GREENSWARD

Journal of the South West Scotland
and
Central Scotland Grassland Societies

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FOREWORD

At the time of publication of this issue of 'Greensward', the whole farming outlook has been completely overshadowed by the devastating outbreak of Foot & Mouth Disease which has swept through much of Britain. In Scotland, it has been concentrated in Dumfries & Galloway, particularly affecting the counties of Dumfries, Kirkcudbright and Wigtown. There have been confirmed cases of the disease on the farms of several members of SWSGS and all other livestock farmers have been indirectly affected. Recovery from the widespread upheavals which have occurred will take considerable time. For ready support, guidance and advice, it is strongly recommended that the services of local SAC advisers be sought. A long tradition and unrivalled knowledge of the area, coupled with up-to-date skills and awareness of possible future trends will provide a reliable foundation for coping with change.

The two Grassland Societies also wish to extend an offer to help members in Central and South West Scotland in any way possible. Of necessity, all activities of the Societies have been suspended, to await the return of more normal conditions. The present issue of the Journal records the meetings and events in Central and South West Scotland from 1999-2000. Most of the items were written before the Foot & Mouth outbreak.

Many of the meetings reported were actively exploring possible new directions in farming. Organic farming was prominent among these, and is being enthusiastically taken up. Cost reduction, greater use of forage, budgeted nutrient management, welfare issues and homeopathic medicine are also featured. More radical developments in farming may well evolve from the current upheaval. It is however, inconceivable that grassland would not figure prominently in any of these.

The Societies record grateful thanks to all speakers and host farmers at their meetings and farm walks. The support from commercial sponsors and SAC colleagues are also sincerely acknowledged. The Editor wishes to thank all authors and advertisers who have contributed to this issue. Particular gratitude is expressed to Lorraine Reid (Rural Business Unit, SAC Auchincruive) for word processing and laying out the whole Journal to exacting standards. Staff at printers: Walker & Connell are also thanked for design, printing and publication.

G E D TILEY - Journal Editor

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MDC FOCUS CENTRE AT CRICHTON ROYAL FARM, DUMFRIES

Paul Charlton, MDC Focus Centre Manager
Dairy Services Unit, Crichton Royal Farm, Dumfries

'What good is research if it is never implemented on the farm?' This is the question behind the formation of nine MDC Focus Centres around Britain. These Focus Centres are due to hold a series of farmer meetings throughout the year* to demonstrate research work funded by MDC and to show how these results can be implemented on the farm to save money for dairy farmers. Topics to be covered range from grassland management to cow fertility, and from restructuring the dairy business to mastitis. Each event will demonstrate some aspect of research work undertaken by the MDC, but ultimately funded by British farmers. Themes of meetings which have already taken place include: 'Milk from Grassland'; 'Profit from Fertility' and 'Efficient Winter Feeding'.

As MDC Focus Centre Manager for Scotland, my role is to organise and run such events at both the main Focus Centre at SAC Crichton Royal Farm, Dumfries and also at the Satellite Focus Centre based at SAC Craibstone Farm, Aberdeen. I will be working with two advisory committees comprising MDC representatives, research co-ordinators and local milk producers from throughout Scotland. We aim to identify the main areas of interest to dairy farmers, and then decide how best the MDC funded research can be applied to enable Scottish dairy farmers to enhance their businesses. Forthcoming events will look at milking parlours, milking techniques, youngstock rearing and grassland management. Invitations to all these events will be distributed to all milk producers in Scotland ahead of the event. If you would like further information, or wish to suggest ideas for future events, please do not hesitate to contact me directly.

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**Unfortunately, the programme events have had to be cancelled due to Foot & Mouth Disease.*

FEEDING CONCENTRATES TO HIGH YIELDING DAIRY COWS AT GRASS

Lynn Wilson, BGS Research Student, SAC Crichton Royal Farm, Dumfries

Concentrate supplementation of high yielding cows is the subject of the second research studentship awarded by BGS. This three year project began in August 1999, and is based at SAC Crichton Royal Farm, Dumfries.

Future profitability of milk production is likely to be highly dependent on using low cost, grass based systems. Managing high yielding cows at grass however presents a major challenge to the UK dairy industry. These animals cannot sustain production from grazed grass alone and require some form of supplementation to reach their production potential without compromising health, fertility or welfare.

The first experiment in the programme studied level of concentrate feeding in late summer. Beginning in mid-August, three groups of summer calving cows were fed 6, 9, or 12kg concentrate per day (18% crude protein, 12MJ ME) for five weeks. Grazing conditions were good with an average sward surface height of 9-10cm. Milk yields and live weight change for the three groups are shown in the table below.

Table 1 Milk yield and live weight change 13 August - 16 September

	Concentrate fed kgd^{-1}		
	6kg	**9kg**	**12kg**
Milk Yield **kgd^{-1}**	28.8	31.4	33.6
Yield of constituents gd^{-1}			
Fat	1046	1059	1080
Protein	894	1022	1063
Live weight change **kgd^{-1}**	0.26	0.14	0.60

Increasing concentrate from 6-9 kgd^{-1} gave an extra 0.86kg milk per kg concentrate above 6kg. Above 9kg concentrate, there was a smaller response of 0.71kg extra milk per kg concentrate.

Grazing behaviour of cows was observed for a 24 hour period and this showed significant reductions in grazing time as concentrate level was increased: Table 2.

Table 2 Grazing behaviour of cows 2-3 September (hours cow^{-1} day^{-1})

	Concentrate treatment kgd^{-1}		
	6	9	12
Grazing	11.1	9.6	7.9
Ruminating	6.7	8.7	8.0

These results provide a demonstration of how concentrate feeding can reduce time spent grazing and in turn reduce total grass intake. This effect of concentrates on grass intake, known as the substitution effect, is critical in determining production response to concentrate fed. The aim must be to minimise this substitution effect to maximise the use of grazed grass. A lower substitution rate tends to occur when a cow cannot obtain all the nutrients she requires from grazed grass alone. The most profitable response to concentrate supplementation therefore will be expected from cows with a high potential milk yield and for cows experiencing poorer grazing conditions.

It has been suggested that energy type concentrate may also have an effect on grass intake and milk production and a further experiment over the 2000 grazing season measured the effect of concentrate type on animal production and grazing. Preliminary results suggest a slightly higher milk yield from a fibrous compared to a starchy concentrate in spring. This effect was reversed later in the season when a more beneficial effect of the starchy concentrate was observed.

Support of ETHOS (BOCM PAULS) in the above experimental work is gratefully acknowledged.

SOUTH WEST SCOTLAND GRASSLAND SOCIETY PRIZES 2000

The Vice President's Prize is awarded annually to the best Grassland student in the first year of the Bachelor of Technology in Agriculture Programme. This year the prize was awarded to Steven Roan of Barnbarroch Farm, Dalbeattie, Kirkcudbrightshire. The winner of the Malcolm Castle Memorial Travel Award was Richard Huston, Advisor at SAC, Lanark. We look forward to reading a report of the study tour in the next issue.

SWSGS SPRING FARM VISITS IN WIGTOWN 1999
G E D Tiley

Visits by SWSGS to Cairngarroch and Low Clanyard, Drummore on 4 May 1999

Cairngarroch, Drummore (By Invitation: Donald McColm & Family).
On a very fine Spring morning, a large gathering assembled at Cairngarroch, including members and guests from all four Counties and a party of Higher Diploma Agriculture students from SAC Auchincruive.

With a 98-cow herd bred up to Holstein from Ayrshires and averaging 9,600 litres, visitors were keen to know how grass and stock were managed to reach this yield level. In a total farm area of 64ha, grass occupied 44ha, wholecrop wheat 4ha, wheat and combining peas 3ha, fodder beet 3ha, early potatoes 6ha, the remaining 4ha being roads, buildings and rough land. Annual rainfall was 875mm (35 inches). Grass begins growth very early in the year on this, one of the most southerly dairy units in Scotland. In 1999, the cows began grazing on 17 March on lighter land, initially for only 3 hours per day, then gradually for longer as grass growth increased. However, due to a period of heavy rainfall the cows had to be brought back inside. The heavier land was reserved for 1st cut silage and 2nd cut silage taken from the lighter land, which tends to burn in summer. Alternate cutting and grazing appeared to promote the growth of white clover in spite of a high N regime. Modern clover varieties were more tolerant of N and tetraploid varieties of perennial ryegrass were used.

Fodder beet was grown to feed when grass growth was reduced in cold springs and late summer droughts. The crop was grown on light land, sown in late April (24 April this year) at 110,000 seeds ha^{-1} in 45cm rows, 14cm between plants. Weed control was by pre-and post-emergence sprays and 750kg ha^{-1} 20:10:10 NPK fertiliser applied. The beet was harvested in December yielding 92-100t ha^{-1}, some being sold to cover seed costs. The beet harvester was shared between 5 farms in a local Fodder Beet Group. Winter wheat required high inputs of 235kg N ha^{-1} plus growth regulator. Spring wheat and peas were also grown. The 5 year old silage field which had won the Society's Sward competition had been sown to a mixture of 45% tetraploid perennial ryegrass, 40% diploid, 10% timothy, 5% white clover. Weed control was by glyphosate before ploughing and Legumex Xtra at establishment. Sheep winter grazed until mid-January. N application was 120kg ha^{-1} for 1st cut, 100kg ha^{-1} for 2nd cut. Timac fertiliser was being compared with conventional fertilisers on another silage field.

In the cubicle house the cows were bedded on 5cm depth of sand which was freely available from a nearby raised beach. Experimental cubicles with 15cm deep sand bedding were favoured by the cows, but gave rise to skin problems.

Epicure early potatoes grown in 3-row beds gave higher plant population and better soil moisture retention, but were more difficult to lift in wet conditions, so the bed system could only be used on sandy soils. Clear polythene film applied in March promoted earlier and more vigorous growth, but had to be removed by hand before tuber initiation, which required maximum light interception. Early potatoes were grown in rotation with 2 years PRG and IRG grass rest. Harvesting the potatoes before 20 June prevented completion of the eelworm life cycle.

Low Clanyard, Drummore (By Invitation: Billy & Margaret Beck and Family).
The afternoon visit was to the equally well-managed dairy/beef/sheep unit of Low Clanyard. Though only a short distance from Cairngarroch, on the western side of the Drummore peninsula, Low Clanyard offered a complete contrast, with a treeless, very exposed landscape. Total area was 200ha, including 27ha rented, 0.5ha of early potatoes, 6ha barley and 20ha rough and reclaimed grazings. 40ha were cut twice for silage, aiming for high quality, achieved by using a good grass seed mixture, applying slurry and fertiliser and employing a contractor for cutting. Grass was easy to grow – the challenge was to convert it into money! Control of extensive whin (gorse) infestations had been tried by burning on 15 April, but the fires were extinguished by 15cm of snow. Stock consisted of 95 dairy cows, 37 sucklers and 800 ewes. The lambs were all finished and marketed as Quality Assured; 60-70 cattle were fattened annually. Newly-constructed sheep handling pens were seen at the top of the hill, together with improved grassland recently reclaimed from rush pasture after a pioneer kale crop.

The Grassland Society wishes to thank both Donald McColm & Family and Billy & Margaret Beck and Family very much for these most interesting and informative farm visits.

THE TREATMENT OF DAIRY WASHINGS AND CONTAMINATED WATERS AT SAC AUCHINCRUIVE FARM DAIRY UNIT

Dr Ivo Svoboda & Stewart E Moir BSc (Hons), MSc
Environment Division, SAC Auchincruive, Ayr

Current Research & Development by SAC: Raw dairy washings are collected and treated primarily in an aerobic Sequence Batch Reactor (SBR) which bubbles air through the effluent and provides oxygen to the microbes responsible for reducing the Biochemical Oxygen Demand (BOD). The BOD is reduced to an acceptable level prior to being discharged into a system of reedbeds which provide secondary treatment. The SBR sits on a concrete apron (3m x 6m) adjacent to the wall of the Auchincruive Dairy Unit. The primary treated effluent is then pumped to the reedbeds which have a total area of only $52m^2$.

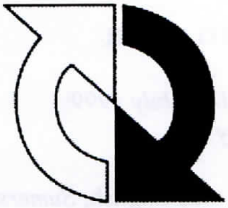
Initial Results: The SBR first handled raw dairy washings in June 1999 and the reedbeds first received pre-treated dairy washings in January 2000. First year results indicate that the SBR and reedbeds are effective in reducing dairy washings to an acceptable standard for recycling as yard washing or discharge into a watercourse. Monitored levels of BOD and suspended solids achieved were below the typical UK watercourse discharge standards of 20mg O_2 l^{-1} and 30mg l^{-1} respectively. Continuation of this project should confirm that a system of an SBR followed by reedbeds will be an effective and viable system for the treatment of dairy washings.

Future Work: The second phase of the project is due for completion in April 2001. A similar aeration system to the SBR for the dairy washings has been installed into the large steel, above-ground contaminated water tank. Treated effluent from this tank will also be pumped into the reedbed system, which will then provide for the treatment of all dairy washings, silage effluent and some yard run-off produced at the Auchincruive dairy unit, so that these effluents will no longer be required to be irrigated or spread by tanker. Both the dairy washings and the contaminated water treatment systems are full scale, farm size demonstrations which are open for public viewing. For arrangements to view the system, or for further information, please contact:

Stewart E Moir, Effluent Treatment Consultant, Environment Division, SAC Auchincruive, Ayr KA6 5HW. Tel: 01292 525321; Fax: 01292 525333; E-Mail: S.e.moir@au.sac.ac.uk

SAC acknowledges the funding support from the Scottish Executive Rural Affairs Department for this project.

Progress report following the Article in Greensward 1999, No. 42, page 23.



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LESS OR MORE FROM MOOR TO MOOR

The BGS Summer Meeting, Somerset, 11-15 July 1999

J Marshall & G E D Tiley

The 1999 BGS Summer Visit was to Somerset or, in olde English, *Sumersaeta* = Land of the Summer People. Robert Reid, CSGS and ourselves attended this meeting.

A unique feature in Somerset are the Somerset Levels and Moors. These are flat, hedgeless land areas, originally reclaimed from the sea and divided into fields by **dykes** or **rhynes**, which are kept full of water in the summer and pumped out in the winter. Near the coast the soils are of clay and the land termed "Levels". Further inland a thick layer of peat has built up from sedge vegetation and the Levels become "Moors". Traditionally, the areas were used for summer grazings, but now are protected nature reserves. More familiar upland moors occur on Exmoor where there is extensive permanent pasture.

Somerset is the second largest producer of milk in the UK after Devon. Much of the milk is made into cheese, including the famous Cheddar cheese, with the by-product, whey, fed to pigs. Somerset is also well-known for the production of cider, once traditionally made from many small orchards throughout the county.

Successful Methods for Grass Establishment - Lympsham Manor Farm, Weston-super-Mare (Robin Hoare)

The first visit was to a 219 ha farm run by 4 partners at the northern end of the Somerset Levels. Soil is heavy alluvial silt loam, and rainfall 710mm. Most of the 78 ha of grass are in short term leys in rotation with 132 ha of arable crops (cereals, winter wheat, linseed, navy beans, wholecrop cereal) plus 30 ha set aside. The leys which are both cut and grazed, are based on Italian ryegrass and regularly win the Somerset Grassland Society's ley competition. Grazing fields receive 62kg N ha^{-1} monthly from March-July and 34.5kg N ha^{-1} in August. Silage fields receive per ha 162kg N 1st cut, 125kg N 2nd cut, 100kg N 3rd cut plus 16,000 litres slurry annually. 145 cows were stocked at 2 livestock units per ha. There is a 0.8 ha 4m gallon lagoon (18m litres) which stores dirty water for summer irrigation.

Substituting Livestock Slurries for Inorganic Fertilisers - Stepstones Farm, Redhill, Wrington (Alvis Bros - John Alvis and Nick Green)

The next visit was to a large-scale dairy, arable and pig enterprise producing farmhouse Cheddar cheese, pork/bacon products and slaughter pigs. Total farmed area was 971 ha (100 ha rented), mainly ryegrass leys, with 20 ha

permanent pasture and 283 ha forage maize and wheat. 85 people were employed and production and processing were divided into 12 separate cost centres, each run by its own manager, who received a profit-related bonus of up to 30% of salary. 1000 milking cows on 3 farms supply 6.8 million litres of milk annually to produce 1600t Cheddar and 550t organic Cheddar cheese. The whey is fed to 30kg purchased pigs which are reared to bacon with an annual output of 35,000 pigs. Stepstones lies in a fertile valley and is used for rearing dairy heifers and beef. Slurry is applied through a ring main after separation of solids for use on the cultivated ground. An IGER project monitors N-levels in the soil and slurries, enabling reductions in purchased N and no purchases of compound fertiliser.

High Forage Utilisation on a Mendip Farm - Tadhill Farm, Leigh-on-Mendip (John and Jackie Davis)

Tadhill lies on undulating land at 280m at the eastern end of the Mendip Hills, with 1150mm rainfall on a free-draining loam over sandstone. Farm size has been gradually increased to 60ha now carrying 75 cows and 45 followers. The aim is to produce maximum milk from forage, with minimum use of concentrates. Current per cow yields were 6,900 litres, 5,300 litres (77%) from forage - 11,600 litres per forage ha. Maize (11ha), stubble turnips and kale (2ha), red clover and peas (4ha) were also grown, adding to the forage resource of long leys. The cows are rotationally set-stocked from early March (IRG) aiming for quality young grass all the year. John and Jackie won the Milkminder Manager of the Year Prize in 1999.

White Clover Management with a High Nitrogen Regime - East Lydeard Farm, Bishops Lydeard (Tom and Tara Morris)

The second day began with a visit in the fertile Vale of Taunton, south of the Quantock Hills, under the chairmanship of Gordon Newman. East Lydeard lies at about 50m with rainfall 750mm and total area 116ha. The farm area includes 10ha of soft fruit, formerly a PYO enterprise, and 6.5ha woods, ponds and a cricket field. Diversification had included farm tours and cream teas, but after a visit to Ireland, Tom Morris decided to focus more on the dairy enterprise. He now used extended grazing in paddocks with tracks, to ensure fresh grass after each milking. The cows were spring calved with the cows dry for Christmas and the New Year. He aimed to graze 350 days of the year, and the condition of the grass was under constant and careful observation. Stubble turnips and maize were also grown to back up the forage. Nitrogen was applied at the rate of 38kg ha^{-1} for each grazing.

Pasture Management for Intensive Stocking at High Altitude - Gupworthy Farm, Wheddon Cross, Minehead (David, Alison and Michael Norman)
The next visit was to a hill farm at 300m in the Exmoor National Park. Park Director: K Bungay emphasised that Exmoor National Park was a living and working landscape with a population of 10,000 and 600 farms. Its aims were to integrate Conservation, Recreation and Farming, which received government support through ESA and other schemes. Rainfall at Gupworthy averaged 1500mm. Traditionally reared lambs and suckler calves were produced on 296 ha (116ha rented permanent pasture) under an almost self-sufficient system, involving 80ha silage, 11ha swedes and 24 ha winter barley. 1500 Texel mule ewes were crossed with Charollais or Texel rams. There were 105 suckler cows. Electronic identification of lambs had been introduced to facilitate weight recording. The grass was based on 5-10 year leys with a high clover content and reseeded only when production fell.

Lucerne and Maize as Winter Forage for High-Yielding Cows in a Low Rainfall Area - Peadon Farm, Fiddington, Bridgewater (John Hill)
Only 625mm (25 inches) rain fell annually at Peadon, so that the soil dried out frequently in the summer. Thus 22 of the farm's 340ha were down to Lucerne cv. Diane, sometimes mixed with Red Clover. 60ha maize and 120ha winter wheat were also grown. 280 dairy cows and 250 heifers were stocked at 2 livestock units ha^{-1}. In addition, there was a 28,000 broiler unit. 8,300 litres milk were sold annually per cow. The herd is strip-grazed in spring and set-stocked in summer with buffer feeding to compensate for variable grass production. Four cuts of silage are taken and fed 50:50 with maize silage.

Organic Conversion on a Mixed Arable/Stock Farm - Kittisford Barton, Wellington (W W Ker & Son)
The 116ha farm is well wooded (11ha) on moderate-steeply sloping upland ranging from 66-50m, with rainfall of around 990mm. The soils are variable, and dry out on the sands and shallow silts. The 72ha of grass carry 480 ewes and 100 ewe lambs, all lambing in late March, plus 135 calves finished to beef at 18 months. Winter wheat (40ha), winter barley (14ha) and forage peas (8ha) were also grown. Converting to organic involved reducing N use to 25kg ha^{-1} on grass, minimum use of anthelmintics and maximum use of clean grazing. All fields are mown out at least once a year, and all silage made into big bales. FYM is spread on the arable fields.

Red Clover Silage on an Organic Farm - Shepton Farms Ltd, Aviaries Farm, Shepton Montague, Wincanton (Oliver Dowding)
Oliver Dowding is a well-known ambassador for organic farming and he sold his first organic milk in 1993 through an Organic Milk Suppliers Co-operative,

having begun conversion in 1989. Homeopathy is used enthusiastically as a second line of defence after good husbandry. He farms 587ha, 342ha grass, 130ha wheat and triticale, 22ha fodder beet, 147ha vegetables and potatoes. The 315 cows are grazed in 2-4ha set-stocked blocks. Milk yields were 5,900 litres per cow, 3,400 litres (59%) from forage. Reseeds were established under arable peas cut in July to give a 16% protein silage. Red clover leys were cut 3-4 times and manured with FYM and slurry. No fertilisers were used on the farm. *Live system* inoculant was used during ensiling.

Environmental Schemes on a Lowland Dairy Farm - Charity Farm, Bere Aller, Langport (Barrie and Rosemary Bryer)
Part of Charity Farm was designated an SSSI in 1983, the base year for milk quotas, and the aim ever since has been to produce as much as possible from forage. The farm is on the edge of King's Sedgemoor, and rises from 5m to 50m above sea level. Total area is 64ha, grass 40ha, maize 24ha, carrying 100 cows. The SSSI occupies 18ha where there are restrictions on mowing dates, stocking density and fertiliser use. Spraying and ploughing are prohibited. Maize provides much of the winter forage, together with high quality grass silage. Milk yields were 5,500 litres, 4,070 litres (74%) from forage.

The **Alternative Programme** organised by the Somerset Visit Committee included a Steam Train ride to the mediaeval village of Dunster, with its 17th Century castle, followed by a tour of the surrounding Exmoor National Park. There was a trip to Wells to see the famous Cathedral, Bishop's Palace, library and surrounds. A visit to the Willow and Wetlands Centre at Stoke St Gregory demonstrated the cultivation and processing of willows for hurdle and basket-making. The programme continued with a visit to the house and gardens of the National Trust property at Barrington Court, built in 1514, and ended at Sheppy's Cider Farm and Cider Museum, near Taunton, with an educational sampling of a range of Sheppy ciders.

On the fourth day, optional visits were arranged to the **High Welfare Pig Unit** at Cannington College, demonstrating an acceptable rearing environment for commercial pig rearing; to the **Kingshay Farming Trust, Crewkerne**, set up in 1991 to provide independent research and advice to dairy farmers through on-farm trials, discussion visits, soil and silage analyses and dairy costings; and to the **Cannington College Gardens** which contain the largest collection of ornamental plants in south west England, including many less hardy species.

SWSGS EVENING FARM VISITS 1999
G E D Tiley

10 August 1999 – Barony Agricultural College, Parkgate, Dumfries (By Invitation: R Marchant, Deputy Principal).
Members of SWSGS enjoyed a detailed tour of the farming enterprises at the Barony, which were fully described by Russell Marchant, Deputy Principal of the College. At the outset, he emphasised that the College Farm was intended to provide an educational resource for teaching. Hence, there was a much wider range of enterprises than could be justified on commercial grounds. However, the farm was now required to be financially self-sustaining, though if there was a profit a case for new investment could be made.

The farm comprised 3 units: Barony, Carse of Ae and Steinmuir ("Stoney Bog"). The main enterprises were: dairying, beef, sheep, fish farming and red deer. Dairying was becoming the dominant activity at the expense of both beef and sheep. Cropping included spring barley to enable student training in cultivation. The Regional Council had invested in a new parlour in the early 1980s and had fully modernised it recently. The cubicle shed designed for British Friesians would require alteration since the herd was graded to Holsteins 5 years ago. Silage making was concentrated at the Barony, aiming to cut early for high quality but waiting for the correct weather. Effluent control and slurry storage had been upgraded to provide 6 months' storage. Slurry was spread in March and October by contractor over 2-3 days using an umbilical system. The silage pits had been resurfaced with Quattro polymer. An example of a high-clover sward which had received no artificial N for 7 years was seen on a field reclaimed from previous use as a POW camp and artillery training unit in the 2nd World War. Annual manuring consisted of 300kg 0:24:24 in spring and spring/autumn slurry. High clover swards had been found to be difficult to integrate with N-fertilised swards, as there was a delay of 2 weeks before cutting the clover sward and the silage clamp had to be re-opened. Cow grazing days were similar on the two sward types, but milk production was higher from the clover. Docks and thistles were often abundant in the clover sward, and required spot-treatment.

Fish Farm
The fish farm was based on a gravity feed supply of 18 million litres daily of clean water from the River Ae, with only a 3m fall over 500m. In very dry weather, the river dried up and water was obtained from boreholes and pumping. The Barony farm produced 25t of Rainbow Trout annually which were sold mainly for restocking recreational fishings. This outlet commanded a better price than for table consumption. The fresh trout market was in 30% over-

supply so some producers would have to come out of production. The fish farm incorporated a hatchery shed supplied with warm water at a constant 7°C. The trout eggs were home produced and also imported from South Africa and, if pressure shock treated in a steel chamber, produced triploid fish which survived the winter. Triploids gave better weights as energy was not diverted to egg production or aggressive behaviour. The rearing tanks required overhead netting protection against herons and diving gulls. Marketed fish were Quality Assured by batch sample tests before despatch. Fish for restocking were transferred from the tanks to earth channels to improve fin quality.

Red Deer Unit

This was set up in 1988 to provide an alternative use of grassland. Red deer were analogous to a May/June suckler herd, producing one calf per year and an average longevity of 10 calving seasons. The calves are separated in September and the stags introduced. The herd is inwintered, as red deer being woodland animals are not well-adapted to wintering outside in exposed fields. The calves are killed at 15-20 months and the carcases marketed co-operatively through the Scottish Farm Venison and also through the Barony's own Country Foods shop at £3 kg^{-1}. Carcase weights are: stags 50-60kg, hinds 40-50kg. Killing out percentage: stags 53, hinds 55. Gross Margins were £90-100 per breeding hind, higher for stags. Breeding stags came from Germany or Yugoslavia as the native Scottish strains had become small by natural selection. Critical business factors were: carcase size, price per kg and weaning % (above average – 90 at Barony).

17 August 1999 – Drummuir, Springside, Irvine (W Cuthbertson)

On a wet August evening, a large turnout of members visited Drummuir farm which is situated in low-lying land close to the new town of Irvine. An extensive tour of the farm was hosted by Willie Cuthbertson, who farms in a partnership of two brothers each with a dairy. David Blackburn, of Lely Ltd, was in attendance to demonstrate the robotic milkers.

Drummuir's total area was 80ha: 4ha barley, 9ha maize, the remainder grass which was all cut for silage except for one field used for grazing all year. Subject to winter flooding and poaching, this field required draining and reseeding after winter barley silage. Manuring was with 350kg ha^{-1} Slurry Balancer (28:3:8) plus 26,000 litres slurry ha^{-1} followed by 20:10:10 in early April. Second cut silage received 375kg ha^{-1} After Cut (20:4:14) with slurry (13,000-16,000 litres ha^{-1}); 3rd cut 125kg ha^{-1} N. First cut silage in 1999 was taken at the end of May after 10 days of rain and was of lower quality than normal: D-value 65, DM 25%. Ecosyle additive was used and the cut grass shaken to raise dry matter. Silage maize (varieties Semira and Ulla) had been

sown in the second week of May under polythene which was extensively blown from the rows 3 days after sowing, resulting in poor crop growth. Bull calves were now kept and fattened in a bull beef unit, for selling deadweight at 12-14 months. Additional protein was given in a home mix of barley/soya/beet pulp/fishmeal and dark grains. Heifers and bought-in stores were also fattened. The 140 cubicle shed was completed in 1998, largely using farm labour. Two Lely Astronaut robotic milkers were installed with an associated computer monitor. The cows were required to pass through the robots to reach the feed trough.

CENTRAL SCOTLAND GRASSLAND SOCIETY FARM VISITS IN 1999

C M McCombie

12 May – Lea Farm, Roslin, Midlothian (Courtesy: P McCluskey & Sons) See SWSGS Silage Competition (p44) for some aspects of Lea Farm.

Easter Howgate, Penicuik, Midlothian (Courtesy: SAC Edinburgh). This visit centred on feeding trials on beef, sheep and pigs being carried out by Dr Basil Lowman and his research team. Emphasis was being placed on aspects of nutrition, welfare and animal health.

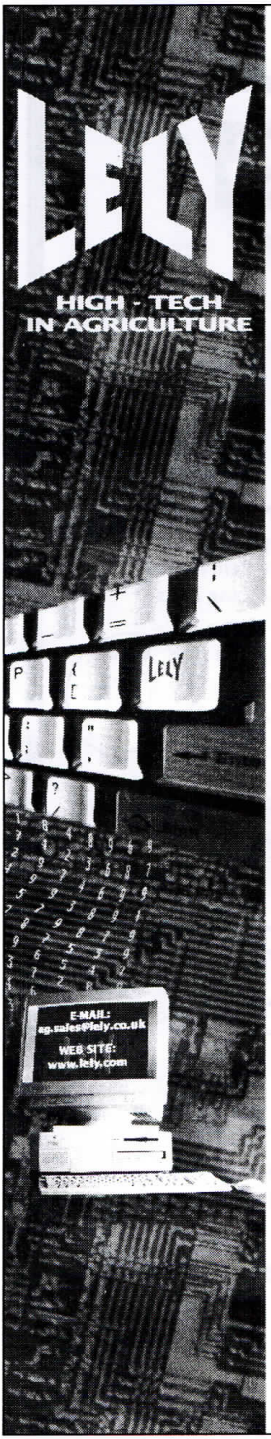
6 July – Meldrum Farm, Blairdrummond, Stirling (Courtesy: W Hamilton & Sons). Meldrum is a 440 ha dairy and arable unit, situated off the main Carse of Stirling clay, south of Doune. It is run by father, Willie, also a vet and his three sons. There were 220 cows, and some 4000t silage were made annually, including 28ha of Maize which has been grown for several years. Latterly, the crop has been established under polythene. At the time of the visit, planning permission was being awaited to reconstruct the steading. This was to incorporate a massive second-hand shed to enable parlour, cattle housing, silage pits and storage to be housed under one roof.

CSGS PANEL EVENING

Evening Meeting of CSGS at the Newhouse Hotel, Newhouse on 24 February 1999

A Panel evening was held at Newhouse in February 1999 to discuss the Outlook for Beef and Sheep Farming. Members of the Panel were:

G Struthers, Moat Mains, Lesmahagow
William Ritchie, Blackston, Ferguslee
Dr Tony Waterhouse, SAC Kirkton & Auchtertyre Farms, Crianlarich



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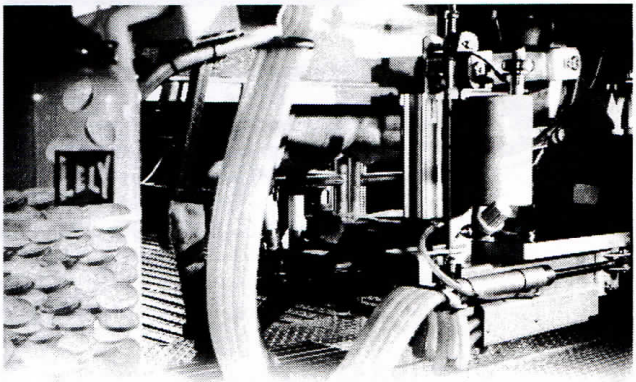

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FARMING TRENDS

Bob Ross, Agricultural Editor, The Glasgow Herald

Evening Meeting of the CSGS at the Newhouse Hotel, Newhouse on 24 November 1999

Bob Ross had been Editor of the Edinburgh Evening News for 15 years before becoming Agricultural Editor of The Herald 5 years ago. His first contact with farming was as a boy sent to the farm to buy eggs, all free range in those days. The farm had 2 milking cows, store cattle and pigs with turnips and a little arable cropping. Newspaper production had undergone massive changes. Reports were now put onto computers for direct transfer to printing, intead of typing report – sub editor – worker setting typescript – back to sub editor.

Recent information supplied by a bank, indicated that although farm bank borrowings were in the region of £1 billion, the overall picture was 85% worth with 15% liabilities; 35% of farmers had no borrowings and banks were not greatly concerned about the future of agriculture. To quote W C Fields: "You are born naked, cold and hungry. Thereafter things get worse!"

Diversification had been successful for many farmers, covering a wide range of enterprises – golf courses, old steadings into holiday homes, caravan sites, etc. A farm near Dundee had started a trout fishery and had built chalets round the trout loch. A Borders farm had started residential computer training courses. Over production meant that some producers would have to go out of business. Lamb production would have to be reduced. Who will go? "the man next door not me". Some producers may not be able to attain required quality standards and will stop production to the benefit of the remainder. Figures show that 1994-95-96 were very good farm income years, and these figures are quoted by politicians. Dairying was looked upon as a real earner for many years. Farmers' markets are a good idea.

If some of the land is not to be abandoned, a case must be made for managing the countryside. Agriculture now has to be considered on a global scale. A good market for sheepskins in Russia has stopped because of the weak Rouble, causing a further reduction in lamb prices. An increasing market for barley in China for beer making is underway.

Following Bob Ross' presentation, David Younie, SAC, gave a talk on Organic Farming. See SWSGS meeting (p 24).

ORGANIC FARMING – OPPORTUNITIES, PRACTICALITIES AND REALITIES

David Younie, Organic Farming Specialist,
Agronomy Department, Craibstone, SAC Aberdeen

Meeting of SWSGS at Douglas Arms Hotel, Castle Douglas on 23 November 1999

A Joint Meeting with the **Stewartry Agricultural Discussion Society** and sponsored by **Timac (UK) Ltd**

The Market for organically produced food was expanding rather than contracting as in other farming sectors, with a spectacular increase in retail sales in recent years – by 30-40% per year since 1996, with projected levels above £1 billion by 2002. Fruit and vegetables (54%) with cereals (14%) occupied two thirds of retail sales, but livestock products, particularly milk, showed the greatest rate of sales increase. Processed foods were increasing in popularity, though these were largely imported. Producer prices were therefore very attractive: organic milk 29.5pl^{-1} and premiums on beef, lamb, cereals and potatoes. Incentives to organic conversion were available under the Scottish Executive (SERAD) Organic Aid Scheme. Rates of payment per ha in 1999 were, over 5 years: £37 for rough grazing and unimproved grassland, and £370-£440 for improved grassland and arable land. The area of organically farmed land in Scotland had risen to 420,000 ha in 2 years from 22,000 ha in 1997, and numbers of organic farms from 120-420. Most (70%) of the increase had been in rough grazings, as it was relatively easy to convert on hill land and the injection of capital very welcome. The slower growth in low ground conversion could however lead to a shortfall in land available for fattening store lambs organically in 2-3 years' time. The total area of organic and in-conversion land in western Europe had increased exponentially in 10 years from 100,000 ha to well over 2 million ha.

The Principles of Organic Production were:

a) Working with natural systems rather than seeking to dominate them.
b) The enhancement of biological cycles involving micro-organisms, soil flora and fauna, plants and animals.
c) The maintenance and development of soil fertility using the minimum of non-renewable resources.
d) The avoidance of pollution.
e) Careful attention to animal welfare considerations.
f) Protection of the farm environment with regard to wildlife habitat.

g) Consideration for the wider social and ecological impact of the farming system.

These were all governed by EC Regulation 2092/91 which dictated that only products properly licensed by a National Certifying Authority can be termed 'organic'. In UK the competent authority was UKROFS (UK Register of Organic Food Standards) which regulated approved private sector bodies, SOPA (Scottish Organic Producers Association) being the most important in Scotland. Certification of a producer with SOPA or the Soil Association was obligatory and joining the SERAD Organic Aid Scheme advisable. The Standards laid down covered key aspects of food production, eg: farming system, livestock and crop inputs, livestock welfare, processing and packaging. Record keeping was also very important. The Organic standard guaranteed the **method** of production not the chemical composition of the food product. The Rules allow partial and phased conversion of a farm, provided the unit converted was large enough for a proper rotation. At least 24 months (monitored) must elapse between the last prohibited treatment (eg: fertiliser, pesticide) and establishment of the first eligible crop. Standards for **grassland and crop management** include: sound rotations (with legumes), animal manures and organic matter, only approved nutrient inputs (eg: rock phosphate) and approved weed and pest control, precluding soluble fertilisers and synthetic pesticides. The conventional philosophy of adding nutrients to the soil to feed the crop should be replaced by that of **feeding the soil**, which can then feed the crop. White clover, with its capacity to supply natural 'free' Nitrogen, is a vital component in grassland, and soil conditions must be made optimum for clover. For example, compaction, which adversely affects clover growth, should be kept to a minimum. N loss in ploughed up grassland should be minimised, eg: by a winter green cover crop. Phosphate and potash could be added through rock, minerals or FYM.

Livestock standards permit bought-in dairy animals but stock for meat must be born and reared organically. Stock must not be housed year-round and must be well bedded. No more than 25% of the floor can be slatted. At least 60% of the diet should be organic forage DM; a proportion of conventional feed is allowed at present, but this will be reduced as sufficient organic feeds become available. Minerals are allowed to rectify deficiencies, but no artificial flavourings, growth stimulants or GM (genetically modified) ingredients. For animal health, positive management strategies must be developed; no routine drug treatments except in cases of real need, eg: liver fluke. Conventional therapy was permitted for clinical symptoms (sick animals).

SAC trials had shown yields of organic oats of 4-5t ha^{-1} in the first year after ley and 3.5-3.8t ha^{-1} in the second year. Clover based silage yields of 4-6t ha^{-1} DM

were also reported for the first cut. Gross margins of £56 per upland ewe, £1,169 per dairy cow (£1,870 per ha) and £168 per beef animal (£420 per ha) were also reported. Organic conversion was easiest in lowland mixed or all-grass farms and most difficult in all arable farms. Plans for individual fields and the whole farm were required in applications.

Overall conclusions were:

- Strong brand image.
- Rapidly expanding market.
- Market expansion limited by lack of supply.
- High premiums for most products – except store lambs in short-medium term.
- Good gross margins.
- Financial support for conversion has increased.
- A very attractive commercial option for many farmers.

Andrew Perry, representing **Timac UK Ltd** gave a short summary. Timac's role in the organic field was the promotion of natural activity in the soil. Timac's fertilisers were based on **maerl**, a calcified seaweed containing calcium and trace elements. This encouraged worm activity, in turn promoting soil aeration, relieving compaction and stimulating grass rooting. **David Finlay, Rainton, Gatehouse** opened the discussion, referring to the practical problems of organic conversion. A considerable length of time was required and it was essential that any decision to convert should be prefaced by visits to already established organic enterprises to learn of practical problems. He felt that a major problem was one of confidence in the organic system in the face of a mass of complex regulations which threatened to overwhelm. Changing from conventional Nitrogen fertiliser to a clover-based grassland occasioned a 10-15% fall in stocking capacity in clover-rich grassland and up to 30% fall where clover was thin. He hoped to begin selling organic milk in 2001 and organic beef in 2003.

Points raised in discussion included: GM contamination in bought-in feeds was a major risk so that a reliable feed supplier was essential. Bloat could be minimised if the cows were buffer-fed before going out to clover-rich pastures. Grass seeds used must be organically grown if available.

Advice and help on Organic Farming can be obtained from SAC Helpline: 01224 711072; Fax: 01224 711293; E-Mail: d.younie@ab.sac.ac.uk.

LEATHERJACKETS AND BIRDS IN SCOTTISH GRASSLANDS

Davy McCracken, Senior Agricultural Ecologist, Environment Division, SAC Auchincruive

Declines in farmland bird species have been well-documented in recent years, and as a result payments are available under SERAD's Agri-Environment Programme to manage certain farmland habitats, e.g. whole grassland fields used for grazing or hay/silage production, in such a way as to benefit breeding birds. Until recently payments for undertaking conservation management on farmland were largely restricted to farmers and crofters within Scotland's ten designated Environmentally Sensitive Areas (ESA's), but now all Scottish farmers and crofters have the opportunity to enhance the wildlife value of their land through the Rural Stewardship Scheme (RSS). The majority of farmers taking up these payments are choosing to instigate this conservation management on relatively fertile swards, not only because such swards are generally lacking in conservation interest, and hence are in need of enhancement, but also because the vast majority of grassland on their farms falls into this category. However, current prescriptions concerning birds mainly focus on the provision of long grass and the reduction of disturbance during the breeding season. No information is provided on how to ensure the availability of suitable food for the birds which nest and forage within these areas. This needs to be considered to maximise the wildlife benefit, in terms of bird breeding success, which might be gained after paying farmers for these management actions.

Scottish farmland forms a very important habitat for breeding wading birds (especially oystercatcher, lapwing, snipe, curlew and redshank), all of which nest and/or forage across the whole of a field rather than simply along the margins. The last three species in particular prefer to nest in long and/or tussocky vegetation and therefore would be expected to benefit most from the management of grazing or hay/silage fields under the Agri-Environment programme. However, as well as suitable nesting conditions, soil and vegetation structure are of particular importance to the chicks, which are not fed by the adults but must collect food for themselves.

Previous research has, however, indicated that the abundance of some soil-dwelling invertebrates eaten by birds is influenced not only by the location and characteristics of a site, but is also affected by the management of the site over the previous weeks and months, (such as the height of the sward and whether or not silage had been harvested in the field the previous year). In addition, both current and past farm management are important in determining the availability of soil-dwelling invertebrates to birds at any one time of year.

A detailed understanding of cause and effect relationships involved would mean that advice could be provided not only on how to enhance the abundance and availability of prey items for waders during the breeding season, but would also help to decide which fields would be best entered under the Agri-Environment Programme. To this end, SERAD is currently funding research at SAC Auchincruive on the importance of farm management and environmental characteristics in determining the abundance of leatherjackets, earthworms and beetles in grassland fields and the availability of these to farmland birds during the bird breeding season. The work is being conducted throughout Scotland on both commercial farms and on a number of wildlife reserves.

There is a particular need to include more commercial farm grassland sites with breeding waders in the project. Any farmer who would be interested in participating please contact D McCracken, Environment Division, SAC Auchincruive, Ayr KA6 5HW. Telephone 01292 525299. E-Mail: D.McCracken@au.sac.ac.uk. A free leatherjacket (and earthworm) count would be made in return for information on recent management history and use by birds of these fields.

NEW BOOK ON ORGANIC FARMING

Organic Livestock Farming – Principles, Practicalities and Profits (2001). Edited by D Younie and J M Wilkinson. Lincoln, Chalcombe Publications. 179 pages. £17.95.

This very recently published book is based on conferences held in February 2001 at Heriot-Watt University, Edinburgh and also at Reading University. Its 11 chapters cover all the most up-to-date aspects of organic livestock production from a purely practical point of view. The topics of Marketing, Certification, Animal Health and Welfare, Organic Management of Grassland, Milk, Beef, Sheep and Pig Production are dealt with in full, **practical** detail, including **financial performance** by leading practitioners in the subject. The publication is primarily aimed at farmers in the UK and northern Europe, and is recommended reading for anyone considering the organic option or in the process of conversion.

A similar conference on Organic Arable Farming – cereals and pulses is being planned for November 2001.

AROUND THE DAIRY WORLD IN EIGHTY MINUTES

Ian Potter, Ian Potter Associates, Sallyfield Lane,
Stanton, Ashbourne, Derbyshire

Meeting of SWSGS at the Gartferry Hotel, Ayr on 21 October 1999

Ian Potter, head of an agricultural quota business set up in 1988, gave an overview of the dairy industry world-wide. The Society was joined for the evening by a group of 10 Canadian dairy farmers who were touring Scotland.

He began by referring to the current milk marketing problems in the **UK**. "Farmers should market their own product" he said, "with a marketing campaign". Children were a very important market, an estimated 89% eat breakfast cereal. There could be milk vending machines in schools, as there were for soft drinks, and a campaign could be mounted to inform pupils of milk's nutritional value. Farmers should co-operate and then "attack the market". A distinct brand image would be an advantage.

Numbers of UK dairy farmers had shown a steep decline from around 150,000 in 1960 to around 30,000 at present. Cow numbers had correspondingly fallen from over 3 million to under 2.5 million, though average herd size had risen from 20 to 72 and milk yields from 3,400 to 5,600 litres cow^{-1}.

Dairying World-wide

The price for milk to the producer varied considerably from country to country – see Table.

UK – there were many advantages to dairying in the UK – favourable climate, large consumer market, flexible quota system. Disadvantages were high production costs, lack of farmer co-operation, power of supermarkets, low milk price and political weakness.

USA – large 'unsubsidised' market, keen farmer co-operation leading to very large marketing firms, economies of large scale units leading to competitive production costs. Disadvantages were very high capital costs and volatile milk prices.

New Zealand – climate allows year-round grazing and low capital costs. There is co-operative ownership and farmer control of processing. No subsidies, but responsible for 33% of world dairy trade with 'Anchor' brand from only 2% of world production. However NZ is remote from main markets and milk price very low; farm assurance and traceability not yet standard.

Table – Milk Prices for the Producer

Price Range (p/litre)	Countries
33-36p	Japan & Switzerland
25-27p	Norway
23-25p	Canada, Denmark, Israel, Sweden & Holland
19-22p	Eire, Holland, UK & USA
16-18p	Czech Republic, Slovakia & S Africa
13-15p	Brazil, Chile, Estonia, Hungary, Poland & Russia
9-12p	Argentina, Australia, India, Latvia, Mexico, New Zealand, Rumania & Uruguay

Argentina – Dairying fast developing and very profitable; low production costs and no government intervention in milk price. Yields are low (3,600 litres) and population sparse.

Ireland – In a natural climate for dairying prospects should be good. However, as in UK there is a failure to capitalise on the 'green' healthy image of milk.

Denmark – Highly professional and informed farmers, high yields, high milk price. Two-thirds of all dairy products exported and well developed organic market. Costs and taxes are high however, with expensive environmental regulations (Nitrate Directive).

Hungary – a growth area for dairying – low costs, high milk price, cheap land and labour, state subsidies, and maize, silage and lucerne are easily grown. A major disadvantage is a year-round housing requirement in a very variable climate, together with shortcomings in support industries, labour and management. Robert Walsh in the Canadian group from Newfoundland, where the climate was wet, said milk production had increased from 9 million to 33 million litres since 1983.

Ian Potter concluded that the prospects for efficient dairy farmers were as good in UK as anywhere, if marketing and milk price can be stabilised. A business approach and hard work will be necessary, and farm location may be a factor in the future. For the adventurous, Hungary offers tremendous opportunities, and for the very brave, Argentina.

A draw for a clock donated by Ian Potter was won by Murray Stevenson, Sandyford, Monkton.

SAVE MONEY WITH GOOD WASTE MANAGEMENT

Mark Aitken, Senior Consultant, (Soil and Waste Management), SAC Auchincruive

Farm slurries and solid manures are valuable fertilisers. They may also be potential sources of pollution. With increasing economic and environmental pressures on farm businesses, it makes sense to maximise the fertiliser value of manures, whilst taking action to prevent pollution. In a recent SAC survey of slurry and farmyard manure management practices in Ayrshire, the potential to achieve financial savings and a reduction in water pollution risks were identified on many farms, through improvements to the collection, storage and land application of manures.

Volume of Waste: Some farm waste storage systems needlessly collect large volumes of rainwater from yards, roads, and roofs. This merely uses up valuable storage space and increases the volume of slurry to be spread. It is better if clean water is not allowed to enter slurry stores unless dilution is specifically required for waste handling purposes. Clean water from roofs and open areas of clean concrete should therefore be diverted for separate discharge into drains or watercourses. In some cases, this will reduce the volume of manures requiring storage and handling by over 600 m^3 per year (equivalent to 100 slurry tanker loads!).

Collection and Storage: **Dirty water** (including wash-down waters from dairies, collecting yards and livestock buildings and liquid draining from middens and slurry storage systems) should never be allowed to flow directly into watercourses, but should instead be collected and spread directly onto land. Manure storage facilities should be inspected regularly for any signs of corrosion, surface breakdown, cracking of concrete and fractured pipes. "*A stitch in time saves nine*" is just as appropriate to farming as in other industries!

Value of Livestock Slurries and Manures: Based on current prices of fertilisers, the slurry produced by 100 dairy cows over the winter housing period has a potential value of almost £2000. With an opportunity to apply to grassland on several occasions during the growing season, this could provide up to 20%, 100% and 80% respectively of the N, P and K fertiliser required for hay or silage production. Good management will improve the value of the manure as a source of nutrients, while poor management will result in the loss of nutrients and possible water pollution. Slurry applications in March or just after first cut in May or June will maximise the nutrient value of the manure. **The amount of available nutrients in a typical slurry application can be around 30 kg/ha nitrogen, 20 kg/ha phosphate and 90 kg/ha potash.**

IMPORTANT NOTE on Foot and Mouth Disease and the Spreading of Animal Manure and Slurry

Manures and slurries from infected animals can contain the Foot and Mouth Disease virus. The rules about spreading manures and slurry in relation to Foot and Mouth Disease depend on whether the farm is infected or is located in a restricted area. A summary of current (April 2001) rules produced by SERAD is as follows:

Infected Premises (Form A Farms): The treatment and disposal of animal manure and slurry is under the exclusive control of the veterinary authorities. Further guidance where required should be obtained directly from them, contact numbers: **Ayr Animal Health Office** Tel No: 01292 268525; **Galashiels Animal Health Office** Tel No: 01896 758806.

Form D Restricted Farms: Spreading of animal manure or slurry is only permitted with the prior approval of the local veterinary authorities. The following conditions must be met:-

- Animal manure and slurry can only be spread on land to which the Form D notice applies.
- Slurry can only be discharged by equipment set to ensure that any jet or spray is directed downwards at an angle of not less than 45° from horizontal and not more than 1 metre above ground level.

Farms within the Infected Area (Excluding Form A or D Restricted Farms)

- Animal manure or slurry must not be moved out of the Infected Area.
- Slurry can only be discharged by equipment set to ensure that any jet or spray is directed downwards at an angle of not less than 45° from horizontal and not more than 1 metre above ground level.
- All vehicles and equipment used to transport and spread animal manure or slurry must be cleaned and disinfected **after each occasion** on which it is used on premises outwith where the manure and slurry is produced.
- Do not allow animal manure or slurry spillage on a public road.

All other Farms: There are no Foot and Mouth disease restrictions on the spreading of animal manure and slurry on these farms.

In any other circumstances where you are unsure about spreading practices, or about which restrictions apply to your farm, please contact your local veterinary authorities at the contact number given above.

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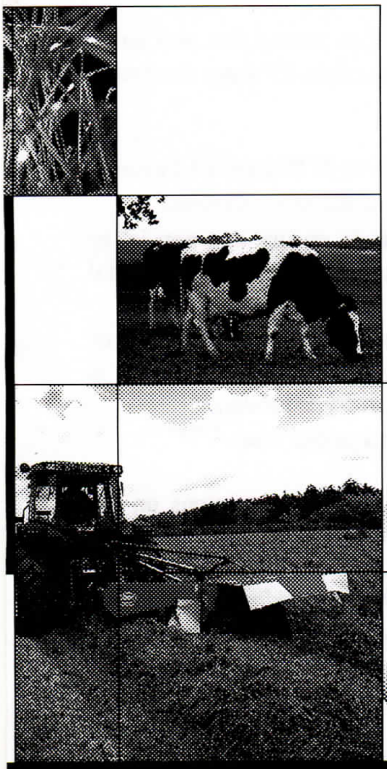


global grow-how

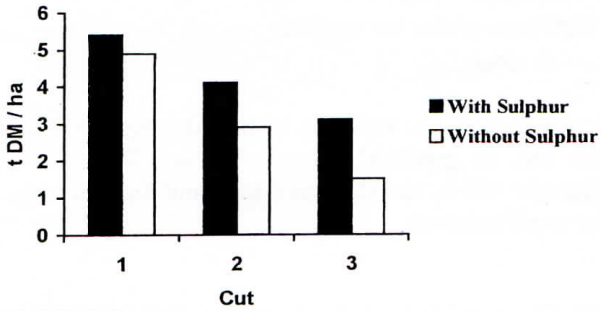
OPTIMISING GRASS GROWTH WITH SULPHUR

Mark Garrett, Technical Manager, Kemira Agriculture

Grass needs between a third and half as much Sulphur as Nitrogen. This is because Sulphur is used in conjunction with Nitrogen to make amino acids, the building blocks of protein and of grass growth. Historically, much of this Sulphur was supplied as atmospheric Sulphur produced as a bi-product of industrial activity. However, as anti-pollution measures have been introduced, there has been a steady decline in Sulphur emissions and consequently of Sulphur deposited on agricultural land. This trend is forecast to continue with major implications for grass production.

Sulphur Grows More Grass

Results of new research by the Institute of Grassland and Environmental Research (IGER), commissioned by Kemira, show the effects of adding Sulphur to fertilisers on Sulphur deficient soils. In a detailed and fully replicated study, IGER concluded that additions of Sulphur can give yield responses at the first, as well as the second and third cuts, as shown in the graph below. These results were obtained on a sandy loam soil with a high Nitrogen input and show a 3.3t DM/ha (35%) increase in grass dry matter yield over three silage cuts. Averaged over three years (1997-1999), grass with Sulphur applications yielded 12.6t DM/ha compared with 9.6t DM/ha without Sulphur.



Sulphur Improves Quality

In 1999, the same experiments demonstrated that Sulphur applications could improve the quality of grass cut for ensilage. Regardless of soil type, Sulphur gave an increase in the true protein content of grass, and a potential to produce higher quality silage and increased milk and meat production from cheap forage. Sulphur fertilisation on sandy soils in 1999 also improved the water soluble carbohydrate content of grass cut for silage, again contributing to potentially better fermentation and silage quality.

Sulphur Protects the Environment

In current environmentally-conscious times, nitrate leaching is a major issue for all farmers, in particular those farming in Nitrate Vulnerable Zones (NVZs). The IGER research showed that dramatic reductions in nitrate leaching could be achieved on sandy loam soils from the use of Sulphur. Sulphur reduced over-winter leaching by an average of 74% per year over the three years of the study, bringing leaching rates to levels well below the EC limit. Whatever the soil type, the addition of Sulphur also reduced denitrification losses – the breakdown of nitrates in the soil into potent greenhouse gases.

All of this research data therefore highlights that it is time to address the potential of Sulphur on grassland farms. Deficiencies of Sulphur for crop nutrition can mean loss of cheap forage to the livestock production system, and therefore reduced financial efficiency. With rapidly declining levels of Sulphur deposition from the atmosphere, land which had satisfactory levels of Sulphur just five years ago, may now be deficient.

The key to deciding whether or not Sulphur fertilisers should be considered in your grass growing system is a Sulphur deficiency risk assessment followed by a tissue test. Land most at risk from Sulphur deficiency includes:

- Light and medium soil types;
- Areas where Sulphur deposition is low;
- Where high grass yields are targeted;
- High rainfall areas.

The Kemira response to this work has been to develop new Sulphur-containing fertilisers for use in grassland farming. Your local Kemira Agriculture Technical Manager will be delighted to assess your Sulphur needs and arrange a tissue test for you if required.

CENTRAL SCOTLAND GRASSLAND SOCIETY VISIT
ROBERT WISEMAN & SONS – MILK PROCESSING PLANT

In the afternoon of 24 November 1999, preceding the evening meeting, members of CSGS visited the Milk Processing Plant of Robert Wiseman & Sons at Bellshill, near Glasgow. The visitors saw the modern milk reception and bottling plant, which handles milk from much of central Scotland, and supplies milk to a wide variety of supermarkets.

CENTRAL SCOTLAND GRASSLAND SOCIETY
Silage Competition 1999

HF Seeds Prize-Giving Meeting of CSGS at the Newhouse Hotel, Newhouse in January 2000

C M McCombie, Secretary, Central Scotland Grassland Society

Silage Judge: Douglas Kerr, Crochmore, Crocketford Road, Dumfries

The Silage Competition was judged in December 1999, and the results announced by the Judge, Douglas Kerr, during the CSGS Competition Evening in January. After the prize-giving, the Judge spoke about his own farming at Crochmore Farm, Crocketford Road.

HF Seeds Cup & 1st Prize	R Reid & Son, Glen, Falkirk
2nd Prize	A H Lyon, Drumachloy, Bute
3rd Prize	J Warnock, Eastfield, Biggar
Hamilton Reco Salver for Best Beef & Sheep Silage:	N M Bowser, Lerrocks, Doune
Best Big Bale Silage:	N M Bowser, Lerrocks, Doune

SWSGS COMPETITIONS

In addition to the Silage Competition, SWSGS also runs an Ideas Competition, Sward Competition, Environmental Competition and Photographic Competition. Due to the outbreak of Foot & Mouth disease, these Competitions (excepting the photographic competition) have been suspended. The Society would hope to be able to resume these in 2002. The **Ideas Competition**, sponsored by **Kemira Agriculture** seeks original ideas and innovations in use on livestock farms. The **Sward Competition**, sponsored by **Nickerson UK Ltd** aims to draw attention to quality in the growing sward, arising from dense, weed-free grass, with clover where required, following on good establishment and subsequent management. The **Environmental Competition**, sponsored by **Bank of Scotland**, seeks to recognise sympathy and care for the environment and wildlife in every day successful commercial farming operations. The **Photographic Competition** is a recreational adjunct to the Competition Evening, when skills at selecting photographic subjects on a rural theme are displayed informally.

Prizewinners at the Silage Competition Evening, held in Dumfries, January 2000. Left to Right: R Campbell, A Paterson, I McIntyre, R Wilson (Silage Champion), H Parker (Chairman), J McCluskey (Silage Judge), J Forrest, W Welsh, J Mackie.

SWSGS SILAGE COMPETITION 1999

The Competition Evening of the SWSGS held at the Cairndale Hotel, Dumfries on 20 January 2000

G E D Tiley

*Sponsored by **Trident Feeds, Biotal Ltd, Nickerson (UK) Ltd** and by **Plasti-Covers Ltd***

Silage Judge: **John McCluskey, Lea Farm, Roslin, Midlothian**

On a clear, frosty night in Dumfries, the Chairman, Hugh Parker, welcomed a good audience of members to the ever popular Competition Evening. He did not think there was much to cheer about in farming, but this did not dampen the enthusiasm of the meeting. The Chairman particularly thanked the County Committee Members for their essential role in screening farms with high analyses marks to arrive at the Short Leet for judging. Thanks were also expressed to the several sponsors of the Competition, and to staff at SAC Advisory Offices and at Auchincruive for supplying and processing the analysis data.

Silage Quality 1999 - G E D Tiley

A brief statistical review was given of the 1999 silages entered in the Competition, all being entries from Society Members which had been sampled and analysed by SAC. The results are summarised in Tables 1 and 2. **DM.** Means were 1-2% higher than in 1998 and similar to 1997. **D-values** and **MEs** were similar to 1998, but generally lower than in earlier years. **Proteins** were also generally lower, particularly in Ayrshire. **Intake Factors** were better than 1998 by 3-4 units in both Dairy and Beef/Sheep silages. Total entries in the Competition were about one third lower than in 1998. **Wholecrop cereal** and **Maize** silage classes were included in the Competition for the first time, reflecting increasing popularity of growing these alternative crops for conservation.

Wholecrop and Maize Silages 1999 – Analyses Means

	DM (%)	pH	CP (%)	Starch (%)	ME
Wholecrop (4 entries)	40.1	3.9	9.7	27.1	10.8
Maize (4)	22.4	3.7	9.8	20.0	10.6

Table 1 - SILAGE COMPETITION 1999- ANALYSES MEANS

Overall Means (Grass Silages)

Group (Number)	DM (%)	D (%)	CP (%)	ITF (c)	ME	Ammonia (% Total N)
Dairy (121)	27.9	67.9	13.7	104.0	10.9	6.57
Beef/Sheep (16)	25.4	64.8	12.0	99.4	10.4	7.57
Big Bale (3)	46.2	64.3	11.6	118.3	10.3	5.60
Dairy						
Ayr (22)	28.2	66.7	12.5	104.0	10.7	6.83
Dumfries (32)	27.4	67.9	13.9	102.6	10.9	6.20
Kirkcudbright (31)	29.0	68.3	14.0	104.8	10.9	6.36
Wigtown (22)	27.2	68.4	14.1	105.0	10.9	7.08

Table 2 - FREQUENCY DISTRIBUTIONS (%) 1999

			Dairy				
	Bale	Beef/ Sheep	A	D	K	W	All
No of Entries	3	16	16	29	21	22	88
D-Value							
70-75	0	19	12	41	38	40	35
65-70	67	44	69	38	52	55	51
<65	33	37	19	21	10	5	14

Table 2 - FREQUENCY DISTRIBUTIONS (%) 1999 cont.

	Bale	Beef/ Sheep	*Dairy* A	D	K	W	All
DM							
>40	67	0	0	10	14	0	7
30-40	0	13	31	14	24	18	20
25-30	33	44	50	31	5	50	32
23-25	0	6	0	28	28	14	19
20-23	0	25	13	3	24	14	12
<20	0	12	6	14	5	4	10
CP							
>18	0	0	0	3	0	0	1
16-18	0	0	0	21	14	18	15
14-16	0	6	0	24	43	32	26
12-14	67	56	69	31	29	36	39
<12	33	38	31	21	14	14	19
ITF (c)							
>125	67	0	6	7	5	9	7
120-125	0	0	6	0	14	0	5
110-120	0	25	13	17	14	23	17
100-110	0	25	44	42	14	36	34
<100	33	50	31	34	3	32	37
Ammonia-N							
<4	0	12	25	21	14	9	17
4-7	0	50	31	48	52	46	46
7-10	0	13	31	31	24	27	28
10-20	0	25	13	0	10	18	9
ME							
11.5-12.0	0	6	0	17	10	5	10
11.0-11.5	0	19	31	35	38	50	38
10.5-11.0	33	25	38	24	38	36	33
10.0-10.5	33	31	31	14	14	9	16
< 10.0	33	19	0	10	0	0	3

Judge's General Comments

Silage Judge, John McCluskey recalled that his father, Peter, had judged the South West's Competition 17 years ago in 1983, and that he himself had also judged 10 years later in 1993. John had enjoyed the 4 days' judging and meeting all entrants. The itinerary had been very interesting and he wished to especially thank Committee Members for taking him around, all farmers visited and the Society for inviting him to judge. He had been pleased to see everyone 'just getting on with the job', in spite of the many difficulties in farming, which was to the credit of all entrants.

Specific comments were:

- There was still a potential to get more from forage and reduce concentrate feeding.
- Additives were an insurance, though he felt the cows could have an increased intake relative to chemical analysis.
- No farm fed effluent – hence maximum marks were never earned.
- The South West Society's marks emphasis should be changed, reducing effluent marks but increasing those for contribution of silage to the diet. Check BGS system.
- Silage sampler should carefully replace patch over sampling hole in the plastic sheet to prevent wastage ingress.

1999 Results. These are given in Table 3. The judge gave a brief individual comment on each farm visited. The main points from the Short Leet Farms, in order of Inspection were:

Arness – attention to detail; no waste, uniform clamp; looking ahead to the next 3-5 years.

Lawersbridge – good contribution to the diet.

Altonhill – very simple, straightforward feeding; very tidy and good effluent control.

Craigalbert – very high efficiency of feeding and labour.

Low Barbeth – very good effluent control, whole crop silage and extended grazing.

Low Clanyard – very well run; attention to detail and good contribution to the diet.

Low Clone – highest marks for contribution to the diet; very good clamp and high feeding efficiency.

Mayfield – large, well-managed, tidy; very good feeding efficiency and excellent contribution to the diet.

Grange – very good feeding efficiency. Unfortunately clamp not open for inspection.

Meikle Firthhead – excellent, highest milk yield – 9,800 litres; good effluent control; alternative forages contributing to the diet.
North Corbelly – good efficiency and contribution to the diet; lowest concentrates fed per litre.
Dalfibble – very impressive; attention to detail; very good effluent control and contribution to the diet.
Trohoughton – very tidy and very good labour efficiency.
Meinfoot – very high stocking rate; highest marks for feeding efficiency; maize fed.
Barony – good efficiency; high clover silage being tried.

Table 3 – 1999 Silage Competition – Short Leet Entrants
(in order of Total Marks)

Prizes		*Analyses (35)*	Marks *Inspection (65)*	*Total (100)*
	Dairy Class			
1st & Rosebowl	R Wilson, Mayfield, Castle Douglas	28.45	61.8	90.25
2nd	J Forrest, Meinfoot, Ecclefechan	29.20	60.5	89.70
3rd	W Welsh, Arness, Fenwick	24.80	62.5	87.30
Best New Entrant	A Paterson, Low Clone, Port William	24.80	60.5	85.30
	W Beck, Low Clanyard, Drummore	28.65	56.0	84.65
	I McIntyre, Low Barbeth, Ervie	29.55	53.5	83.05
M. Milligan Prize	J Mackie, Dalfibble, Parkgate	24.70	57.7	82.40
	R Marchant, Barony, Parkgate	25.75	55.7	81.45
	D Yates, Meikle Firthhead, Castle Douglas	22.55	58.0	80.55
	C Smith, Lawersbridge, Mauchline	23.55	53.5	77.05
	G Sommerville, North Corbelly, New Abbey	20.95	53.5	74.45
	A Borland, Altonhill, Kilmarnock	16.60	57.5	74.10
	Beef/Sheep Class			
1st & BP Trophy	R W Campbell, Craigalbert, Ballantrae	22.65	52.0	74.65
	WT McCombe, Trohoughton, Dumfries	19.70	53.7	73.40
	D Biggar, Grange, Castle Douglas (pit not open for inspection)	20.15	38.0	58.15

		Analyses (35)
	Big Bale Class (on analysis)	
	A Crichton, Killymingan, Kirkgunzeon	23.85
	Best Silage in County (on analysis)	
Ayrshire	W Welsh, Warnockland, Fenwick	24.80
Dumfries	J Forrest, Meinfoot, Ecclefechan	29.20
Kirkcudbright	P Bull, Coopon Carse, Palnure, Newton Stewart	28.50
Wigtown	I McIntyre, Low Barbeth, Ervie	29.55

Cash tokens for the purchase of plastic products, donated by **Plasti-Covers Ltd**, were awarded to the 1st Dairy and 1st Beef/Sheep prizewinners.

WHOLECROP FORAGE PEAS AT LEA FARM, ROSLIN

John McCluskey, Silage Judge

The Judge briefly summarised his experiences with growing forage peas at his farm in Midlothian in the East of Scotland. He had previously grown peas for combining in the 80's. This could be a difficult crop to harvest if the weather was poor, but provided a good break crop to follow due to the nitrogen fixed. In 1999, 25 ha were sown 9-11 April to varieties: Ramrod and Eiffel, cut on 1 September and lifted 15 September, giving a yield of 7.2t ha^{-1} at a DM content of 37%. Costs in 1999 were:

		Cost (£ ha^{-1})
Seed (87.5 kg)		63.75
Fertiliser 0:20:30 (125 kg)		34.89
Sprays: Pre-emergence	27.87	
Fungicide	31.01	58.88
Harvest		0.00
Additive		66.72
Total Cost Per Hectare (without Arable Aid)		**224.24**
Yield (t DM/ha^{-1})		7.2 t
Cost/Tonne DM (33.5%)		£30.30
Arable Aid Payment		312.46

Forage Analysis of Wholecrop Peas (wilted) in 1999 was:

DM	33.5	pH	4.2
D-value	69.2	Ammonium N	10.1
ME	10.7	Starch	13.5
Crude Protein	17.3	ND Fibre	399
Ash	7.5		

A feature of forage peas is the consistent levels of starch and crude protein. If the crop is treated with pre-harvest glyphosate, D-values are reduced.

Feeding. The wholecrop forage pea silage was fed to high-yielding cows as a replacement for grass silage (see Rations Table). Due to frequent cold east winds in spring, protein levels in grass silage can be variable.

Rations Fed in 1999-2000 Winter (kg fresh weight)

Milk Yield cow^{-1}	M+42 l	M+48 l	M+28 l
Grass Silage	0.00	0.00	10.00
Wholecrop Wheat	20.00	25.00	15.00
Wholecrop Peas	10.00	12.00	12.00
Soda Wheat	4.00	2.50	1.70
Soya	3.25	2.50	0.17
Rape Seed Meal	1.00	1.00	0.70
Sugar Beet Pulp	1.50	2.00	1.40
Fishmeal	0.40	0.25	0.17
Megalac	0.60	0.60	0.27
Minerals/Vitamins	0.20	0.20	0.12

The winter wheat-forage pea diet resulted in a lower acid load in the rumen compared with a high grass silage diet. Grass was also more expensive to conserve (£15 t^{-1} compared with £13 t^{-1}).

In conclusion, the judge felt there was a future in dairying if costs were regularly monitored and everything on each farm was done as efficiently as possible. Farmers should be candid and not complacent about costs. "Invite a third party to look at the farm and at costs and attend discussion groups to search for new ideas".

SCOTTISH REGIONAL SILAGE COMPETITION 2000

Dr Ron Harkess, OBE
Scottish Regional Silage Judge, 2000

Winner: A S Buchanan & Sons (Powmill Farm, Kinross), East of Scotland Grassland Society.

Runner-up: W R Wilson, Mayfield, Castle Douglas, SWSGS

The spread of marks was very close this year, as follows:

	Total	Inspection	Analysis
A S Buchanan & Sons, Powmill, ESGS	73.6	54	19.6
W R Wilson, Mayfield, SWSGS	72.7	53	19.7
R Reid & Son, Glen, CSGS	72.6	52	20.6
A & E Wyness, Midtown of Barras, NSGS	71.7	52	19.7

Inspection marks were allocated to the following items:

A) Visual assessment of the silage – 20 marks.
B) Management and utilisation of effluent and farm wastes – 10 marks.
C) Grass silage production and utilisation – 30 marks.
D) Safety, welfare and overall impression – 10 marks.

UK NATIONAL SILAGE COMPETITION 2000

The National Competition is run by the British Grassland Society, with support from ADAS, SAC and Kemira Agriculture. The **Winner** in March 2000 was: **Ian Walton, Carkin Moor Farm, East Layton, Richmond, Durham**. Ian runs 120 cows on 62 ha (156 acres), all grass farm at 130m, and feeds a low-cost simple ration and silage through a forage box. Milk yield: 7,800 litres, 4,300 litres from forage. **Runner-up** was **Douglas Lund**, with 129 Ayrshires on 85 ha at **Elm Tree Farm, Kirby Misperton, Malton**.

Comments from the Judges on the 2000 National Competition (with acknowledgement to BGS).

A) **Silage Inspection** – Absence of Waste – 11 marks.

Marks ranged from 9 to 3 from a possible 11. In 3 years out of 5, judges would expect to see at least one farm gaining full marks, even on an outdoor clamp. Shoulder waste let everyone down. Perhaps the sheer bulk of this year's crop meant that grass was too high up the walls for proper consolidation. Wisely, farmers took the safe option, and didn't get too close to the edge, but many of the tactics used to ensure well preserved shoulders were not in evidence this year.

Visual Assessment – 9 marks.

A high scoring section, with only one clamp showing any sign of overheating. Mould, as expected, was not encountered at this level, and little if any contamination was seen. Our only criticism was some evidence of lack of uniformity at the face of all clamps, brought about by difficult ensiling conditions.

B) **Management of Effluent and Farm Wastes** – 10 marks.

All 9 finalists can be justifiably proud of their systems. High scores all round for responsible and efficient effluent and slurry management. Farms differed in the use they made of their wastes, notably as fertiliser. One farm had made a study of the value of slurry, including analysis, and was using it to great effect. At the other extreme, slurry was seen simply as a waste product for disposal.

C) **Silage Production and Utilisation** – 30 marks.

Use of labour and machinery was universally efficient, with little to choose between the farms. Efficiency of feeding was slightly more varied, but only

1.5 marks separated the highest and lowest score. Animal production from silage was the major discriminator. Production was clearly a feature of management; latitude and longitude had no bearing on the scores achieved.

D) **Safety, Welfare and Overall Impression** – 10 marks.
None of the farms was in any way unsafe, but proactivity towards safety and attention to detail did vary. Welfare is clearly uppermost in many farmers minds, and whilst all the farms were good in this respect, some were quite outstanding. Straw bedding was much in evidence and a great deal of attention had been paid to cubicle design. The judges were interested in clarity of thinking and development of the farm business. Cleanliness is important however, but all contestants were wise to that.

E) **Silage Analysis** – 30 marks.
Marks have been higher in previous years, simply because weather conditions made this year a difficult one to achieve high dry matters. DM values ranged from 20 to 34%, ME from 10.8 to 11.9 from the 9 farms judged.

SILAGE: A BRIGHT FUTURE OR THE END OF AN ERA

Prof R J Wilkins

Excerpts from an address given at the UK National Silage Competition Awards Ceremony

Much of my early research career was concerned with silage, and I was involved with Mike Wilkinson and others in putting together the rules for the first BGS National Silage Competition held in 1979. This Competition has played a key role in the recognition, discussion and dissemination of best techniques of silage making. The future of grass silage has been challenged in recent years as the full costs of silage making have been realised, and farmers have been striving to reduce their unit costs. The production of grass silage in the UK increased from 10m t in 1970 to a peak of 50m t in 1993, but has now dropped to about 41m t in 1999, with an additional 4.5m t of silage from maize and other forage crops.

I do not consider that dairy cow systems based on 12-month grazing will be of any significance in Britain in the next 20 years. Production in winter is severely limited by low levels of radiation, giving potential yields in mid-winter of only some 10kg DM/ha per day compared with over 100kg DM/ha per day in late spring. Grazing management to carry over grass for grazing into late autumn or even spring, will have only limited impact because of the high losses in yield and quality which occur in standing herbage. I still contend that much of the feed requirement for the winter third of the year is best supplied as silage produced as an adjunct to an efficient grazing system. But the trend for a reduction in growing specialist grass leys for silage will continue.

In essence, there will be a somewhat different role for silage in the next decade compared with the 80's or 90's, but grass silage will nevertheless continue to have an extremely significant part to play in ruminant feeding. It will be increasingly important to constrain costs of production, whilst achieving effective preservation and high feeding value. We will need to reduce the cost of production of the material going into the silo, through using productive swards and efficient use of fertilisers and manures, and to reduce the costs of machinery, additives and storage through good management, attention to detail and full machine use. The Competition provides a framework for further development to fully reflect the requirements of the next decade. Silage will therefore continue to play a pivotal role in our animal production systems, although with some further reduction in the total quantity of grass silage made.

NICK OFFER WINS NATIONAL LIVESTOCK NUTRITION AWARD

Dr Nick Offer, Specialist Nutrition Chemist in the Food & Farming Systems Department, SAC Auchincruive was awarded the prestigious Roche National Livestock Nutrition Award for the year 2000. The award was in recognition of his outstanding contribution to the greater understanding of the nutritional characterisation of feedingstuffs for ruminants, particularly in the area of forage analysis. In recent years, Nick has been at the forefront of developing technologies to predict the nutritive value and intake potential of forages, especially grass silage. These technologies have been universally adopted by the feed industry and consultancy bodies, enabling more accurate and descriptive rations for ruminants, especially dairy cows, resulting in improved forage utilisation and lower costs. The National Livestock Nutrition Award is sponsored by Roche Vitamins (UK) Ltd and has been made annually since 1986 for the most significant or innovative contribution during the preceding five years to the nutrition or practice of feeding farm livestock. It was awarded to SAC scientists on two previous occasions: Dr Cledwyn Thomas and Team, 1988; Dr Sandra Edwards, 1997.

With acknowledgement to Janette Elder, Corporate Information Office, SAC, West Mains Road, Edinburgh.

BETTER USE OF PASTURE – THE ONLY WAY TO A SECURE FUTURE

D Arthur Davies
President of the British Grassland Society 1999-2000

I believe that there is only one way for our pastoral industry to survive the current crisis:- **that is to make more and better use of grass and forage.** In the British Isles we have a climate that is arguably the best in the world for growing grass. Also, our livestock farmers are excellent stockmen. Grazed grass is the cheapest and most natural way of feeding ruminants. The BGS and local societies have a pivotal part to play in helping the industry overcome the present difficulties by promoting the need for greater, or better reliance on grass and forage.

The BGS Grass project, under Jerry Rider's leadership, played an important part in starting the ball rolling amongst dairy farmers. I am pleased that this initiative is continuing with the MDC funded project. There is also scope to make more use of grazing in the beef sector, but for sheep there is little scope for increased use, since systems are already heavily dependent on grass and forage. However, there is ample opportunity to make improved use of pasture in sheep enterprises, both in the lowlands and in the uplands. We need to get across the answers to three questions: **why**, **how** and **what are the benefits?** Two main reasons for making more and better use of pastures are: a) it is the cheapest feed, and b) it is the only way of satisfying the growing consumer demands for food that has been produced in a "natural", sustainable and environmentally-friendly way.

I think that many of us have forgotten the basic rule of economics that "price for product minus production cost equals profit". If production costs are greater than the price received, then obviously profit becomes a loss. How many primary producers know what their cost of production really is? The Grass project with its Comparable Farm Profit concept is pointing dairy farmers in the right direction. We need to promote the idea of working in unit cost (ie: pence/kg) to beef and sheep farmers too. Currently, many producers have to accept prices that are way below the cost of production. Such a situation just cannot be sustained. There are two ways of trying to improve or retain profits. Either you reduce the cost of production, or you secure a better return for the product. There are, I believe, tremendous opportunities emerging for beef and sheep farmers to market their grass-fed animals as a quality product. This is an opportunity not to be missed. In fact, the key to survival is to produce prime, branded meats, that have the best taste and flavour in the world, and which have been produced in a welfare-friendly way, whilst also enhancing the environment.

We cannot compete on the world market with commodity producers from places such as South America that have much lower costs.

How might production costs be reduced? One of the most expensive items is that of feeding the sward. In the past, many lowland farmers have applied too much fertiliser, in particular N and P. As well as literally throwing money down the drain, this has serious environmental consequences. In the uplands, the situation is the reverse with many farmers applying **insufficient** nutrients to maintain soil fertility. Proper use of animal waste also needs serious consideration (see page 32). We must regard it as a valuable source of nutrients and not just a disposal problem. The BGS conference on "Accounting for nutrients" in 1999 dealt admirably with this topic. We must of course not forget the potential of legumes to supply "free" nitrogen, as well as being a valuable source of home-grown protein. Utilisation of pasture must also be efficient. It was fitting and timely that the Society's first conference of the new millennium at Harrogate in February dealt with "Grazing management – the principles and practice for profit and environmental gains". To produce quality products from pasture you must have quality herbage. Exciting developments are being made in research to improve the efficiency of the ruminant in utilising raw materials to produce milk and meat. It will soon be possible to influence the composition of products by adjusting the composition of the diet. This has tremendous possibilities in enhancing the healthiness of livestock products.

Pastoral agriculture is the backbone of our remoter rural areas. The future of these less favoured areas depends on the continuation of livestock farming that is both biologically sustainable and economically viable. We need to grasp the opportunities for processing livestock products in our rural areas, thus creating employment and not exporting jobs. We must always remember that the late Sir George Stapledon's (Founder President of BGS) vision of growing two blades of grass where only one grew before, owed more to his desire to retain a viable population in our rural areas than to increase overall production. His vision all those years ago remains equally valid in the 21st century.

We pride ourselves in BGS that we have a good blend of membership encompassing farmers, those in commerce, and those in research and development. What concerns me though is that there is very little mixing of the different sections. You cannot bake a good cake simply by putting all the ingredients in a bowl. They have to be thoroughly mixed. A challenge facing the BGS is to foster better contact between members working in these different sectors. Local societies also have a role to play in fostering this link. Finally, in relation to future prospects, grassland societies have a key role in promoting the

benefits of grass-based systems to both policy makers and the general public at both local and national level.

I look forward to visiting south west Scotland for the BGS Summer Meeting in 2002, and seeing some excellent examples of quality livestock production from grass and forage.

BGS SUMMER VISIT - SWSGS

It will be remembered that the British Grassland Society had accepted an invitation from SWSGS to hold the Summer Meeting for 2002 in South West Scotland (see last year's Greensward, page 57). Plans for organising this 3-4 day visit had been progressing well until early in 2001, when the whole of Britain was struck with the outbreak of Foot & Mouth Disease.

Obviously, the 2001 Summer Visit to Bangor, North Wales was cancelled. At the time that this issue of Greensward is going to press, it is believed that the North Wales visit will be postponed until July 2002 or possibly even 2003. In which case, as far as can be foreseen, the visit to South West Scotland will consequently be postponed until 2003 or 2004.

UNIQUE BACTERIA TO BOOST GRASS ESTABLISHMENT
Advanta Seeds UK

Although grass is a very resilient crop, it is very vulnerable at the all-important establishment phase. Farmers can do a great deal to give their new leys the best possible start in life. A firm, fine, weed-free seedbed is an absolute priority, and it is vital to ensure that pH is correct and any nutrient imbalances have been rectified in good time. Despite the best efforts, it is still possible to get a mediocre establishment, which means that grass yields will be compromised. This problem can arise, for example, in difficult seasons, from many factors outside the farmer's control. Fortunately, a unique new product called **Integral®** can make a significant contribution to the health and vigour of newly sown grass. This is a seed dressing based on a naturally occurring strain of bacteria (*Bacillus subtilis*) which has produced dramatic results. The bacterium was identified originally by scientists at Nottingham University and subsequently licensed through the Micro Bio Group in Cambridge. The strain is patented and is only available through Advanta Seeds UK who have combined it with the already proven and successful biological seed treatment **Headstart** to ensure optimum establishment of a grass ley.

The bacteria in **Integral®** work by colonising the root system of the grass, making it much more vigorous and resulting in a more rapid establishment, a more uniform stand and a greater yield potential. Why does Integral work so effectively and efficiently? The reason is that the bacterium, which is found widely at low levels in the soil and natural water supplies, lives in a mutually beneficial relationship with plant root systems. The very large concentration of bacteria supplied by Integral multiply and invade the root area to the exclusion of other harmful or non-beneficial micro-organisms, and competing strongly for surplus nutrients. Newly sown grass represents a major investment in future profitability. Anyone planning a reseed can take full advantage of the extra 'security' offered by this new seed treatment in Sinclair McGill seeds mixtures.

'FERMENTED WHOLECROP PEAS FROM THE SEED TO THE RUMEN'

This was the title of a video film on Wholecrop Peas, shown by Chris Totten during the SWSGS Competition Evening in January 2000. It demonstrates the growing, harvesting and feeding of wholecrop pea silage and is available free of charge from **Biotal Ltd** (see advert, page 13). The video emphasised that wholecrop peas are not only an excellent source of protein, but also contain up to 20% starch which increases energy in the diet without causing acidosis. Intakes are high, leading to high milk production. *Wholecrop legume* additive is recommended by Biotal for successful fermentation.

NOTES FROM THE MANX GRASSLAND SOCIETY 1999

Caroline L Perry
Secretary, Manx Grassland Society
Department of Agriculture, Fisheries & Forestry, Knockaloe Farm, Peel, Isle of Man

The 1999 programme began with an evening meeting in February.

24 February 1999 - Alternative Forages - evening meeting, including supper, sponsored by Nickerson (UK) and Isle of Man Farmers. The alternative forages: maize, protein crops, mixed crops, red clover and grass were discussed by Peter Schofield and Simon Broddell of Nickersons.

4 March 1999 - Ballahott and Ballavell Farms. *Ballahott, Malew* (H M Cain & W J Cain). A partly organic farm growing potatoes, spring oats and carrots, with spring barley, swedes and grass. The 82ha farm carries 200 cross bred ewes crossed with Suffolk and Texel; the lambs are sold off grass from Easter to August. The 26 sucklers are crossed with a Charolais bull, with 30 bought-in sucklers added to finish. Winter feed consists of hay, straw, feed blocks and waste potatoes. The hay and grazing fields receive fertiliser. The organic grass is treated with FYM and G27 fertiliser (Gafsa ground rock phosphate). The organic hay is baled with a different coloured twine. Organic potatoes are manured with FYM, seaweed and G27 fertiliser. Manganese deficiency in potatoes and oats is treated with manganese sulphate, with permission from Organic Farmers and Growers, who carry out annual charged inspections of all organic crops.

Ballavell, Malew (Colin & Helen Dougan). Ballavell was visited by SWSGS on its Tour of Isle of Man in 1987. An 82ha farm of mixed crops and grass, with a dairy herd of 86 cows, 50 beef animals including 24 bull beef which are finished at 18-24 months. Crops include 11ha winter barley, 5ha spring barley, 7ha winter wheat, 27ha grazing grass, 32ha 1st cut silage, 18ha 2nd cut silage. Grass mixtures emanate from Sinclair McGill and Watsons Seeds. Milk Yield: 6,800 litres per cow.

27-30 April 1999 – Trip to Southern Ireland

17 members of the Manx Society spent 3 full days visiting 6 farms, Moorepark Research Centre, an abattoir and tourist venues. The aim of dairy farmers in southern Ireland was to produce milk at its cheapest and all farms visited practised extended grazing. The farmers believe that a more intensive use of land was the way ahead and not a scaling down process.

Farms visited were: **Bishopswood**, Durrow, Co. Laois (see Greensward No.42, pp 63-64). Padraig Walshe runs 110 cows on 69ha, grazed until 20 November. **Rathcormae**, Co. Cork (James Maye), where 150 Aberdeen Angus are finished on 40ha. Calves are purchased and reared on 8 Friesian cows. The finished animals are marketed through an Aberdeen Angus scheme, which gives bonuses for selected grades. **Castlelyon** R & D Farm (Moorepark), to see a trial comparing Holstein Friesian, Dutch Holstein with two new French dual-purpose breeds: Normande and Montebeliarde. **The Laurels**, Lehenaghmore, Toghen, Co. Cork (John Barrett). This is the home of the Laurelmore top genetic herd; 150 pedigree Holstein Friesians, averaging nearly 10,000 litres, 70 sucklers and 35 bulls are kept on 280ha, including 70ha spring barley and 16ha maize. The cows graze a fresh paddock every day from mid-February to mid-December. Excess of sulphur due to being under a flightpath had to be counteracted by selenium treatment of the animals. **Whitechurch**, Co. Cork (Michael Downing). 92 Holsteins were kept on 73ha, aiming for high protein quality milk to earn premiums. Dairy Farmer of the Year 1997. **Ballindangan, Mitchelstown**, Co. Cork (Tim Dunne). 80 cows graze on a 21-paddock system. Tim was Guide on the tour, and is a noted Aberdeen Angus breeder, who organises a producer group for this breed. Also at **Ballindangan**, (Pat Lauder) with 74 cows on 70ha. Pat was a member of the Grazing Discussion Group led by Leone Foster. He is planning to increase the scale of his farming to survive, putting emphasis on output per ha using extra cows with the same cost base.

22 June 1999 – Glendown, Port St Mary (Derek & Jean Qualtrough). A 127ha farm entirely north facing and varying from easily worked ground to rocky rough grazing which burnt in dry summers. The main farm enterprise was 82 cows averaging 7,000 litres, some of which were bred to Belgian Blue and Limousin. A second enterprise comprised 285 Texel X or Mule Ewes put to Texel or Suffolk rams. Spring barley (8ha) was grown for feed and straw, and also to control docks.

26 August 1999 – Visit to Freshwater Trout Hatchery, Cornaa, Maughold.

14 December 1999 – Knockaloe Farm, Peel (Department of Agriculture, Fisheries & Forestry, Isle of Man – Director D N Peck). The 138ha farm was taken over by the Government in 1924, when it required reclamation from its previous use as an internment camp. Currently, its main role is as a Livestock Breeding Station which supplies breeding cattle, sheep, pigs and poultry to Manx farmers. Improved strains of cereals and potatoes are also distributed. The suckler herd of 115 cows is synchronised and allows comparison of the performance of different breeds. In a trial comparison, early grazing of silage fields demonstrated a clear advantage in animal performance, reduced winter

feed and lower housing costs. Sheep (120 Mule ewes) are kept and variety trials on cereals, potatoes and lupins are also carried out. Wildlife habitats on the farm include: woodland, old grassland, sod hedgebanks and drainage ditches. Opportunities for conservation are regularly demonstrated. Annual rainfall is 900mm.

Competitions. The usual silage and grassland management competitions were held. Paul Fargher, SWSGS Silage Judge in 1998, won 3rd prize for silage, and 1st prize for the best set-up. Silage winner was H Quayle, Ballavitchel – only the second time the prize went to a sheep farm. Silage Judge was John Burrow, Lancaster.

SWSGS SILAGE COMPETITION

The SWSGS Silage Competition has been held annually for 28 years (CSGS Competition for 22 years), and is one of the most popular events organised by the Grassland Society. It is earnestly hoped to be able to continue it next winter.

Silage is made by practically all livestock farmers in south west Scotland, but quality and performance of the product are dependent on several variables such as season, cutting dates, machinery performance. Small changes in any of these can have large effects on the final product. Sampling and analysis themselves introduce more variation, but chemical analysis results are used in the initial selection of silages. All silages of Society members which have been sampled and analysed by SAC are automatically considered for entry into the Competition. Commercially analysed silages can also be considered if the results are sent into the Grassland Society secretaries.

In SWSGS, the leading silages on analysis are screened by the County Committee members to arrive at a Short Leet for Final Judging. This is performed by an invited Judge, himself a local or National silage winner, and an exponent of quality silage.

The Competition is divided into Dairy, Beef/Sheep and Big Bale classes, the Big Bale section on analysis only. The CSGS Competition is sponsored by **HF Seeds**. In the south west, support is given by **Trident Feeds Ltd**, **Watsons Seeds**, and **Plasti-Covers Ltd**.

New classes for **Forage Maize** and **Whole Crop** silages have recently been introduced, and are marked on analysis only. Prizes for maize are sponsored by **Biotal Ltd** and for whole crop by **Nickerson UK Ltd**.

SWSGS GRASSLAND IDEAS COMPETITION 1999

Sponsored by ***Kemira Agro UK Ltd***

G E D Tiley

The Winning Idea: **Simple Drawbar Attachment on a Feed Barrow for Towing by a 4-Wheeler ATV**, was submitted by Andrew Maclean, stockman at King's Arms, Ballantrae.

To facilitate the movement of a ½-tonne capacity, 3-wheeler Ritchie feed barrow between feed silo and beef shed, a simple drawbar attachment was made which allows hitching to an ATV motorbike. It is constructed from flat iron bar, D-shaped, and fitted with a normal trailer clip attachment. The drawbar swivels only vertically at its fixture on the trailer, and can be clamped out of the way to the barrow push handle when hand manoeuvring is required. The barrow's single, pivoted, front wheel allows sufficient coarse steering when towed by the bike. Benefits: The main benefit is the obvious advantage of mechanised transport of bulk concentrate from silo to shed. It is also a very cheap and simple addition to the barrow.

Two other ideas submitted were:

Temporary Calf Pens made from Wooden Pallets and Metal Gates (A Borland, Altonhill, Kilmarnock)

Individual calf pens are erected in a Beef shed from July-November, by placing no-cost wooden pallets on edge at 1-1.2m intervals against a back wall and closing the front with 3.6m metal gates. The pallets are secured to the gates with baler twine. Feed and milk buckets can be attached to the gate at the front. Benefits: The temporary pens are very cheap, clean, with good ventilation, and can be added to as required. They are easily stripped down, and removed in November when the shed is required for beef cattle. The calves are then moved to fresh accommodation. These pens have been used for 8 years, and have proved effective against calf diseases such as scour and pneumonia.

Modular Lambing Pens Constructed from Metal and Plywood (G Beck, Low Clanyard, Drummore, Stranraer).

Individual pens for lambing or for calves (1.8m x 0.9m) are constructed from 20mm x 20mm box section metal bars with 9mm plywood facings. The partitions are Rawlbolted to the wall and firmly fixed by iron pins. Front partitions (0.9m) slide down onto secure hinges for opening/shutting. Each partition is kept clear of the floor for drainage by short metal struts. Buckets for water and silage are readily hung on the gates. Benefits: Simply constructed, easy to erect, dismantle and store, much easier to use than pallets and firmly fixed rather than tied with string. The metal is galvanised and thus rustproof, hygienic and with low maintenance, and can be steam-cleaned.

TAKING MORE CONTROL OF THE BUSINESS ENVIRONMENT

Hamish Walls, Scottish Agricultural Organisation Society, Edinburgh

Meeting of SWSGS at the North West Castle Hotel, Stranraer on 15 February 2000

This was a joint meeting with the **Wigtown Agricultural Discussion Society** and was sponsored by **Carrs Agriculture Ltd**

Hamish Walls was Project Manager for South Scotland at SAOS, promoting joint ventures and farmer controlled businesses in agriculture. The current trading environment was extremely difficult, with a dominance of multiple traders, such as Walmart. There was a growing food service market – hotels, catering, pizza shops, etc; a continuing evolution of structured marketing chains with delivery expertise; a growing internationalisation of the food trade; an increase in opportunities for niche market development. Unfavourable elements in the Scottish Food Industry were: very few world-class food chain companies; limited value-added products, especially in beef and lamb; fragmentation of farming production; requirement for low cost traceability; reduced Scottish-owned food processing and retailing; poor Scottish diet. On the positive side, there was: a strategy for Scottish brands, eg: beef; Scottish Enterprise linked by buying and selling; Scottish Executive support; potential for bulk purchase power and access to markets through large volume sales; opportunities to become a 'preferred supplier' and to eliminate intermediaries to secure stable profits; production of greater quantities of high value specific products. The benefits of co-operatives were: co-ops could sell in farmers' best interests; they could reduce and share marketing costs and also debt risks; marketing experts could be employed if co-operative was large enough.

SAOS could help by organising farmers to sustain their buying and selling position; develop supply chain efficiency, reducing costs; improve competitiveness, eg: provide storage; organise farmers to optimise farm assets. Under business consultancy, SAOS could provide feasibility studies on new or joint ventures; business reviews and planning; marketing strategies; investment appraisal; grant applications; training of directors.
For further information, visit website: www.saos.co.uk.

United Farmers, 'Uel Morton, chief executive, then gave an outline of the structure and operation of United Farmers Ltd, 62 West Harbour Road, Edinburgh. They were involved in farmer-run co-operatives handling a wide range of agricultural products, ranging from seeds and fertilisers to feeds, chemicals and hardware, sold under the brand name: **Unifarm**.

TARFF VALLEY LTD

Tarff Valley Ltd is an example of a local co-op in south west Scotland, with Head office in Ringford and local branches in Glenluce, Dumfries and Castle Kennedy.

When founded in 1903, there were 24 members. There were now 700 members, 1250 customers, 32 staff and 6 board members. Share capital was £712,000; turnover had increased to £10.5 million in 1998 from £4.1 million in 1991 and profits risen from £70-220,000. **Objectives** were to: 1) Ensure customers purchase farm inputs competitively; 2) Ensure that profits generated stay in the local community; 3) Provide customers with up-to-date market information: *when to buy/not to buy* gluten, sugar beet pellets, fertilisers, silage plastics, animal health products; *when to sell*: wheat, barley. 4) Make products available for members to collect ex store: animal health products, spray chemicals, feed bagged and bulk, drainage materials, clothing, human food, pet food. 5) Create image of being with the farmer, who is our owner. 6) Develop the commitment of next generation of farmers.

The co-op aims to source products within south west Scotland. By giving more business to Tarff Valley, scale can be increased and products bought at more competitive prices.

CARRS FERTILISERS

Ian Allison and Peter Scott, Carrs Fertilisers Ltd

Carrs Fertilisers, a division of Carrs Agriculture, is the most broad-based fertiliser company in the UK with an unparalleled range of products and services. Its six production sites in Scotland and Northern England serve customers throughout the UK and Ireland.

The Company supplies fertilisers for the agricultural, forestry, horticultural and amenity markets. Products for farming include 'First Choice' compounds, 'Field Choice' quality blends, 'Scotphos' – the Gafsa based speciality and organic P's and PK's, 'Granucal' – granulated calcium lime, liquid urea and a wide range of straights. These products are available in a wide range of pack sizes from 25kg up to 1000kg, including Carr's innovative weatherproof 500kg bag – 'Four Pack', which consists of 4 x 500kg bags stretch-wrapped on a pallet, allowing outside storage. There is an emphasis on quality and uniformity of product.

The Company's services include delivery, but also extend to a bulk delivered-and-spread operation which provides a cost-effective, time saving option for farmers during the busy spring and summer periods. Advice and recommendations on fertiliser practice are available and these are supported by Carrs Fertilisers technical services including soil, herbage and organic manure analysis.

For further information on Carrs Fertiliser products and services, contact our main distributors for South West Scotland, Tarff Valley on 01557 820247.

HOMEOPATHY – A PERSONAL VIEW

Elaine Hamilton, High Ardwell, Kirkcolm, Stranraer

I recently introduced homeopathy into the management of my dairy herd of cows and youngstock, my main aim being to build up herd health by increasing individual animal resistance to disease, with a treatment that is safe, efficacious and cost-effective. According to Day (1995) (a leading homeopathic veterinary expert and author), homeopathy has been around for 200 years and works on the principle of treating an illness with a highly diluted medicine that would produce similar symptoms if given in an undiluted form to a healthy animal. The remedies can be given individually in a way which takes into account the totality of symptoms presented by a disease or by adopting a regular regime of adding *nosodes* to the drinking water of specific animal groups. Nosodes are remedies prepared from infected tissues, disease discharges, or organisms and are usually used in the prevention of disease but can also be used in the treatment. C Day (1986), used nosodes in the prevention of mastitis in a dairy herd of Friesian cows. A combined mastitis nosode produced positive results in reducing high cell counts. Benefits have also been obtained in preventing and treating calf scouring and in pre- and post calving problems.

The homeopathic treatment I have used within my own setting has highlighted positive and negative aspects. Positively it is highly rewarding and cost-effective to effectively treat a problem in this holistic manner. The benefit of having no residues in tissues or milk is advantageous in a dairy situation. Orthodox therapy can be used in conjunction with homeopathy, especially if the person prescribing is unsure of the choice of homeopathic remedy in a serious life threatening position. Negatively, the technique is not easy to learn, involves a great deal of time and commitment and its holistic approach can be difficult for conventionally trained people. Adapting to the changes in management requires time, and therefore a trial period is recommended initially. I think that my objectives of using homeopathy have been achieved and the positive aspects definitely outweigh the negatives. It helps to have studied the subject and there are good veterinary books available. The pharmacies distributing remedies will also provide advice and support. Last, but not least, it is advantageous to have the approval and assistance from your local vet.

References

Day, C. (1986). Clinical trials in bovine mastitis. British Homeopathic Journal, vol. 75: no. 1:11-15.

Day, C. (1995). The Homeopathic Treatment of Beef and Dairy Cattle. Beaconsfield: Beaconsfield Publishers.

SCOTTISH MAIZE IN 2000

Dr Katharine Leach, SAC Crichton Royal Farm, Dumfries

While Southern maize growers were despairing at wet conditions delaying their sowing, late April soil conditions in south-west Scotland were the best for several years and drills were busy even before 1st May. The warm temperatures in the first half of May gave rapid germination and we were off to a great start. However, the cool, cloudy weather in the second half of May and first half of June resulted in a familiar prolonged "stagnant growth phase", with sad yellow plants. The physiological development of the plants and their growth were delayed once again. The response to an increase in temperature was marked, with a visible change in plant colour, almost overnight. This illustrates the point that the yellowing of maize is not caused by lack of nitrogen in the soil, but lack of chlorophyll development in the plant, which being a tropical, C4 plant, needs a temperature of 13°C for active growth.

Dry matter yields were down on 1999, as also were Ontario Heat Units. DM% was however higher, perhaps a reflection of the newer varieties available. See Table 1.

Table 1 – Forage Maize yields and climate at SAC Crichton Royal Farm, Dumfries

Year	Yield (t DM ha^{-1})	DM%	Sunshine Hours (May-Sept)	Ontario Heat Units (May-Sept)
1999	10.5	22.0	729	2397
2000	8.5	23.5	800	2224
Long Term Average	10.7	22.7	782	2134

No reminders are needed of the atrociously wet autumn, which split harvests into early and late, with no option for a "normal" (October) date. Crops harvested early tended to be higher in starch than might have been expected from the low dry matter content and green plant state, and have analysed quite well. Late harvested material lost some energy from the stem and leaf. Attention will need to be paid to the soil structure in fields returning to maize, after suffering unavoidable compaction at harvest.

WEATHER DATA FOR 1999
SAC AUCHINCRUIVE (35°29'N 4°34'W) Alt 45m

	Mean Air Temp °C		Mean Soil Temp °C	Rainfall		Sunshine
Month	*Max*	*Min*	*At 10 cm*	*Total (mm)*	*No of Days*	*Total Hours**
January	7.3	2.4	4.3	160.8	28	32.8
February	7.4	2.1	4.2	103.1	25	80.3
March	9.5	3.1	5.2	78.1	19	118.8
April	12.2	5.1	8.3	48.3	21	155.6
May	15.6	8.0	11.6	90.2	19	194.9
June	16.2	8.6	13.0	78.7	18	190.3
July	19.5	11.8	15.7	53.9	15	199.4
August	18.4	10.8	14.4	44.4	15	165.1
September	17.7	11.3	13.7	114.0	21	123.7
October	13.3	7.5	10.1	33.0	16	95.9
November	10.1	4.2	7.3	131.6	19	63.7
December	6.8	1.1	4.3	191.0	28	41.3
Means/ Totals	**12.8**	**6.3**	**9.3**	**1127.1**	**244**	**1461.8**

Max air temperature: 26.5° on 31 July. Min air temperature: -9.1° on 20 December 1999. Last frost: 19 April 1999. First frost: 18 November 1999.

* Prestwick Royal Navy Air Squadron (HMS Gannett).

WEATHER DATA FOR 1999
SAC CRICHTON ROYAL FARM (55°3'N 3°35'W) Alt 65m

	Mean Air Temp °C		Mean Soil Temp °C	Rainfall		Sunshine
Month	*Max*	*Min*	*At 30 cm*	*Total (mm)*	*No of Days*	*Total Hours*
January	7.5	2.1	4.3	146.9	23	55.7
February	7.8	2.0	4.7	40.3	20	88.1
March	9.7	3.1	6.6	58.9	18	112.5
April	12.7	5.0	9.6	87.2	17	153.0
May	16.2	8.6	14.2	95.6	15	156.8
June	16.8	8.8	16.0	79.3	17	147.4
July	17.8	15.4	17.8	38.3	13	178.3
August	19.0	11.0	17.5	40.5	17	134.9
September	17.8	11.2	15.7	130.9	17	111.2
October	13.5	7.1	11.9	58.7	13	98.2
November	10.5	4.6	8.6	139.8	16	61.4
December	7.0	0.7	5.0	207.3	23	57.2
Means/ Totals	**13.0**	**6.6**	**11.0**	**1123.7**	**209**	**1354.7**

Max air temperature: 26.8° on 31 July. Min air temperature: -9.6° on 20 December 1999. Last frost: 19 April 1999. First frost: 18 November 1999.

1999 began very wet, but fairly mild, followed by a mixed spring. Wet spells in May affected silage making. From July onwards there were some fine warm spells extending into autumn. October was dry before a very wet early winter.

Meteorological data reproduced courtesy of SAC Auchincruive, SAC Crichton Royal Farm and RNAS Prestwick.

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