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FOREWORD

At the time of writing this foreword the wet weather which started in June 1985 was still plaguing the farming industry. If any spring ever needed to be fine and the grass early, it was this year, but alas it has proven not to be. The true effect of the sward damage and soil compaction of last summer/autumn is now becoming only too evident and it will be several years before many fields can throw-off the legacy of 1985.

This, on top of the many other difficulties which have beset farming in recent months does little to generate confidence in our industry. However, agriculture has weathered the storm in the past and with grit and determination it will do so again.

Despite all the difficulties, the importance of grassland as a key pivot in the farming system has remained. Two main items in this issue of Greensward discuss the interesting topics of silage protein and the developments in grassland farming, both worthy pointers to more efficient use of grass.

That West Scotland has a considerable reputation for its grassland farming is evidenced by the British Grassland Society visit to this area in July, and jointly hosted by our two Societies. Hopefully there will be good support from Society Members to welcome our guests. The theme of the meeting is 'Scotland Goes for Grass'.

During the past year your Editor has been seconded to the administration unit linked to Scottish Agricultural Colleges (SAC), the new company formed conjointly by the three Scottish Agricultural Colleges. This development has been necessitated by a need to rationalise research and development work and to meet the swingeing 41 per cent cut in advisory services' funding being imposed upon the Colleges. In order to offset this reduction in income, the Colleges' will be required to introduce charges for advice to farmers and growers in 1987 although matters pertaining to animal welfare, rural diversification, pollution and countryside conservation by Ministerial pronouncemen will remain free of charge. SAC intend to offer an efficient and compet tive advisory service based on its immense experience and wide-ranging specialist back-up facilities and remains devoted to the cause to encourage and service a healthy Scottish farming industry.

As a result of my absences, many have contributed to the production of this edition of Greensward and to all concerned, many thanks. The Societies record their gratitude to Mrs I Robinson for typing the manuscript and to the Advertisers, as listed on the last page, for their continued support.

Ronald D Harkess - Editor

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THE UTILIZATION OF SILAGE PROTEIN

Dr P.C. Thomas

The Hannah Research Institute, Ayr

A Meeting of the SWSGS at The West of Scotland Agricultural College, Auchincruive, Ayr, 25 February 1985

In the wake of the introduction of milk quotas there is a progressive movement towards low-cost systems of milk production involving a reduced use of purchased concentrates and an increased reliance on grazed and conserved forages. The potential of silage as a 'production feed' is now widely accepted, and whilst individual farmers must by necessity adopt a silage system which is workable within the constraints of their own particular farm, many are attempting to obtain as high a proportion of the cow's winter feed as possible from silage.

Energy intake is the first regulator of milk production in the dairy cow and understandably a great deal of emphasis has been given to maximising energy intake from silage. Advice to farmers, based on a wide range of experimental studies, has been simple and clear : cut crops at an early stage of growth to achieve high D-value and ME content; optimise the ensilage process to achieve satisfactory efficiency of conservation and silage fermentation quality; and reduce the cow's concentrate allowances to allow the intake potential of the silage to be fully exploited.

Milk production is also regulated by dietary protein supply but practical recommendations about silage production and feeding with regard to protein have been less clear cut and more qualified, reflecting the complex and sometimes confusing picture which has been emerging from recent research.

This paper briefly summarises relevant features of the utilization of dietary protein in the dairy cow and considers the implications in relation to the production and use of silage diets for milk production.

PROTEIN UTILIZATION IN THE COW

Most dietary protein sources are extensively degraded in the cow's rumen with the production of amino acids and ultimately ammonia which are used as starting materials for the synthesis of microbial protein (Figure 1).

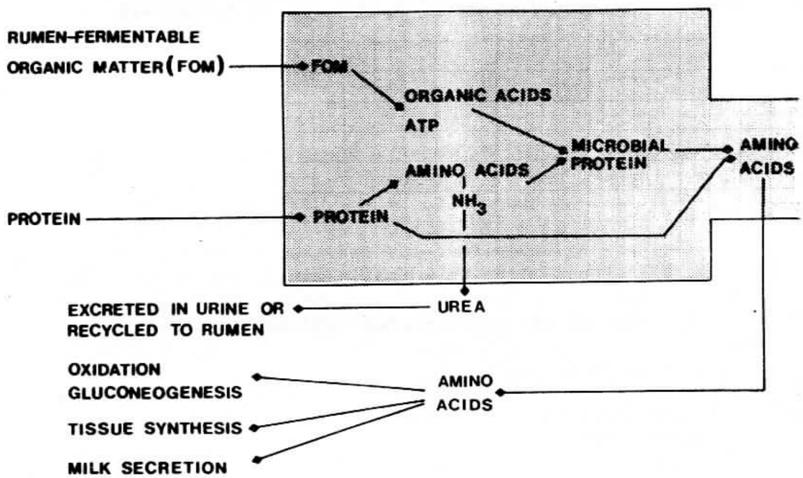

Figure 1. A schematic outline of the digestion of dietary protein in the rumen and small intestine of the cow. Protein degraded in the rumen to amino acids and ammonia represents the rumen-degraded protein (RDP) fraction of the diet, whilst that passing undegraded to the small intestine represents the undegraded dietary protein (UDP) fraction.

The extent of the degradation varies with the protein source. For soluble proteins the rumen degradable protein (RDP) component may be over 80% of the total protein whilst for resistant, insoluble proteins RDP values may be less than 40%, and under these circumstances there is a substantial passage of undegraded dietary protein (UDP) to the small intestine. The UDP together with the rumen-synthesised microbial protein provides the cow with amino acids which are absorbed and used for milk and tissue synthesis, for glucose formation and for other purposes.

Microbial protein synthesis in the rumen is a dynamic process and its efficiency depends on the rumen micro-organisms (mainly bacteria and protozoa) being presented with a balanced supply of nutrients. Thus the release of amino acids and ammonia from dietary protein sources should be matched by a corresponding supply of energy and organic acids. The latter are derived from the rumen-fermentable organic matter in the diet and also provides most of the dietary ME. Imbalances in protein or energy supply arising either from adverse dietary RDP:ME ratios or from disparities in the rates of release of RDP and ME in the rumen have significant consequences. Where there is excess RDP ammonia is absorbed from the rumen and converted to urea in the cow's liver; some urea is recycled to the rumen but a large part is wastefully excreted in the urine. Where there are deficiencies in protein supply microbial growth is restricted and the ruminal breakdown of organic matter is impaired, leading to reductions in the effective ME content of the diet and in forage intake.

The amount and type of protein in the diet thus has important effects both in optimizing digestion in the rumen and in influencing the animal's amino acid uptake in the small intestine - adequacy in RDP and UDP supply should therefore be regarded as a prerequisite for the efficient utilization of ME. Furthermore, evidence suggests that in the dairy cow imbalanced diets with a high uptake of ammonia from the rumen impair the synthesis of glucose in the cow's liver. Glucose is essential for the production of milk lactose, and an inadequate supply of glucose to the udder would inevitably lead to a reduction in milk yield.

THE CONTENT AND COMPOSITION OF CRUDE PROTEIN IN SILAGE

Since there is normally little loss during conservation, the protein content of a silage closely reflects the protein content of the grass from which it is made. However, for silage samples submitted to advisory laboratories for analysis, protein contents vary from around 100 to 220 g/kg DM indicating the wide range of values that can occur in practice. Protein contents are affected by the variety of grass that is grown, by fertilizer application, by growing conditions and by stage of growth, and they are difficult to predict with precision. Moreover under west of Scotland conditions the changes with stage of growth can be very rapid. In early-heading grass varieties coming up to first harvest protein content can be reducing by 5 g/kg DM per day during a period when D-value is reducing only slowly. A few days delay in cutting can thus make a substantial difference to the protein content of a 70D silage!

Of the crude protein (nitrogen x 6.25) in the standing grass crop approximately 85% is present as true protein and the remainder consists of various non-protein nitrogen (NPN) compounds and a little ammonia (generally < 2%). When the crop is cut, plant enzymes begin to hydrolyse the true protein to amino acids, increasing the NPN content. This effect is clear from chemical analysis but is not of major concern unless the wilting period is prolonged. Much more extensive hydrolysis of protein occurs in the silo when the NPN content of the crop may typically be increased to 40-60% of the total crude protein. Most of this NPN represents free amino acids or small residues containing several amino acids, though even under good ensilage conditions there is some animo acid breakdown to ammonia. By convention, well-fermented silages have been considered to contain less than 10% of their total nitrogen in ammonia form, and higher values have been taken as an indication of clostridial activity, poor lactic acid production and low intake potential. This view is only partly true, however, and recent evidence suggests that high levels of ammonia can be produced, with adverse effects on silage intake, in silages that have satisfactory pHs and lactic acid contents. The action of coliform bacteria in the silo appears to be responsible for these effects.

DIGESTION OF SILAGE PROTEIN

For silages made without additive or with commercial acid or acid-formalin additives, protein degradability values of 76-83% have been determined by incubation of samples in polyester bags suspended in the rumen. An RDP value of approximately 80% of the total crude protein can therefore probably be regarded as typical of most farm silages. As might be expected from this high degradability, consumption of silage gives rise to pronounced post-feeding peaks in rumen ammonia concentration. The size of these peaks varies with the protein content of the silage, or more precisely with the RDP:ME ratio, but with virtually all silage diets there is a post-feeding phase when there is net absorption of ammonia from the rumen.

Because of the low energy yields that the rumen bacteria derive from silage fermentation products like lactic acid, microbial protein synthesis in the rumen of animals given unsupplemented silage diets is low, around 144 g/kg of rumen-fermented organic matter. Supplementation of the silage with concentrate feeds may improve this value to around 188 g/kg of rumen-fermented organic matter, but the evidence available indicates that even with supplemented diets of moderate protein content there are substantial 'losses' in protein between that presented in the feed and that passing to the small intestine. As a consequence amino acid supply to the small intestine can become limiting for milk production and under these circumstances the 'first-limiting' amino acids are inevitably methionine and lysine.

SILAGE-BASED DIETS FOR MILK PRODUCTION

Silage production

For typical low-cost systems for milk production based on the use of 68-70D silage and low protein cereal based supplements, the silage protein content needed to meet recommended RDP requirements is approximately 140 g/kg DM, and that protein value can be regarded as a minimum target for silage production. There are of course good economic reasons for obtaining as much of the dietary protein as possible from silage but the fact that the protein content of grass is difficult to estimate from a visual assessment of the plant's stage of growth presents something of a barrier to the consistent production of high-protein silage crops. One solution to the problem is to chemically analyse samples of the sward pre-harvest and to set the cutting date on the basis of protein content rather than assessed D-value, and a commercial analytical service designed for that purpose is now available in some parts of the country. Cutting dates determined in this way are generally slightly earlier than would be chosen on the basis of assessed D-value, and this may lead to benefits in conservation since the protein in the more immature crops is less susceptible to breakdown in the silo.

Controlling silage fermentation with high-protein crops can nevertheless present problems and it is generally advisable to use an appropriate silage additive. Applied at recommended rates, formic acid and sulphuric acid additives are generally effective. However, high rates of formic acid should be avoided since with immature high-protein crops there is a danger of suppressing the growth of lactobacilli and allowing coliform bacteria to become established, leading to high ammonia levels. Acid-formaldehyde additives may also be used to good effect. The formaldehyde reacts with the grass protein 'cross-linking' the molecules and reducing their breakdown in the silo, and potentially in the rumen also. Technically this provides a means of reducing the rumen-degradability of silage protein and increasing the silage UDP content.

The effects of formaldehyde on silage NPN and ammonia-nitrogen contents have been demonstrated experimentally over a wide range of dose rates. However, it should be noted that low rates of formaldehyde application fail to 'protect' silage protein from ruminal breakdown and produce no benefit in protein passage to the small intestine. This is important because the commercially available silage additives are of the low-formaldehyde type.

Milk yield reductions may occur with high-protein grass silage diets, and if this is the case low rates of formaldehyde application at ensilage could alleviate the situation by reducing the rate of ammonia absorption from the rumen during the immediate post-feeding period. However, such benefits from formaldehyde have yet to be demonstrated experimentally, and with grass silage diets containing approximately 145 g crude protein/kg DM responses to inclusion of formaldehyde in the silage additive have been small.

The recently introduced biological silage additives based on bacterial inoculants and enzymes have few special features with regard to silage protein other than those that arise through a general improvement in silage fermentation. Exceptions are the additives containing protease enzymes, use of which should be avoided.

Supplementation of silage

The traditional view that grass silages should be supplemented with low protein cereal-based feeds was soundly challenged in the mid and late 1970s. During that period a number of experiments showed that supplementary protein feeds led to responses in milk production in cows receiving silage diets which were nutritionally adequate as judged by the then accepted digestible crude protein standards. See Table 1.

Table 1. Silage intake and milk production in cows given grass silage ad libitum with various supplements (Data is from Castle and Watson (1975))

	Supplement				
	None	Barley	Groundnut cake	Barley + groundnut	SED
Supplement intake (kg DM/d)	0	4.7	1.5	4.7†	
Silage intake (kg DM/d)	10.8	8.6	11.6	9.3	0.28
Total intake (kg DM/d)	10.8	13.3	12.6	14.0	0.27
Milk yield corrected to 4% fat content (kg/d)	15.2	17.9	17.7	19.1	0.51

† Groundnut cake 0.8 kg DM/d

Barley supplements were shown to lead to a pronounced reduction in silage intake but similar reductions were not obtained when small allowances of protein concentrate feeds were given, and these feeds were also effective in offsetting the adverse influences of the barley supplements. Milk production was shown to be greater with supplements of protein concentrates and with barley-'protein' mixtures than with supplements of barley alone. As a consequence of these findings there was a general move to use higher allowances of protein feeds to supplement silages, and to increasingly regard the nutritional value of silage protein with suspicion.

The responses to supplementary protein feeds tended to be rather variable between experiments because the responses arise through a complex of mechanisms involving changes in digestion in the rumen and amino acid supply to the small intestine. Protein feeds can increase the ruminal digestion of dietary organic matter, raising the effective ME content of the diet and promoting an increase in silage intake. Also they can increase the passage of UDP to the small intestine enhancing amino acid supply and amino acid use for milk and tissue synthesis, and this again may give rise to an associated increase in appetite. The balance in occurrence between these two separate but interrelated effects depends on the RDP and ME contents of the silage and on the rumen-degradability and amino acid composition of the protein supplement. Many of the diets used in experiments such as that shown in Table 1 were in fact marginal in RDP by present day standards and the intake and milk production responses observed could probably be explained largely by 'ruminal' effects. With diets of higher RDP content responses in milk production would be expected to occur mainly through influences on duodenal amino acid supply, and they would be greatest with protein sources of low rumen-degradability and high methionine and lysine content (reflecting the fact that these amino acids are the 'first-limiting' ones). This hypothesis can be tested experimentally by comparing the cow's responses to a relatively highly-degradable vegetable protein source, such as soya bean meal, with low-degradability fishmeal. The results of such an experiment are shown in Table 2. As anticipated, at low rates of protein supplementation both soya and fishmeal increase silage intake and milk production but responses to the fishmeal are more pronounced at the higher levels of protein inclusion in the diet.

Table 2. Feed intake and milk production in cows given silage ad libitum and various supplements. (Hannah data)

		Supplement				
	Barley≁	Barley + Soya LP≁≁	HP	Barley + Fishmeal LP	HP	SED
Supplement intake (kg DM/d)	7.85	7.75	7.86	7.84	7.78	
Silage intake (kg DM/d)	7.67	8.36	8.73	7.98	9.02	0.51
Total intake (kg DM/d)	15.2	16.11	16.58	15.81	16.91	0.50
Milk yield (kg/d)	20.3	21.8	21.9	22.9	24.0	0.32
Fat (g/kg)	41.3	40.5	36.0	37.6	39.9	1.2
Protein (g/kg)	28.8	29.2	30.6	30.1	29.9	0.5
Lactose (g/kg)	50.5	49.2	48.8	48.2	48.0	0.5

≁ Barley concentrate 129 g CP/kg DM. Protein concentration of barley-silage diet was approximately 134 g/kg DM.

≁≁ LP, low protein concentrate, approximately 180 g CP/kg DM.
HP, high protein concentrate, approximately 220 g CP/kg DM.

The question of whether responses corresponding to those obtained with fishmeal can be obtained using alternative, lower-cost feeds remains to be fully answered but several lines of research are being followed with some success. Initial experiments conducted at the Hannah Research Institute were designed to reduce the rumen-degradability of soya bean meal supplements by 'cross-linking' the protein with formaldehyde but did not lead to benefits in animal performance. However, in more recent studies a similar technique has been applied to the barley component of the concentrate mixture. This has the advantage that it not only lowers the rumen-degradability of the protein but also 'cross-links' the cereal starch slowing its rate of fermentation in the rumen and reducing the adverse effects of the supplement on silage intake. Results obtained using this procedure have been promising, the effects on animal performance corresponding to those obtained with inclusions of approximately 1.0 kg/d of fish-meal in the diet.

Other approaches that are being pursued at the Hannah Institute include the development of specific amino acid supplements, protected from degradation in the rumen, and sugar supplements designed to enhance ammonia capture and microbial protein synthesis in the rumen and designed to deliver the amino acids directly to the small intestine.

In digestion experiments sugar supplements have been shown to be effective in reducing rumen ammonia concentrations but the technology of these types of supplements is still in the process of evolution and their composition has taken the inclusion of approximately 1.75 kg of a sugar supplement in the diet in replacement for barley led to a slight reduction in silage DM intake and a loss in milk yield with three silages with protein contents ranging from 149 to 182 g/kg DM but intake and animal performances were unaffected with a fourth silage containing 237 g crude protein/kg DM. Protected amino acid supplements have been manufactured using industrial encapsulation technology, and in recent dairy cow experiments promising results have been obtained with supplements containing combination of methionine and lysine, although milk production responses as large as can be obtained with fishmeal have yet to be achieved.

Discussion

Additives containing a high level of acid maintain the level of true protein in the silage as it prevents its breakdown. Alternatively, an additive containing formaldehyde can also prevent protein breakdown as it is chemically linked to the protein. However, this is only part of the story because, even if protected in the silo, there is still the problem of breakdown in the rumen. Formaldehyde applied at 30 g/kg protein can increase the protein flow into the small intestine by around 30%. However, silage protein is low in methionine and cystine so although there is a greater flow it is still not the best amino acid make-up and with dairy cows there is no evidence of consistent improvement in milk yield from such treatments. Soya protein can be protected with formalin but it is still deficient in methionine and lysine and again no yield response to the technique. The cereal portion can also be protected by formalin as it slows down the rate of fermentation. The ideal level of true protein in silage is in the order of 16-17% because if it is too high it is more difficult to control the silage fermentation.

Growing grass is low in methionine and lysine. For example, it contains only 16 g of methionine per kg dry matter (DM). Rumen microflora contain 25-30 g/kg DM and the microbrial synthesis in the rumen produces both methionine and lysine. Fishmeal, although it gives a yield response, is perhaps not the best supplement for dairy cows and in trials, modified barley was just as good.

A build-up of ammonia in the rumen is an undesirable factor and should be avoided. Protected protein in the ration, however, has given liveweight gain responses ranging from -20 to +80%!

Is barley the best supplement for dairy cows? No, in theory barley is a bad supplement and it has a high replacement rate of silage (1 kg barley DM replaces around 0.5 kg silage DM), but it is the feed most readily available to the farmer. The compounder does use other ingredients in his concentrates. Molasses as an energy source has looked good in experimental feeding trials but in commercial trials, has been disappointing.

Should we be considering no concentrates at all? Yes, and it can be done. ICI at Dairyhouse have produced 5000 litres plus on an all-grass diet, ie grazing and silage. This is above the current national average so it shows what can be done, but it may be necessary to break the grass barrier with such crops as white clover or lucerne. Also, it may be necessary to go for lower D-value silage and offer extra sugars to improve the D-value "in-silo" by the addition of some special additives. At present, to make best quality silage, grass should be cut when it is ready for grazing, but such herbage is low-yielding and is difficult to ensile.

How is the cereal treated? With a mixture of acetona and formaldehyde applied at 8-15 litres/tonne. Roll the barley then treat, store for two days before feeding. Ideal application rates are still under investigation.

With silage high in non-protein nitrogen (NPN), is it better to supplement with starch rather than with protein? Yes, it is probably advisable. Sugars such as molasses also give an intake boost.

What is the effect of wilting on silage? Nutritionally it makes little difference provided the fermentation is good. Stock do eat more wilted silage but do not necessarily produce more milk. Wilting the crop does expose it to weather but wilting may have to be considered to avoid pollution problems from silage effluent. There is much recurrent interest in the feeding of silage effluent to stock. It is a very dilute product but 20 litres of effluent can have a similar feed value to 1 kg/barley. One of the major problems is cost of storage.

Where silage effluent can cause problems, various absorbents have been tried to reduce the flow from the silo. One of the most common additives is straw. It is layered at the bottom of the silo before filling commences, but in very wet conditions this will only reduce effluent flow by a small amount.

Do we really need additives? Additives are expensive and if you can do without that is very good. However, with our uncertain climate it is difficult to consistently produce good quality silage. Therefore additive use is essential for regular production of well fermented silage.

Is it advisable to wait until the afternoon before cutting in order to allow the grass to build up more sugars? With perennial rye-grass which is usually high in sugars this is of less importance. Where additives are used, it is also less important and in practice it is not worth waiting until the afternoon. However, it may be appropriate to wait if the crop was particularly wet in the morning.

From the farming press, high forage intakes are frequently quoted from the United States. Why is this so? The diets in the States are frequently based on corn feeding and lucerne but the silage making technique and knowledge is general are equal to and certainly no better than in the UK. However, the strain of cows in the United States has a high intake ability and so better yields are obtained.

GRASS FOR PROFIT : A PANEL NIGHT

Mr Andrew Barr	Heatheryhall, Thankerton, Biggar
Mr Douglas Kerr	Crochmore, Crocketford, Dumfries
Dr Basil Lowman	East of Scotland College of Agriculture

A meeting of the CSGS held at the King Robert Hotel, Bannockburn, 27 February 1986

Mr Andrew Barr - Heatheryhall, Thankerton

Heatheryhall was purchased in the 1940's and extends to some 227 ha lying between 180 and 300 metres above sea level. Annual rainfall is about 875 mm. Current cropping is 40 ha barley, 65 ha of silage and hay and 9 ha of swedes with the remainder of the farm down to grazing. Around 43 ha of marginal grazing has been reclaimed in the last few years being put through a pioneer crop of rape. A further 16 ha remains to be reclaimed by this method.

Around 80 Angus x Friesian heifer calves are purchased annually in the period from August to October, and these are reared on to sell as calving heifers at about 2 years 8 months. They are normally in calf to a Blonde D'Aquitaine bull. In addition to these cattle about 70 stores are also purchased annually. In the first winter the bucket-reared heifer calves receive a ration of 3 kg per day of a barley, sugar beet pulp, soya bean mix in addition to *ad lib* silage, the concentrate mix being fed three times per day. In the second winter the bulling heifers are fed *ad lib* silage. The main principle is to winter the cattle as cheaply as possible and make maximum use of quality silage.

In addition to the cattle a flock of 400 cross-bred ewes are also run along with 30 cross Texels. The cross-bred flock has been involved in the West College's lowground sheep development project for the past four years, in an effort to try and improve the performance of the lambs. Initially treating the lambs with copper and cobalt was tried but this had little effect on growth rates. Management of the ewes starts at speaning time when the ewes are condition scored. The fat ewes are then sent to the poorer grazing. Ewes are scored again a month before tupping and the aim is to have them at condition score 3 by the time they go to the tup, rising to 3½ by the time the tups are withdrawn. Lambing percentage last year was 176 which is a considerable improvement on the 150% being achieved five years ago.

Lambing starts on 7 April, having been held back from 15 March largely because of the sheep meat regime. It now pays to keep lambs and fatten them off swedes rather than selling fat from grass. Ewes are fed 0.5 kg per day of a 12½% CP mixture of barley, fishmeal and soya bean meal and this is increased to 16% CP at lambing. Lambing is indoors with ewes being watched 24 hours per day.

Stocking rate is currently around 16.8 ewes and lambs per ha on the lowground and about 12 ewes and lambs per ha on the hill. Fertilizer use aims to supply 13 kg nitrogen per ewe through the season with the first application of 75 kg per ha being applied at soil T value 100 (generally around mid March). The remainder of the fertilizer is applied throughout the grazing season as a 29:5:5 compound.

Silage ground is cut once, but is not shut up until mid April. The aim is to make 60+ D value silage which provides a cheap, bulky winter feed. This season 20 ha of silage ground was treated with poultry manure.

Around 1450 lambs are fattened off swedes and grass with as little concentrate as possible. About 300 ewe lambs are away - wintered, and are put to the tup which helps pay for the wintering.

Current Gross Margin per ewe is £34 or £582 per ha.

Mr Douglas Kerr - Crochmore, Crocketford

Having had a period as a technical representative with SAI, Douglas went home to the family farm in 1975 when the neighbouring farm of Merkland Wells was taken over. At that time there were 90 dairy cows on self-feed silage and these were run along with 150 blackface ewes and 40 suckler cows. The decision was taken to eliminate the beef cow enterprise and double dairy cow numbers. A new unit for 120 cows was designed for easy management in the hope that it would attract a good dairyman to look after it. At the time the unit was built for £500 per cow.

The policy has been to go for pedigree Holstein cows because of their production potential and all cows are now fully registered. Do-it-yourself is practiced with a 65% conception to first service and a calving index of 360-375 days.

All bull calves are retained and put into a bull beef unit with an average price of £475 being received at 12 months of age.

Feeding is the major cost of milk production, and a complete diet is fed from a mixer wagon. This suits the block calving pattern, with the main calvings being from mid October to late December. The cows are fed for 23-25 litres production outside the parlour, and no more that 5 kg of concentrate is fed in the parlour. The concentrate added to the complete diet is :

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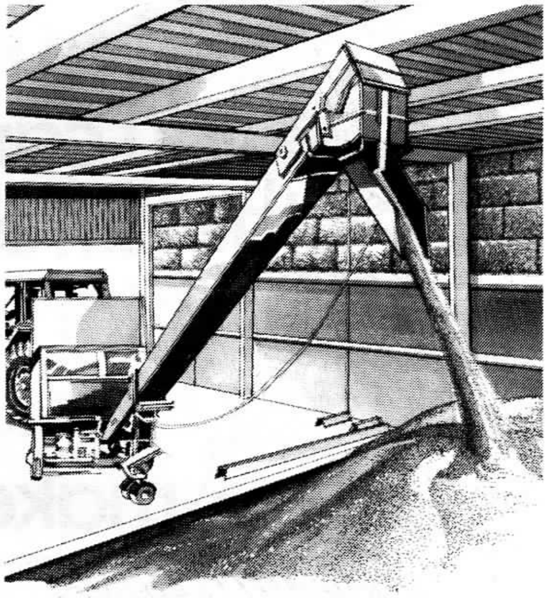

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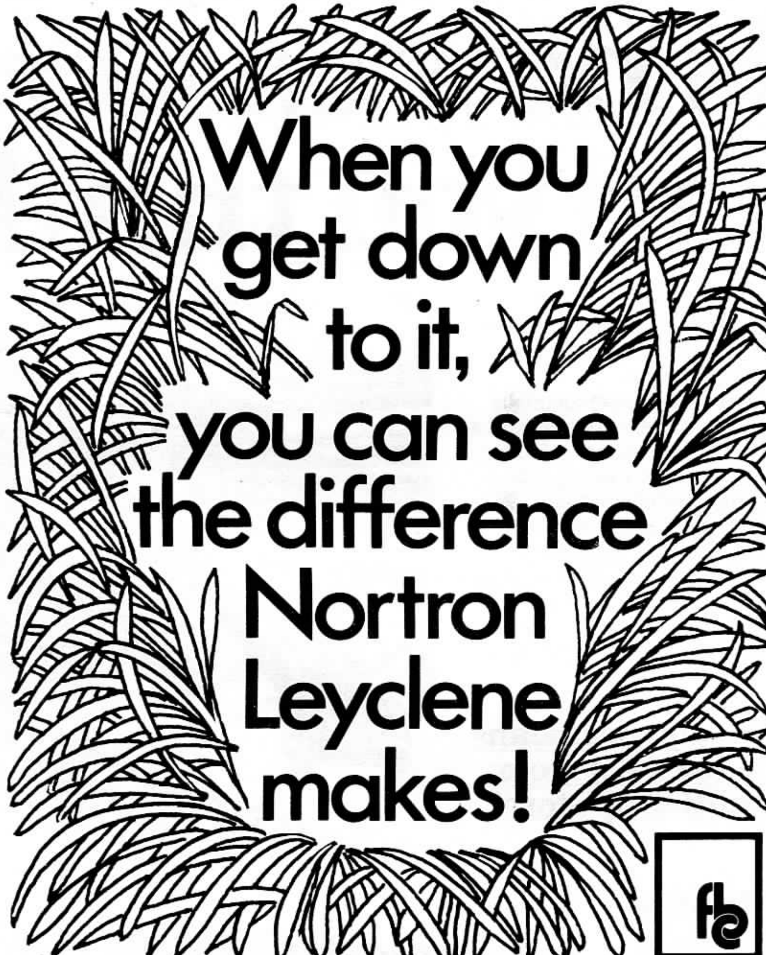
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you can see
the difference
Nortron
Leyclene
makes!
fbc

Ingredient	kg per head	Cost/tonne
Molasses	1.6	63
Sugar beet pulp	2.0	106
Maize Gluten Feed	2.0	107
Maize Grain	2.0	108
Fish Meal	0.6	275
Total	8.2	£111.50

This gives a mix of 12 MJ/kg DM and a CP of 18% in the dry matter. The maize products can be interchanged if one is in short supply and fishmeal is added as a source of undegradable protein.

Sugar beet pulp is added to the silage at ensiling to soak up some of the effluent. Most ingredients in the ration are purchased during the summer when they are at their cheapest.

In summer the cows are set stocked with 30 litres milk per day being taken from grass and this is reduced by roughly 5 litres per month. Fat coated sugar beet pulp is fed at grass during the summer. The aim will be to make 5000 tonnes of silage this coming year (1986).

Grass is cut with a 2.5 m Claas mower with two rows put into one and lifted with a JF 110 forager which has found to be more power-efficient than the old engine mounted Claas forager. Add F has been applied to all silage, but Add Safe is to be used in the coming year. A breakdown of the silage costs shows that it is far from being a cheap feed.

COST OF SILAGE

		£/ha		
Rent	(Grass cut)	250		
Fertilizer	(0.5 tonne)	175		
Grass establishment		55		£/tonne
Yield 35 t/ha		480	=	13.70
Harvesting				3.50
Additive				1.20
Sheeting				0.10
Removal of silage from clamp				1.00
				£19.50 per tonne

Capital requirements are also very high and at Crochmore these total in the region of £70,000 at today's prices giving an annual interest charge of £10,500 and a depreciation charge of a further £10,500.

Current dairy herd costings for the two herds are :

	Number of cows	Milk rates (l/cow)	Concs. (t/cow)	Concs. (kg/litre)	MOC
Merkland Wells	126	6984	1.86	0.27	878
Crochmore	172	6450	1.75	0.27	832

Dr Basil Lowman - East of Scotland College of Agriculture

Currently in most grass based beef systems 60% of the feed is grass of which 31% is grazed and 29% is conserved forage. The idea is often put forward that the farmer who makes silage is "efficient", but this has to be examined more closely.

Table 1. Potential Production from Grazed and Conserved Grass.

	Silage	Grazed
Production (Tonnes OM/ha)	24-30	18
Harvested (Tonnes OM/ha)	12-15	9-10
ME per kg OM	11.5 (68 D value)	12.8 (75 D value)
ME Harvested (GJ/ha)	138-172	115-128
ME Fed (GJ/ha)	117-146	115-128

To cover the extra fixed costs associated with silage there has to be at best an 8% bonus in favour of conservation. Therefore, work is now being carried out to look at ways of achieving greater efficiency and greater profitability from grazing systems. A good grazing system requires to be FLEXIBLE and to MINIMISE RISK. There will always be variation in animal performance, but grazing systems can still be manipulated either by varying the number of animals on a given area of land or by varying the area of land for a given number of animals.

One such system which uses these principles is buffer grazing, where the grazing area is varied according to the performance of stock and the rate of grass growth. If and when surplus grass is available it is taken out for hay or silage. This flexibility can easily be achieved using the electric fence although cattle have to be trained to respect this before the system will work properly. The aim of the system is to achieve a continuous supply of high D grass every day throughout the year.

Target stocking is 2.5 tonnes of animal liveweight per ha in spring, eg 10 steers at 250 kg or 4 cows at 600 kg. Fertilizer is applied 0.1 kg per ha for every kg of beef stocked on the grass and is applied regularly throughout the season. At the East College five applications are given with 25% of the total in March, 20% in May, 20% in June, 20% in July and 15% in August.

The question then arises of when to cut the buffer. Generally this should be early whilst growth is still rapid, and the crop should be treated as a bonus - not part of the winter feed requirements. In some seasons the buffer conservation yield may amount to very little. The aftermath should always be added back to the grazing area. The results from the buffer grazing work at the East College are summarised as follows :

	Control	Buffer system
Stocking weight (kg)	2150	3150
Liveweight gain (kg/head)	0.8	0.91
Gross Margin per ha	816	857
Buffer dry matter conserved	0	2
UME/ha	55.5	72.5

This concept has now been developed into the "Edinburgh Grass Beef System" which involves purchasing Hereford x Friesian steers at about 1 week old in January (approximately 55 kg). At the beginning of the grazing season priority is given to finishing cattle (ie those 12-15 months old), and these are sold June-August. Any cattle not ready to be sold fat in August are sold store. The young calves are grazed very tightly at the beginning of the season (up to 27 per ha) when their turnout weight is around 135 kg. As cattle are finished off the system so the "followers" are given more grass to graze, hence the reason that all finished cattle must be off by August as the younger cattle then require all the grass that is available. At housing in October these cattle should weigh 250 kg, and during the winter they are fed a ration of straw (1 tonne approximately) and 4 kg per day of a mixture of 5 parts barley and 1 part soya bean meal with minerals. The target turnout weight is 380 kg with a slaughter weight off grass of 490 kg (carcass weight 265 kg).

An example of financial results from the system is given below :

			£/head
Output			
Sales	: 490 kg @ 107p/kg		524
Less	: calf cost and mortality		130
			394
Variable Costs			
Calf rearing	: 15 kg milk substitute	12	
	250 kg concentrate	41	
Store winter	: 600 kg barley	60	
	120 kg soya bean meal	20	
	1 tonne straw (feed & bedding)	25	
Grazing	: 0.25 ha	35	
Vet, medicines and haulage		15	208
Gross Margin per head			186
Gross Margin per hectare			744

Discussion

The panel were asked whether they used straight nitrogen for their grazing grass or whether a compound was applied. Andrew Barr used a 29:5:5 compound throughout the season, and with the returns from sheep, reckoned this supplied sufficient phosphate and potash. Douglas Kerr used straight nitrogen at the start of the season, but then switched to a compound, aiming to give 50-60 kg per ha each of phosphate and potash over the grazing season. Basil Lowman stated that the whole area that the cattle were on received an initial application of 80 kg nitrogen per ha, and this was generally followed by compound.

Considerable discussion took place on the use of beef implants with all members of the panel expressing a preference for hormones to remain in use. Douglas Kerr felt that if profitability was to be maintained in beef enterprises then hormone implants were a must. The consumer was unlikely to pay the extra cost of not using implants. Basil Lowman reckoned that hormone implants gave a better quality finish to the carcass and also if they were banned, up to one-third loss in efficiency could occur.

The panel were asked what development they could see in grassland in the future. Andrew Barr felt that clover would need to be more widely exploited in the west of Scotland, and varieties that would stand up to higher fertilizer inputs were required. Douglas Kerr felt that more work needed to be done on reseeding techniques particularly with a view to eliminating ploughing. Stones were a major problem in Crochmore, and a reliable technique not involving the use of the plough was needed. More work was needed on palatability of grasses particularly in the grazing situation, and the factors which make some swards more acceptable to stock than others.

Panel members were asked about their current reseeding method. Douglas Kerr undersows his grass using Golden Promise spring barley where possible, or direct reseeding for land not suitable for cropping. Some grass ground is sown down to rape for the sheep before reseeding. Andrew Barr preferred to broadcast rather than drill, as he felt the drill left gaps for the weeds. Following on, they were asked about repairing grass swards following the disastrous summer of 1985. Andrew Barr had 2 fields he intended to "repair". He was going to harrow them first then spread grass seed with fertilizer, roll, and then graze with sheep. Douglas Kerr intended to stitch in grass using the Aitchison seed drill in the service offered by SAI Limited. CMPP would be used to take out the chickweed.

The level of interest and rent which the various enterprises could carry was widely discussed. Douglas Kerr felt he would be struggling if these exceeded £250 per ha and would be happier with half that. Andrew Barr felt that £60 per ha financing charges were plenty with a rent to pay over and above. I Fraser.

SWSGS SILAGE COMPETITION 1985 - 86

A meeting of the SWSGS at the Lochview Motel, Crocketford, 16 January 1986

Judge : Dr M E Castle, Tobergill, Low Coylton, Ayrshire.

Judge's Remarks

The Judge prefaced his remarks by thanking the Society for giving him the opportunity to participate in this year's silage competition. This event has always proved to be one of the highlights in the Society's year and from looking round at the large turnout this evening, it seemed likely to remain as such.

On going round the farms, wastage at the silo had been largely controlled although here and there some shoulder waste was detected. This is one of the most difficult wastes to prevent but the use of side sheets in addition to adequate consolidation were ways to tackle this problem. Outside clamps were prone to shoulder waste due to inadequate or damaged sheeting enabling water to seep into the silo.

Where silage was being removed from the pit mechanically, there were several examples of clean removal by the skilful use of machinery. Only on one farm was silage effluent being collected for feeding, the others were running it into slurry tanks. The Judge warned of the dangers of toxic gases when effluent and slurry were mixed and recommended adequate ventilation in buildings where slurry tanks were below slats. Several lives and stock have been lost in the UK due to this problem. The wet weather in 1985 had highlighted the inadequacy of many effluent collection and handling facilities and in order to avoid pollution problems, he urged all silage producers to give earnest consideration to effluent handling.

Over all the dairy farms, the level of concentrate use was a commendable 0.23 kg per litre milk, and beef producers were feeding their silages very effectively.

Because of the poor 1985 summer some stock had been housed for a long period (eg from the end of July). Milk production had been sustained and the Judge wondered if we should not be considering the feeding of silage over a longer period of time such as developed by the practice of buffer feeding.

The marks awarded by the Judge are given in Table 2. The overall winner and recipient of the Silver Rosebowl was A Campbell, Slagnaw, Castle Douglas. Runner-up in the Open Class was B Sloan, Darnlaw, Auchinleck, who also received the prize for the best new entrant. Third was I Houston, Torkatrine, Dalbeattie. The winner of the Beef/Sheep Class was H McKeever, Hillhead, Tarbolton and runner-up was J Robertson, Meiklewood, Castle Douglas. The best big bale prize went to R Clark, Fineview, Glenluce. The Milligan prize was won by R Maitland, Ingleston, Twynholm.

Rank	Code	% DM	% CP	D Value	M.E.	Ammonia N % Total N	Marks /35
1	KS 4	20.1	18.5	68.4	11.0	9.7	28.19
2	*KS 7	22.8	19.3	69.2	11.1	11.9	28.13
3	DS 4	19.3	18.2	69.6	11.1	10.9	28.03
4	DS 2	21.9	17.2	68.6	11.0	10.2	27.87
5	KS 3	16.9	19.8	69.5	11.1	10.0	27.50
6	AS13	18.6	21.1	68.9	11.0	10.8	27.06
7	KS 2	21.6	18.8	66.3	10.6	10.6	25.97
8	*KS15	21.6	18.3	67.0	10.7	11.5	25.95
9	KS19	19.6	15.9	69.8	11.2	11.8	25.56
10	AS 6	19.2	22.7	69.5	11.1	13.9	25.48
11	*DS 6	20.1	18.5	67.9	10.9	13.1	24.97
12	DS 1	21.2	18.3	65.9	10.5	11.5	24.75
13	AS 1	18.2	23.3	66.3	10.6	10.4	24.58
14	AS21	19.6	19.7	65.9	10.5	10.9	24.48
15	KS11	19.8	15.9	68.5	11.0	12.4	23.88
16=	*AS 8	17.7	15.7	68.3	10.9	10.7	23.79
16=	*WS 1	23.6	14.1	65.6	10.5	8.2	23.79
18	KS 5	18.5	16.8	67.1	10.7	11.7	23.29
19	DS 3	19.0	15.3	67.7	10.8	10.9	23.28
20	DS10	20.9	19.8	66.7	10.7	14.5	23.05
21	AS18	20.0	16.7	64.6	10.3	9.7	23.04
22	AS 4	18.4	16.8	65.8	10.5	10.4	22.98
23	S DS 9	19.4	21.7	68.0	10.9	15.4	22.88
24	KS 8	22.8	18.3	65.1	10.4	13.4	22.83
25	WS 7	20.9	15.6	67.4	10.8	12.9	22.63
26	AS 9	26.4	14.8	63.6	10.2	8.9	22.28
27	AS 3	17.9	17.6	67.7	10.8	14.5	22.15
28	B WS 5	19.7	19.4	63.4	10.1	11.5	21.55
29	WS 8	26.5	16.1	61.2	9.8	8.6	21.42
30	*AS17	18.7	14.8	65.8	10.5	10.7	20.89
31	KS10	18.2	17.9	66.3	10.6	15.0	20.80
32	*WS 2	22.3	15.8	63.0	10.1	10.8	20.49
33	AS 7	19.4	18.8	62.3	10.0	11.4	20.38
34	AS 2	19.1	17.5	58.3	9.3	6.4	19.73
35	AS20	21.0	13.5	63.1	10.1	9.0	19.40
36	WS 6	22.2	15.0	64.0	10.2	12.4	19.38
37=	WS 4	17.8	18.0	62.5	10.0	14.7	17.14
37=	B*KS18	31.3	13.8	62.1	9.9	12.2	17.14
39	*DS 8	19.2	16.2	63.6	10.2	15.2	16.74
40	B AS11	16.9	14.2	64.5	10.3	14.1	15.42
41	KS 6	18.1	15.2	61.0	9.8	11.9	15.23
42	KS12	18.0	17.4	61.8	9.9	15.6	15.22
43	AS 5	23.8	8.4	58.3	9.3	7.9	14.68
44	*DS 7	17.5	19.4	64.0	10.2	22.8	14.25
45	B*KS13	18.3	14.2	64.2	10.3	16.2	14.09
46	*DS11	17.3	15.5	57.3	9.2	9.7	13.19
47	*KS17	25.6	10.1	59.8	9.6	13.6	11.92
48	B*KS14	18.3	12.1	61.1	9.8	12.9	11.53
49	*AS14	18.7	11.8	61.0	9.8	13.0	11.45
50	DS 5	14.8	20.9	61.0	9.8	19.6	11.32
51	*AS 9	18.7	10.8	54.4	8.7	8.5	10.05
52	AS10	20.8	13.0	54.9	8.8	11.7	9.54
53	KS 9	14.8	18.1	59.3	9.5	24.2	9.30
54	*AS15	16.3	13.6	57.7	9.2	12.9	8.98
55	*AS16	25.7	11.3	51.0	8.2	14.1	7.72
56	B*KS16	19.8	13.3	55.2	8.8	25.5	2.70

* Beef/Sheep entry   B = Big Bale entry

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

Awards	Open Entries	Marks Analysis (35)	Marks Inspection (65)	Total
1st and Trophy	W A Campbell, Slagnaw, Castle Douglas	28.2	58	86.2
	J Forrest & Son, Meinfoot, Ecclefechan	28.0	52	80.0
	W S Jamieson & Son, Kirkland, Thornhill	27.9	N/A	N/A
Milligan Prize	R F Maitland, Ingleston, Twynholm	27.5	54	81.5
2nd and Best New Entrant	B Sloan, Darnlaw, Auchinleck	27.1	58	85.1
3rd	I D Houston, Torkatrine, Dalbeattie	26.0	57	83.0
	M & J G Dunlop, Bishopton, Kirkcudbright	25.6	49	74.6
	W S Speirs, High Todhill, Fenwick	25.5	53	78.5
Awards	**Beef/Sheep Entries**			
2nd	G & J Robertson, Meiklewood, Castle Douglas	28.1	54	82.1
	R J C Hogg, Gribdae, Kirkcudbright	26.0	49	75.0
	D F & R E Grant, Burrance of Currance, Lockerbie	25.0	40	65.0
1st	H McKeever, Hillhead, Tarbolton	23.8	61	84.8
	R D Armstrong, Sorbie, Garlieston	23.8	40	63.8
	Best Big Bale Entry (not visited)			
	R D Clark, Fineview, Glenluce	21.6	N/A	N/A

Dr R D Harkess : Clamp Silage Quality, 1981-1985

A summary of the quality of clamp silages over the last five competitions is given in Table 3. Judged by D-value, the overall quality was poorer than the previous year, undoubtedly due to the inclement weather of 1985. Those who managed first cuts at the end of May or very early June avoided the worst of the weather. Thereafter conditions turned very wet and this reflected in the low silage dry matter concentrations - the lowest recorded over the history of the competition.

The mean ammonia N content at 13% was up on last year. Indeed, nearly one-half of the entries were in excess of 12% this year compared to about one-eighth last year. The widespread use of additives in 1985 no doubt would have helped to prevent a big rise in the number of less well fermented silages, especially where dry matter concentration was below 18%.

Overall the quality of entries was very good given the conditions that existed on many farms in 1985.

Table 3. Silage quality 1981-85.

		% of total in each group				
Quality	D-value	1981	1982	1983	1984	1985
Very good	>70	0	3	0	17	0
Good	65 - 70	7	39	16	63	48
Medium	57 - 64	88	56	71	20	45
Poor	<57	5	2	13	0	7
Mean dry matter %		21	23	23	24	20
Mean ammonia N (% of total N)		13	12	12	10	13
No. of entries		63	66	69	77	56

Dr R D Harkess : Additive Use, 1985

Table 4 summarises the use of additives on entries in this year's competition. In the open section, mainly dairy cow silages, 84% of the entries had been treated with an additive. The top twenty silages in this section were additive treated. By contrast, in the beef/sheep section, only two of the top eight had received additive. The best entry in this class, placed second on analysis, had not received an additive.

Acid/formalin additives made up 58% of additives used and straight acid types, 34%, suggesting a swing towards the mixed additive compared to last year. A smaller range of additives was used by competitors this year and the seven types listed were remarkably few considering that there are over 60 additives on the market.

Table 4. Additive Use 1985.

Additive	Type*	Open Class (37 entries)	Beef/Sheep Class (19 entries)
Add F	A	12	-
Farmline	A/F	9	-
Sylade 2	A/F	6	5
Molasses	Sugars	2	-
Silaform	A/F	1	1
Silosafe	I	-	1
Sulphuric acid	A	1	-
No additive used		6	12

* A = acid A/F = acid/formalin I = Inoculant

PRIZE WINNERS COMMENTS

The Chairman invited each prize winner to say a few words on his silage system and silage making philosophy. Alan Campbell went for fast filling with a watchful eye on detail throughout silage making. A good silage ME was the key to success. Bryce Sloan aimed to ensile 14 ha per day. His management target was to produce as good a crop as possible at first cut, preferably enough to carry the cows throughout the winter. Later cuts are fed to other classes of stock. In 1985, cows were housed at night from the 23 July in an endeavour to save the pastures from excessive treading damage. Ian Houston used a contractor and started cutting before the end ot May. This saved him labour and machinery costs and speeded up the ensiling of his first cut of 52 ha. Adequate sealing was an important key to success and careful extraction at feeding was also important - steam rising from the forage box indicates secondary oxidation changes and a potential loss of feeding value. Good ration formulation was essential to get the cows to milk well.

On the beef production side, Harold McKeever has three rules : 'get it dry'; 'get it quick'; 'get it sealed'. He is a one-man farm and uses a contractor to ensile his 18 ha of first cut between pm on day one and am on day two. He is not too worried about dry matter content provided silage fermentation is good. To guarantee this he uses an additive. Conversely, James Robertson does not use an additive but pays attention to detail. His system centres round adapted old buildings with slats. Beef cattle and in-lamb ewes are fed silage.

Discussion

Following the success of John and Willie Carson of Conchieton, Twynholm, in the British Grassland Society's National Silage Making Competition, a video has been produced in conjunction with SAI plc. The video was screened at the meeting after which Willie led off a discussion on the making and feeding of silage. The Conchieton data, lactation yield at 6023 litres with a concentrate use of 0.13 kg per litre, speak for themselves. Again good sheeting and sealing were stressed. Conchieton has open silos and the top sheets are first tucked into the silo walls to reduce shoulder waste and the edge of the sheet goes over the silo wall. This leaves a channel in the plastic sheet which runs off rain water. Calfbox dung is used to weigh down the top sheet and is spread across the silo in bands about a metre apart, so in fact the entire surface is not weighted. Despite this, there is virtually no waste on the surface. The dung follows the surface line of the silage and keeps the sheet in contact with the silage, a feature which can be difficult with tyres. If filling is to take longer than five days, the back of the pit is sealed and weighted as the filling area moves forward.

Willie will join the BGS judging team for the 1986 inspections. Asked what he would be most closely looking for during the visits, he quickly replied that lack of waste was critical. It gave a clue as to the thoroughness of the filling and sealing technique. The carting out of wasted silage was an activity the industry could not afford.

The discussion then broadened out and the problem of crevices in and slippage of ensiled grass arose. One member felt that too fast filling caused slippage and he left the pit to settle for a day before continuing to fill. Slippage is most likely to occur with very wet herbage (around 15-17% dry matter) which is short-chopped. Also, if the filling-face is very steep and high, the high density of short chopped, wet herbage (circa 850 kg per cubic metre) creates a pressure which encourages slippage. The density of drier herbage, say at 22% dry matter, is around 650 kg per cubic metre.

The level of nitrogen use and whether or not split-dressings of N are advantageous caused some debate. Where fertilizer for silage is applied late, that is, after late March, there is little to be gained from splitting the nitrogen application. However, where N is applied early, such as in late February or early March, there may be a case to split the dressings, especially if the weather is broken. This may be practically convenient too, since many silage fields receive compound and straight N for first cuts. Also, where injected aqueous ammonia needs bagged fertilizer to balance the phosphate and potash requirements, a split dressing can be advantageous. Whatever system is adopted, all nitrogen should be applied at least 5 weeks before date of cut. This gives the grass time to show a yield response to the nitrogen and reduces the risk of excessively high herbage protein and moisture levels upsetting the fermentation of the silage.

Sward damage was severe on many farms in 1985. A field inspection should be made in March and fields placed into four categories : a) so badly rutted or thinned that they must be reseeded in spring; b) those with sufficient botanical deterioration and bare patches that may respond to oversowing; c) those which are in poorish state but can give some response early in the year and then be ploughed for an autumn reseed; d) swards which are not damaged - these may have to be used more intensively to take the pressure off the damaged areas.

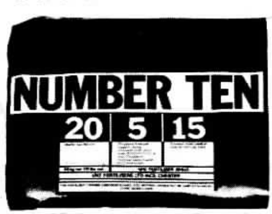
The area which can be reseeded will depend on individual farm circumstances. Loss of winter fodder for next winter is already causing concern on some units. Undersowing in arable silage is a useful method of ensuring a good silage yield followed by light midsummer and autumn grazings. Arable silage is not suited to milk cows and is best offered to other classes of stock.

Enemy number one for second cut silage.

It takes a grassland farmer to recognise that the biggest enemy of a good second cut is the first cut.

For every ton of silage dry matter, it removes up to 10 units of phosphate and 40 units of potash per acre. This loss needs to be replaced with the right balance of nutrients that only a compound granular fertiliser like UKF No. 10 (20.5.15) can provide.

Apply 4 bags per acre after first cut for strong regrowth of sward.



Growing a greater Britain

Rutted fields can damage machinery and may lead to soil pick-up and sward scalping at silage time. When ground conditions are soft, wide tyres will help reduce wheel pressures, but fitting these or extra wheel and axles can be expensive. If conditions are wet, trailer loads of grass will be very much heavier and it may be necessary to reduce the size of the load to reduce trailer wheel damage to swards.

The Chairman had to close this packed meeting with the discussion in full flow. David Hogarth proposed a vote of thanks to the competitors, the Chairman and to all who had made the evening so successful, but particularly so, a big thank you was expressed to Dr Castle who had stood in at less than a week's notice to judge this year's competition.

HAY COMPETITION

Due to the disastrous weather in July and August, no entries were received for the 1985 Hay Competition.

GRASSLAND IDEAS COMPETITION

South West Scotland Grassland Society

Winner 1985 J & J Shepherd, Grassmillside, Kilmaurs

SILAGE CLAMP LADDER

Access to the top of the clamp silo is necessary for the removal of tyres, rolling back the cover etc. This can involve clambering up the face, scrambling over wet polythene or bringing out a ladder each time. Wooden ladders can deteriorate if left out and can also be in the way.

A short ladder was constructed from steel off cuts with two supports and an overhang hook. This simply hangs on the silo wall, where it can remain out of harm's way, yet is always available for use when required.

Two other ideas submitted in 1985 were : the side drainage of effluent from the inside corners of the clamp and the use of a home-made level indicator in the slurry tanker to allow the driver to watch filling from his tractor seat.

The winner received the UKF Fertilizer tankard, presented at the annual competition evening held at the Lochside Motel, Crocketford, Castle Douglas, on 16 January 1986.

COMPETITIONS 1986-87

SOUTH WEST SCOTLAND GRASSLAND SOCIETY

14TH ANNUAL SILAGE COMPETITION

A few small changes have been introduced to the judge's marks and to fees and prizes.

The most important change in marking is the introduction of penalty marks of minus 1-3 for careless or damaging effluent control. Increased marking emphasis will also be given to silage feeding efficiency. Owing to increased analyses charges there is a small increase in entry fees - the first time for four years.

The prize for the best big bale silage is to be retained but only one prize (First) will be awarded in the Beef/Sheep Section.

Details are being sent out to all Members.

11TH ANNUAL HAY COMPETITION

Although no entries were received in last year's competition, the hay competition is being continued, though with only one prize (First) award.

The BP Nutrition Trophy hitherto awarded for the best hay will now be given to the best beef/sheep silage.

GRASSLAND IDEAS COMPETITION

Previously called "Innovations", this competition is held to attract original ideas on grassland or stock machinery, systems or practical inventions, which make life easier. Entries are free and are judged by the Committee on the basis of the description of the idea submitted.

There is an added interest this year as the winner will be eligible to enter a BGS National Ideas Competition attracting a first prize of £300.

GLEANINGS FROM THE ISLE OF MAN

J. Harris

Adapted from the Manx Grassland Society Newsletter No 8, 1986

SUMMER CALVING

With the Creamery at full capacity in May and June, and under-used for the rest of the year, there may well be inducements for calving cows in the summer (mid June ideally) and penalties for calving too many cows in what has up to now been the most profitable time - January and February.

The June calver does have some advantages : she calves in good condition, outwith the grass staggers and summer mastitis period, and is in good condition at bulling time in September. But she does have some disadvantages :

- grass is usually past its best after mid June, both in quality and quantity.
- grass quality is going down as feed requirements increase, particularly in August and September.
- grass is difficult to manage in the 2nd half of the year. The June calver tends to peak even higher than the winter calver and this may mean a fair amount of supplementary feeding.
- most cows drop by around 2 litres per day or so on housing, and this can be quite disastrous for a cow just past her peak.
- it is a long time until March/April and a lot of summer calvers are dry long before this.
- there is no way of making much money from late April/May milk with the June calver. May and June usually give a third of the total margin on a winter calving cow.

Odd summer calving cows are not going to get the special treatment they obviously need, but a fair sized group really would benefit from special treatment.

One factor that would help grassland management a lot is the practice of using a buffer to grazing in the June - August period. This could be either :

1. April sown stubble turnips or Tyfon - really worth considering as they benefit winter calvers as well as summer calvers. No great area has to be involved - 0.5 hectares per 10 cows in a normal situation or 1 hectare in a drought prone situation.

2. Buffer feeding of silage from calving right through to housing. This involves a separate pit of quality silage, and might well be limited to late spring and summer calvers only (including August calvers). About 2 tonnes per cow would be required.

If grazing has been supplemented by one of these right through till autumn, then the summer calver can start to make use of one advantage - a big appetite for grass and silage from September on, and an ability to use this efficiently without much resource to concentrates. With reasonably quality silage (64D or over) fed really *ad libitum*, the June calver would milk well on less than 0.5 tonne of balanced concentrates. But remember, anything up to 11 tones of silage per cow would be needed summer and winter.

Long on land use, short on concentrate use - that seems to sum up the summer calver. Long on first class management too!

SILAGE FOR SHEEP

It is not easy to be dogmatic about anything in farming. There is however one exception, and that is the subject of silage for sheep!

Following the deplorable hay weather of 1985, a variety of silages have been fed to breeding sheep last winter, and a variety of results have been obtained - some of them quite disastrous from the point of disease, palatability and the general feeding environment. Only the best has been good enough!

So to be dogmatic, silage for sheep MUST be :

Well fermented. Free ammonia ideally below 8% and a low pH (below 5.0 in dry silages and 4.2 in wet ones).

Dry. Ideally 25% dry matter or more which means 1 -2 day wilt with young grass. Wet silage means a bad indoor feeding environment, and sheep much prefer drier silage.

Leafy. Sheep are quite capable of picking out the best and leaving any coarse material. D values need to be 63 or over for sheep to eat silage non-selectively.

Short chopped. Yes, sheep will eat long big bale silage, or fairly long forage-wagon silage. However, they much prefer short chopped silage of which they can eat 3.5-4.5 kg relatively quickly. Long silage may mean poor intakes and possibly some gum damage.

Clean. We are all aware of the ravages of listeriosis. It is favoured by badly fermented silage with soil contamination, but even the best silage with top or side waste contamination, or with secondary oxidation can act as a source of listeriosis.

Dairy cows can cope with a fairly wide range of silages, and so can beef cattle; while store cattle and suckler cows often have to deal with some very ordinary stuff without ill effect - but sheep NEVER!

Sorry, but only the best is good enough for these aggravating animals!

THE SILASCOPE

The Board kindly invested £100 in a "Silascope" in spring 1985. This small optical instrument can give a quick reading of the sugar content of grass sap from a representative sample of chopped grass. The critical sugar level for silage making is around 3% in the fresh grass.

We made use of this with the Knockaloe grass plots from 20 May, quickly finding that the sap had to be squeezed from the stem rather than the leaves.

Early results were so low, from 0-2%, that we seriously thought we had a faulty instrument just at a time when several farmers were thinking of starting silage making. However, we found that ADAS was recording similar figures, due to 3 weeks of dull sunless weather. A warning was issued that poor fermentations would be likely unless an additive was used. Strangely enough, fermentations turned out quite satisfactory, but the silages had high fibre contents and very low D values.

The sun shone in 'practise week' but sugars didn't rise much simply because the grass was growing fast and using such sugar as was being formed.

The 'Silascope' did pinpoint which grasses and which parts of the plant tended to be highest in sugar. Italians and tetraploids soon reached 2-3% while cocksfoot, timothy and many perennial ryegrasses stayed low.

Similar results continued right through the year with dull wet weather giving big grass crops of low sugar content which led to poor fermentation in 2nd and 3rd cuts.

One of the most interesting results came with the dairy performance check at the end of May. Normally cows do very well at this time, but in 1985 we had lots of grass, and cows dropping in yield at silage time. Someone suggested, and they could well be right, that the low sugar content of the grass was having a big effect on the cows too. Makes you wonder if a herd of cows is just as good a guide to grass quality as is a 'Silascope'!

VISIT TO KEIR AND CAWDER ESTATES

An afternoon visit by the CSGS to Craigarnhall and Greenyards, Bridge of Allan, 8 August 1985

Douglas Armstrong, the manager, welcomed members on behalf of Mr A Stirling. The estate at Bridge of Allan comprises 810 ha of which 300 ha are in grass, 120 ha winter wheat, 80 ha oilseed rape, 80 ha winter barley and 230 ha spring barley.

Two dairy herds totalling 280 cows are carried, each unit being designed for one man operation, with relief milkers being brought in to give the regular dairymen time off. The cows are buffer-fed silage during the summer months and are set stocked at about 6 cows per ha until after second cut silage. All dairy replacements are reared with the heifers calving down at 2 years of age. They are overwintered on straw as a way of utilizing this arable by-product along with a liquid protein supplement and barley.

All bull calves are retained from the main herd and put into a bull beef enterprise with finishing in 11-12 months at about 450 kg.

The other major livestock enterprise is the flock of 1500 breeding ewes of which 1000 are Greyface and 500 are draft Blackface. The Greyface ewes are inwintered in a shed designed by Mr Armstrong which is some 95 m long and 25 m wide. This shed recently won an award from the Farm Buildings Association for its simple and effective design. In addition to the breeding sheep some 550 hogs from an associated hill farm are wintered and 1000 Blackface lambs are taken in from the associated farm to finish on silage aftermaths.

Around 90 ha of silage are made to give around 4000 tonnes. Silage ground receives around 275 kg nitrogen for two cuts with a further 100 kg/ha being applied for aftermath grazings. Young grass is undersown on about 25 ha of carse ground with tick beans, which can either be ensiled if grass is short or combined and used as a protein feed for the stock. The residual nitrogen gives a boost to the first year grass.

With the number of stock being carried, grassland management has to be of the highest standard and members were very impressed with what they saw. The farm is an extremely good example of an integrated unit where livestock and arable enterprises are geared to complement one another. Members very much enjoyed the visit to this well-run and efficient unit and extend their thanks to both Mr Armstrong and Mr Stirling for the opportunity to visit the estate. I Fraser.

DEVELOPMENTS IN GRASSLAND - AN UPDATE

John Frame
The West of Scotland Agricultural College

A meeting of the South West Scotland Grassland Society at the Lochview Hotel, New Cumnock, 10 October 1985.

Over 95% of the 1.8 million hectares of agricultural land in the west of Scotland is classified as 'less favoured' by EEC directive. Two thirds of this land is rough grazings, a quarter is enclosed grassland and only 6% is arable crop land (Table 1).

Table 1. Land use in west Scotland (June census statistics, DAFS, 1985).

	Hectares ('000)	% of Total
Rough grazings	1230	67
Grass (>5 years old)	320	17
Grass (<5 years old)	140	8
Crops	100	6
Farm woodlands	30	2

The reasons for the small emphasis on cropping are unsuitable climatic and soil conditions which in turn lead to problems in grassland production and utilization. High rainfall/poorly draining soils equals poaching. High rainfall equals unsuitability for hay and also low-dry-matter silage with its attendant problems of fermentation and effluent. The growing season and the complementary housing periods vary in length with winter housing ranging from 110 to 240 days.

A good proportion of the annual grass growth (50-60%) takes place before the end of June; this means if the boat is missed whether by undergrazing or not winning a good fraction of winter feeding needs in the May-June period, the loss will not be recouped later in the season, even by good husbandry.

With half of Scotland's 2.5 million cattle and 8 million sheep, it is not hard to conclude that west Scotland is livestock country - and this can present animal waste problems on intensive units.

A continuing aim of grassland research is the analysis and solution of factors which limit efficient and economic production and utilization of grass. Optimum use of inputs, not maximum use, is the name of the game. Increasing consideration is now being paid to the environment, such as avoiding pollution by silage effluent and nature conservation matters. In addition to the College's work at Auchincruive, certain developments at other centres which are relevant for the west of Scotland are worthy of note.

THE RIGHT PLANTS

The evaluation of grass and clover varieties is ongoing at 11 centres in the UK, including Auchincruive. Scottish results are summarized by way of merit ratings for individual varieties in a Scottish Colleges' publication, revised annually. Plant breeding has made many advances in recent years and some of the old favourite grasses and clovers are now outclassed. As an example, new diploid and tetraploid perennial ryegrasses are not only higher yielding but are more acceptable to stock (Table 2).

Table 2. Relative production from 3 late pasture perennial ryegrass varieties (WPBS data)

	S 23	Perma	Meltra
Herbage production	100	112	118
Animal intake	100	117	122
Ewe and lamb weight gain	100	130	136

Up to half by weight of tetraploids may be incorporated into seeds mixtures and it is worthwhile to experiment with higher proportions. Experiment - because tetraploid-dominant swards are still less dense than the usual diploid varieties which on many soils can lead to a poaching hazard. The few per cent more moisture in tetraploids is not a serious drawback for silage given the already wetting western conditions.

Secondary Grasses. Surveys have shown that many types of grassland, especially long-term or permanent, contain unsown native grass species. These grasses have variously been called natural, secondary, undesirable, non-preferred or even scorned as weed grasses. Bent, fine-leaved fescues, Yorkshire fog, smooth- and rough-stalked meadowgrasses, crested dogstail and sweet vernal are the most commonly found.

These grasses have always been subsidiary to perennial ryegrass. Ryegrass has virtues of fast establishment, dense tillering, good yield response to fertilizer nitrogen (N) and high feeding quality. Yet it must not be forgotten that a wide range of adverse soil, climatic and management conditions exist, giving an environment unsuitable for optimal performance of perennial ryegrass and the other primary grasses. Several secondary grass species are adapted to withstand or even exploit these poor conditions.

This linking of secondary grasses with adversity, low soil fertility and poor management has led to a reputation for low yields. Regrettably, there has never been intensive breeding or selection of many of the secondary grasses, so their potential is not fully known.

The yield and quality characteristics of a number of secondary grasses, using perennial ryegrass as a yardstick, have been studied under various fertilizer N rates (Figure 1).

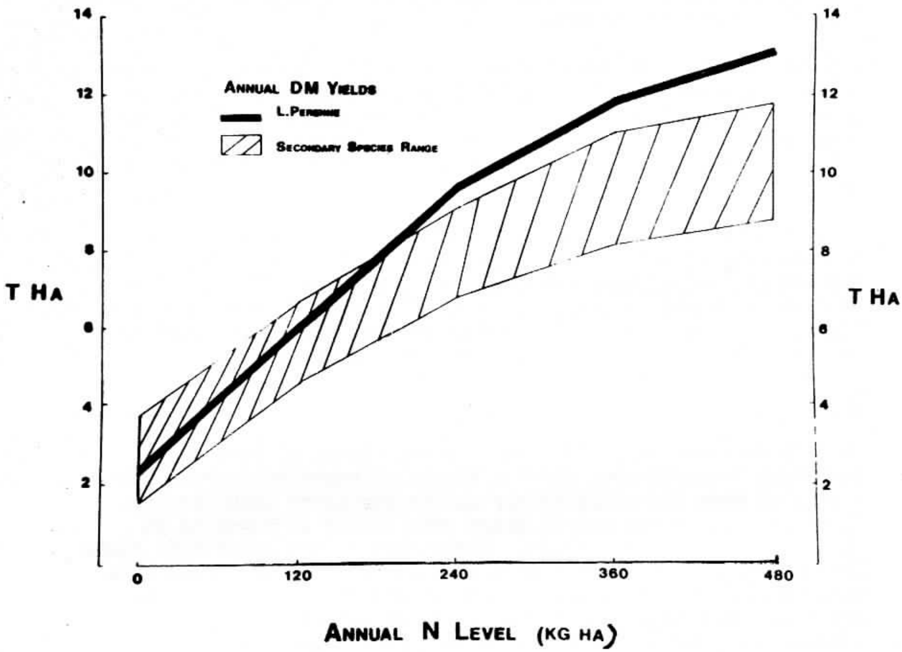


Figure 1. Production of secondary species

Yorkshire fog, red fescue and creeping bent grass outyielded ryegrass at rates of fertilizer N up to 120 kg/ha. Nevertheless, Yorkshire fog, red fescue and smooth-stalked meadowgrass still gave good DM yields at the high N rates. Crested dogstail and sweet vernal both outyielded ryegrass at nil N! The poorest-yielding grasses were rough-stalked meadowgrass, S 50 timothy and the two common bent grasses.

However, the superiority of ryegrass in quality (D value) was unchallenged at all N rates, followed by Yorkshire fog, crested dogstail, S 50 timothy, sweet vernal and rough-stalked meadowgrass. The red fescues, bent grasses and smooth-stalked meadowgrass were always low in D value.

Phosphorus (P), potassium (K) and calcium (Ca) were at 'satisfactory' levels for grazing stock in all the grasses whereas magnesium (Mg) levels were mainly 'marginal'.

Better management. These results indicate that certain secondary grasses can match or indeed, outyield perennial ryegrass at nil to moderate N application rates and can repay increased input costs. A few have a yield advantage over ryegrass at certain times of year, which is a feature worth exploiting and although some fall down in their D value rating, they are not lacking in the minerals essential for stock health.

Clearly, not all secondary grasses are weed grasses. Old swards containing them are often unproductive, but at least they persist under low fertility conditions whereas perennial ryegrass and other primary grasses would not only be unproductive - they would not even persist because of their requirements for high soil fertility.

It therefore may not always be essential to reseed swards simply because they do not contain a good proportion of primary grasses, bearing in mind current reseeding costs and the temporary loss of yield. Reseeding should be part of a planned programme of intensification and the vigour of the sown species must be maintained by attention to soil fertility and sward management.

WHITE CLOVER

Development work is proceeding on white clover at many centres including Auchincruive, where a series of experiments have been completed over the years mainly on its husbandry requirements. Clover forage on its own or grass with clover is superior in feeding value to grass alone. Higher liveweight gains from lambs and beef cattle and higher milk production from dairy cows have been clearly demonstrated. Clover is richer in protein, many minerals and energy. It has a higher digestibility over the season, a higher intake by stock and the digested nutrients are used more efficiently.

Clover fixes N from the atmosphere, as much as 280 kg/ha but nearer 150 kg/ha on average, provided there is vigorous clover growth in the sward. At least a third of the sward's annual production needs to be clover herbage in order to gain the full benefits from it.

The most rapid route for the transfer of clover-fixed N to grass is via the urine from grazing stock. A major route for the build-up of long-term soil fertility is transfer to the soil from dead and decaying roots, and the root nodules in which the N-fixation process takes place.

From experiments to measure the amount of fertilizer N needed in a grass sward to produce the same yield as a grass/clover sward given no fertilizer N, the average amount required is 200 kg N/ha. A grass/clover sward given N outyields a grass sward given the same N except at high rates (Figure 2).

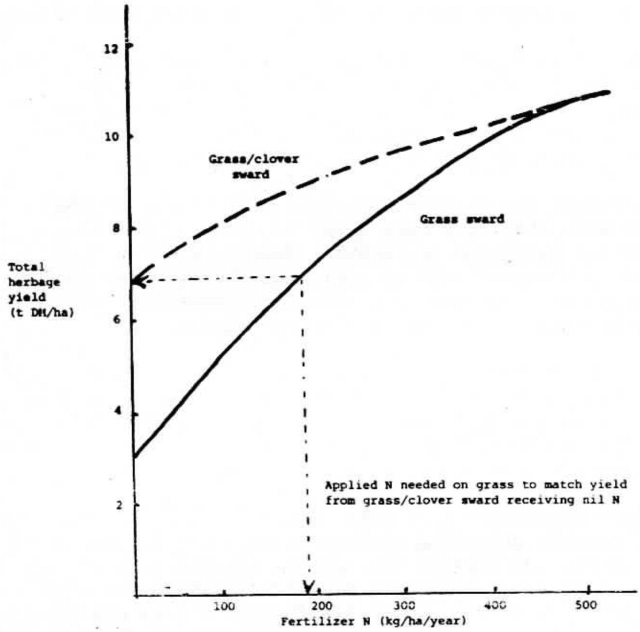


Figure 2. Effect of increasing fertilizer N on grass and grass/clover swards.

When N is applied to grass/clover, grass yield is boosted and clover yield depressed. However, the grass receives an additional boost from the clover N released from the sloughed-off root nodules and decaying roots, and eventually the grass/clover sward becomes grass dominant.

Many beef and sheep farms use considerably less than 200 kg N/ha. On these farms, it is worth placing more emphasis on white clover since clover-rich swards can give high individual animal performance.

Practical results. Few economic assessments in practice have been made of the performance of grass and grass/clover swards for sheep and beef cattle enterprises. However, farmlet-scale comparisons were made in Northern Ireland of 18-month beef from grass/clover swards given 50 kg N in spring only versus grass swards with 300 kg N/ha.

Daily liveweight gains and killing-out percentages were higher from animals on the grass/clover. Carcase weights were higher too but because of lower stocking rates, liveweight gain/ha at 847 kg was 19% less than that (1049 kg/ha) in the high N system. Gross margin from the two systems did not differ markedly. Bloat was not a problem in any of the swards. It was concluded that grass/clover swards could provide an economically viable alternative to high N swards in an 18 month calf to beef system.

Strategy. With regard to the strategy for any farm, a decision is needed on the intensity of grassland production and utilization required. The grass/clover sward has a lower 'ceiling' yield than grass heavily fertilized with N. Clover is not therefore totally suited to intensive dairy farming.

The farm's soil and climatic features will influence clover growth. Clover is more sensitive than grass to limiting factors, be they soil nutrient deficiencies, weather factors such as drought or unsuitable management such as continuous heavy sheep stocking for extended periods. Clover is particularly sensitive to low soil pH, poor drainage, low P and low K soil status.

Where a production system is dependent on a good spring grass supply, grass/clover may not fit the bill since clover requires higher temperatures than grass to make growth. Possibly a two-sward system might suit whereby grass/clover swards are complemented with grass swards receiving N as appropriate.

A switch to grass/clover on some swards will need a change of attitude towards grassland management by thinking less of the fertilizer bag and more of the special needs of the clover. The alternative of using strategic moderate applications of N in spring, is a possibility where swards have a good clover content and have the ability to recover from the setback which N will give by its boost to grass.

Clover management. A million tonnes of white clover seed is sown annually in the UK at a cost of about £3 million. Some seeds are sown too deeply and so do not establish; other seedlings are killed by herbicide sprays; clover is subjected to shortages of the necessary nutrients and is then placed at a competitive disadvantage to grass by the use of heavy N fertilization. No wonder it struggles to survive!

Interestingly, white clover is more suited to conservation than previously thought. The long rest interval associated with silage helps the clover to build up food reserves particularly via its runners. These send up successive new plants which become independent of the mother plant; indeed clover persistency hinges upon the spread of runners. Continuous severe grazing, by sheep especially, militates against clover. The plant needs leaf to capture sun energy, to thrive and to fix N.

Consequently, some form of rotational grazing is best with 4-5 week intervals of rest. Grazing is in effect a compromise between using the growth for stock feed and leaving sufficient to ensure future growth and N fixation. A silage cut incorporated into a set-stocking system will rejuvenate the clover. In view of the anti-clover factors listed above it is not surprising that clover has a reputation for unreliability.

Clover varieties. There have been interesting developments in clover plant breeding and a number of newer varieties are slowly becoming available, eg Donna, Olwen, Aran. They most definitely outclass some of the older favourites and use should be made of them, even although they are expensive, where grass/clover swards fit the farming enterprise.

Table 3. Relative yields of old and new white clover varieties (NIAB data).

	Variety	Yield
Old	S 100	100
	Kent	75
	Huia	86
New	Donna	116
	Olwen	120
	Aran	131

THE RIGHT PLANT FOOD

It is folly to cut back on the basic fertility needs of lime, phosphate and potash although it is tempting to do so, since the response of grass is not so dramatic as when nitrogen is applied. However, it must be borne in mind that fertilizer nitrogen cannot operate at full efficiency unless the other nutrients are in sufficient supply. For example, if potash is limited, experiments have shown 40% less production than if it is in adequate supply.

Surveys of soil fertility have shown many fields are low in one or other of the nutrients referred to above. It is particularly concerning that lime is not being adequately replenished in Scottish soils given the natural leaching and, on intensive farms, the acidifying effect of a high fertilizer N policy. Potash is usually less than half the price per kg of other major nutrients so it is false economy to save on it.

Sulphur. With the increasing purity and concentration levels of modern fertilizers, attention to other nutrients will become increasingly important. A survey of sulphur levels on soils and grass in the west of Scotland identified several light sandy loam sites likely to be sulphur deficient and on which yield response to sulphur application could be expected. A good annual grass yield, say 10 tonnes dry matter per hectare, will remove 30 kg sulphur per hectare.

Experiments have shown that the major yield response (20-30% or more) to sulphur application is at the second cut and sometimes at the third silage cut. Sulphur is available in gypsum, ammonium sulphate, superphosphate, potassium sulphate and sulphur sprays. Some compounds have a few kg of sulphur present in them too. It will pay to check out soil sulphur status by soil analysis and start applying sulphur if required.

Nitrogen. Nitrogen is the main determinant of grass production. Fertilizer programmes are available from the Colleges' bulletin on fertilizer recommendations for grassland (and crops) and there is increasing emphasis on precision of fertilizer use and on optimal use rather than maximum use.

Timing of fertilizer N. Accumulated temperature systems in the early part of the year can act as a guide to when to apply first applications of N. Systems based on temperature are a *guide*, not a holy writ, and ground conditions, weather in the short term and the particular farming objectives will determine how to interpret the guide. What can be said definitely is that many farmers who use the guide have been satisfied, and that many farmers traditionally are later than they should be in applying spring N.

Another timing 'tip' for N use is the advantage of prompt application after cutting for silage or after grazing in a rotational system. The number of growing days is limited, so it is important to get regrowths off to a flying start. A few days' delay on each occasion N is being applied can result in 5-10% less production over the year.

Urea. There has been a revived interest in urea as a source of fertilizer N, since it has become available at a very competitive price. Urea has the reputation of being less efficient than ammonium nitrate particularly in summer, when losses by volatilization are a possibility. However, over a two-year period including 1984, the very hot dry year, urea gave grass production only a few per cent less than traditional N fertilizer. This work was verified at other centres in the UK too. If the price can be kept competitive, more use of urea is foreseen. Care during storage is necessary as it absorbs moisture quicker than other forms of N. Its low prill density also means that extra care in spreading is necessary.

Precision of fertilizer use. In the future, for both economic and environmental reasons, precision use of all fertilizers will be the watchword. Also, just as sulphur is becoming limiting, partly from intensification of output from the land and partly from the purity of modern fertilizers, so other plant foods will emerge as limiting. Magnesium will bear watching for example, and trace element problems - in many cases best treated via the animal - can be typical of many localities. As a rider to efficient fertilizer use, recent experiments have clearly shown that grass yield response is better under well-drained soil conditions, and of course, utilization is enhanced by the better ground conditions.

ANIMAL SLURRY

Knowing that many are more than aware of its negative effects, some comment on the positive aspects of slurry is worthwhile. It has plant food value and therefore financial value. It should be used rationally in a planned fertilizer programme in which it can partially substitute for and complement purchased fertilizer. Since completely efficient storage systems are expensive, a balance must be sought between using slurry in winter with an acceptable risk to the environment and the costs of storage to allow it to be applied during the growing season.

Value of slurry. To illustrate the value of slurry, the available nutrients in dairy cow slurry - 100 cows for 26 weeks' housing - are 1820 kg N, 660 kg P_2O_5 and 3510 kg K_2O worth £1650. Slurry is best applied in diluted form, 1 to 1 with water being satisfactory. At this dilution, 10 m³ (2200 gallons) of slurry has 12 kg N, 4 kg P_2O_5 and 23 kg K_2O. To illustrate the adjustment of fertilizer use to take account of slurry, look at the table below for first cut silage :

	Nutrients		
	N	P_2O_5	K_2O
Nutrients needed	120	60	90
40 m³ of 1:1 slurry supplied	48	16	92
Fertilizer needed	72	44	0

Since dilute slurry out of a store can be a variable product, it is necessary to do some calculations and make sure the nutrients produced from a given number of stock are applied to a given area (See Table 4).

Table 4. Volume and nutrient content of undiluted slurry.

Number and type of livestock	Quality and nutrient content			
	m³	N	P_2O_5	K_2O
100 dairy cows	780	1820	660	3510
100 young cattle (250 kg LW)	180	530	130	910
100 fattening pigs (70 kg LW)	80	310	180	200

Dilution beyond the 1:1 ratio of slurry and water should be avoided otherwise nutrient status per unit volume is reduced and more time and journeys are needed for disposal. Take account of rainfall. A winter rainfall of 500mm on a 0.5 ha farmstead is equivalent to 2500 m³ water (equal to the volume of slurry from 320 cows over 26 weeks).

Timing of slurry application. For environmental reasons, a single slurry dressing should not exceed 55 m^3/ha with at least a month between repeat applications. Applying more nutrients than a crop needs is best avoided. Not all the N is available for the growing season if slurry is applied in winter. Losses of N are around 75% with November applications, 50% with January and 25% with March applications. Risks of polluting surface water by run-off or seepage into drain water must be minimized. Overflowing slurry stores can be major causes of pollution. Timing and method of application which cause least offence to urban neighbours should be considered. There is impending legislation about where and when to apply slurry and even on the quantity of nutrients permitted on a given area of land.

CUTTING MANAGEMENT

The west of Scotland is silage country and produces about 2.5 million tonnes, half the Scottish total! It is, and will continue to be, silage country because silage making is more flexible than hay making and integrates more easily with efficient and intensive grazing systems. It suits 'buffer' areas which enable grazing-pressure adjustments on grazed areas. The ensuing tight grazing in spring not only utilizes herbage efficiently but releases more area for silage. Compared with hay, silage is less weather dependent, regrowth is quicker after cutting and it allows higher fertilizer N use if intensification is the aim. There is also opportunity to achieve consistently better feeding value than hay. Silage making will increase further in the west. Big bale silage will play an increasing role - for opportunity silage in late season, for small units and to avoid high capital expenditure on silos.

Cutting frequency. It is well documented that increasing frequency of cutting reduces herbage yield (See Table 5) although quality, as exemplified by digestibility is increased, particularly in early season. Provided the system is not already receiving optimum levels of fertilizer N, the yield shortfall can be made up by the use of more N and by more cuts. It is still worth doing this at present N prices.

Table 5. Effect of frequency on DM yield (t/ha)

	N (kg/ha/year)				
System	0	160	320	480	640
4 cut	3.6	8.1	11.4	12.8	13.1
8 cut	2.4	5.0	8.2	10.4	11.4

Recent work at Auchincruive has examined different cutting regimes to define systems for specific animal enterprises, which require silage of differing quality. The experiments have shown the importance of date of first cut in determining annual yield, and the difficulty of sustaining a high digestibility at successive harvests especially if the rest interval is greater than 4-5 weeks.

Effect of spring grazing. The yield reduction associated with improving herbage quality is of practical significance. It is important to make sufficient silage for the winter feeding period. Recent cutting trials at Auchincruive in which sheep grazing was simulated in early spring have confirmed the adverse effect of grazing on first cut yields of silage (Table 6). For optimal silage yields, grazing during the winter period should cease in January at the latest. Even increased N use may not overcome the fall in yield as Table 6 illustrates!

Table 6. Effect of simulated grazing in spring on first silage cut yield (Harkess, WSAC).

N kg/ha		DM yield at 17 June	
Ungrazed	Grazed	Ungrazed	Grazed
60	90	7.5	4.3
100	150	8.0	5.0
140	210	9.1	5.5

Follow the rules. Moving on to silage *per se*, the golden rules of good silage making have been presented many times and are set down in various College publications. Get 8 or 9 out of 10 correct and good silage is virtually assured. Attention to detail is what separates the good from the bad makers. Do make use of the Colleges' predictions of D value as a guide to when to cut but remember they are for the standing crop. D value losses are 2-3 units even with good techniques - but 4-5 units or more with poor techniques!

Additives. The need for an additive should be carefully evaluated. With ideal, sunny conditions and the use of good procedures, an additive may not be necessary. If an additive is needed then choose a proven one. So far additives with high acid content and acid/formalin mixtures have been the most proven and effective. Some of the newer types such as inoculants and enzymes offer possibilities but currently there is a lack of animal production evidence. Looking into the crystal ball the ultimate additive is foreseen as being based in inoculants plus enzymes plus carbohydrates. The carbohydrate is likely to be needed, since so often in the west, the natural plant sugars are low in the wet herbage usually ensiled.

Silage effluent. Concerning silage making procedures, air exclusion at all times and adequate weighting of the plastic sealing sheets is emphasised. Silage effluent has assumed greater importance, partly with the increasing stringency of anti-pollution legislation and partly because wet spells in recent years have exacerbated the problem. Effluent must be collected and disposed of safely, avoiding watercourse pollution. As effluent flow peaks 2-4 days after ensiling, effluent tanks should be a minimum 3 m^3 per 100 tonne silo capacity and regular emptying at peak flows is necessary.

GRAZING

Grazing is still the least expensive form of using grassland and the cheapest source of nutrients. In relative terms, grazing: silage:concentrate costs are equivalent to 1:2:4 approximately. A recent development has been the use of the height of grass above ground level as a means of efficient utilization. It is sometimes forgotten than stock graze grass not hectares. In other words, you must match the quantity and quality of grass available to stock needs. Rigid grazing systems will not compensate for low yields of grass or low stocking densities. Stock belong to a 'trade union' and will not forage for more than 8-10 hours a day.

Influence of sward height on growth. Grass tillers have a rapid turnover of leaves; the leaves last 3 to 4 weeks if uneaten and then die. Grazing to keep the grass short improves utilization of the grass but the stock may not obtain enough intake and the amount of leaf available to capture the sun's energy is limited, so growth of grass will be affected adversely. In contrast, leaving the grass to grow long improves growth and increases the intake per animal. However, the amount of leaf unused increases and so there is death and decay. The amount of grass utilized on a hectare basis therefore, will suffer.

Experimental work in Scotland and elsewhere has shown that target grass heights to aim for in order to optimize grass growth and utilization are as shown in Table 7.

Table 7. Target sward heights

Set stocking	Sheep (cm)	Beef cattle (cm)	Dairy cattle (cm)
Spring	4	5	6
Summer :			
Milk/fattening beef	5	7	8
Store systems	4	6	-
Autumn	7	8	10
Late autumn	5	5	5
Rotational grazing			
Stubble height	6	8	9

Measuring sward height. The sward height must be measured without pushing the foliage down or pulling it up. A 'sward stick' developed by the Hill Farming Research Organization is ideal. Measurement should be made on typically grazed areas, not field edges, rejected growth, bare areas or dung patches. While the swards look shorter than those to which most are accustomed, they are very dense at the heights proposed and of course in any sward the bulk of the growth is in the lower layers of the sward. Short leafy herbage is also highly digestible. Much more attention than hitherto will be given to the 'state' of the sward as a management device. Above all, it requires regular walking over the swards to assess them and this in itself can be advantageous to management.

UTILIZED METABOLIZABLE ENERGY (UME)

Management performance records are just as essential for grassland as for other farm enterprises such as barley or the dairy herd. UME assesses the efficiency of use of grassland and is the unit of measurement most closely associated with profitability. Recent dairy farm costings show that a 1 GJ/ha increase in UME is associated with a £13-£15 increase in GM/ha.

Metabolizable energy (ME) is now the standardized and most frequently used measure of the energy value of feedstuffs, expressed in Megajoules (MJ) per kg dry matter (DM). Since the nutritive requirements of the various classes of livestock have also been standardized, ME provides a common term or link in which to express feedstuff values and livestock requirements.

Method. In measuring grass output as ME, the ME requirements of the livestock (for maintenance and production) are estimated. These are offset by the ME value of feeds fed (bought and/or home-grown feed) other than grass. The residual balance is assumed to have come from grass; if required it can be apportioned between ME from conservation (silage and hay) and ME from grazing. This residual ME represents the utilized ME (UME) output and is usually expressed in Gigajoules (GJ) per ha, there being 1000 MJ in 1 GJ.

UME has advantages over other partial measures of grassland productivity such as grass dry matter production, milk production or livestock grazing days since it takes account of all these and of supplementary feed as well. It is in fact a guide to the *effectiveness of use* of grassland and as such is closely related to profitability.

Farm grassland UME. The average UME output of the whole-farm grassland can be estimated quickly from knowledge of the following *annual* figures :

- A Average livestock numbers, including their production.
- B Quantities of home-grown farm crops sold.
- C Quantities of crops in hand at end of year.
- D Quantities of purchased feedstuffs.
- E Yields of home-grown farm crops produced.
- F Quantities of crops in hand at beginning of year.

These items are converted into ME equivalents using factors for the different classes of stock, production and growth and type of feedstuffs, and the results transferred to a balance sheet. Table 8 shows that the grassland average UME is derived from the formula (A + B + C) - (D + E + F), and dividing the answer by the number of hectares of farm grassland.

Table 8. UME balance sheet for farm grassland.

A	Livestock	12550	D	Bought feed	1900
B	Crop sales	650	E	Crops grown	1650
C	Crops in hand (end of year)	550	F	Crops in hand (beginning of year)	950
				Balance	9250
		13750			13750

$$\text{UME/ha} = \frac{9250}{\text{ha of grassland}} = \frac{9250}{120} = \underline{77\ \text{GJ}}$$

Single enterprise UME. Another approach is to use the UME concept for specific stock enterprises, for example, the dairy cow herd. The annual ME requirement of the individual dairy cow is calculated from knowledge of its breed and/or weight and its milk production. The ME value of feedstuffs fed other than grass is then estimated via standard ME factors and subtracted from the dairy cow ME requirement. The balance as before is from grass, and expressed as GJ/cow which is in effect UME/cow. This value is then multiplied by the stocking rate (cows/ha) to obtain UME/ha (See Table 9).

Table 9. Dairy cow enterprise UME.

	GJ/year
ME for maintenance/growth/pregnancy	25.0
ME for milk (6000 litres)	31.8
Total	56.8
Less ME of concentrates and other feeds	15.2
Balance (UME/cow)	41.6

UME/ha = stocking rate (cows/ha) x 41.6

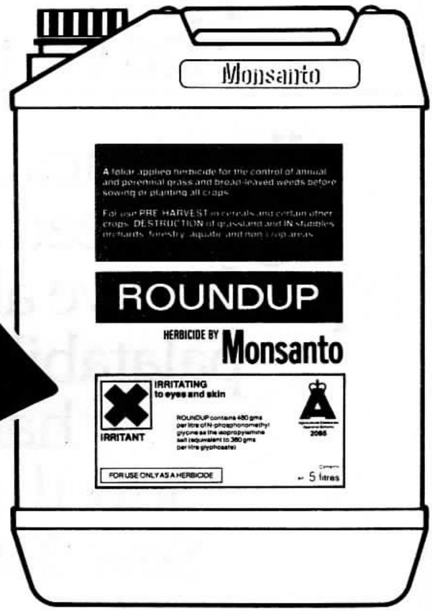
= 2.4 x 41.6

= <u>100</u>

Individual field UME. Individual field recording requires records to be kept throughout the grazing season. The essential facts required are the periods of grazing on various fields, number and type of stock, supplementary feeding, output of milk (or liveweight gain for beef or sheep enterprises) and the estimated yields of hay and/or silage. These data are converted into metabolizable energy and UME per hectare for each field calculated by the 'difference' method outlined in the tables above.

Coming out of grass...

Deep down it'll only come clean with Roundup.



When it's time to come out of grass, spray Roundup® herbicide before you plough.

Roundup kills grass and the weeds it contains deep down, unlike contact herbicides which can only burn off the sward.

Tough grass and broad-leaved weeds are killed right down to the root tips, so they can't grow back.

Give your new cereals, fodder crops or reseeded grass a clean start and you'll be well on the way to higher yields.

For clean crops after grass

ROUNDUP

HERBICIDE BY **Monsanto**

Much useful information can be obtained about individual fields or swards, the effect of changing management practices and seasonal distribution of UME. Figures for milk/ha or livestock unit grazing days/ha can be abstracted if required. Naturally, the main disadvantage compared with other systems is the continuous recording necessary. With the advent of on-farm computers, the day is coming when individual grass field recording will be the norm - at least for progressive grassland farmers! Meantime, the other simpler yet informative methods (Tables 8 and 9) should be more widely used. Soon UME value will be part and parcel of farmers' language just like D value and T sum.

Interpretation and UME targets. Whatever the UME system used, the results from year to year on the same farm can be compared, or results from similar types of farm. The value will indicate whether grassland is pulling its weight in comparison with other crop enterprises on the farm. UME gives the basis for diagnosing reasons for low output and pointers to the necessary remedies. Low yields of grass in relation to potential yield is a common cause of low UME output; so is low utilization efficiency of grass grown, for example, in a situation of high fertilizer nitrogen use giving high grass yields, but associated with a low stocking rate. Alternatively, in spite of adequate grass being produced, there may be excessive inputs of other feeds.

Farm surveys have shown wide variation between farms, not unnaturally, due to differences in factors such as sward type, growing conditions, fertilizer use and efficiency of utilization. However, even similar types of farms in the same area can show a wide range of outputs indicating scope for improvement. UME targets will vary according to individual circumstances. Average farms will attain 30-70 but the best will achieve 110-140. Why not have a go at measuring and analysing UME? Remember that increased UME is associated with increased potential profitability!

CONCLUSIONS

Forward planning of grassland production and utilization based on simple guidelines will become pre-eminent. Precision and timeliness will be all-important. Limiting factors should be identified and rectified and proven products, methods and systems used. At the same time there must be increased vigilance against any form of pollution of the countryside. There must be confidence in the grass crop - and it should be treated as a crop and fully costed and assessed. after all, it has to compete against other sources of food for stock on its own merits - on cost, on quantity and on quality. Current efforts on stock management and control should be extended to individual grass fields. A major 'plus' is the scope which still exists to exploit our grassland resource - follow the means of doing so such as outlined in this article and meet the challenge of the future.

MEET THE CHAIRMAN

SWSGS : MICHAEL MILLIGAN, CULVENNAN, CASTLE DOUGLAS

Educated at Edinburgh Academy, Michael went into farming partnership with his brother in East Lothian for twelve years before coming to Culvennan, near Castle Douglas, in 1959. He started here with 200 ha and now, with his three sons - James, Neil and Andrew - farms over 304 ha, 52 of which lie some twelve miles from Culvennan.

Always a grassland enthusiast, Michael has been an exponent of high quality silage, and milk and meat production from grass, for many years. Elected on to the SWSGS Committee for the period 1968-1970 he has been closely associated with the Society ever since. He has also been winner of our silage competition on seven occasions and the winner of the Scottish Regional silage competition three times. In addition to being Chairman of the Grassland Society, Michael is a mainstay of the Stewartry Agricultural Discussion Society and has been its Honorary Treasurer since 1966.

Although "Michael Milligan" and "Culvennan" are usually associated with dairying and top quality silage, the 100 cow dairy herd is only one of the farming enterprises. Other major enterprises are the 68 ha of cereals and the 200 head of beef cattle which are "finished" each year.

That he is willing to try out potentially more efficient ways of grassland production and conservation is demonstrated by the way he has changed his silage making machinery and choice of additives as new improved models and materials have been developed. Silage effluent, that normally undesirable waste product, has been successfully stored and fed back to stock at Culvennan for a number of years now.

The Milligan family's enthusiasm and success extends beyond their routine farming activities into their only real "hobby" - that of horse racing. Mrs Milligan and daughters Jane and Kate, all have strong equestrian interests. An undoubted highlight for them all must have been when their horse, "Hardy Lad", won the 1986 Ayr Gold Cup. M Wrathall.

TURNING NITROGEN INTO PROFIT

Dr J.M. Wilkinson
Forage Consultant
Chalcombe, Highwoods Drive, Marlow Bottom, Marlow, Bucks

A joint meeting of the SWSGS and the FMA in the Ernespie House Hotel, Castle Douglas, 19 November 1985

Losses of nitrogen from intensively grazed pastures are substantially higher than from cut swards. Policies for more efficient use of nitrogen include : integrating grazing with cutting, removing animals from grazed swards from mid season onwards, reducing inputs of fertilizer N as the season progresses, applying spring dressings of N as ammonium sulphate or urea rather than as ammonium nitrate, managing slurry to reduce losses of N, growing grass/clover swards as appropriate, and growing forage crops which require less nitrogen than grass. The overall strategy for turning nitrogen into profit implies a reduction in intensive grazing and an increase in the proportion of grass which is cut.

Gross margin from grassland has been shown to be proportional to UME. Increased stocking rates, improved silage making techniques, reduced area of land or decreasing wastage of applied nitrogen can all help to increase UME from grassland.

Losses of nitrogen from grassland. Until recently the arable farmer was blamed almost exclusively for pollution of water supplies with nitrate, through its release following the ploughing out of permanent grassland and leaching of fertilizer nitrate following spring applications, but recent work by Ryden and colleagues at the Animal and Grassland Research Institute, Hurley, indicates substantial losses of nitrogen through leaching of nitrate in intensively grazed pastures, particularly from soil beneath urine patches and camping areas (Table 1).

Table 1. Nitrogen in soil under grass in November*

	Nitrate-N (kg/ha)	Ammonia-N (kg/ha)
GRAZED	160	19
Below urine patches	920	258
Below camping areas	400	36
CUT	38	8

* Soil sampled to 90cm depth; swards received 420 kg N/ha

The combined losses due to leaching and due to denitrification are probably in the region of 60 per cent of the total N input.

The estimated proportionate fate of nitrogen under grazing compared to cutting is in Talbe 2.

Table 2. Estimated fate of nitrogen under cutting or grazing

	Grazing	Cutting
LOST		
By denitrification	20%	20%
By leaching	40%	8%
HARVESTED IN ANIMAL PRODUCTS	15%	15%
RETAINED IN SOIL	25%	25%
IN SLURRY	-	32%

The high loss under grazing is balanced under cutting by nitrogen voided by the animal in slurry. Some of this is lost to the atmosphere immediately after it leaves the animal. Ammonia is released to the atmosphere in the housing area, from the slurry store and by denitrification after application to the land. When slurry is applied to grass early in spring, probably about 40 per cent is available for use by the crop in the season of application, 20 per cent has been or is lost to the atmosphere and 40 per cent is retained in the soil. Thus, with an annual input of 400 kg N per hectare to cut swards, about 40 kg is likely to be available for crop growth the following season.

Reducing N losses. Current research at Hurley is focussed on finding ways of reducing losses of ammonia following application of N to soil either as fertilizer or as animal slurry.

One possibility is to trap the ammonia at the soil surface as soon as it is produced, in the same way as it is held in the soil mass - by cation exchange with a colloidal clay.

Zeolite applied to the soil surface as clinoptilorite at 5 tonnes/hectare has given encouraging results in small plot trials. Loss of ammonia over one week was only 7% following application of 100 kg N per hectare as urea to moist soil treated with zeolite. Without zeolite, the loss was 25%.

A further benefit from zeolite is that it has an alkaline pH and a relatively high ability to retain calcium ions. Thus it has a liming effect on the soil in addition to reducing losses of N.

Policies for turning nitrogen into profit. A number of policies may be considered to achieve the objective of turning nitrogen into profit rather than loss.

a) Manage slurry to minimise losses of N. When excreta are voided from the animal, their temperature is quite high, just below 37°C. Loss of ammonia can be substantial from warm slurry. Rapid movement to a lagoon, to trap the ammonia in a cold aqueous solution, will reduce losses to the atmosphere. It may be worthwhile to cover the surface of the slurry store to reduce atmospheric losses of N. A further possibility is to inject slurry into the soil rather than to spread it over the surface of the grass sward.

   Slurry should be applied in spring (ie from March onwards) rather than in late autumn or during winter, to minimise leaching and atmospheric losses. There would be an advantage of fermenting slurry to produce methane in that the residual liquid can be applied to pastures throughout the summer months, without the usual health hazards or rejection problems, thus achieving efficient capture of N by the rapidly growing grass crop.

b) Reduce inputs of fertilizer as the season progresses. The objective here is to avoid accumulation of nitrate-N as the grazing season progresses. By August the soil below grazed pastures will have accumulated substantial quantities of nitrate. A simple test kit is available (NVRS) to assess soil nitrate status and may be a helpful aid to intensive grassland farmers who wish to economise in fertilizer use from mid-season onwards.

c) Integrate cutting with grazing. Withdrawal of animals from intensively grazed areas from mid-August onwards and feed silage at night will help to reduce soil nitrate levels. Further grass growth, harvested as silage, will mop up residual nitrate and ammonium ions in soil.

d) Apply spring nitrogen in the correct form. Trials in SE England have shown that both urea and ammonium sulphate are superior to ammonium nitrate as spring fertilizers for grassland. However, urea may prove more difficult to spread evenly because of its smaller prill size and its predisposition to lumpiness. Ammonium sulphate has a slightly greater acidifying effect on the soil than ammonium nitrate.

   Direct injection of ammonia could lead to possible luxury uptake into grass and upset the fermentation of silage.

e) Designate suitable fields for clover. If the average use of nitrogen is 250 kg per hectare or less, then it will be economically worthwhile to arrange fertilizer N dressings so that those fields which tend to grow clover well receive no N after an initial spring dressing of 50 kg per hectare. Other fields which do not grow clover well could receive more fertilizer N. It is important to provide adequate phosphate and potash to the clover/grass swards eg 50 kg P_2O_5 and 50 kg K_2O per hectare on aftermaths.

f) Grow forage crops which require less N than grass. Many forage crops yield comparable amounts of nutrients to grass but require much less N than the recommended level for grass (Table 3). The objective is to reduce the risk of low grass yields which can mean that either grazing animals run out of available herbage or that silage yields are reduced, or both.

Table 3. Recommended levels of nitrogen and typical yields of forage crops

	Recommended level of nitrogen kg/hectare	Yield*	
		Nitrogen kg/ha	ME GJ/ha
Grass	370	230	110
Whole crop cereals	100	160	100
Maize	100	130	100
Lucerne	0	300	95
Kale	125	200	90
Swedes	100	125	90
Fodder Beet	125	125	150

* Average grass growing conditions ie Site Class 3

The forage crops in Table 3, grown as an integral part of a programme of producing milk or meat from grass, can make a significant contribution to feed energy production, UME output per hectare, gross margins and farm profit in areas suitable for the growth of such alternative crops.

Discussion

A vigorous and enjoyable discussion followed Mr Wilkinson's paper. The storage and effective use of slurry received considerable debate as did type of nitrogenous fertilizer, the fate of soil nitrogen and the role of white clover in modern grassland husbandry. The final conclusion was that even with the level of N lesser indicated in the paper, an economic response was attained from N application.

VISITS TO LANARKSHIRE AND MIDLOTHIAN

Farm visits by CSGS on 20 November 1985 and 21 May 1986

November visit — Fernieshaw, Cleland by courtesy of Mr Sandy Bankier.

Cartland Mains, Lanark by courtesy of Mr Alec Wilson.

A discussion on these two farm visits was opened by Mr S A Ross, The West of Scotland Agricultural College, Lanark, at an evening meeting in the Cartland Bridge Hotel, Lanark at which both farmers gave freely of their wisdom and philosophy to their farming.

May visit — Lea Farm, Roslin by courtesy of Mr D McLuskey.

Animal Production Department, East of Scotland College of Agriculture (Ms M Lloyd and Dr Basil Lowman).

Both visits were made to follow up talks given at previous meetings of the Society, and although it proved it could even rain in the east of the country, members had the opportunity to crawl out of their own mud for a short while and spent a very interesting and informative day in Midlothian.

Society members express their thanks to all concerned in hosting these most enjoyable visits. I Fraser.

GRASSLAND MACHINERY

PANEL NIGHT

A meeting of the South West Scotland Grassland Society at the Village Hall, Glenluce, 20 February 1986

The meeting took the format of a panel of four speakers, discussing performance and experiences with grassland machinery during 1985. Prior to looking at their present machinery set-up, each speaker traced the development of silage making equipment on his farm and in doing so enabled an appreciation of the great strides forward that have been made in mechanising the silage crop.

The Ramsays of Lodge of Kelton, Castle Douglas, began silage making in 1880 (Robert's great grandfather) and hence may have been among the first to introduce the technique on any large scale in Scotland. The family has in its possession an invitation to a silage pit demonstration dated 1883. In the 1930's a Wilder cut and lift machine was purchased from Prestwick aerodrome and the story is recorded in the Scottish Farmer in 1933. During the 1960's an in-line flail Lundell forage harvester was used and interestingly enough the best ever silage made on the farm, 74D, was with this machine.

Ronald Campbell, Craigalbert Farm, Ballantrae, began silaging with a double chop and has now moved to a self-propelled machine.

Jim Alexander, Clauchrie, Wigtown, had a Bamford precision-chop before purchasing a Pottinger forage wagon in 1976. A forage wagon was selected for its ability to cope with steep and sometimes rocky ground, and also for its low manpower requirement.

Jock Rome, Ingleston, Irongray, Dumfries, uses a JF machine.

In choosing their present tackle, the panel outlined their criteria for selecting their various systems. Indeed, for anybody considering silage machinery, the first step must be to consider what is required from the system and then match purchases against those needs. The amount of silage to be made was the major influence on the system adopted.

Jock Rome wanted a fast system capable of cutting 15-20 ha per day. A JF 83 mower cutting 16 ha per day, followed by two small JF harvesters and trailers behind, was the basis of the system. A homemade buckrake, designed to be wide (3.5m) but short, fitted to a 4 wheel-drive tractor with a fast reverse gear, overcame the problem of volume at the pit face. Labour comprises a six man team, with two men transporting.

In the past, treacle was applied in the pit. This proved to be a slow process and a proprietary applicator is now used. The main advantage of the Ingleston system is the relatively low capital cost (£5000 per machine) and low power input. A much larger JF machine had been looked at, capable of loading a trailer in 5-6 minutes, but this involved high expenditure, due to the large tractor needed. The smaller machines on the farm now were capable of loading a trailer in 8 minutes ie with two machines, a load every four minutes - a faster work rate at a lower capital cost and power input.

Robert Ramsay has favoured a direct cut system as he feels there is less wastage and that the cows milk better on direct cut material. It also eliminates the need for a man mowing and reduces his team to 3 men - one cutting, one carting, and one rolling in the pit. The harvester is a Taarup 602B multi-blade precision chop and is operated with a direct cut 2 metre mowing head attached to it.

Direct cut material can present problems, in particular the low dry matter grass exerting pressure on the pit walls. Effluent is also a major problem. In 1985, around 16,000 litres of effluent were being produced every two days from the 1000 tonne clamp. Effluent is spread back onto the grazing area with little or no detrimental effect on the sward.

John Alexander looked for a system which could cope with steep, sometimes rocky land and which would have a low manpower requirement. The Pottinger forage wagon, preceded by a 2.76 metre mower, fulfil these criteria. The even flow into the machine and the extra time available for rolling at the pit enabled a product equally as good as a silage made with a precision chop machine.

Ronald Campbell needed a system which allowed large areas to be harvested quickly. Having acquired a self propelled machine, the trailers were upgraded by building the frames onto Fraser chasses, allowing 6.5 tonne loads. The trailer beds taper 150mm in every metre.

Discussion

The discussion opened with a query on whether it would be possible to make good silage but reduce the capital cost involved. The panel thought not, especially as the price of new tractors had risen a lot faster than other items ie milk etc. It was essential that the contractor had reliable machinery to ensure speedy completion of the job.

Whilst using a silage contractor is not a cheap service, nonetheless, by preserving additional D value in the ensiling process, the contractor could save the farmer as much as £3000 in winter feed costs.

It was pointed out that a change to a direct cut regime could save up to 30% in reduced fuel bills.

The discussion then turned to the area of machine maintenance and the question was asked as to what was the most expensive item to run. The panel pointed out that most farmers do not keep accurate records of upkeep costs on machinery. Therefore it probably surprised most people to discover that between £3.50-£4.50 per tonne of silage made goes towards spare parts and repairs. This figure has risen from £0.92 in 1982. All agreed that it was vital to keep the mower moving and appealed to farmers to ensure good rolling of fields in spring.

Direct cutting versus wilting was discussed, with opinions varying. It was pointed out, however, that correct levels of phosphate helped improve silage quality in either situation. J. Rice.

SWSGS-SAI VIDEO - WINNERS WITH GRASS

Featuring John and Willie Carson, Conchieton, Twynholm, Kirkcudbright

A 10-minute video film on silage making was produced last year jointly by the South West Scotland Grassland Society and Scottish Agricultural Industries PLC. This was based mainly on film shot at the Open Day held at Conchieton by John and Willie Carson on 11 July 1985, following their success as overall UK Silage Champions in the 1985 BGS National Competition.

The physical difficulties of the farm at Conchieton, seeds mixtures, fertilizers, clamp technique and self-feed method are clearly outlined, together with an unusually explicit sequence on clamp sealing - one of the secrets of the Conchieton success.

Requests for copies of the film have come from all over Scotland, England and Wales and also from Spain and Canada. Copies of the video are still obtainable on application to the Secretary, SWSGS.

The Society thanks John Caughlin Productions, Scottish Agricultural Industries PLC, The West of Scotland Agricultural College and The British Grassland Society for their help and support in making the video. G E D Tiley.

AN AYRSHIRE EXPERIENCE WITH THE ROUNDUP RENOVATION TECHNIQUE

J. Marchington

JMC, High Street, Guildford, Surrey

Changing economic pressures are forcing farmers to pay more attention to detail - and a good example is improving the output from grass. This can be achieved by applying nitrogen to swards with the highest possible proportion of desirable grass species; in other words the productive grasses such as ryegrass.

The proportion of desirable grasses in the sward diminishes with age. Good management can prolong the life of a sward, but the effects of frequent slurry applications, drought, and excessively wet seasons all tend to favour the invasion of the sward by 'natural' less productive grasses and other weeds.

Farmers in south-west and central Scotland, as well as elsewhere in the country, have found that they can use Roundup herbicide to destroy the unproductive old sward, getting rid of the weed grasses together with broad-leaved weeds such as docks and thistles prior to cultivating and drilling a new ley or pioneer crop.

Working with local farmers, Monsanto developed the new Roundup Pre-Cut or Pre-Graze technique, giving farmers the choice of when to apply the herbicide to fit their farming system. Apart from the saving in time, the new system allows the treated crop to be utilised, whether for silage, hay or grazing, safe in the knowledge that food value is not impaired and there are no adverse effects to animals.

Ross Drummond, the manager of Dumfries House Estate near Cumnock in Ayrshire, used the new Roundup system on two different fields in 1985. His experience highlighted the flexibility of the system. He has 200 suckler cows and calves, 600 purchased fattening cattle and 850 breeding ewes, on around 320 hectares of long-term pasture and a little over 160 hectares of arable land.

The first area that Ross treated with the new system was a 4-hectare patch of old unproductive sward. It consisted mainly of timothy, with bent grasses and other weeds. It looked like a fairly bulky crop from the edge of the field, but in fact, looking into the crop, it was very thin. The field was sprayed with Roundup at the end of May, and cut for silage in the first week of June. The system gave a good kill of the old sward and weeds, although the subsequent cultivations caused some weed seeds to germinate. However, these were relatively easy to control. The silage was later fed to cattle of a wide range of sizes and weights, and there was nothing to indicate that it was any different from normal silage.

On the second field, there was a different weed problem. It was an 8 hectare patch of a 13 hectare field, and the old grass had become infested with rushes. The field had been working at only 15 or 20 per cent of its potential. It was sprayed with Roundup at the end of July, and after the necessary five days the treated sward was grazed by sheep. the new grass was sown on the 11th of August which was the only really good day that month! By October the ewes were grazing the new well-established sward.

In summary, the system is flexible and in a normal year can, in effect, save time equal to several weeks' growth.

Note. *Mr Marchington was involved with the Monsanto team which developed the new technique in Scotland. He is now a consultant based in Surrey.*

PROPOSED NEW SWSGS LOGO

A logo has been produced and displayed on the new SWSGS Membership Application Forms, which have just been distributed. The logo, seen below, consists of a circle incorporating a grazing dairy cow and two sheep. Below the animals is a simple tillered ryegrass plant with a white clover leaf either side.

The ryegrass tiller is the basic unit of grass production helped in many cases by white clover. However, both are valueless unless eaten and utilised by the stock above. The letters SWSGS below emphasise the supporting role of the Society in helping Members in producing and using their grass.

THE CENTRAL SCOTLAND GRASSLAND SOCIETY

SILAGE COMPETITION 1985-86

A meeting of CSGS in the Stuart Hotel, East Kilbride, 9 January 1986

Judge : Dr R.D. Harkess, Agronomy Department, The West of Scotland Agricultural College, Auchincruive, Ayr.

The "summer" of 1985 will long be remembered for the perverse nature of the weather, and the fact that most second cut silages were either cut in atrocious conditions in August and September, or rescued in the brief spell of better weather in October. Despite this, entries in the competition were back to their normal number, mostly being first cut samples. The new beef and sheep section attracted seventeen entries, and there were nine new competitors in the competition. The first cut silages were characterised by being of lower than normal dry matter, but some extremely high D values were achieved. As Table 1 shows, 45 per cent of the entries achieved a D value in excess of 65 and the average D value of 64.3, whilst being two points down on last year's average, was still the second highest in the history of the competition. Dry matter average turned out to be the lowest in the seven years of the competition. Ammonia nitrogen levels increased from last year's levels. The average analysis for silages entered in the last seven competitions is given in Table 3.

In opening his comments, the judge reckoned that all of the top 25 silages were worthy of a visit and that only a few points separated the first 9. However, a cut-off point was necessary because of time available for visits. In looking at the analyses marks the judge commented that dry matter content now assumed much less importance because of the wide use of additives. However, dry matter content was still important in the case of tower silos. Crude protein content attracted 6 marks for a range from 10-18 per cent, and there was always debate as to whether too much importance was attached to high levels of protein. With possibilities of protein protection, more importance could probably now be attached to these higher levels. A total of 14 marks were available for D values ranging from 56-70 and it was right that there should be a good range of marks because D value gave an important guide to the nutritive value of the silage. Ammonia nitrogen levels also attracted a good range of marks and again this was important as low levels gave a good indication of the quality of the fermentation and likely intakes of silage.

Moving on to the inspection it was emphasised that a great deal of expense went into making good silage. Losses in the clamp can be over 25 per cent and it was therefore imperative to eliminate waste. Plastic side sheets should be used to eliminate shoulder waste which could be quite substantial and it was encouraging to see that most of the clamps visited were now using side sheets. Some farmers had stopped sheeting at night. A College survey had compared sheeting at night against leaving the top of the clamp uncovered and it was found that there was an increase of 3 units of D value in favour of nightly sheeting.

It was also important to have silage free from contamination, of which soil was the most likely. Soil carries bacteria which are undesirable for good fermentation and some effort should be made to avoid picking it up. In general, uniformity in the silages was good indicating good filling techniques. The presence of moulds was a tell-tale sign that air was getting in, and silage would rapidly deteriorate in the presence of air. Over-heating and putrefaction were also important to avoid, with the shoulders of the clamp being the most likely places to see these problems.

In his final comment on the inspection, the judge made special mention of effluent control. It was very necessary to trap all effluent as it was dangerous stuff in the wrong place. In the wet conditions in 1985 much had been heard of effluent problems, and greater effort was needed in its control. Some interest had been shown in feeding it back to livestock, but few farmers had actually embarked on this. The easiest way of dealing with effluent was to run it into the slurry tank, but care must be taken when mixing effluent and slurry as dangerous gases can be given off.

Turning to silage making and feeding, the judge said it was necessary to make full use of buildings, which could mean filling silage higher than before then removing the top to a ring feeder. This also had the advantage of allowing shy cows and heifers a greater chance to feed uninhibited. If using an electrified wire or barrier, care should be taken in setting it up in order not to discourage stock from grazing the silage face.

Overall stocking density had not been as high in 1985 as in previous years, probably due to the poor grazing season and poor ground conditions. Milk quotas had probably played a part in this too and also the fact that less fertilizer had been applied than normal.

Finally, the judge referred to wilting. He said he preferred a 24 hour wilt but if this was not possible, a reliable additive should be used on young, lush, high D grass. In doing this farmers should be prepared to cope with effluent particularly when using strong acid additives as flow could be very rapid.

Table 1. 1985-86 Silage Competition : Analysis and Marks

Rank	Code	Analyses DM (g/kg)	CP (g/kg)	D Value	Ammonia N as % total N	Marks (out of 35)
1	CL25 (T)	348	173	69.5	72	32.39
2	CL19	210	181	67.8	61	30.92
3	CP31	224	185	70.5	93	30.91
4	CP33	246	156	68.6	88	29.26
5	CS 6	175	206	70.1	88	29.21
6	CS 1	229	179	68.3	104	28.41
7	CL17	182	173	69.8	102	27.89
8	CP 7*	253	128	67.9	82	27.74
9	CL11	215	150	69.0	120	26.03
10	CL18	180	181	68.6	118	25.66
11	CP48	208	193	67.3	121	25.52
12	CP30	216	185	66.5	115	25.45
13	CL42*	199	160	65.5	87	24.99
14	CL40*	215	141	65.0	81	24.70
15	CS23	187	176	67.1	118	24.31
16	CL16	180	163	68.6	127	24.09
17	CS 4*	186	133	66.2	86	23.77
18	CL 9*	219	205	64.1	107	23.77
19	CL12	185	154	66.6	113	23.01
20	CS26	195	133	64.6	90	22.30
21	CP37	217	192	62.6	112	21.82
22	CL14	185	196	64.4	120	21.55
23	CL20	181	188	65.2	132	21.19
24	CL41*	214	121	63.2	92	20.99
25	CS 2*	186	103	65.8	98	20.91
26	CP32	198	161	63.5	114	20.83
27	CS24	197	127	62.5	85	20.40
28	CS 3*	179	108	65.9	112	19.79
29	CP22	231	199	65.7	182	19.67
30	CL49*	209	149	64.5	142	19.54
31	CL10*	202	163	60.4	98	19.31
32	CP35	212	156	64.3	149	19.23
33	CL44*	206	144	60.5	98	18.66
34	CS 5*	262	119	61.3	110	18.45
35	CL15	189	168	60.2	102	18.39
36	CL13	206	126	61.0	100	18.10
37	CL47*	197	140	59.6	87	17.99
38	CL46	162	230	63.6	147	17.84
39	CL43*	198	144	61.9	125	17.50
40	CP34	192	182	61.1	141	16.92
41	CP 8*	172	123	60.9	103	15.91
42	CL45	190	245	64.1	236	15.10
43	CP36	175	233	64.8	213	15.05
44	CL27	192	216	63.0	304	14.10
45	CP29	207	159	57.0	138	12.76
46	CL21*	201	103	57.8	136	10.62
47	CL38*	221	139	58.9	262	9.13
48	CL39*	202	133	58.4	262	7.65
49	CL28	172	206	57.0	350	7.10

* = Beef/Sheep entry

T = Tower silage

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

Awards	Farm	Analysis (35)	Inspection (65)	Total (100)
2nd	Mr W. Black, Orchard Farm, Bellshill	32.39 (T)	56.3	88.69
3rd	Messrs A. Bankier & Co., Fernieshaw, Cleland	30.92	57	87.92
1st and SAI cup	Mr J. Clark, Dunrod, Inverkip, Greenock	30.91	58	88.91
	Mr R. Howie, Drumfork, Helensburgh	29.26	49	78.26
	Mr A. Orr, Boagston, Avonbridge	29.21	43	72.21
4th	Messrs T. & B. Wilson, Bishopbrae, Bathgate	28.41	56	84.41
	Messrs J. Kerr, Kirklands, Dunsyre	27.89	53	80.89
1st Beef/Sheep	Lord MacLay, Milton, Kilmacolm	27.74	52	79.74
	Messrs W.S. Millar & Son, Newlands, Uddingston	26.03	53	79.03

Other Prizes (by analysis only)

Best New Entrant : Lord MacLay, Milton, Kilmacolm.
Most Improved Silage : Mr J.M. Milne, Solsgirth Estate, Dollar.

Table 3. Mean silage analysis for silage competitions 1979-1985

Year	Numbers entered	% DM	% Crude protein	D value	Ammonia N as % of total N	% of entries with D > 65
1979	33	20.8	17.0	61.8	18.9	12
1980	37	21.6	15.7	61.3	16.3	8
1981	53	22.6	13.8	60.1	14.0	4
1982	59	26.6	14.6	63.6	13.6	42
1983	53	24.0	14.6	61.5	11.3	13
1984	40	23.5	15.7	66.3	11.6	68
1985	49	20.4	15.9	64.3	12.9	45

Before announcing the results there was thanks to all those who had entered the competition and, in particular, to those who had been visited in the previous two days.

The inspection marks awarded by the judge are given in Table 2. First prize and the SAI cup was then presented to Mr Jim Clark, Dunrod, Inverkip, with the runner-up Mr W. Black, Orchard Farm, Bellshill, only 0.2 points behind. This was in fact the first time that a tower silage had been in the list of prizewinners. Third prize went to Messrs A. Bankier & Co., Fernieshaw, with the fourth prize to Messrs J. & B. Wilson, Bishopbrae, Bathgate.

In the newly constituted beef and sheep section the first prize went to Lord MacLay, Milton, Kilmacolm, who was presented with the Hamilton Reco Trophy. Lord MacLay also won the best new entrant prize and Mr J.M. Milne, Solsgirth Estate, Dollar, won the most improved silage award. I. Fraser.

CENTRAL SCOTLAND GRASSLAND SOCIETY

COMPETITIONS 1986/87

8TH ANNUAL SILAGE COMPETITION

Prizes for the open competition will be the same as last year. Increased marks will be awarded for silage feeding efficiency and less marks awarded for overall stocking density. The judge will be allowed to deduct up to three points where lack of effluent control constitutes an environmental hazard.

The BEEF and SHEEP CLASS will be extended to include on-farm judging with the first three silages placed on analysis receiving a visit. The winner will receive the Hamilton Reco Salver, and a goblet for permanent retention.

GRASSLAND INNOVATIONS COMPETITION

This will be held as a local heat for the National Competition being run by the British Grassland Society as a contribution to UKF Grassland '87. Members are invited to submit any noval ideas, inventions, innovations which aid the growing, harvesting or utilisation of grass or conserved forage. Entries will be required by the beginning of November 1986.

Details of all competitions will be sent to members in late July.

DEVELOPMENTS IN SILAGE

Dr R D Harkess
Agronomy Department, The West of Scotland Agricultural College

A meeting of the CSGS held in the Stuart Hotel, East Kilbride, 9 January 1986

Grass varieties and seeds mixtures

The making of good silage starts with the grass and varieties which will combine a high yield with high quality. Traditionally silage mixtures have been based on perennial ryegrasses, but even between varieties there is a difference in yield as the following figures demonstrate :

Table 1. Yield of grass varieties : four silage cuts, 350 kg N/ha per year.

Mid season perennials	Combie	10.3 t dry matter per ha
	Talbot	12.8 t dry matter per ha
Late perennials	S 23	12.9 t dry matter per ha
	Perma	13.1 t dry matter per ha
Italian ryegrass	EF 486	11.6 t dry matter per ha
	Optima	15.2 t dry matter per ha
	RVP	18.2 t dry matter per ha

Seeds mixtures for silage now tend to be based on intermediate/late ryegrasses which can combine a satisfactory yield with high quality. There is also increasing interest in clovers which can be very nutritious in their own right. Again there is wide variation in yield between varieties, and some of the new clover varieties on the recommended list show substantial yield improvement over the more traditional varieties.

Table 2. Yield of white clover varieties.

White clover	Relative Yield (%)
Kent	75
Huia	86
S 100	100
Donna	116
Olwen	120
Aran	131

Interest has also been expressed in some of the so-called "secondary" grasses such as Yorkshire fog, bent grasses, crested dogstail, smooth and rough-stalked meadow grass which are commonly found in natural grasslands. In work carried out at Auchincruive it was shown that at levels of nitrogen up to 120 kg/ha, Yorkshire fog, red fescue and creeping bent grass outyielded perennial ryegrass, and at levels of nitrogen above this, still gave respectable dry matter yields. However, in terms of D value ryegrasses remain supreme and in an intensive grassland situation still remain the key grasses.

Fertilizers

The acidifying effect of ammonium nitrate is often overlooked. As a rule of thumb a dressing of 125 kg/ha nitrogen as ammonium nitrate creates a lime requirement of around 500 kg of ground limestone per ha. In many intensive grassland situations liming may therefore be necessary every 3-4 years.

Nutrient balance is also important, and in the silage situations the importance of potash cannot be overlooked. Grazing returns much of the potash to the soil, but silage systems remove it.

Table 3. Relative yield of sward receiving 300 kg/ha nitrogen and different rates of potash application (3 silage cuts plus autumn 'graze')

Potash (kg/ha)	0	150	300
Year 1 relative yield (%)	90	97	100
Year 3 relative yield (%)	60	95	100

The penalty for ignoring potash fertilizer can be up to 40% of yield and means that nitrogen inputs would be very inefficiently used.

It is also important not to exceed recommended nitrogen application, and for two cuts of silage, more than 250 kg/ha nitrogen would be excessive in many situations. Too much nitrogen can lead to problems in fermentation leading to depressed intakes, and also in extreme cases to digestive and metabolic upsets in stock being fed the silage.

Height of cut

For perennial ryegrass 3-5 cm is the recommended height of stubble whilst for Italians and hybrid ryegrasses 5-7 cm is preferred. It is important not to scalp the sward as this will not only damage the sward but can lead to problems of contamination by picking up soil, and organic manures (FYM or slurry) where these have been applied. Cutting too low also leads to water stress, and of course there is a much higher risk of damage to machinery. A higher stubble may also aid wilting by allowing freer air circulation round the swath.

Targets for Quality

The suggested targets are 65-68 D value for dairy cows, finishing cattle and young stock with 60-62 D value for suckler cows. It is always important to ensure that there is sufficient quantity, and there is little point in having a pit of high D value silage if it is only going to last two thirds of the winter feeding period. Much has been talked about 70 D value silage, and here again the main question comes back to whether sufficient bulk can be harvested. Some farmers set off with the intention of making 70 D value silage, but because of inefficiencies in their system only achieve 65 D value in the clamp at feeding time.

From early cut silage there is rapid re-growth which slows down the more mature the first crop is before cutting. However, even rapid regrowth may be unable to make up for the yield penalties incurred, particularly at the very high D values. It has been shown that the yield penalty for each unit of increase in D value between 60 and 65 D value is 3-5% whereas in the range of 65-70 D value this figure is nearer 6-8%.

Studies at Crichton Royal Farm have shown that total yields of silage decrease as D value increases where a three-cut versus two-cut system was investigated. This showed the three-cut system to yield 9.4 tonnes/ha dry matter at 69 D value compared to 11.3 tonnes/ha at 62 D value for the two-cut system. Intakes of silage were 4% higher for the high D value silage and resulted in a 13% increase in milk yield over the low D value silage. However, 24% extra land was required to make the three-cut system work which would prove impractical on most farms. A fourth cut in the high D system would have been required to give a yield level similar to the low D system.

Silage Additives

There has been a big increase in the number of inoculant-type additives on the market in the last two years. At present little independent trials data on these are available, but the present generation of inoculant type additives are much improved and it is now possible to achieve populations of bacteria in excess of 1 million per gram of grass ensiled. However, more evidence is required of how efficient these additives are in low dry matter, low soluble carbohydrate material.

Sulphuric acid is now being sold straight as a silage additive at 45-50% concentration. Again few experimental results are available especially with high yielding dairy cows, but sulphuric is a strong mineral acid which will not break down as readily as some organic acids. There must therefore be some hesitancy in recommending its use, as it is possible to over-acidify the silage which could lead to problems in mineral nutrition and feed intake.

Silage Effluent

Silage effluent is lethal to many forms of aquatic life. It removes dissolved oxygen from the water in the burns and ditches it gets into, and it also provides an ideal substrate for the growth of bacteria fungi and algae. The polluting effect of waste products is measured in terms of their ecological oxygen demand (BODs) in a five-day test. Typically, some of the more common pollutants have the following BODs (mg oxygen per litre) figures : domestic sewage sludge, 500 : cow slurry, 5,000 ; pig slurry, 35,000 : silage effluent, 90,000.

Looked at another way, the effluent production from the Auchincruive silos in 1985 (very wet) was *circa* 300,000 litres. This has the same polluting effect as the domestic sewage production for a town the size of Ayr for a 5 day period. Silage effluent must be controlled.

In 1958 about half a million tonnes of silage was made in Scotland and today it is 5 million tonnes; this meaning a ten-fold increase in the problem. Silage effluent is a mixture of plant products such as soluble sugars, amino acids and organic acids, and also contains some of the products of fermentation such as organic acids, alcohol and ammonia. It is therefore very dangerous material and has to be contained and disposed of properly.

The production of effluent is mainly determined by the moisture content and quantity of grass ensiled, and is therefore difficult to predict. Effluent production can range from virtually nothing at 25% dry matter to 300 litres per tonne at 15% dry matter, and with direct harvesting or minimum wilt becoming more popular, effluent production is tending to increase. Ideas have been put forward for ways of controlling effluent production, and one such idea involves the use of absorbents to soak up the effluent. These absorbents would be added to the silage at time of filling the clamp, and an efficient material would have to have some or all of the following properties : high water-holding capacity; high ME value so as not to dilute the feeding value of the silage; high density; help fermentation; inexpensive and available.

Various materials have been tried or are being tried and these include : barley, straw or hay, sugar beet pulp, waste paper, clay minerals.

Levels of addition of these materials are normally 5-6% of the fresh weight of the silage, and some are proving more successful than others. The material showing most promise at present is sugar beet pulp in that it fulfils most of the conditions of a good absorbent. Straw has been used in the past, but it has been found that its water-holding capacity is limited and in certain circumstances it can encourage a faster run-off of silage effluent by providing a permeable base in the silage pit through which the effluent can escape.

Silage effluent can, of course, be collected and used either as a fertilizer or a feed for livestock. Where it is used as a fertilizer it is frequently collected in slurry tanks and here care has to be taken as quantities of toxic hydrogen sulphide can be released. However, storing silage effluent solely for its fertilizer value is unlikely to prove cost-effective.

More recently interest has been shown in silage effluent as a feed for livestock. The nutritive value of silage effluent is given in Table 4.

Table 4. Nutritive value of silage effluent.

	Range	Average
Dry Matter (g/kg)	10-100	50
Analysis of Dry Matter		
Crude protein	160-350	260
Water soluble carbohydrate	100-300	250
Ash	170-320	260
Calcium	13-33	28
Phosphorous	3-11	8
Magnesium	4-12	6
Potassium	20-120	80
ME (MJ/kg)	11-13.5	12
pH	3.5- 5.0	-

For long term storage formalin has to be added at the rate of 3 litres per 1000 litres effluent. The cost of storage is important in assessing the viability of storage for feeding, and at the North of Scotland College an inexpensive 71,000 litre butyl bag store within a cheap stockade and canvas roof, costing around £2000, has been developed. However, even with the cheap store there are financial limitations as can be seen from the following table :

Table 5. Benefits and Costs of feeding effluent.

	500 t silo	1000 t silo
Effluent (litres)	60,000	120,000
Feed value at £6.30*/1000 litre	380	760
Capital cost of tank, piping, pump etc	(2120)	(2900)
Annual costs :		
Depreciation and interest	350	470
Formalin, electricity, maintenance	80	140
	430	615
Net benefit (£)	-50	+150

* Barley @ £100/tonne urea @ £170/tonne

Effluent concentration DM 50 g/kg CP 260 g/kg ME 12.5

The financial benefit of storing effluent for feeding or as a fertilizer is limited, and in most silage making situations, silage effluent will continue to be a disposal problem which must be handled with a great deal of care. On the other side of the coin the question must be posed - 'what is the cost if you are caught polluting the burns with silage effluent?'.

Discussion

Considerable discussion centred around the use of wilting as an aid to preventing silage effluent. The speaker pointed out that a 4-5 day wilt was required to achieve 30% dry matter and that after cutting, grass continued to respire leading to rapid deterioration in quality. Thus if the crop can be lifted quickly after cutting this deterioration does not take place. Also, the drier the material, the more air is trapped, and the greater is the risk of overheating in the clamp, again leading to rapid deteriorating in quality. With direct cutting or minimal wilt a higher quality product is ensiled but silage effluent flow is greater. A 24 hour wilt will lead to a reduction of up to 2 units of D value.

Round bale silage increased in popularity in 1985 following the very wet summer and the speaker was asked for his views on the system. The system was useful for getting someone into silage but it was not a cheap system. It was also labour intensive and there was a limit to how much silage could be made in one day. A good wilt had to be achieved and additives were not recommended because of problems of application. In 1985 a lot of silage made into big bales was salvaged hay which might earn the technique an undeserved bad reputation. The new cling-wrapping of big bales was yet to be fully assessed, particularly on how well the bales remained airtight. It was unlikely to be a system which would appeal to established silage makers unless in an excess grass or storage shortage situation.

There is a tendency for wider cut mower conditioners to be used and the speaker was asked for his views on these machines. Whilst conditions undoubtedly helped to wilt the exposed part of the swath, there was generally a poor wilt inside. For efficient wilting it was necessary to open up the swath and let the wind through it to carry away the moisture. However, rowing up silage could cause problems in contaminating the grass with soil, so care was necessary.
I Fraser.

VISIT TO DUMFRIESSHIRE

A meeting of the SWSGS to Land Farm, Ecclefechan, 29 January 1986

Mr D Martindale welcomed members of the SWSGS to an afternoon winter visit to Land Farm, Ecclefechan.

This is an extremely well-run dairy unit with 140 Friesian cows, which are fed on a complete diet via a mixer forage wagon.

Each year 60 heifers are reared to calving and up to 12 breeding bulls reared for sale. The remaining male calves are reared to finishing : half as bull beef sold at 12 months and half as bullocks sold at 15-18 months. Last winter these stock were fed on a straw/concentrate mix.

In addition, 1000 feeding lambs are bought in annually for autumn/winter finishing. 60 ewes for breeding were being tried this year.

Cropping comprises 28 ha barley, the rest of the farm, which is all ploughable, being grass for silage and grazing. 1985 silage was of good quality but extremely wet (15-16% dry matter) and there had been considerable slippage problems in the clamp. This was seen at the time of the visit in the large covered clamp with a central effluent collection drain.

There was a very impressive set of buildings all fully utilised to house stock. One shed was used for intensive calf rearing with a direct milk pipeline from the tank room. Average milk yield, 6500 litres.

Being the middle of a cold winter, the grass was not seen. Leys were based on South West Seeds general purpose ryegrass - timothy mixtures. A change to more specific cutting mixtures was envisaged.

Nitrogen usage was high at over 375 kg/ha per year. 43 kg/ha was applied every alternate week and the grass kept producing even in dry spells.

Members' questions and discussion centred on breeding, housing and feeding, the feed-mixing being a particular feature and calf health problems.

On a cold winter day, this was an extremely interesting visit to an efficient and well-run unit and Members of the Society wish to thank Mr and Mrs Martindale for welcoming them to Land Farm. G E D Tiley.

SPRING VISIT TO THE STEWARTRY

A visit of the SWSGS to Ingleston, Twynholm and Ardwall, Gatehouse, 7 May 1986

Ingleston (Maitland family)

Ingleston (146 ha) is farmed in conjunction with Culraven, Borgue. The dairy herd of 175 Friesians is block calved September-November and self-fed silage in order to reduce labour and machinery requirements. Three cuts of silage are made to a fixed routine, regardless of weather. Simplicity of feeding and attention to detail won the Milligan prize in the SWSGS 1985 Silage Competition.

Long term mixtures from Sinclair McGill are favoured. One field containing a really dense and persistent perennial ryegrass sward has been able to stand up to grazing, cutting and slurry treatments and members who braved the pouring wet day saw and heard much of grassland interest during the walk and discussions.

Ardwall (McCulloch family)

Sandy McCulloch escorted the circular tour around the estate, including ancient woodlands and hillground. Ardwall runs to 970 ha, much of it rough land rising to 300 metres asl with about 162 ha cultivable and includes Lochside (445 ha) and Margrie (202 ha).

The breeds of cattle (Shetland, White Galloways) and rare sheep breeds were an unusual feature and stock totalled 600 suckler cows and 1700 breeding ewes. The rare breeds interest is part of the Rare Breeds Survival Trust programme and careful management is required at tupping with so many sheep breeds to handle. A 40-doe fat rabbit enterprise was also seen in one of the many fine old farm buildings on the estate. Silage is made for the suckler cows, the remainder of the grassland being permanent or hill grazings.

Conservation of woodland and countryside features have been spontaneously practised over many years. The rocky hill top is now an SSSI and an area of old woodland has been fenced by the Nature Conservancy.

Members wish to thank the Maitland and McCulloch families for making their visits most enjoyable and interesting. G E D Tiley.

EVENING WALKS

Evening walks organised by local committee members of SWSGS, summer 1985

Ayrshire	:	Staflar, Symington, by courtesy of W Steel Esq (22 July)
Dumfriesshire	:	Thwaite, Ruthwell, by courtesy of R Broach Esq (7 August)
Wigtownshire	:	Colfin, Lochans, Portpatrick, by courtesy of W MacWilliam & Sons (13 August)

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

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

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