fair demand. However over the same time scale there would be a rise in the market for such products from the U.S.S.R. and Mediterannean countries. Predictions for fertilizer use based on the requirement for grass-derived products suggested that between now and the year 2000, the U.K. use on grassland would fall by 1% and in the Netherlands by 0.4% per annum, whereas in Denmark and Italy there would be rises of 1.7% and 5.9% respectively.

Farmers must remember that they are producing a raw material for processing and the changing demand was for pre-packaged food. Because of the small increase in demand for products and rising costs, managerial ability will become increasingly important and it will be those farmers who are able to implement quick changes to comply with the market demands who are likely to be most successful in the future.

The speaker caused some amusement by remarking that whilst his ob was to make the predictions, he did not necessarily believe them!!

Energy

The efficiency of energy use in farming systems indicated that the inclusion of white clover could reduce support (or input) energy requirements. For example an autumn calving herd being grazed and fed wilted silage required 47.3 GJ per hectare per year of support energy but this fell to 27.4 GJ if a ryegrass/white clover sward was used instead of pure ryegrass plus high N. The output energy: support energy ratio was 0.53 and 0.75 for the two systems respectively indicating a potential improvement in the energy efficiency of the grass/clover system albeit the overall output of energy was 25% lower on this system (i.e. 20.4 GJ compared with 25.3 GJ per hectare). Output energy is always lower than support energy but of course we can't eat fertilizer or grass ourselves and the cost of the produce pays for the inefficiencies of energy use.

* *The author thanks SWSGS for a sponsorship to attend this conference.*

Legumes

The theme of the value of legumes in livestock systems was taken up by a researcher from Portugal who spoke with an infectious enthusiasm and conviction. Due to light and temperature conditions, Mediterranean areas do have a greater potential for legume production than the temperate European zones such as experienced in the U.K. However, the same difficulties face all areas and work must continue to try and overcome such problems as establishment difficulties, ineffective inoculation and oestrogenic and bloat problems. The speaker suggested that over the last three decades the art of managing clover had been lost.

Nitrogen

To keep the pot boiling the next speaker from the Netherlands pointed out that much of the nitrogen applied in an intensive system was unaccounted for. For example, where the fertilizer N input totalled 383 kg per ha and a further 15 kg was obtained in rainfall plus 127 kg from purchased feeds, the N accounted for in milk and liveweight output totalled only 84 kg per hectare, that is 441 kg N per hectare was unaccounted for. In the extensive no-N system, 66 kg N per hectare was not accounted for. Reasons for this were given as; the grass did not take up all the nitrogen, some was fixed in the soil, some was lost to the atmosphere, some was leached, the grass response to nitrogen decreased at higher levels of N use. Also the over-consumption of N in the herbage would lead to higher urinary and dung N losses due to the uneven distribution of these on the field and to surface evaporation.

N recovery was generally poorest, *circa* 30% in very wet or very dry sites but could rise to 80% under ideal grass growing conditions. In Holland average N recovery was 50%, in Ireland 34% and in U.K. 70%. Where a grass/clover sward was involved the recovery was likely to be only half these values due to the contribution from the clover. However, the final recovery was very dependent on the overall dry matter yield which in turn was influenced by practical grassland management techniques.

Weeds, Pests and Diseases

Efficient herbage production can be hindered by the presence of weeds, pests and diseases. Establishment time was a critical phase in the life of a sward, particularly in terms of competition from weeds. Hence attention to lime and fertilizer requirements and proper topping or grazing to encourage tillering and control weed growth, along with adequate seed rates of appropriate grass mixtures are the most important factors. Pests are rarely a problem with spring sown swards but autumn sown re-seeds were at greater risk. The best way to avoid pests was therefore to advance sowing date, use a crop rotation, apply heavy rolling following seeding and seed dressing may also be helpful.

Once established there were many herbicides available to control weeds but insidious insect damage does occur and can reduce the yield by 30%. Frit fly damage is more noticeable especially on Italian ryegrass. At the present time the general use of pesticide is uneconomic due to the need for repeated treatments and the possibility of toxic residues. The selection of grass varieties resistant to such diseases as ryegrass mosaic virus and frit fly attack is now of some interest but in the meantime the manipulation of such management factors as sowing time, fertilizer use and frequency of defoliation can have a large effect on the incidence of pests and diseases.

Animal Production

Turning to animal production from grassland the main factors influencing output are stocking rate, methods of grazing, type of stock, autumn and spring grazing management, the integration of conservation and the use of nitrogen. The complementary grazing of beef and sheep had lead to a 30% increase in both sheep and cattle liveweight gain compared with separate grazing systems. This in turn lead to a 5-10% increase in total liveweight output per unit area. This improvement was attributed largely to the complementary grazing habits of the two animal types. Importance of stocking rate was illustrated in a survey which showed that 67% of the extra income when comparing the top and bottom third producers was directly attributable to the improved stocking rate. So the management aim must be for a simple integrated system to suit individual circumstances and which will sustain both pasture and animal productivity.

Turning to milk production the point was made that the increasing genetic potential of a dairy cow compelled more attention than before to be paid to feeding and management. 40 kg milk per day was not uncommon these days which means up to 300 MJ energy per day are required and a dry matter intake of 4 kg per 100 kg liveweight. Conserved herbage of high quality combined with a concentrate in approximately 50:50 ratio would readily support 35 kg of milk. Ever increasing lactation yields mean that method of stimulating the appetite to encourage energy intake must receive a high priority from all involved in dairy cow husbandry.

Following on from the main papers there were research project reports and brief comments on these now follow:

Sward Establishment

Failures from direct-drilled seeds were due to trash, fungi, insects and too dry a seed bed. Suggested answers to these problems are to remove the trash, apply a seed dressing (fungicide and insecticide) and to consider sowing the seeds in a gel (fluid drilling). In one trial, a delay in drilling of nine days following spraying with glyphosate improved seedling emergence by up to 300%. The target was to establish 50 plants per metre of row (approximately 400 plants per square metre). The general conclusion however was to wait 21 days after spraying glyphosate before direct drilling with grass seeds.

A review of various direct drilling machines highlighted the success of the SIAE sod seeder but generally slot seeding with a drill was not an easy technique and a considerable management input was required to ensure success. If the sward is thick some form of chemical suppression of the existing herbage is necessary to give the new seeds a better chance to establish. It is suggested that overdrilling or sod seeding could be up to £125 per hectare cheaper than drilling into a conventionally prepared seed bed.

Fertilizer Use

A paper from France noted that increasing N use raised the other mineral contents of grass and that the most efficient use of N was to apply it just as growth starts. This ensures that the nitrogen is taken up by the plant and not fixed in the soil. Hence the lesson of timely fertilizer application was stressed.

The effect of higher levels of N on grass tiller numbers was discussed in another paper. Where N was applied at 130 kg per hectare tiller numbers were around 2000 per square metre and 90% of the tillers were replaced following a defoliation. 40 kg of N produced a more dense sward of up to 18,000 tillers per square metre and only around 60% were new, showing a much lower mortality rate. Of the new tillers in the high N situation 40% were produced from the base of the plant and so there was a time lag before new leaf extension was visible.

From Ireland was the guideline of 0.98 cow grazing days per kg of N over a range 150-450 kg or 18 kg of milk per kg of N which at 42p for N and 16p a litre seems an attractive base on which to build a farming system. The value of slurry as a source of N had been studied in 10 trials over a seven year period. January and March applications gave a better response than November applications in most years although in five of the ten trials there was little difference among the three application dates. Silage cuts were taken in May/June and in seven of the ten trials slurry even at the high rate (30 cubic metres per ha approximately equal to 100 kg N) had no significant residual effect on herbage growth.

During the visit to ICI Jealotts Hill, delegates were shown results of the field leaching studies. Where N rate was 250 kg per hectare, up to 6 kg was lost to the field drains but this increased to 54 kg with 500 kg of N and 155 kg with 900 kg of N applied. N loss from usual grassland application levels was not as large as is often believed. However these experiments were in a drier area of the U.K. and leaching could well be higher in wetter western areas and hence consideration to the correct time of application was important.

Grazing

Studies on plant growth suggested that rotational grazing was most likely to be the ideal method of defoliation. The plant is given time to recover from defoliation but should then be utilised again before the lower layer of grass starts to die off. No indication was given as to the ideal rest time or herbage yield at which to use the grass in order to maintain it at this highly productive state. However it does indicate that a flexible rotational system is needed to account for the differences in growth rate during the season.

By adjusting stock numbers according to grass available, HFRO endeavoured to reduce the dieback of leaves and stems. Cattle and sheep were grazed in these trials and sheep grazing created a more dense sward which produced a higher level of net dry matter production (i.e. growth minus death) than the cattle grazed swards.

Irish work on rotational grazing confirmed some well-known responses to growing For example, grazing to below 5 cm reduced yield by 20% compared to grazing to 8 cm. Late autumn grazing delayed spring harvest by 1 day for each week the back-end grazing was prolonged. Spring grazing before a first silage cut reduced the yield by 2.5 tonnes DM per hectare and each other single grazing at 21 day intervals prior to silage was likely to knock a further 1 tonne DM off the yield. This paper also returned to the problem of balancing leaf growth to leaf dieback and pointed out that increase in DM *per se* may not necessarily result in an increase in useful feed.

A report on a survey of grassland use in England and Wales indicated that less than 65% of the metabolisable energy available in herbage is utilised on dairy farms and this rises to 75% on beef/sheep farms. However, complete utilisation may not be practicable and much of the under-use occurs at times of year when soil/grass management difficulties arise such as in early spring or autumn. Surprisingly, 50% of permanent grass on the 300 farms in the survey received no N fertilizer. The key to good dairy herd production from these swards was linked to level of N, adequate content of perennial ryegrass and good access. In the beef/sheep case, in addition to these factors, clover content (because N input was lower than for dairy systems), elevation and drainage were important.

Where high output of beef was the target the use of a grass buffer system was discussed. This allows for an extra grass area to be held within a moveable fence and which can be either conserved or grazed when herbage becomes scarce in mid season. This avoided the need to revert to concentrate feeding should growing conditions become difficult in mid season.

White Clover

The concern over rising energy costs has focussed attention once again on a role of white and red clover in farming systems. Work is under way to elucidate the management factor which would enable a reasonable contribution to be maintained from white clover. The general recommendation was that at least 30% clover in the sward at mid summer is necessary to produce an acceptable yield. Work at Auchincruive has indicated that 7-8 tonne DM per hectare is possible from a grass/clover sward with no N and with 240 kg of N the yield is likely to be 9-11 tonnes of dry matter per hectare. In practice clover content of swards is below that used in this trial so reliance on the clover sward may not be possible on a highly stocked enterprise. On the other hand where lower N levels are used on grasses less intensively farmed, there is good cause to encourage clover growth.

The mechanism of white clover growth and spread is via the stolons or surface stems and several authors discussed the importance of this. Light is important to encourage growing points on the stolons and hence clover in unfertilized swards or those which are fairly heavily grazed will have an advantage. Even if the crop is cut for silage or hay, provided no fertilizer N is applied, has enabled the clover stolons to continue to branch and spread.

Because clover is inactive in early and late season some discussion centred round the tactical use of N to boost output at these times. The use of 50-60 kg N per hectare would be the maximum rate in order to maintain a good clover presence.

The high feeding value of white clover was mentioned in several papers not only because of its high content of nutrients but also because of its high acceptability to stock leading to improved intakes.

Finally

Although this was a conference primarily for scientists there was a deep awareness that farming involves a system and the results of applied research and development work should be able to blend into any such system to further improve its efficiency. Final sections of the conference were given over to illustrations of efficient grassland systems in practice - these ranged from a small 13 hectare farm in Norway to one of 136,000 hectares in the U.S.S.R.

VISIT TO DUNROD

An afternoon visit by the CSGS to Dunrod, Inverkip, 12 August, 1982

We all wanted to know how perfect silage was made and utilised, and no-one in the Society is better qualified to show us than Jim Clark. Having won the silage competition in the two previous years, we were lucky to arrive just as he was making his third cut. The one lesson that everyone learnt was that to make the quality product requires tremendous attention to detail and this was amply demonstrated when the silage pits were visited.

Dunrod is a marginal farm extending to about 219 ha of which about 65 ha is grass and in long term leys and the remainder is upland grass/heather pasture grazing 200 Blackface ewes. Rainfall is in excess of 1750 mm per year. In addition about 12 ha are rented annually to graze dairy youngstock. The dairy herd comprises of 120 mainly autumn calving Ayrshire cows and about 30 heifers are reared each year as herd replacements. The dairy cows average over 5900 litres per cow.

First cut silage is taken from 36 ha and gets 125 kg per ha nitrogen in early April, usually as a silage compound fertilizer. This is normally cut during the third week of May and immediately 32 ha receives 100 kg/ha nitrogen for a second cut in early July. About 16 ha is reserved for third cut in mid August and also receives 100 kg/ha nitrogen. Grass is cut with a Vicon Doublet mower and is followed by a short wilt, then picked up with a New Holland 717 forage harvester behind a Ford 7610 four wheel drive tractor. No rowing up is done to avoid soil contamination and additive is applied to all cuts at the full rate. The pit is filled with a Ford 5000 four wheel drive tractor using a fore-end loader and attention is paid to compacting the grass as much as possible. There are four pits giving a total capacity of 1100 tonnes. Particular attention is paid to sheeting, side sheets being used to cover the shoulders of the pit, and the main top sheet is weighed down with straw bales across the entire area of the pit.

Grazing grass receives an initial application of 75 kg per ha nitrogen and a further four to five applications to give a total of around 300 kg per ha nitrogen over the season. Most of the grassland receives an application of 28 m^3 slurry at some stage during the season.

It was particularly impressive to see a 15 year old ley being mown for third cut silage which was still predominantly perennial ryegrass, and had an almost total absence of weeds and weed grasses. Many of the leys at Dunrod were of similar age and all looked to be as productive as the day they were put down.

The Society extends its grateful thanks to Jim Clark and his sons for giving the members a chance to see the excellent level of management which is applied at Dunrod. Thanks also to Mrs. Clark for the superb spread she provided for members after the visit. - I.R. Fraser.

THE CENTRAL SCOTLAND GRASSLAND SOCIETY

SILAGE COMPETITION 1982-83

A meeting of the CSGS in the Stuart Hotel, East Kilbride on 13 January, 1983.

Judge Mr. David Marshall, High Lea Farm, Humbie, East Lothian.

The competition attracted 59 entries, this being the highest number since the competition started in 1979. The standard was also the highest (see Table 3) and 45% of the entries had a 'D' value in excess of 65%. The average 'D' value for the top nine silages was 68.6%. With less than 10 points separating these top nine entries, there was a strong competitive aspect to this year's competition.

The judge opened his remarks by commenting on the very high standard of the nine entries he had visited. When it came down to this level of the competition some of the aspects being judged probably assumed greater importance than they would in normal commercial practice; but nevertheless the competition should be striving to see silage makers achieve as high a standard as possible, not only in making and storing silage, but also in utilisation.

Growing the crop was where it all started and grass to be cut for silage had to receive adequate fertiliser. At least 120 kg of nitrogen per hectare should be applied for a first cut. Slurry should be applied as early as possible in the spring to minimise contamination and prevent poorly fermented silage.

Good sealing in the clamp was vitally important and particular attention should be paid to the shoulders as good consolidation close to the edge of a clamp was not always possible. The use of side sheets could eliminate a large proportion of this waste. Top sheets should always be weighed down, straw bales being very effective for roofed silos and old car tyres for outdoor clamps. Torn sheets particularly on outdoor clamps served no useful purpose at all.

Silage had to be palatable in order to achieve maximum intakes and this meant it had to have a good smell. There was little point in making high 'D' value silage if the fermentation was wrong and intakes were adversely affected. All the clamps smelt good and the silage was uniform, but where first and second cuts had been put in the same pit there was evidence of deterioration at the join. If at all possible cuts should be kept separate as it was undesirable to open the clamp once sealed.

Effluent control had generally been good and the judge felt that genuine effort had been made to prevent contamination of water courses. Control was particularly important for outdoor clamps, and effluent tanks had to be of sufficient size to cope with surface run off during the winter.

Handling efficiency was also important, both in preventing waste of silage and ensuring that adequate quantities were always available. In self-fed silos barrier control, absence of waste, and adequate length of feed face were the main features examined. One farmer had put a ring feeder in the self-feed area and took silage off the top of the clamp each day with a fore-loader to fill it. This effectively increased the feed width available and gave shy feeders easier access. In easy feed set-ups the method of taking silage out of the clamp, the amount of waste in feeding and ease of getting silage from clamp to feed area were the main features examined.

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Table 1. 1982/83 Silage Competition : Analyses and Marks.

Rank	Code	% DM	% CP	'D' Value	Ammonia N as % of total N	Marks/100
1	CL15	20.8	16.6	70.8	7.3	92.1
2	CL 1	29.6	13.0	69.1	8.6	88.7
3	CS25	24.8	11.7	70.3	10.3	88.2
4	CS10	26.1	16.8	67.3	9.2	86.5
5	CL44	23.2	15.9	68.7	11.1	86.1
6	CL 4	22.7	18.3	67.6	11.4	84.1
7	CL14	21.0	15.7	69.1	12.9	83.1
8	CP40	23.9	14.3	67.3	9.4	82.7
9	CP41	25.9	13.1	67.0	8.6	82.5
10=	CL 5	21.3	18.1	66.9	10.3	81.0
10=(T)	CL56	28.4	13.9	66.8	10.3	81.0
12	CL 2	30.9	13.0	65.4	9.4	80.9
13	CL34	21.1	14.7	67.4	10.0	80.0
14	CP42	22.1	18.3	65.6	10.3	78.6
15	CP18	28.3	14.2	65.2	9.7	77.1
16	CS31	28.1	14.2	65.3	10.9	76.2
17	CL37	25.6	14.9	65.2	11.5	76.0
18	CS20	24.6	13.1	65.6	10.7	75.8
19	CS45	22.3	13.1	66.1	10.3	75.4
20	CL 8	29.8	13.8	65.1	11.5	74.6
21	CS30	21.8	15.0	67.7	18.5	73.4
22	CP51	28.4	12.6	63.3	6.3	73.2
23	CA11	18.9	16.1	65.7	10.3	72.7
24	CS26	26.3	14.4	63.4	9.0	72.6
25	CS57	24.9	14.8	64.1	12.9	71.1
26	CP55	23.2	14.0	64.5	12.0	70.7
27=	CL32	20.5	15.1	66.1	15.7	70.2
27=	CL36	17.4	14.8	65.4	7.6	70.2
29	CP19	24.8	12.8	63.4	9.9	69.9
30	CL43	20.3	14.1	64.4	10.8	68.8
31	CL 9	26.9	12.4	62.8	10.8	67.0
32	CS54	32.9	11.0	62.8	9.6	66.8
33	CP49	23.0	15.1	63.1	12.9	66.5
34	CL16	20.7	17.6	62.2	10.8	66.1
35	CS17	24.1	14.6	62.4	12.8	65.1
36	CL38	21.9	14.4	64.1	15.7	64.9
37	CS21	21.3	11.7	63.0	9.4	64.6
38	CP50	28.6	17.9	60.8	12.9	64.4
39	CL23	19.1	20.0	66.5	23.4	64.3
40	CL35	20.5	11.8	62.6	9.6	62.5
41	CS58	25.1	15.2	60.0	9.8	62.4
42	CL29	23.6	15.5	60.0	9.9	61.2
43	CL 3	20.7	17.3	63.8	20.5	60.7
44 (T)	CL 7	30.1	11.7	60.0	8.2	60.5
45	CS52	24.5	13.5	63.9	21.3	60.4
46	CL39	19.3	14.1	63.2	14.4	59.9
47	CL33	18.8	14.9	63.3	15.7	58.7
48	CS53	26.0	12.6	63.0	21.0	57.6
49	CL27	23.2	12.2	60.5	11.7	57.2
50	CA13	27.9	15.1	60.0	17.6	54.5
51	CL22	21.8	11.3	58.3	9.7	50.3
52 (T)	CL 6	39.7	11.1	57.4	11.7	48.6
53	CS59	21.3	16.5	59.9	26.6	42.9

Table 1 continued

Rank	Code	% DM	% CP	'D' Value	Ammonia N as % of total N	Marks/100
54	CA12	18.6	15.7	56.8	14.9	40.4
55	CL24	15.4	25.9	63.1	41.7	39.3
56	CP47	24.4	16.4	53.8	24.4	33.4
57	CL28	19.2	17.0	58.0	28.9	32.5
58	CL46	20.7	12.8	53.6	19.4	31.1
59	CP48	23.3	17.7	55.2	31.8	28.6

In summing up, the judge said he had been presented with a difficult task, with less than 10 points in the analysis markings between first and ninth silages. First prize went to Mr. A. Bankier, Fernieshaw, Cleland; second prize to Mr. J. Clark, Dunrod, Inverkip; third prize to Mr. W. Millar, Newlands, Uddingston; and fourth prize to Mr. T. Wilson, Bishopbrae, Bathgate. The judge then thanked all the competitors, particularly those whose farms he had the pleasure of visiting.

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

Awards	Farm	Analysis (100)	Inspection (75)	Total (175)
1st and Trophy	Mr A Bankier, Fernieshaw, Cleland.	92.1	67	159.1
4th	Messrs T & B Wilson, Bishopbrae, Bathgate.	88.7	60	148.7
	Mr H Gray, Aitkenlea Dairy, Slamannan Road, Falkirk.	88.2	30	118.2
	Mr A Orr, Boagstown, Avonbridge.	86.5	58	144.5
3rd	Mr W Millar, Newlands, Uddingston.	86.1	63.5	149.6
	Mr A Smith, Hazeldean, Stonehouse.	84.1	46	130.1
	Mr W K Carruthers, Netherton, Auchenheath, Lanark.	83.1	48	131.1
2nd	Mr J Clark, Dunrod, Inverkip	82.7	71	153.7

Other prizes (by analysis only)

Best New Entrant: Mr H Gray, Aitkenlea Dairy, Slamannan Road, Falkirk.
Most Improved Silage: Messrs T & B Wilson, Bishopbrae, Bathgate.

Table 3. Average analyses for silages competitions 1979-82.

Year	Numbers entered	% DM	% Crude protein	'D' Value	Ammonia N as % total N	'D' Value (Top 9)
1979	33	20.8	17.0	61.8	18.9	65.1
1980	37	21.6	15.7	61.3	16.3	64.7
1981	53	22.6	13.8	60.1	14.0	63.7
1982	59	26.6	14.6	63.6	13.6	68.6

WHY FORAGE MEANS MONEY TO ME

David Marshall

High Lea Farm, Humbie, East Lothian

A meeting of the CSGS in the Stuart Hotel, East Kilbride, 13 January, 1983.

Following the judging of the silage competition, David Marshall outlined his philosophy on forage. He was then joined by a panel comprising of Mr. Sandy Bankier, silage competition winner, Mr. Hugh Gray, best new entrant in the competition and Mr. Tom Wilson, winner of the most improved silage award.

In speaking of his farm Mr. Marshall said that High Lea rose to 150 m above sea level and extended to some 120 hectares, all of which were ploughable. At the time of taking the farm over it had all been down to grass and at that time the rent could be justified with livestock enterprises. Initially the plan had been to grow barley and keep Greyface ewes and rear in-calf heifers. However the ewes had a fairly short life and were put off the farm over 10 years ago. The economics of the in-calf heifers had also become more doubtful, and it was gradually replaced by an 18 month beef system. Calves were bought in during the autumn and initially the system depended on hay and barley to winter them, although a move had now been made to silage. Calves were turned out to intensively grazed grass during the summer.

In 1974 the bottom fell out of the beef market and the value of calves coming off grass in the autumn was little more than their value when put to the grass in spring. As a result another review of policy had taken place, and from then on it was decided to purchase stores in the autumn (at around 300 kg) and to keep these through the winter on silage and a minimum quantity of barley, to sell again in the spring at 400-450 kg as forward stores.

High Lea is basically a heavy land farm, originally drained by 5 cm tiles which have gradually silted up. Because of the nature of the soil it was decided to plough as often as possible and only keep enough stock to maintain the fertility levels for growing barley. The result is now that 96 hectares of barley are grown of which 28 hectares is in winter barley, 12 hectares of potatoes and 12 hectares of grass all of which is made into silage. To achieve the maximum liveweight gain, silage has to be of good quality, but this has to be balanced against getting sufficient quantity and the aim is to keep 100+ bullocks through the winter. Therefore the aim is to make 62-64 'D' value silage which means cutting in the first week of June. The fertilizer for first cut is put on during the last week of March and is normally 155 kg per hectare nitrogen with 75 kg each of P_2O_5 and K_2O. An additive is not used unless conditions are poor. The aim is to wilt to over 25% dry matter, but consideration is now being given to direct cutting.

After second cut silage this year 50 kg per hectare of nitrogen was applied to the aftermaths which produced a tremendous flush of growth. Cattle were turned out to graze in August and in five weeks grazing had gained 40 kg, representing £44 in money value for an input of under £8 for nitrogen. Normally swards are down for four years and are perennial ryegrass based.

Barley prices are good at present but things tend to go in cycles and in the future it may be necessary to move back to more of a livestock based system of production. The present system is flexible enough to allow this and is the main reason for not going into an all barley system. If on the other hand the cattle enterprise goes wrong, it is something which can be discontinued in a fairly short period of time. The important thing at the present time is to keep the system flexible.

Discussion

Mr. Marshall was joined by Messrs. A. Bankier, H. Gray and T. Wilson for the discussion.

Do members of the panel save on concentrate feeding by making top quality silage?

Mr. Bankier aimed to take maintenance and 14 litres from silage and 4.5 kg per head of mineralised barley. Above this level of production an 18% crude protein cake was fed at 0.35 kg per litre. Total consumption of barley and concentrates was just over one tonne per cow per year for a yield of 5000 litres per cow. Currently there were 102 cows milking and since the beginning of the winter had consumed 0.64 t of barley and concentrate per head. Because there were more cows in the herd this year total milk yield was up 18% and this represented an increase of 12% per cow. This was due in part at least to the newly installed out of parlour feeding system, and also due to higher quality silage made in 1982.

Normally 40 hectares were taken for first cut silage to make 650-700 tonnes.

Mr. Wilson wanted maintenance + 9 litres from silage and currently for a yield of 5900 litres per cow he fed just under one tonne per cow of concentrates. Overall stocking rate was 2.78 cows per hectare.

Mr. Gray fed as little concentrate as possible and was currently aiming for a yield of 5000 litres per cow on 460 kg of concentrates. Last year he had achieved this milk yield on 865 kg of concentrates per cow. The herd was still being built up and last year averaged 250 cows which included 100 heifers. The cows were block calved in January and February and high quality silage definitely had an effect on performance.

Mr. Marshall said that with fattening cattle silage quality had a very pronounced effect on the concentrate input. If possible he wintered his cattle on silage and 2-3 kg per head of brock potatoes. If he started feeding barley this drastically reduced his margin. Even feeding 1 kg of barley per head per day could cost him £30 over the winter period which represented 25% of his output.

Would Mr. Bankier not be better feeding dairy cake than barley?

Mr. Bankier said he liked to grow barley because it suited the farm, and it also kept his options open. If there was no barley, the alternative would be growing more grass, and this would require stock to utilise it. There would then be a requirement for a large amount of additional capital.

Dr. John Frame commented on the discussion about achieving more output from grassland, and trying to measure this in more definitive terms. There was a need for a common denominator in measuring grassland output and UME (utilised metabolisable energy) provided one such successful measure. Whilst output from other crops could be directly measured, in grassland it was necessary to take account of the utilisation of the crop through the animal. In the UME system the total energy requirement of the animal is measured in terms of maintenance and production. The energy input from feeds other than grass, e.g. cereals, concentrates, are determined and the difference between the animal's total energy requirement and the energy input derived from sources other than grass is attributed to grassland output.

What single factor did the panel feel was most important in making top quality silage?

Mr. Wilson felt good weather was probably most important - unfortunately he hadn't much control over it! Speed of cutting, chopping and carting was also critical, and once cut, grass needed to be put into the pit as quickly as possible and sealed immediately. He did not use an additive and had been satisfied with the quality of silage made. The cows were the ultimate judges of quality. He always cut silage on or about 29th May.

Mr. Bankier always cut on or as near to 27th May as possible and speed was essential. Nothing should be allowed to interfere with the operation. Sheeting the pit and putting bales on the top of it as quickly as possible were also very important to ensure minimum wastage.

Mr. Gray also said speed was essential, and working as long a day as possible was necessary to ensure quality.

Mr. Marshall felt early cutting and speed to be the main determinants of success.

What grass seeds mixture did the panel use for growing silage and was a ley down for 8 years or longer suitable for quality silage? Were the same fields always cut for silage and were the same fields used for first and second cut?

Mr. Bankier liked to cut the same fields year after year and cut them for both cuts. Some aftermaths were grazed if a third cut was not taken. Some of his fields had been down for 15 years and leys were only ploughed when necessary. He used SAI HF 11 and PD mixtures going for long term leys as these seem to stand up to the cutting regime reasonably well.

Mr. Marshall tended to work with shorter term leys, only because they fitted his rotation. Generally grass was down three or four years. However in his earlier days at High Lea when grass was down for much longer he felt he achieved better production from these long term leys. With proper management the useful life of a ley should be more than 8 years.

Mr. Gray explained that all his cows grazed one farm and he silaged the other farm. He used SAI HF 7 and HF 11 mixtures and was generally satisfied with them, although they were slow to start in spring. He had tried some pure stands of Augusta which was a very leafy grass and had been quite winter hardy. He was now sowing it along with perennial ryegrass to offer more protection and get at least three years from it.

Mr. Wilson's silage fields averaged about five years although he didn't plough unless it was necessary. Silage fields tended to be solely for that purpose, although aftermaths were grazed by young stock.

How much fertilizer do panel members apply for silage and do they use T sum to indicate timing of first application?

Dr. Frame explained that T sum was used to decide when nitrogen should be applied, as the current rules of thumb tended to be 10-14 days too late. The concept originated in Holland and T sum is calculated by summing the mean daily maximum and minimum air temperatures (excluding negative values) from 1st January and applying nitrogen when the sum reaches 200° C. Because air temperatures tend to be higher in Scotland than on the continent, 200° C in Scotland can be reached as early as mid-February. Consequently another method is being examined and soil temperature at 10 cm depth is being measured from 1st February and positive daily values summed to reach 100° C. On average over the last twelve years this has occurred 16 days after the Dutch T value has reached 200° C.

Mr. Gray thought T sums were probably useful, but hadn't as yet used them. Land condition largely governed when he first applied fertilizer. For grazing he applied 75 kg per hectare straight nitrogen starting in March, and this application was repeated in April, May and June. After this compound was applied to give a total of around 415 kg nitrogen per hectare. For each silage cut 125 kg nitrogen was applied, the first application being in early April. For each kg of nitrogen applied, two thirds of a kg of potash was applied and phosphate was applied according to analysis.

Mr. Bankier applied his silage fertilizer 8 weeks before cutting. The first cut is given 500 kg per hectare of a silage compound fertilizer plus 180 kg straight nitrogenous fertilizer. The second cut receives a similar quantity of compound plus 125 kg of nitrogenous fertilizer.

Mr. Wilson applies 110-125 kg per hectare of straight nitrogen about the end of March for first cut silage, as long as the silage ground has received slurry. Grazing ground receives 75 kg per hectare of straight nitrogen in early March, and a similar quantity again at the end of March. A 29:5:5 compound is then used to give a total of 375 kg per hectare over the season. Second cut silage is slurried and given around 100 kg per hectare of straight nitrogen.

Mr. Marshall gives his first cut silage 150 kg per hectare nitrogen by the end of March, and for second cut applies 100 kg nitrogen, both applications as a compound. The aftermaths receive 50 kg per hectare straight nitrogen.

How do the panel manage autumn grazing?

Mr. Wilson felt that autumn grazing was under-valued, and there was still a lot in it. Last autumn his cows had dropped in yield because they were brought in early. In most years he felt the grazing didn't last long enough.

Mr. Marshall normally has his second cut of silage off by 10th August. He then applied fertilizer and the aftermaths were grazed with cattle until late September. Thereafter it was let for sheep.

Most of Mr. Gray's cows were nearing the end of lactation and he felt he could make full use of autumn grass. Dry cows utilised all silage aftermaths until mid November, and whilst poaching could be a problem he always tried to ensure that the surface mat of the sward was not severely damaged. Cows came into the house in good condition and went on to silage without any supplementation.

Mr. Bankier tended not to have much aftermath grazing as he generally made third cuts of silage.

When do panel members like to see sheep off?

Mr. Marshall replied mid December whilst Mr. Wilson said the end of January, and Mr. Bankier tried to get them off by the end of March. Mr. Gray didn't have the problem of sheep!

Do members of the panel use side sheets?

Mr. Marshall replied that he hadn't done so up to now, but had learnt the error of his ways and would do so in the future. He always tried to keep the settled silage depths below the level of the clamp walls in order to reduce shoulder waste.

Mr. Bankier had built up the walls of his silage pit this year in an attempt to reduce shoulder waste. He felt side sheets were fine if you wanted to win silage competitions but questioned whether they were really justified.

Mr. Wilson was convinced of their value, as was Mr. Gray. Mr. Gray did not like the idea of carting in quality grass and taking it out as compost. The shoulders of the pit were most vulnerable as they were difficult to consolidate at filling, particularly where settled silage depth was above the level of the walls. In this situation side sheets were invaluable. - I.R. Fraser.

SCIENCE INTO PRACTICE FOR PROFITABLE GRASSLAND MANAGEMENT

Dr. W. Stewart Jamieson

Kirkland, Thornhill, Dumfries

A meeting of the CSGS in the Royal Hotel, Bridge of Allan, 23 February, 1983.

To turn grass into money stock have to eat it. Thus utilisation of the grass crop is just as important as growing it. It was along this theme that the speaker outlined his philosophy on the grass crop and how he puts this concept into practice.

Most of our knowledge of the factors affecting profitable grassland management have been known for some considerable time and success is dependent on being able to apply the known techniques. Getting the most out of grass means integrating all the little pieces of information and lessons learned from experimental work, and to build these up into the complete system which will work on a farm scale.

Work at Grassland Research Institute

During three and a half years at the Grassland Research Institute (GRI) at Hurley the speaker's main project was grazing behaviour and how it affected herbage intakes. The results are summarised in the following Table.

Table 1. Grazing activities of Friesian calves.

	Average	Maximum
Hours grazing	7-10	11
Bites per minute	45-60	70
Bite size (g)	300-500	1000
Bites per day	25000-30000	35000
Intake of Dry Matter (kg)	14-16	20

However the most important factor affecting intake was the digestibility of the pasture on offer. It was found that cattle grazed for a maximum of about 11 hours per day; with sheep it was nearer 12 hours, and that little grazing took place at night. It was also shown that herbage could be grazed down to 8 cm length without significantly affecting animal performance. Where herbage was grazed down to this sort of length, stock tended to vary their grazing behaviour, and were thus forced to eat short herbage. This gives us some important indicators as far as stocking rate is concerned. Maximum output occurs when individual performance is suppressed, e.g. milk yield or liveweight gain.

We probably worry too much about individual animal performance and do not look at the wider implications of output per area of land. We should therefore have more courage to push up stocking rates. In some work which was done at GRI the maximum herbage intake of a group of lambs occurred when they had three times the available pasture that they required. When this was reduced to just one and a half times their requirement, performance (growth rate) only fell by 10%.

Herbage intake also varies with season of grazing. In a trial comparing intakes on spring and autumn grass with calves, intake on spring grass was 16% higher than with autumn grass for the same herbage availability. Because grass also grows faster in spring, total production was some 50% greater than in the autumn.

Nitrogen availability is one of the main factors affecting the rate of grass growth. It is still economic to apply up to 400 kg/ha nitrogen despite increases in price in recent years. There is a straight line response up to about 300 kg and thereafter the response tends to tail off. Cost per unit of dry matter from grass is about 25% of that from dairy cake and even in silage where there are dry matter losses, the cost is still only 50% of that of proprietary compounds.

Therefore the most important factors in managing grass to achieve maximum output and profitability are the supply of nitrogen, the availability of grass, the digestibility of the grass on offer, the season of growth, and overall stocking rate.

The Farms

Armed with this information Dr. Jamieson returned home in 1975 to take up farming at Kirkland with his father. The farm sits in the Nith Valley and is farmed with the adjoining unit of Rosehill. Extending to 182 ha, about 70 ha are flat alluvial soil on gravel which is liable to flood in winter. The rest of the farm is a gravelly loam which can burn up in a dry summer. The farms are run as one unit with the exception of the two dairy herds. Most of the silage is made at Rosehill and is carted to Kirkland daily during the winter. Twenty-six to thirty ha of barley are grown and the rest of the farm is down to grass. A total of 580-600 head of stock, equivalent to about 390 livestock units are carried on the 160 ha of grass, giving a stocking rate close to the target of 2.5 livestock units per forage ha. There are 252 cows in the two herds, with all calves being kept, the bullocks being sold as stores at 250-300 kg.

Buildings

At Kirkland there is an easy feed cubicle shed for 116 dairy cows and a slatted floor shed for 135 youngstock. There is also a general purpose hayshed which houses 60 stirks.

At Rosehill there is an easy feed cubicle shed for 140. The old byres have been converted into calf rearing accommodation and a cubicle house for in calf heifers. This enables the heifers to be trained in cubicles before calving as they spend at least one winter on the slats. All silage is stored at Rosehill in earth walled bunkers to which sleeper sides have been added.

The Dairy Herds

Cows calve all the year round, except in the period from mid August to end of September. It is felt that this period when changing back from grass to silage is too difficult a time to manage a group of newly calved cows and therefore it is best not to have them calving at this time. The majority of cows calve in the January to March period and this enables maximum advantage to be taken of early turn-out time - normally 12 to 16th April. Cows usually rise 10-12% in milk yield, and with a decrease in cake usage, every day earlier the cows can be turned out in spring is equivalent to an increase in margin over concentrates per cow of £1.20 (herd £270/day). It is therefore worth the risk of applying early nitrogen.

Cows giving less than 20 litres at time of turnout are fed no concentrates at grass at all. For cows giving about this at turnout a flat rate of concentrate according to yield is given, and it is reckoned that the decline in grass quality is compensated for by the decrease in milk yield. A maximum of 7 kg of concentrates is fed at grass, and this only to cows calving in the June/July period.

It is vital to stock cows tightly during the early part of the grazing season and in doing this there is then no problem from rank clumpy undergrazed grass. This means that more area can be shut up for first cut silage which is always more valuable.

One hundred and thirty cows at Rosehill graze 25 ha and 104 cows at Kirkland graze 23.5 ha.

The grazing system is less important than stocking rate. At Rosehill cows are set stocked and this system has the major advantage of being simple. At Kirkland there are two day fields and two night fields and cows spend an average of 5 days in each. This means that they are into a new flush of grass every 2-3 days and it is important not to change day and night fields at the same time.

In winter cows are split into high yielders, low yielders and dry cows. The high yielders receive a flat rate of concentrates up to 11 kg per day. The flat rate system works well with good quality *ad lib* silage, but it is not the system to produce very high individual cow yields. The high yielders also receive a feed of dried grass in the middle of the day which helps to increase silage consumption. It is also a good source of high quality protein because of the heat treatment. Low yielders are fed according to yield and dry cows are fed *ad lib* silage and 1 kg per day of mineralised barley.

Table 2. Summary performance of dairy herds 1981-82.

	Total	Kirkland	Rosehill
Numbers of cows	248	113	115
Milk sold per cow (litres)	5785	5578	5992
Butterfat (%)	3.94	4.02	3.85
Concentrates fed per cow (tonnes)	1.87	1.81	1.92
Concentrate costs per cow (£)	230	220	240
Margin over concentrates (£)	611	585	637
Calving index	367	370	363
Cows sold	61(14)*	39 (8)*	22 (6)*
Hectares used by cows	106.1		

* Figures in brackets indicate cows sold with fertility problems.

Youngstock

There has been a conscious effort to improve the efficiency of the heifer rearing enterprise by trying to calve them down at a younger age. Because of all-year-round calving the decision did not involve a straight choice between 2 year or 3 year old calving and gradually over the last six years the average age has been reduced.

Table 3. Heifer age at first calving.

Year	Age	Yield	Calving Index
1977	2 Years 11½ months	4104	361
1978	2 Years 11 months	4210	370
1979	2 Years 10 months	4628	363
1980	2 Years 6½ months	4705	369
1981	2 Years 4 months	5157	366
1982	2 Years 3½ months	5065	-

Improved growth rates have come from feeding a lot more silage during the winter. Some heifers are still outwintered with the remainder on slats. They receive a supplement of 2 kg of barley meal.

After treating the young calves with Dictol, the youngstock are grazed on a leader/follower system with bulling heifers following young calves in a four paddock system. The decision when to move is made when the followers have insufficient grass. Last year 55 leaders and 57 followers grazed 10 ha and the cattle are kept particularly tight in spring to allow maximum quantities of first cut silage to be made.

One problem which has arisen is a shortage of cobalt in the pasture and in 1980 and 1981 a comparative trial was carried out in conjunction with Dr. A. McPherson of the West College looking at the effect on growth rate of supplementing the cattle with cobalt. The cobalt was offered in the drinking water.

Table 4. Growth rates for treated and untreated youngstock (kg/day).

	Control	Cobalt Supplement	Improvement (%)
1980	0.78	0.85	9.0
1981	0.86	0.95	10.5

However in both years there was no effect of a copper injection supplementation. Now as a matter of routine all youngstock pasture will be sprayed with cobalt sulphate costing about £12/ha for a three year treatment.

Fertilizer

Average nitrogen fertilizer applied to all the grassland is around 300 kg per ha which is still below the optimum level for maximum economic yield. However slurry is also used which adds another 30-40 kg per ha of nitrogen.

For grazing the first application is 90 kg per ha straight nitrogen, normally split in two dressings giving 45 kg/ha as soon as soil temperature indicates a rise. Normally first application is around March 10th.

Silage ground normally receives a dressing of 375 kg/ha of a 20:10:10 compound and straight nitrogen to give a total of 140 kg per ha nitrogen. All silage ground receives slurry twice between Christmas and spring, with the pre Christmas slurry application also going on the grazing ground.

Silage is cut around 25th-26th May aiming for 67 'D' value. No significant wilting is carried out as wilting has never been shown to benefit milk yield and Add F is applied to all silage at the recommended rate. Fifty-seven ha are taken for first cut and 52 ha for second cut. Six ha are cut for hay.

The idea is to keep the farming system as simple as possible, but nothing is ever as simple as it looks, and there is much truth in the saying that no problem looked at in the right way doesn't become more complicated. Perhaps our attitude to grass could be summarised as

Good Results Acknowledge Simple Science

Discussion

Particular interest was shown in the types of grasses grown and the speaker said that in his system he didn't feel that clover had a very important role to play. He was committed to a high nitrogen system for high stocking rates. The grazing and silage areas are kept separate and therefore it is possible to sow separate grazing and cutting mixtures. Because of the large area to be cut for silage, mixtures with two different heading dates are sown with about seven days difference between them. In the past silage mixtures have been 28 kg/ha perennial ryegrass and 6 kg/ha timothy. Recently mixtures containing hybrid ryegrasses have been used because of their higher productivity and mixtures containing 50% hybrid ryegrass and 50% perennial ryegrass have been sown. The results so far have been encouraging and persistency seems satisfactory with one sward having been down for three years. The only drawback appears to be the higher moisture content of the hybrid grasses.

Swards are down for an average of five years, although some were now coming into their seventh season.

The speaker felt that high nitrogen application did not affect the palatability of the grazing sward, but cows seldom had any option but to eat it. It was always noticeable that road verges and areas not subject to intensive management techniques were frequently grazed by cattle so there could be something in this grass, but it was difficult to say what.

Individual cow yields would probably be higher if the system was less intensive but the aim was most definitely to go for maximum output per area of land. Whilst this required a higher capital investment in stock, they usually grew into money. Once it was felt that optimum stocking rates had been achieved then it might pay to look more closely at individual performance.

Rainfall was 1125 mm and this therefore made silage wilting difficult. Over the last three years silage dry matter had averaged 18%, although last year with more or less perfect weather when first cut silage was made in 12 days, dry matter averaged 23.5%. In making this low dry matter silage it was necessary to have an effluent tank large enough to take the maximum daily flow, and it was very necessary to keep emptying it to prevent overflow.

All-the-year round calving was perhaps more complicated than batch calving, but because cubicle accommodation was limited to 130 at Rosehill, all-the-year round calving actually allowed an average herd size of 140. It was also always gratifying to see milk in the bulk tank all-the-year round, and the work load throughout the year was more evenly spread. Limited facilities such as calving boxes could more fully be utilised. A good calving index was achieved by being able to spot cows bulling quickly and accurately. With the emphasis tending towards spring calving nature also played its part.

The farm could probably carry more cows - in theory 450 on 182 ha, but the management problems would be infinitely more complex and the logistics of such an operation somewhat daunting, not to mention the capital investment required. The aim was to keep the system simple and to become involved in some of the physical work, rather than managing all the time.

It had never been proved that cows on an intensive management system had a shorter herd life and culling from the herd did not appear to be higher than from less intensively managed herds. High culling at Kirkland had occurred because it had traditionally had a lower genetic potential and more strenuous efforts were being made to improve it.

Holsteins, it was felt, would not fit the system as well as Friesians. There would be problems about what to do with calves, and there was no desire to go into bull beef because it was not a grass based system.

Swards had to be dense when grazed down to 8 cm. On more open swards grazing to 10 cm would probably be more appropriate. The aim should be around 2500 kg/ha of available herbage dry matter.

It was not felt that the inclusion of clovers would increase cobalt levels in the pasture as the deficiency was the soil. There was trouble maintaining clover in the swards as it tended not to survive competition from other grasses in a high nitrogen regime. Spraying cobalt sulphate on to the pastures was reckoned to be the most cost effective way. It could be added to the water supply but the equipment cost £500 to £600 per water trough. The effectiveness of cobalt bullets tended to wear off during the season and they could not always be relied upon to meet animals' daily requirements. - I.R. Fraser.

WINTERING SUCKLER COWS

Dr. Peter J. Broadbent

The North of Scotland College of Agriculture, Aberdeen

A joint meeting of the SWSGS and the Farm Management Association at Lochview Hotel, Crocketford, 10 February, 1983.

The North College programme to study the effects of shelter on the well-being of suckler cows had taken two years to set up and then was run for five years. All aspects of shelter and animals were studied and it must not be overlooked that what happens currently may have been the consequence of what happened of six or even twelve months earlier.

The breeding management of the suckler cows at Aberdeen is as follows:

	Serve	Method	Sire	Calve
Heifers	Nov/Dec	Natural	AA	Aug/Sept
1st calvers	21 Nov/Jan	Syn AI/natural	Lincoln Red	Sept/Oct
Cows	21 Nov/Jan	Syn AI	Lincoln Red	Sept/Oct

Each group is held separately and weaning is in May before going to grass. The experiment used second calvers and they remained on their experimental treatment until culled. The grazing and feeding managements of the sucklers was as follows:

	Summer	Diet	Winter	Site
Heifers	Graze	Mixed	Group	Out/In
1st calvers	Hill	Mixed	Group	Out
Cows	Grazing	Trial rations	Individual	Various

The Trial

The study was specifically to look at the response of cow genotypes to winter environment and winter nutrition. Practical extremes of environment, cow type and winter nutrition (October to May) were selected. All calves had shelter from the wind if not housed. The experimental treatments were:

Factor	Levels	Description
Sites	4	Slatted house Slatted pad - exposed Sheltered field Exposed field
Breed	2	Blue Grey Hereford/Friesian
Nutrition	2	80 MJ ME per day (= M + 4 kg) 120 MJ ME per day (= M + 10-12 kg)

The 64 cows were individually fed and milk production peaked at 8 to 14 kg/day, so some were under and others overfed. A flat rate ration was offered throughout the whole winter rather than stepped feeding.

The Rations

All cows received daily 0.5 kg soya meal with a mineral, trace element, and vitamen supplement plus either 3.5 kg (80 MJ ME) or 9.0 kg (120 MJ ME) cubes and barley straw *ad libitum*. The cubes contained 30% sodium hydroxide treated straw. Straw consumption averaged 6.2 kg and 4.7 kg dry matter per day on the low and high ME rations respectively.

The Results

The results indicate no differences in response to shelter by both breeds or both winter feeding levels, that is, there were no interactions. The table below summarises the results for five years.

Table 1. Production from four systems of wintering suckler cows averaged over breeds and levels of nutrition (average 1977-1982).

	Slatted house	Slatted pad	Sheltered field	Exposed field
Calving date (Sept)	7	10	13	12
LW at calving (kg)	588	578	604	594
Straw DMI (kg)	5.6	5.3	5.3	5.7
LW at housing (kg)	599	586	609	603
Minimum wt (kg)	562	535	552	549
LW at late April (kg)	587	553	569	568
Calves				
LW at birth (kg)	38	38	38	38
LW at weaning (kg)	264	248	240	241
LW at Sept (kg)	342	334	339	336

The cows were large because being weaned in May they put on a lot of weight over the summer. The cows in the sheltered paddocks went off to lie down out of the wind but those in the no-shelter group stayed at the feed stands and were tempted to nibble at more feed. The housed cattle showed quite a lot of activity at night.

From Table 1 can be seen that the housing treatment had no effect on birth weight, a small effect at weaning but none by the time the calves reached the yearling stage.

The data in the table are meaned over the two levels of ME on offer and so are equivalent to 100 MJ ME per day. This is quite a high level of feeding for a suckler cow. A lower feeding level, more in keeping with commercial practice, may have shown somewhat greater differences between winter treatments but would not have altered the main conclusions.

Summary

1. Benefit to cows from shelter is small. At most benefit is worth 0.6 kg barley per day on average during the winter at Craibstone. The benefit does not justify the cost of a house. There will be odd days when the cow would benefit from shelter but not on average over the winter.

2. Confinement without shelter may be justified, for example, to prevent poaching or for ease of management. Wintering sites should have good facilities for feeding, water and handling and provide a dry lying area. These factors are of more importance than shelter. Water is particularly important and for out-wintered groups a thermostatically heated water trough may be required to prevent freezing.

Discussion

Needless to say Dr. Broadbent's talk was a precursor to our vigorous and interesting discussion session.

There were no differences in cow fertility among the groups. 70% conception was achieved at first synchronous AI and to each following insemination. 95% held to first and second service. The cow condition score at the start of the winter was 3+. The score is independent from size of cow. Had the score dropped to 2 by the end of the winter, there may have been a different result due to a lower insulating value. However, this would also mean a lower body weight and loss of thermal ability would be offset by a lower maintenance requirement. Cows on a high energy intake are not likely to be cold. Flat rate feeding was used to make it experimentally simple. With 64 cows spread over 16 treatments, decisions of when to change would have been more difficult. The flat rate system proved to be very successful and is desirable because of its practical simplicity.

The same field area was used each year and was badly poached. The area was harrowed level and broadcast with Westerwolds ryegrass and dressed with nitrogen. By July some grazing was available but probably it did not pay, so in reality the production from this area was lost.

The choice of a Lincoln Red bull was a compromise. With the cows involved, a Hereford would have given a two way cross on one group and a three way on the other. With the Charolais there was some concern about calving difficultues and with 64 cows it was important that none were lost. Originally natural service was to be used and this is frequently the key to success with suckler cows. However the trial would have needed four bulls and this would have led to confounding of the winter site with the bull used. So the decision was to use one Lincoln Red bull and use AI. Dr. Broadbent then went on to tell the audience about MABEL, a thermal analogue of a suckler cow. This comprises an insulated steel drum covered by cow hide. Inside there is a heating element to simulate body head and other equipment for climatic monitoring. Recently a 'mini-mabel' had been constructed to use in far-off sites. The climatic energ demand (CED) can be computed for the winter period using these pieces of equipment. Generally rainfall is of less importance than temperature. - R.D. Harkess.

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SWSGS SILAGE AND HAY COMPETITION 1982-83

A meeting of the SWSGS at the Galloway Arms Hotel, Newton Stewart, 13 January, 1983.

SILAGE COMPETITION

Judge: David McCluskey, Lea Farm, Roslin, Midlothian.
Winner of the 1981-82 Scottish Region Silage Trophy and runner-up in the BGS National Silage Competition.

Judge's Remarks

The number of entries for this year's competition was a record for the Society, 46 in the open class and 23 in the beef/sheep class. This clearly demonstrates the importance of and the interest in silage making in south west Scotland. The judge remarked that there is an 'awful lot of grass in the south west' and he had not seen a ploughed field which was particularly striking to an east coast farmer. Although a dairy farmer himself, the judge had enjoyed the opportunity to visit both dairy and beef/sheep entries in this year's short list. Unfortunately four silages were not available for inspection but nonetheless the visit and look around these farms was equally enjoyable.

The judge commented that on the whole, the use of the plastic sheet was being very well done although side sheeting could be used to some advantage in several silos. He felt that silage feeding was not being taken to its maximum in some places where a little too much cake was being fed despite the high quality silage. A lot of emphasis was placed in calving index with a target of 365 days in many minds. The judge was quite happy to give the cow an extra month if she had milked well and would benefit from a longer rest interval. One entry in the form of Agbag silage was most interesting. The silage was of very good quality and had a very pleasant smell. However, certain basic precautions must be adhered to when using exposed plastic in this manner. The "sausage" must be protected from stock and/or vermin damage and must be so sited that access and extraction of the silage is straightforward. This, of course, would also apply to big bale silage stores as well. The judge felt that careful costings should be considered before embarking on the use of 'plastic silos' since in the long term certain more conventional silos may be more suitable. One novel item to the judge was silage being fed to calves at a few days old and he resolved to try likewise at Lea Farm when he returned home. Before announcing the winners the judge thanked the Society for its warm hospitality and the interesting three days in south west Scotland.

The inspection marks awarded by the judge are given in Table 2. The overall first prize and trophy was won by Mr. M. Milligan of Culvennan. Runner-up in the open section was Mr. J. Magnay of Gadgillfoot and third was Mr. A. Irving of Largs. The winner of the beef/sheep section was Mr. W. Glover of Hall of Barnweill and runner-up was Mr. J. Biggar of Grange. The judge awarded the Michael Milligan prize to Dr. S. Jamieson of Kirkland. Plasti-Covers Ltd., Irvine donated vouchers to the winners and to the best placed big bale entry, Mr. R. Clark of Fineview, Glenluce.

Table 1. 1982/83 Silage Competition: Analyses and Marks.

Rank	Code	% DM	% CP	D Value	ME†	Ammonia N as % total N	Marks/85
1Ag	DS 7	24.3	20.8	68.3	10.9	7.4	78.5
2	DS13	24.2	16.7	71.7	11.5	9.6	78.3
3	KS13	25.2	15.5	67.7	10.8	7.3	75.6
4	KS24	19.5	18.1	71.7	11.5	8.9	75.1
5	KS 1	21.3	16.6	69.7	11.1	9.6	74.7
6	AS 3	20.2	16.9	68.7	11.0	9.0	72.5
7	KS 9	23.3	14.2	68.1	10.9	8.8	71.9
8	DS 1	22.3	13.4	68.5	11.0	7.9	71.8
9	DS 4	20.1	12.9	68.5	11.0	6.0	71.0
10	DS14	23.8	18.3	65.8	10.5	9.6	70.8
11	KS17	21.4	18.3	66.5	10.6	8.7	70.7
12	KS10	22.5	14.1	67.5	10.8	8.6	70.0
13)T	AS 9	37.3	18.6	65.0	10.4	11.2	68.8
13)	DS 6	20.6	14.0	68.2	10.9	9.2	68.8
15	AS13	24.2	15.5	65.7	10.5	9.8	68.3
16*	AS10	22.7	16.4	65.6	10.5	9.1	68.2
17	AS 4	24.3	14.3	65.6	10.5	8.8	68.0
18	WS 3	25.5	15.8	66.1	10.6	12.5	67.5
19*	KS29	21.3	13.7	66.1	10.6	7.8	66.4
20	KS25	18.9	15.6	67.5	10.8	9.2	66.2
21	DS12	21.3	18.6	65.5	10.5	11.3	66.0
22	KS12	21.9	13.5	67.1	10.7	10.8	65.8
23)	KS 3	25.0	11.5	66.2	10.6	10.5	65.4
23)*	KS30	25.1	13.8	63.5	10.2	7.4	65.4
25*	KS33	23.7	17.2	63.4	10.1	9.4	65.3
26*	KS11	25.5	12.4	65.0	10.4	9.2	65.2
27)	KS27	22.5	14.2	65.1	10.4	9.1	64.8
27)*	KS28	34.8	13.2	63.2	10.1	6.8	64.8
29)*	KS 7	28.5	18.4	62.3	10.0	11.0	63.6
29)*	KS14	25.0	12.6	63.7	10.2	8.4	63.6
31)	KS 2	23.6	11.0	65.3	10.4	8.8	63.4
31)*	DS18	20.6	14.8	67.6	10.8	14.2	63.4
33	DS16	22.1	18.7	62.6	10.0	9.0	63.3
34*	KS22	22.2	14.0	64.1	10.3	8.4	63.0
35)*	KS19	23.0	11.9	65.2	10.4	9.6	62.7
35)	WS 4	35.3	15.5	61.9	9.9	8.6	62.7
37	AS 6	23.0	19.6	64.9	10.4	15.3	62.5
38	DS10	23.1	16.1	63.2	10.1	10.5	62.1
39	DS11	23.9	15.1	62.8	10.1	9.9	61.7
40	WS 1	23.5	11.1	63.4	10.2	6.8	61.6
41)*	KS23	19.9	16.3	63.7	10.2	9.3	61.2
41)	KS34	19.5	16.1	63.4	10.1	7.7	61.2
43*	KS 8	25.1	15.0	61.7	9.9	9.4	61.0
44	DS 9	25.3	16.1	61.3	9.8	11.8	58.9
45*	KS20	22.5	13.3	62.6	10.0	9.3	58.7
46*B	KS31	48.5	12.0	61.1	9.8	8.0	58.2
47	DS 2	20.2	14.9	64.3	10.3	14.2	56.5
48	KS26	19.2	14.4	62.0	9.9	7.4	56.4
49	KS15	18.3	16.5	67.6	10.8	19.3	56.0
50	AS 7	20.8	13.3	62.5	10.0	10.5	55.6

Rank	Code	% DM	% CP	D Value	ME†	Ammonia N as % total N	Marks/85
51*	KS21	21.9	11.9	61.9	9.9	9.6	55.0
52	DS13	20.8	14.9	63.4	10.2	14.9	54.6
53*	DS 8	22.3	14.2	59.4	9.5	7.9	54.4
54	AS 8	20.4	13.5	60.9	9.7	8.7	54.0
55	DS 5	21.2	11.7	61.7	9.9	9.4	53.9
56*	KS 6	22.2	18.0	64.7	10.4	23.2	53.4
57*	KS32	22.4	16.4	60.7	9.7	15.4	51.8
58T	AS11	30.2	13.5	61.1	9.8	16.5	51.2
59*	KS18	22.8	11.7	60.4	9.7	11.6	50.7
60	AS 2	22.1	15.3	60.1	9.6	14.4	50.2
61	KS16	19.9	18.6	62.3	10.0	21.1	48.3
62	DS15	21.8	20.3	61.1	9.8	21.7	47.3
63	DS17	21.9	18.3	59.9	9.6	20.0	46.7
64*	KS 5	20.1	18.1	61.1	9.8	24.2	43.1
65*	AS14	23.0	10.6	53.7	8.6	14.8	35.8
66	AS 5	20.0	15.5	59.8	9.6	28.0	34.1
67*	KS 4	19.7	23.1	58.7	9.4	37.7	31.8
68	DS 3	19.4	21.5	58.5	9.4	37.3	30.8
69	AS 1	19.2	16.7	57.4	9.2	37.2	26.9

* = Beef/sheep entry Ag = Agbag T = Tower silage B = Big bale silage
† = not used for marks: provided for interest

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

Awards	Open Entries	Analysis (85)	Marks Inspection (85)	Total
	F Stirling, Mainhill, Lockerbie.	78.5	63	141.5
2nd	J. Magnay, Cadgillfoot, Chapelknowe.	78.3	73	151.3
	I D Houston, Torkatrine, Dalbeattie.	75.6	NA	
1st and Trophy	J M L Milligan, Culvennan, Castle Douglas.	75.1	78	153.1
	J & W Carson, Conchieton, Tywnholm	74.7	76	150.7
	Lady K P Moore, Newlands, Monkton, Prestwick.	72.5	63	135.5
3rd	A C Irving, Largs, Twynholm.	71.9	79	150.9
	R Broatch, Thwaite, Ruthwell.	71.8	66	137.8
Milligan Prize	W S Jamieson & Son, Kirkland, Thornhill.	71.0	71	142.0
	W S Jamieson & Son, Kirkland, Thornhill.	70.8	NA	
	R J R Ramsay, Lodge of Kelton, Castle Douglas.	70.7	NA	

Awards	Beef/Sheep Entries	Analysis (85)	Marks Inspection (85)	Total
1st	W A Glover, Hall of Barnweill, Craigie, Kilmarnock.	68.2	69	137.2
	D F Culham Farms Ltd., Boreland of Southwick, By Dumfries.	66.4	NA	
	D F Culham Farms Ltd., Boreland of Southwick, By Dumfries.	65.4	63	128.4
	J L Brander & Co., East Glenarm, Crocketford Road, Dumfries.	65.3	61	126.3
2nd	James Biggar, Grange, Castle Douglas.	65.2	69	134.2

Dr. M.E. Castle: Silage Qualities 1978-82

A summary of silage quality in the last five competitions is given in Table 3. The higher quality of the silages made in 1982 compared with 1981 is a reflection of the better weather conditions in 1982. As a result, 39% of the silages were in the "good" class when measured by D-value and 3% in the "very good" class. Both these values are higher than in 1981. Only 2% of the silages were in the "poor" class.

The mean dry matter content of the 1982 silages was 23% which is only slightly higher than the mean values in the previous three years and indicates that excessive wilting had not been practised. This is an excellent trend, but one which demands the use of an effective additive to ensure a good fermentation. However, most of the silages had excellent fermentations as judged by the average content of ammonia-nitrogen which was 12%, a satisfactory value. Nine silages had ammonia values over 20%, and, as these silages had low dry-matter contents, it suggests that an effective additive had not been used correctly on them.

The number of entries for clamp silages has increased from 35 in 1978 to 66 in 1982 and clearly indicates the keen interest which this competition arouses. In addition, there is little doubt that the competition, and all that it involves, has been most worthwhile in stimulating interest and discussion in the whole subject of making quality silage and feeding it efficiently.

Table 3. Silage quality 1978-82.

		CLAMP SILAGES				
		% of total in each group				
Quality	D-value	1978	1979	1980	1981	1982
Very good	>70	17	3	0	0	3
Good	65-70	57	30	31	7	39
Medium	57-64	20	64	67	88	56
Poor	<57	6	3	2	5	2
Mean Dry Matter %		28	22	22	21	23
Mean Ammonia %		12	15	13	13	12
No. of entries		35	37	53	63	66

HAY COMPETITION

The hay this year was generally of better quality than the previous two years although entries in this competition remained disappointingly few. The results are summarised in Table 4 and the silage judge presented the awards as follows:-

Winner and recipient of the BP Nutrition Trophy - Mr. C.L. Mason, Torrorie, Kirkbean.

Runner-up - Mr. D.R. Kennedy, The Knowe, Kirkconnel.

Table 4. 1982/83 Hay Competition : Analyses and Marks.

		ANALYSES			MARKS		
Rank	Code	% DM	% CP	D Value	Analyses Marks/90	Visual Marks/10	Marks Total/100
1 C	KH 2	82.3	10.6	61.8	58.95	8	66.95
2	DH 2	83.0	9.8	61.0	56.1	8	64.10
3	KH 1	80.8	10.6	59.4	53.4	7	60.40
4	DH 1	83.2	8.0	60.9	52.4	6	58.40
5	KH 3	81.8	7.5	56.7	42.3	7	49.30
6	AH 1	87.1	5.5	55.0	38.55	8	46.55
7	AH 2	83.6	7.8	51.3	33.0	8	41.00
8	KH 4	84.0	5.2	50.0	27.0	6	33.00

C = Cold blown hay

INNOVATIONS COMPETITION 1982

South West Scotland Grassland Society

Winner 1982 David Brown, Barmagachan, Borgue.

'A silage plough'. Silage is carried from the pit to the feed passage with a front-end loader and dumped at intervals in the passage. Then the tractor and 'plough' reverse up the passage pushing the silage to either side. This process can be repeated as necessary during the day. It is a very simple and fast way of feeding cattle utilising the feed passage.

The 'plough' was constructed from the frame of an old drill plough with one side panel also from the drill plough; the other panel was purchased.

Any dirty silage etc. can be pulled out of the feed passage by pulling the plough forwards.

It also makes a good snow plough!

The UKF Fertilizer tankard was awarded to the winner at the annual competition evening at the Galloway Arms Hotel, Newton Stewart on 13 January, 1983.

MY FARM

David McCluskey

Lea Farm, Roslin, Midlothian

A meeting of the SWSGS at the Galloway Arms Hotel, Newton Stewart, 13 January, 1983.

Lea Farm, with the adjacent unit of Rosewell Mains, extends to a total of 117 hectares, lying 3 miles to the south of the Edinburgh City boundary. The steading at Lea Farm is situated at about 153 m asl with the land ranging from 137 to 168 m asl. Soils are medium loams with some very light sandy fields. Rainfall averages 700 mm per annum. The main enterprise is a dairy with around 100 Friesian cows.

Last years grassland comprised 30 hectares for grazing and 25 hectares for silage. In addition 21 hectares of Igri winter barley and 16 hectares of Norman and Hustler winter wheat were grown. Spring barley covered 22 hectares, the varieties being Flare, Kym and Golden Promise. Buildings, woodlands and roads account for the remaining areas on the farm.

Grassland

Long leys, up to 7 years duration, are kept around the steading for grazing and 2 year mixtures are grown for silage. Usually about 13 hectares of the 30 hectares of long leys are cut once for silage in June. The short leys give 3 cuts of silage. Occasionally hay is made but the normal practice is to buy it in. Short term leys are undersown in spring barley with occasional one year leys going in after winter barley. Longer leys are usually direct re-seeds under Westerwolths ryegrass sown in July-September. These seeding year swards assist to give good keep up until December for lambs brought in on a headage basis.

Silage is made in a covered pit. The herbage is mown, wilted for 24-48 hours, lifted by precision chopper and additives are used. The pit is back filled and consolidated by a double-wheeled tractor.

Fertilizer Use

Grass grazed all the year receives 375 kg/ha of 29:5:5 in March with subsequent dressings of 250 kg/ha as required.

Grass for first cut silage occasionally receives 125 kg/ha 34.5% N in February following 375 kg/ha 20:10:10 in March and 250 kg/ha 34.5% N in April. For the second cut, 500 kg/ha 24:4:15 is applied and for the third cut either 375 kg/ha 24:4:15 or 250 kg/ha of 34.5% N prior to ploughing.

Stock

There are 94 Friesians in the commercial herd. A Hereford bull is used in addition to AI (DIY). The cows are milked in a 10:10 herring-bone parlour with automatic cake feed. Calving is all the year round.

After turn-out in late April the herd receives hay and mineral rich concentrates to the end of May. Cake feeding comes in again for high yielders after June.

Winter feeding is based on barley, beet pulp and silage, the herd being loose-housed in high and low output groups. The high yielders receive 40 kg silage plus 2.5 kg of barley and beet pulp for M + 18 litres then 1.8 kg of an 18% gold concentrate per litre. The low yielders receive 40 kg silage plus 1 kg barley and beet pulp for M + 13 litres but receive no cake.

Current concentrate usage is around 800 kg per cow overall with heifers calving down at 24-27 months. Young stock, that is Friesian heifers with some retained Hereford/Friesian bullocks and heifers, are run on rented grass for summering. The courts provide dung for the winter wheat ground which follows 2 year grass.

Production

Of the 94 cows in the herd, 27% are heifers. Average milk production per cow is 5248 litres with a value of £788. Cost of concentrates and other purchased feeds was £96 to give a margin-over-concentrates and purchased feeds of £692 per cow. The gross margin per cow, allowing for milk, calf value and income from sheep grazing but less herd depreciation is £861 per cow. Livestock units per hectare are 2.14 and average concentrates fed around 0.14 kg per litre. Calving index is 384 days.

Formerly the milk was retailed and emphasis on quality is retained. Total solids run at 12.87% with 4.07% butterfat. The cell count is 250,000 and total bacteria cound 10,800.

Cost per cow total £222 including concentrates (£95), fertilizer (£80), seeds and sprays (£4), AI (£13), vets and medicines (£8), dairy sundries (£8), other costs (£14).

Discussion

The judge said that he had ceased milk retailing in 1979 because he had run the business for a long time and was not getting any younger. His son was more interested in the farming activities. The few Jerseys seen in the slides were a legacy from the retailing days.

The breeding policy was to use AI with nominated Friesian bulls. This year there had been a poor run of heifer calves - only 20 out of 100 calvings! The Hereford bull is used on low yielders, heifers and any cow which does not settle to AI. Most calves are sold privately.

The Lea Farm system leans heavily on good quality silage, that is a D value of 68+ and a low ammonia content. Both formic acid and sulphuric acid plus formaldehyde additives had been used - the price was carefully considered before deciding which to use. Attention to detail at all stages of silage making was stressed. The different fertilizer approach to cut 3 silage was dependent on whether the field was to be ploughed for grain, when it received straight N, or if it was to be retained for a further year, when NPK was applied to strengthen the grass.

The cows were kept strictly in two groups, and there were no problems encountered when changing groups as yields declined. The change was always made at feeding time.

During the discussion the winners of the various competitions were given a chance to say a few words. Michael Milligan was pleased he had scored so well despite his low dry matter silage. He felt less emphasis should be placed on dry matter but an effective additive must also be used. He also thought that the provision of the ammonia figure in the silage was particularly useful as a guide to the quality of the fermentation. Mr. Glover agreed with these sentiments. In relation to silage effluent, comment was made that provision must be made to collect it but Mr. Milligan thought that we should go further than this and feed it to the stock, perhaps mixed with straw. Some development work on this subject was now under way. Mr. Clark had made big bale silage for the first time. His only regret was that the bales were now finished! He did stress the need to plan the baling and aim for quality rather than do a salvage job on a poor crop. In reply to a question on the worth of a good D value in silage, Mr. Milligan recalled that a 6 unit fall in D value in 1981 cost him 2.5 litres per cow per day. Dr. Castle used a 'rule of thumb' that 1 unit improvement in D value was worth about 0.25 litres per cow per day due to the better intake of the better quality silage. - R.D. Harkess.

DAY VISIT TO WIGTOWNSHIRE

A day outing of the SWSGS to High Balyett and Beoch, 17 February, 1983.

High Balyett (the Hair family). This is a 124 hectares all grass farm carrying 170 pedigree Ayrshire cows plus their followers. In excess of 300 kg nitrogen per hectare is used each year and being on a sandy soil type, irrigation is used in most seasons. Some 1500 tonnes of silage were made annually and molasses is used as an additive. This is applied in the field by one of the new tractor mounted applicators. The level of milk production is 6400 litres per cow or 1500 litres per hectare which along with 0.31 kg concentrates per litre gives a commendable margin over concentrates of £679 per cow.

Beoch (the Hastings family). Beoch extends to 567 hectares of which 122 are ploughable. 21 ha of spring barley is grown for home use and 445 ha are rough grazings and permanent grass. Kale mixtures and rape are used for fattening lambs. 1400 tonnes of silage are made.

The stock carried includes 50 suckler cows, 200 Friesians x Aberdeen Angus calves and 500 Blackface ewes. The calves are bought in during October to January at one week old and are reared on milk. They are summer grazed and then outwintered on silage before being sold as stores in the spring. All lambs are sold fat.

Members of the Society wish to thank both families for their kind welcome and for the time and trouble taken to provide the Society with a most interesting visit to Wigtownshire.

FORAGES, LEGUMES AND COWS

Gordon Newman

Hanford Farms Ltd., Blandford, Dorset

A meeting of the SWSGS at the Royal Hotel, Cumnock, 3 March, 1983.

The speaker opened his paper with some interesting comments on forage for dairy cows. Two crops which do grow reasonably well in the south, i.e. south of the Thames are maize and lucerne. Lucerne is the widest grown world crop for feeding to cows and a sample of second cut lucerne silage which was ensiled with two litres of Foraform additive was passed round the audience. The analysis was: dry matter 26%, MAD fibre 32%, ammonia N 6%, pH 4, D 55% and ME 9.4. Along with 0.26 kg concentrates per litre, this ration gave a final MOC of £672 per cow. A flat rate winter ration was offered to cows and comprised: silage, dry matter 13 kg; treated straw 2 kg; molasses 3 kg; maize gluten 3 kg; fishmeal 0.75 kg and minerals 0.75 kg. This indicates a high daily intake and the speaker stressed the importance of the three 'puts' - 'you can't get output, without input and throughput'.

Another high input ration which along with 0.27 kg concentrates per litre produced an MOC of £683 per cow was: maize silage 43-50 kg; treated straw 3 kg; molasses 3 kg; soya 3 kg; fishmeal 0.75 kg; fat prills 0.2 kg and minerals 0.2 kg. This ration also has given a remarkably high intake. The 270 cows on this ration had a lactation yield of 6272 litres. The speaker stressed the value of molasses as a feed and at £52 per tonne it was a cheap nutrient. Hence the importance of forage intake, if it suits an enterprise to reduce the input of concentrates. MOC can be improved most easily by increasing the intake of good quality forage.

With both herds, summer feeding on high N grass was buffered with some treated straw plus molasses but no concentrates were offered.

Legumes

Real competition in the nitrogen fertilizer market is having the effect of reducing prices and so the case for using legumes to save nitrogen is now less applicable. Only on hill farms where low output cannot justify expenditure on fertilizer N is the case for white clover a strong one. A suggested break-even point of 100 kg of N per hectare was suggested beyond which white clover contribution to the sward is likely to be suppressed. Although some legumes have a lower digestibility value than grass when analysed in the laboratory, the combined effects of high cell content, less cell wall and more of a less degradable protein makes the legumes a potentially valuable feed. An example of this in practice is an experiment on weaned lambs at the Grassland Research Institute, Hurley.

The speaker felt the need for a forage legume group within the British Grassland Society because farmers have no commercial pressure on them either to reduce fertilizer or feeding stuffs input. As buffer feeding with forage at grass becomes more popular, so the use of forage legumes such as lucerne or red clover for zero-grazing may increase.

Table 1. Intake and liveweight gain of weaned lambs (GRI data).

Daily feed	Digestible OM Intake (kg/d)	Liveweight gain (kg/d)	Empty BWG (kg/d)
All grass	0.38	0.11	0.062
57% grass	0.40	0.14	0.099
All clover	0.38	0.15	0.103

This illustrates that there is little advantage in increasing clover contents above 50% and probably 30-40% ground cover in mid-summer is adequate.

Problems

There are basic problems with legumes and these can be summarised as follows:

1. Lower yield than with high nitrogen grass. For example 5-7 tonnes dry matter per hectare compared to 10-12 tonnes dry matter per hectare.

2. Lack of predictability and proneness to drought. Also the clover growth season is generally short in the U.K.

3. Supplies of seed of improved varieties bred in the U.K. are scarce. Lack of seed tends to encourage low seeding rates and so limit success.

4. Reseeding late in the season after autumn harvest results in frost damage to clover seedlings. Wet autumns can also result in slug damage.

5. Drilled seed is frequently too deep for clover to survive.

6. With less lime being applied, pH is frequently a limiting factor. Less soluble phosphate and reduced potash application to avoid hypomagnesaemia may also limit clover growth, development and survival.

7. Frequent N applications are lethal to clover - one application in the spring is all that should be applied.

8. Selective grazing by sheep can substantially reduce clover content in a sward.

9. Diseases and pests such as eelworm, sclerotinia and slugs cause havoc in red clover but are less damaging in white clover.

10. Animal health problems in grazing red clover and lucerne, particularly with bloat and infertility in ewes, have caused many farmers to stop grazing them. However this infertility factor has not been shown to affect dairy cows. The tannins in sainfoin prevent bloat and so the concept of genetic engineering to breed this factor into other legumes is now being applied.

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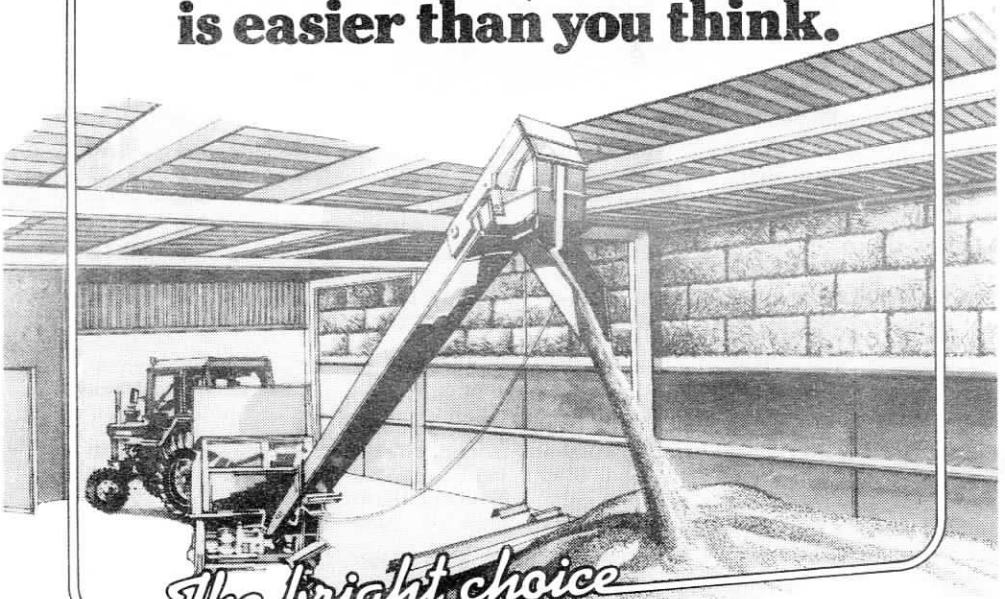

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Intake and Feeding Value

Although legume silages, particularly red clover and lucerne, have a lower D value than ryegrass counterparts, the speaker makes an addition of one unit of ME to legume silage because of higher intakes of the legume silage. The improvement in intake due to the presence of clover in the sward can be up to 25% compared with pure grass and this is due to a fast rate of digestion. The inclusion of clover in a ley therefore plays an important supplementary role to grass particularly where it can be held in the sward in a reasonable content. Apart from digestibility differences, the crude protein in grass is less effectively used. The quantity reaching the lower gut is three times greater with clover protein and hence it is more efficient as a ruminant feed than grass protein.

The benefits of feeding legumes have been so well demonstrated that it is up to the farmer to decide whether his system can take advantage of the potential. Intensive dairy farmers may benefit by feeding dry lucerne or purchased legume hay but it is sheep farmers who can gain most benefit. When legumes are grown every effort should be made to obtain the best varieties and whenever appropriate, seed should be fumigated and/or inoculated in order to assist establishment and survival. The late Rex Paterson told us that anyone could grow grass but it takes an expert to utilise it. Contrarily with legumes any fool can utilise them, but it is the export who can grow them.

Discussion

The speaker mentioned that his cows were Friesian or half-Holstein and they were not large cows, *circa* 400 kg liveweight. If the correct food was offered even small cows can eat a lot of feed and rate of digestion was important. Many cows in the national dairy herd suffer from acidosis - you can spot them standing around doing nothing and looking miserable! Many cattle are offered acidic silage laced with gaseous ammonia and then have large quantities of barley and soya shovelled in. We can feed bicarbonate of soda, but is this not an admission of failure? Hay feeding stimulates the saliva flow which helps to neutralise stomach acids and a high fibre diet such as sugar beet pulp or treated straw, coupled with the little and often feeding of concentrates helps to limit rumen acidity. Because the cows were on good quality and palatable winter forage solids averaged 13.6% all winter. The liver of a cow producing 45 kg milk has to synthesise its own weight in carbohydrate each day and we must not forget the physiological strain on a high yielding cow.

Molasses is an inexpensive feed if purchased in bulk, the price can come as low as £45 per tonne. The purchase of barrel molasses or molasses mixtures which frequently contain expensive water is not to be encouraged. Molasses was used on lucerne silage but if the dry matter was below 22% the silage received 10 litres of molasses plus 4 litres Silaform per tonne ensiled. If conditions were very wet, formic acid was used instead of molasses. Commercial formic acid can be obtained now at a competitive price. Wilting is not necessary but in such instances an additive must be used.

The feeding of molasses was straightforward. The storage tanks must be up high to allow gravity flow through a large hose. It can be allowed to run along the length of the feed trough or self-fed in water troughs. If the latter system is used, devise a system that makes the cows lick the molasses (e.g. floats in spaces cut in trough cover) rather than let them drink it.

The discussion closed with a debate about the need to declare concentrate formulations, a subject on which our speaker had very strong opinions. He also encouraged members to shop around for the appropriate straights and have them mixed to their own requirements. Better still was for a co-operative purchasing system to be developed and to use the mechanism of bulk buying and the collective bargaining power of a co-operative to keep down purchased feed costs.

DAY VISIT TO AYRSHIRE

A day outing of the SWSGS to Dalchomie and South Craig, 5 May, 1983.

Dalchomie (the McFadzean family). This is a 193 hectare unit made up of three adjoining farms. 155 ha are in grass to provide silage and grazing for 155 Friesian cows and their followers plus 205 crossed ewes. 300 store lambs are bought each autumn and fattened off grass and turnips.

Other cropping includes 22 ha barley, 8 ha turnips and swedes, 5 ha potatoes and 2.5 ha vegetables. Being on a busy trunk and tourist road the opportunity has been taken to open a farm shop as an additional outlet for potatoes and vegetables.

South Craig (the Edwards family). This unit was acquired to run in close conjunction with Black Clauchrie at Barrhill. It covers 145 hectares of which 72 are in rough and permanent grassland and 63 are improved for grazing and silage making. Other crops include 3 ha swedes and 3 ha rape. Woodland covers 4 ha.

The cattle at South Craig comprise 60 Blue Grey cows crossed with a Hereford bull. Cows and calves are inwintered along with the progeny of the 50 Galloway cows at Black Clauchrie. Some additional cattle are inwintered on a contract basis. About one third of the calves are sold as stores in the spring, the remainder being summered then sold as stores in the autumn.

350 ewes are maintained, a proportion of which are older ewes from the hill unit. Ewes are crossed with Suffolk and Blue-faced Leicester tups. Wether lambs are sold fat and live lambs are sold for breeding. Additionally 600 Blackface lambs from Black Clauchrie are transferred to South Craig for fattening on grass, rape and swedes.

Members of the Society wish to thank both families for their kind welcome and for the time and trouble taken to provide the Society with a most interesting visit to Ayrshire.

BRITISH GRASSLAND SOCIETY - SUMMER MEETING

CHESHIRE 1983

I.W. Taylor

The West of Scotland Agricultural College

Cheshire consists of rolling plains, generally about 60-120 m above sea level, and a ridge extending from the SW along the Shropshire/Staffordshire border to the southern end of the Pennines with a spur which divides the county roughly in two. In the plain, soils tend to be clay while, at the western end of the ridge, very free draining gravelly loams occur. Rainfall is about 1000 m in most of the county, perhaps increasing to around 1250 mm nearer the Pennines.

Grassland and dairying predominate on the heavier soils, with some winter barley, winter oilseed rape and early potatoes in the lighter soils of the ridge.

General Points

Milk Yield. Most herds visited had averages of over 6000 litres/cow and were aiming for 6500 to 7000 litres/cow.

Nitrogen use. All farms used at least 375 kg N/ha, sometimes rising to 500 kg on grazing land. This allowed stock carry often above 2.5 cows per hectare even on the heavy clay farms. There were occasions in very wet periods when "sacrifice" fields were used in order to reduce poaching in the better grazing areas.

Integration of cutting/grazing. Three conservation cuts are common in Cheshire. At the time of the visit, in mid July, most farms had finished two cuts, with some actually starting a third. It was apparent from several of the visits that grazing and conservation areas were frequently interchanged. This provided substantial areas of fresh, leafy pasture at a time when the quality of grass, grazed from turnout, generally declines due to seed-head formation and rejection. Indeed, the absence of seed-heads was one of the most noticeable features in grass fields and suggests a high utilisation of herbage.

The three cuts provide flexibility in grazing management. Few farms used strict paddock or strip grazing, although often a controlled rotational grazing system was used.

Capital investment. No completely new dairy units were visited, nor were many evident in the Cheshire countryside. Most farms had converted existing buildings for cow and milking accommodation. These conversions did mean that scraping out of slurry and cow movement were often awkward. Areas to be scraped were quite substantial.

Slurry storage was frequently an excavated hole into clay subsoil with perhaps one or two sides being of wooden sleepers. This allowed liquids to be strained off and to be handled separately.

Seeds mixtures. These often include Talbot, Melle and the tetraploid Meltra. Most farmers relied on intermediate and late perennial ryegrass for long-term pastures.

Personal attitudes. An over-riding and very important point applying to the farmers themselves was an attitude of mind to look after the very high yielders rather than the average cow.

Slurry disposal. The disposal of muck and slurry was as great a problem in Cheshire as in Lanarkshire. Storage capacity was at least two months. On all grass farms, a heavy application of muck is made prior to a reseed, while the liquid was applied to the whole farm. In the drier areas, maize and stubble turnips were grown after heavy mucking.

Specific Points

Direct drilling of rye and Italian ryegrass. One farm used the direct drilling of Italian ryegrass into permanent pasture every third year as a means of boosting herbage production in the silage field. This farm, at the foot of the Pennines had all its flat ground devoted to silage making, so one-third of the silage area was drilled each year.

On the same farm, to reduce silage requirements, rye had been direct drilled into a 5 ha silage field for the last nine years. This generally provides grazing from early April before being shut up for silage. Cutting trials have indicated an extra 1 t DM/ha or, by farmer comment, grazing two weeks earlier.

Several farms in the area apparently use this technique although it has not caught on nationally. One important factor was soil type - a free draining soil is essential, preferably a loam. The spring decline in quality of rye and gearing it to the growth of spring grass may also limit its use.

Direct drilling of brassicas was demonstrated by Dr. Allen Charles from Aberystwyth who was conducting trials with different drilling machines on several catch crops. The "Hunter Seeds" modification of the WRO prototype, and the SIAE prototype drill appeared to give better results than their commercial competitors.

Drainage. Although drainage was mentioned as the first essential on many farms, one visit was primarily devoted to see the drainage of a difficult soil type with a poor thin soil. An "Inter-Drain" trencher machine was in action laying plastic pipes at 10 and 11 metre intervals. No gravel backfill was being used. Neither subsoiling nor moling were envisaged, although a Paraplow 1982 model was being tried.

Although this system on this soil appeared far from ideal, the appearance of the sward was still good. However, other management factors were involved such as:- the use of a sacrifice field when wet periods prohibited the use of the "good" swards: winter grazing let out for sheep to encourage a tight sward: no heavy contractors' machines on the field at any time if conditions were wet.

Winter grazing by sheep. It seems that only recently have Cheshire dairy farmers considered the letting of winter grazings. However, they still hold an upper hand on the hill farmers by dictating the date of entry and departure of the sheep - generally November to February. In these circumstances it is surprising that hill farmers are still prepared to away-winter hoggs.

Zero grazing. Two farms visited were practising zero grazing, one for over 26 years. Although cows appeared fairly dirty through standing on wet concrete, feet and hygiene problems were not considered serious. There is no doubt that stocking rate is extremely high. On one unit, 190 cows and 140 replacements are carried on 92 hectares.

The system depended upon a weekly stocktaking exercise of grass yield in each field. Grass for grazing was cut at three weeks regrowth, while silage was at five weeks regrowth.

Maize/lucerne. An interesting aspect of a visit to a farm on the Cheshire ridge, was two crops rarely seen in UK. The lucerne field was now six years old, fairly open and past its best. The maize, however, was most spectacular. It made good use of the ample dung and slurry applied to this free draining, gravelly soil. The farm manager had spent some time in the USA where much of his knowledge of these crops had been collected.

The author wishes to express his gratitude to the West of Scotland Agricultural College for allowing attendance at this BGS summer meeting and to the Central Scotland Grassland Society for partly subsidising the visit.

CHESHIRE 1982 - A FARMER'S VIEW

J.S. Watson

Creoch, Ochiltree, Ayrshire

On leaving behind Ayrshire's green fields, grazed by mixed dairy cattle, one pondered the fact that here I was off to see grassland further south. In Young Farmer Club days we used to say that we would not see green grass until we returned. This occasion was to be different because the destination was that other great dairy county, Cheshire. Having heard of BGS summer meetings it was not difficult to be persuaded to join the meeting and partake of what Cheshire had to offer. I was not disappointed.

At CLIVE AND JENNIFER GURNEYS', AUSTERSON HALL, NANTWICH we were to see a family farm with very high performance dairy cows. Swards were late perennial ryegrasses with white clover. Lactation yields were 7700 litres with 2.3 tonne per cow input of concentrates. The cows themselves struck me as having great potential. The policy followed was to restrict grass in favour of concentrates in early lactation. After lactation peak, cows then had to make maximum use of grass. This policy along with careful breeding had lifted milk sales by 2700 litres per cow in six years.

The next port of call was to DAVID AND KATHLEEN CHARLESWORTH, BRIDGE FARM (David was SWSGS silage judge in 1974/75). Great pains were taken to think things through and attention to detail was evident everywhere. 2000 tonnes of silage are made, with the first cut around 15 May. Cows have been ICI recorded for 34 years. Slurry is stored and goes on to land being reseeded and full use is made of the poultry muck from 11000 laying hens.

At the CHESHIRE COLLEGE OF AGRICULTURE we visited the new Food and Dairy Technology Unit alongside which is the machine training school for Tetra Pak (UK). The final visit of the first day was to RUTH AND ROGER MILLS, FIELDS FARM, DARNHALL. This heavy land farm was all grass with mixtures based on Melle, Meltra, Talbot, Timothy and White Clover to minimise the need for reseeding. Slurry handling was aided by straining off the effluent through sleeper walls and storing this separately. The liquid was then sprayed onto silage aftermaths and the solid fraction ploughed in at reseeding.

Day two started with a visit to the BUXTONS, KILN HILL, BOSLEY. Norman struck me as a young man poing places. His work on drilling rye and Italian ryegrass into permanent pastures was very interesting and used to boost spring production on this high fertility soil. The entourage then moved on to NEVILLE THORNHILL'S FIELDS FARM, SANDBACH. This was a mixed farm with sheep and cows and with grass and arable forage crops such as maize, swedes, stubble turnips, arable silage and potatoes. I was impressed by the high level of management in running this farm with its 144 dairy cows and 250 ewes. Extensive use was made of chemical sprays which I thought bordered on chemical warfare! I felt that the use of more phosphate might save money and hassle and Mr. Thornhill tended to agree. At ICI, DAIRY HOUSE we saw intensive dairy farming being practiced on a 157 ha all-grass farm. Many wildlife conservation projects were under way in order to preserve and enhance the natural environment.

The final day came all too soon and started with a visit to WATMORE'S TURFLAND. Here turf was produced and sold to councils near and far. Turf growing is a two year operation and specific mixtures are used for bowling greens, sports turfs and public areas. At sowing great care is taken to obtain a fine tilth and level seed bed. Seed is broadcast from a box mounted between two Cambridge-type rollers - an American machine imported for the job. Michael Watmore, who handled both production and sales, was an intriguing person to talk to.

At the next visit GEOFF VICKERS, PECKFORTON HOME FARM, BEESTON, gave us chapter and verse on how to grow forage maize and lucerne, subjects of great interest but not crops for here in the north. Zero grazing was practiced because of the distance factor of some fields. 3000 tonnes of grass silage and 1000 tonnes of silage from arable crops are made each year to feed the 375 dairy cows and 220 dairy replacements.

MESSRS. CHADWICK, GORSTELLA, KINNERTON was the venue for our final visit. Brothers Andrew and Peter farm in partnership with their mother. Zero grazing has been practiced here for 26 years and the brothers were among the pioneers in using cubicles and Holstein cattle. Particular care is taken in spreading slurry and every effort is made to keep harvested grass free from slurry and soil contamination and so present the grass in an attractive manner to maximise intake. The brothers obviously knew their cows and were well in tune with the complexities of modern dairy cow husbandry.

The BGS visit to Cheshire was a joy to experience and the hospitality and friendship was quite overwhelming. Many thanks to the SWSGS for sponsoring my attendance at this most instructive and enjoyable event.

BOOK REVIEWS

'SILAGE FOR MILK PRODUCTION' Technical Bulletin No. 2. Editors, J.A.F. Rook and P.C. Thomas.

Produced by the National Institute for Research in Dairying and The Hannah Research Institute. 1982. 165 pp. ISBN 0-7084-0166-X. Price: £5.00. (Obtainable from the Librarians of the respective Institutes).

This bulletin summarises research and development work on silage making and feeding carried out at the Hannah Institute. In particular it covers the very active period from 1973 onwards when the nutritive value of high quality silage was clearly demonstrated and indeed was called for by the ever increasing lactation yields of our national dairy herd. When appropriate, work from other research centres is quoted.

Chapter One is a short introduction to the contents of the bulletin. Chapter Two outlines the early history of silage making and then gives a detailed account of the principles of conservation, the chemistry of the grass plant and factors involved in silage fermentation including micro-organisms, lactic acid production and the clostridial break-down of proteins.

Sward management is dealt with in Chapter Three and choice of herbage species, fertilizer rates and cutting management are discussed with a view to growing the ideal crop for conservation.

Grass of course has to be fed to ruminant stock before it can be cashed as a saleable product. Chapter Four discusses the usefulness of silage as a foodstuff. Factors affecting intake, the value of silage energy and silage protein and the effect of silage feeding on milk composition are all current points of debate and are covered in this chapter.

Chapter Five discusses the techniques adopted at The Hannah Institute to make consistently high quality silage from preparing the sward to cutting and harvesting to additive use and effective sealing. It concludes with the well-known key points to observe when aiming for good quality silage.

Feeding the quality silage so produced is covered in Chapter Six. Hannah experiments over the years have included straight silage diets as well as those supplemented with various types of concentrate feeds. For each unit improvement in D value between 60 and 70, 0.2 kg milk per cow per day can be expected due to a better intake of the higher D silage when it is offered *ad lib* and along with a conventional concentrate. This may seem a small yield improvement but the cumulative effect can be large if multiplied by the number of cows in the herd and the length of the silage feeding period.

The final chapter looks to the future and poses several questions. Can better additives be found which aid fermentation *and* improve silage D value? What are the products of fermentation which limit intake? Will a better understanding of dietary factors enable the manipulation of milk fat and milk protein content? So despite the long history of silage research there appears to be plenty to keep the boffins busy for the next two or three decades!

'Silage From Milk Production' is the most recent in a series of books on this subject and perhaps has been somewhat overshadowed by these predecessors. Chapter Four is probably the most novel since the complexities concerning silage intake and the metabolism of the products of silage digestion are still being unravelled. The style of the cover does not appeal to the reviewer's eye nor do the several 'pull-out' pages to accommodate large tables which could have been otherwise arranged. Nonetheless 'beauty is only skin-deep' and the contents of the Bulletin make interesting and instructive reading for research workers and students. Farmers may find some of the chapters heavy going. It is unfortunate that the ARC has labelled a £5 charge for this publication (no doubt Government will carry the blame) when a sister institution recently produced, albeit with a commercial company, a not entirely dissimilar book which is *gratis*! - R.D. Harkess

'MILK FROM GRASS' edited by C. Thomas and J.W.O. Young.

Published jointly by ICI and the Grassland Research Institute. 1982. 104 pp. ISBN 0-7084-0253-4 (ARC) or 0-9508356-0-9 (ICI). Price: free on request.

Chapter One on grass production discusses the effects of soil type and summer rainfall in setting potential herbage yield and how this is further influenced by type of grass and the level and pattern of N use. Target N levels for the various "site" classes are given. The need for a balanced fertilizer programme and a watchful eye on soil pH is made.

The various factors involved in making good silage are covered in Chapter Two. Silage quality in terms of digestibility, energy, protein and fermentation quality and how these influence intake are discussed for autumn and spring calving cows. A guide to potential stocking rates at various target silage qualities is also given on the assumption that grazing and silage are integrated.

Chapter Three discusses grazing systems, stocking rates, intake and sward height and gives some guidance on offering concentrates at grass. The integration of conservation with grazing as a key to successful production of milk from grazed grass and silage is further developed in Chapter Four. Site class, calving date and silage quality targets are used to give a guide to potential level of output in terms of UME (a measure of energy output from grass), stocking rate and gross margins. This chapter takes careful reading, along with the appendix tables, to sort out the combinations and permutations of the variables discussed. Chapter Five is entitled 'Economics of Production' and discusses costs of milk production and gives indicators to methods by which gross margins may be improved. Silage quality and level of concentrate feeding are particularly important.

'Milk From Grass' is a particularly interesting book, probably the first of its kind, in which attempts are made to quantify and permutate the many variables involved in milk production systems. Many assumptions have been made and the data will probably not fit any one farm but nonetheless it is a thought-provoking publication designed for farmers and advisers who are prepared to take the time to read it through carefully. As a free publication it must be 'the best buy' of the year. - R.D. Harkess

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Competitions

CENTRAL SCOTLAND GRASSLAND SOCIETY

5th Annual Silage Competition 1983/84

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

11th Annual Silage Competition 1983/84

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

8th Annual Hay Competition 1983/84

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

Innovations Competition

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

VISIT TO THE HILL FARMING RESEARCH ORGANISATION

A visit by the CSGS to Hartwood, Shotts, Lanarkshire, 25 November, 1982.

Hartwood was taken over from the Lanarkshire Health Board at the end of 1979 after the remit of HFRO was widened to look at ways of improving productivity from marginal land farms. The farm lies between 125 and 270 m above sea level and extends to 345 ha of which 292 ha are arable and permanent grazings, 28 ha moor and rough grazings, and the remainder (25 ha) is in woods, buildings and roads. Cropping in 1982 was 22 ha barley, 14 ha arable silage, 35 ha grass silage and 30 ha forage crops - mainly rape.

Soil type is mainly a heavy textured watered gley of the Rowanhill series and as such is imperfectly drained. Forage crops have been used to replace poor grassland, and have been utilised by hill lambs from other HFRO farms.

Stock carried on the farm includes 263 suckler cows divided between the Blue Grey and the Hereford x Friesian. Within each type there is a spring calving and an autumn calving group. 891 Greyface ewes are run with a further 100 Blackface ewes. In total there are about 1,200 feeding lambs. There was no stock on the farm at takeover, and the ultimate aim is to build up to about 1,000 crossbred ewes and 250 suckler cows. It is hoped to run the breeding ewes on a clean grazing system, and conservation will be silage, some of which will be made in big bales.

Work in progress at present is concerned with systems of lamb finishing, systems of upland production and systems of suckler cow and calf production.

Setting the Scene - Mr. John Eadie, Director, HFRO.

In setting the scene for the evening discussion the HFRO Director said that the sheep industry was enjoying more prosperity at the present time due to the EEC sheep meat regime. The upland hill sector had increased its indebtedness by 14-15% over the previous year, but interest rates were now declining which was making things look better. Currently the £ was under pressure which could lead to an upward turn in interest rates, but hopefully this would just be temporary. The relationship between the Sterling price of lamb and the price in France was widening and this would encourage exports, although the random testing of lambs for hormones was causing some concern. EEC ministers are due to receive a report on the sheep meat regime in autumn 1983, and if market prices remain low and support high there may be some concern expressed. However, it was always anticipated that the sheep meat regime would be costly and that Britain would receive the major benefit.

The other cheerful factor in the equation at present was the fact that inflation was abating and this was keeping cost increases in check. Also input costs such as barley and soya bean were relatively stable.

We should therefore look on the next 2-3 years as a breathing space, and use this period to get the sheep industry into shape. There would still be pressure to contain production costs and it had to be remembered that for every three producers, there were 30 consumers and nothing reduced demand as much as economic depression. In this respect the upland sector has its problems. Part of the reason for the current state of unprofitability is that businesses are smaller than others in the agricultural sector and increase of size would have to come through intensification. This would have the effect of spreading fixed costs over a greater volume of production.

Intensification may not appeal to everyone but it is going to be essential for survival. In the upland situation this would be achieved by high grassland production and effective utilisation.

Utilisation of Grassland by Upland Sheep - Dr. Geoff Maxwell

The Greyface ewe had been used at Hartwood and this would therefore be used as the background to describing the work being carried out. It was necessary to become more objective about the way we talk about sheep and grass, rather than using terms such as "too little" and "too much". We therefore have to get to a point where we can describe things such as grass growth in quantitive terms.

In relation to the annual grazing cycle for sheep, grass starts to grow as the ewe lambs (late March), but grass growth rates are slow irrespective of quantity of fertilizer applied. The ewe's appetite increases very rapidly, even for non-lactating ewes, and it is difficult to satisfy requirements from grass. Milk production therefore comes from utilisation of body reserves and it is necessary to have ewes lambing in condition score 2-2½. The aim must be to have 750 kg dry matter per ha in front of the ewe as soon as possible and to achieve this fertilizer must be applied early. However, because of the increasing appetite of the ewe the sward will be kept bare and growth will be slow, and it is therefore necessary to provide supplementary feeding until such time as temperatures rise and grass production starts to increase.

It is necessary to maintain control over the pasture to achieve maximum production. A target is to keep 1200-1800 kg dry matter per ha in front of the ewes. This can be manipulated by fertilizer application and grazing stocking rates. As the season progresses grass reaches the physiological stage of wanting to flower, and both quantity and quality start to decline. A balance also has to be struck between shutting off sufficient grass for winter keep, and giving ewes sufficient grass to maintain lamb growth rate. If too much grass is shut-off lamb growth rates can suffer by as much as 50%, But if grass is not shut-off early enough and there is insufficient grazing pressure to keep grass in the vegetative stage, then intakes, and thus lamb growth rates can also suffer as grass goes into reproductive growth. Results so far suggest that the aim must be to keep around 1,600 kg dry matter per ha on offer, that is about 7 cm depth of grass on the sward.

As the season progresses less new leaf is produced in grazed swards, and conservation aftermaths tend to give a better quality sward at tupping time. The condition of the ewe also affects herbage intake. To achieve a reasonable reproductive performance from a Greyface ewe she must be at or approaching condition score 3 in the autumn.

Wintering ewes at Hartwood on grass is difficult because of the heavy wet ground conditions. A proportion of stock are put into woodland areas and it has been found that a stocking rate of 5-7 ewes per ha will not damage the sward, but above this level cattle turnout in spring will be delayed. Feeding for the first part of the winter is on silage but because this is geared to the suckler cows the quality is not suited to ewes in the last six weeks before lambing and they go on to a diet of hay, sugar beet pulp and dried grass.

Discussion 1 - Mr. Gordon Gray, Hillridge, Biggar opened the discussion. It was felt that the pastures appeared very bare after tupping and was there a danger of reabsorption of the eggs? It had been found that ewes maximised their herbage intakes on barer pastures, although this was less true on spring grass. The problem in late autumn was maintaining grass condition when growth stopped and consumption continued. The amounts of herbage available had to be tied to the condition of the ewes but it had been found that ewes could maintain their liveweight at 900 kg dry matter per ha. However, the question of whether feed supplementation was required at this stage had still to be answered.

The question of implantation of embryos was still a grey area, but the shedding of eggs was largely influenced by stress which could be due to many factors including weather and nutrition. If fact, stress could be created by an increasing plane of nutrition with the same result. Providing any downward plane of nutrition was gradual then there should not be too many problems.

It was pointed out that weight and condition score did not tie up and could any reason be offered as to why small ewes were small and large ewes large. If a large ewe was in the same condition as a small ewe then she should be more productive. A small ewe in fit condition could not overcome lack of size. Most farmers still tended to measure condition by weight which as a guide to the condition of a flock on a particular farm was all right.

Guidance was sought on what a sward of 1,000 kg dry matter per ha looked like. As a guide 1,500 kg dry matter per ha was equivalent to about 6 cm growth and less than 2 cm growth meant around 500 kg dry matter per ha. These swards were very tight and generally only grazed for 3-4 years at high stocking density. In carrying out measurements of herbage mass, the herbage height was measured every week, and cuts were taken at three week intervals. One problem was that sward density changed throughout the season. Species of grass tended not to be so important as the age of the sward and the grazing system.

Asked about how much plant nutrients were returned by ewes and lambs to the ground and also about optimum level of clover in the sward it was stated that there was a need for a proper study of the nitrogen economy. Clover contents tended to be associated with management routines and further work was required on this aspect. Clover content at Hartwood was 5-10% but as there was no defined target it was difficult to know whether this was acceptable.

Utilisation of Grassland by Suckler Cows - Dr. Angus Russell and Dr. John Hodgson.

Margins from beef production have been squeezed recently, and this is bringing pressure to improve the efficiency of beef cattle production. The biggest cost in suckled calf production is that of feeding the cow through the winter, and one way of reducing this is to make use of the cow's own body reserves. In spring calving cows it has been known that potential savings could amount to as much as 200 kg barley or 300 kg hay with negligible effects on subsequent production. Whilst calves are lighter at birth, the plus factors are easier calving and lower calf mortality. After calving the cow uses her own body tissues to produce milk and sustain calf growth, but in order to do this she must be in good condition at the end of the grazing season. The key to operating a successful low input system is a high standard of grazing management in summer. This means having a high quality sward and adequate quantity of grass available.

At Hartwood a clean grazing system is operated in a three year rotation. It has been found that intake is higher on ground grazed by sheep compared to ground grazed by cattle. Therefore the question of what it is possible to do to cattle grazing by adding sheep needs to be investigated. If sheep are present this helps to raise the tiller population to a level expected on a sheep grazed sward. It has been found that a mixed grazed sward comes out in performance similar to a sward grazed by sheep only.

Discussion 2 - Mr. J. Hamilton, Headsmuir, Carluke opened the second discussion sesson. The question of 'blue prints' for suckler calf production was raised but it was generally felt by the speakers that these imposed too many disciplines and were too restrictive. There was a need to leave options open and to tailor the system to the circumstances of the individual farms. The suckler cow is fairly resilient to changes in the system and this should be seen as an advantage. There are certain basic guide rules which are becoming more clearly defined e.g. condition scoring at certain critical times and it is best to design a system which satisfies these requirements according to individual circumstances.

The subject of variation in calf size at weaning was discussed and whether calves lighter at birth would catch up with heavier calves. It had been found that low feeding regimes reduced the birth weight of calves by 3-4 kg but if the cow was well managed post-calving this was made up before weaning time. In spring calving cows a low cost feeding from calving until turnout slightly reduced milk supply, but this could be made up by introducing a high quality creep feed at about 6 weeks or alternatively feeding the calf on barn dried hay.

Experience of feed saving in autumn calving herds was far more limited and indeed the potential for saving was less. Nutrition levels could probably be lowered without adverse effect on milk yield, but the effect on re-breeding has also to be considered. Nutrition levels could probably be dropped as spring approaches to make savings and it is always worthwhile to use the condition score to ration the cows.

The question of whether strip and paddock grazing systems were obsolete for suckler cows was also raised. There would appear to be little advantage in these over existing systems and a rotational system would not necessarily be expected to grow any more grass. Grazing system is very much up to the individual farmer and depends on what he wants and what works best for him. - I.R. Fraser.

DAY VISIT TO BERWICKSHIRE

A day outing of the CSGS to Legars, Kelso and Fans, Earlston, 12 May, 1982.

Legars (Mr. T. Mitchell). Tom Mitchell can best be described as a cow enthusiast. But not only is his stocksmanship of the highest order, his grassland management also achieves the same degree of excellence. It was therefore easy to see how he had been the first winner of the BOCM Silcock Scottish Dairy Farm Award in 1981.

The farm runs to some 125 ha of which 53 ha are in cereals. Apart from 3 ha of kale the remainder of the farm is down to grass. The dairy cows have 28 ha of long term grazing mixtures for day and night grazing and a further 24 ha are in short term (normally two years) hybrid and tetraploid mixtures for silage. The youngstock graze the remaining 16 ha of grassland. The grazing ground receives 300-500 kg per ha nitrogen during the season with the first application in early March. Normally a grazing type compound is used. The 24 ha set aside for conservation receives a split application totalling 145 kg per ha nitrogen and 25 kg per ha each of P_2O_5 and K_2O plus 28 m^3 per ha slurry. Only about 16 ha are cut a second time and this receives 125 kg per ha nitrogen, along with 20 kg P_2O_5 and 75 kg K_2O per ha. Kale is used for late season grazing between September and November.

Around 140 mainly Holstein cows are carried with an average yield of just over 7000 litres. Concentrate usage is 0.27 kg per litre giving an M.O.C. of £781 per cow and a margin over purchased feed of £760 per cow. Mr. Mitchell does all his own AI and is currently achieving a 70% conception rate to first service and a calving interval of 369 days.

There are approximately 100 dairy followers carried and all bull calves are retained. These are reared on warm acidified milk to 6 weeks and are on weaner pellets to 12 weeks. They then go on to an *ad lib* barley ration and are implanted with a growth promoter every 90 days, going for slaughter at 10-12 months of age. This leaves a return of £375 per head on a dead weight basis giving a gross margin per animal of £125. Heifer calves are in a similar rearing system to 12 weeks of age then go on to a hay and barley mixture diet.

Fans (Mr. G. Stewart). In contrast to the morning visit the tour of Fans provided members with an opportunity to see an extremely well run traditional Borders arable and stock farm. The farm lies between 100 m and 200 m above sea level in rolling Borders countryside and extends to 510 ha. Cropping consists of 112 ha spring barley, 33 ha winter barley, 50 ha winter wheat, 20 ha seed potatoes, 15 ha swedes, 134 ha rotational grass and 48 ha permanent pasture. There are also 98 ha of rough grazings, mainly being undrained bogs.

There is a herd of 152 suckler cows mainly calving from October to December, although 40 calved in the March-April period. A proportion of these nurse twinned calves. There are a further 150 store and feeding cattle which are fattened off during the winter on a silage based diet, with the aim of selling finished cattle at about 18 months of age.

A flock of 830 half bred ewes is also run achieving a lambing percentage (ewes tupped to lambs sold) of 179%. A clean grazing system is operated and the aim is to carry at least 15 ewes and lambs per ha. Lambing commences on 20th March and fat lambs are available for sale from July onwards with the swedes being used to finish off the last of them. Ewes are flushed on the new seeds and also on 40 ha of Italian ryegrass grown as a catch crop.

Rotational grass is normally down for three years, with sheep grazing in the first year, conservation in the second year and cattle during the third year. The secret in operating the clean grazing system successfully is to get the balance between sheep, cattle and conservation right. Because the fields tend to be large (average size about 16 ha) it is necessary to sub-divide the fields when grazing and this is done with mains powered electric fencing. Grazing grass normally receives 60 kg/ha nitrogen in early spring followed by a further 60 kg about six weeks later and the same again about 6 weeks after that, giving a total of 180-200 kg nitrogen in season depending on growth.

Silage is cut with a precision chop harvester, wilted, and an additive is always used. The first cut receives 125 kg per ha nitrogen and 20 kg per ha P_2O_5 and K_2O. The second cut receives 130 kg per ha straight nitrogen.

There is normally a five year arable break, with spring barley the first crop after grass, and then variations of cereals, potatoes and roots, with new seeds being undersown in spring barley. The farm employs seven men including a full time mechanic.

The Society is indebted to both Tom Mitchell and Graham Stewart for giving members such an interesting and informative day. Thanks also go to their respective wives for the extremely welcome refreshments provided at both farms. - I.R. Fraser.

DAY VISIT TO DUMFRIESSHIRE

A day visit by the CSGS to Torrorie, Kirkbean, 12 May, 1983.

With a total of 1040 hectares tenanted, Mr. Chris Mason was able to show members a fully integrated farming unit, from silage growing at sea level to Blackface ewes running on Criffel at 575 m. At Torrorie 44 ha of barley are grown, some of which is fed back to stock and the remainder is sold. Eight ha of turnips are grown for fattening lambs with 28 ha of silage being cut twice, most of which is fed to the dairy cows. Around 8 ha of quality hay are cut in July after being shut up when the suckler cows move to higher ground in late spring. There are 36 ha of rotational grass and another 108 ha of permanent pasture mainly for suckler cows and ewes. About 8 ha are direct reseeded each year using either Sinclair McGill's Progress or TR83 mixtures. The remaining 800 ha are rough and hill grazings.

The dairy herd comprises 120 pedigree Ayrshire cows calving mainly in autumn. 50 of these are bred pure to provide herd replacements, with the bull calves sold at birth. A further 45 dairy cows are crossed with the Hereford and the calves are reared on to be sold as store cattle at about 18 months old. The 25 dairy replacement heifers are in calf to the Shorthorn bull to provide heifer replacements for a 60 strong Ayrshire x Shorthorn suckler herd. The suckler cows are mainly spring calving, in-calf to a Hereford bull and are sold at about 12 months of age.

The dairy cows are loose housed in straw bedded courts with mechanical scrapers used on the feed stances and the store cattle are housed on high level slats converted from traditional barns, and also on low level slats in a lean-to shed.

The dairy cows are currently yielding around 5200 litres on 1.5 tonnes of concentrates giving a margin over concentrates of £546 per cow. The aim is to keep a cow on 0.4 ha to provide grazing, silage and home grown barley and in the year to 30 April 1982 utilised metabolisable energy for cow grass was 74 GJ/ha.

Grazing ground receives about 82 kg nitrogen per ha in the spring and around the end of May receives 72:12:12 as a compound. Thereafter no further bagged fertilizer is applied, the aim being to maximise the contribution of clover nitrogen. Silage ground receives 110:18:18 for the first cut plus slurry and for the second cut 75:22:45. No nitrogen is applied to aftermaths. Hay ground receives a similar fertilizer application to first cut silage.

Members were particularly impressed by the high levels of output achieved from very modest fertilizer inputs, and the quality of the grassland did Mr. Mason great credit. The Society was most appreciative of the welcome and of the time taken to show them round Torrorie. - I.R. Fraser.

EVENING WALKS

Evening walks organised by local committee members of SWSGS, summer 1982.

Dumfriesshire	:	Castlehill, Moniaive, Thornhill by courtesy of J. Renwick Esq. (14 July).
Kirkcudbrightshire	:	Torkatrine, Dalbeattie by courtesy of I.D. Houston Esq. (22 July).
Ayrshire	:	Daldowie, Pinmore, Girvan by courtesy of A. Kyle & Sons (10 August).
Wigtownshire	:	Garthland Mains, Lochans, Stranraer by courtesy of J. McColm Esq. (12 August).

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

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

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Printed by W.J. Ross, Repro Services, 90 West Nile Street, Glasgow G1 2QU