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## **Cattle Outwintering Demonstration Year 2**

**Run by SAC on House o'Muir Farm and  
Woodhouselee,  
Bush Estate, Penicuik**

**Co funded by Quality Meat Scotland 0131 472 4040**

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## **OUTWINTERING OF CATTLE – DEVELOPING THE OLD SYSTEMS IN A NEW ERA**

It would be true to say that the majority of Scottish farms could grow Brassica crops well, however only a limited number of them can Outwinter cattle on them. This is because, for cows to Outwinter successfully, their welfare and the prevailing environmental conditions must be considered. Failure to adhere to welfare or cross compliance measures could potentially have an impact on the Single Farm Payment, if penalties are imposed.

SAC, co funded by QMS and supported by SEERAD are now in Year 2 with the Cattle Outwintering Demonstration, which has been visited by over 1000 farmers and industry during the 17 months it has been running at House O'Muir outside Edinburgh.

The importance of the Outwintering Demonstration is not simply an Outwintering system versus housing, but to look at the ability of farms to reduce the amount of time cattle spend in the sheds throughout the winter.

By simply growing a crop and being able to put cattle on it for a certain period can help reduce costs such as bedding, machinery etc. **This is not a new concept.**

The Outwintering Demonstrations are in fields and not on hill ground, which has been a common practice for many for a number of years.

Some farmers have carried it out for a number of years, slashing costs by Outwintering cows for most of the winter. An Aberdeenshire farmer strip grazes cows on Swedes supplemented by straw, and protein after the tops are frosted. An Angus farmer operates a similar system using a hardy variety of kale.

In Year 1 (winter 2004/2005), Dry Spring calving cows were put onto the demonstrations but in Year 2 (winter 2005/2006) weaned Spring born 2005 steers were also included.

The objective of the Outwintering Demonstration is to demonstrate a range of potential self-feed systems as a discussion focus for producers and policy makers alike.

With beef production relatively profitable under the former headage based subsidy system it was possible to justify the cost of transporting straw and other requirements for in wintering cattle from the east to the west of the country. Farmers continue to seek ways to keep costs down and so by visiting the demonstration, they can make informed choices to see if the systems could be carried out on their farm or not.

It is not just about going on the best fields - one of the options being looked at - Deferred Grazing is suited to a number of grass growing areas even with permanent grass.

Even if we can extend the period the cattle are out for two, three weeks or a month there are potential benefits. Apart from any cost savings, there is greater flexibility in use of buildings.

## CATTLE DEMONSTRATION WINTER 2005/2006

### Cattle were put onto:

- Kale: Dry spring calving cows : Strip grazing supplemented with straw
- Kale: Weaned spring born 2005 steers – 2 Groups split with 1<sup>st</sup> Group supplemented with straw and the other silage.
- Stubble Turnips: Dry spring calving cows :Strip grazing supplemented with straw
- Deferred Grazing: Dry spring calving cows: Strip grazing on grass with no supplementation.
- Control Groups: Dry spring calving cows and steers, which were housed.

### What is Deferred Grazing?

One of the Outwintering treatments investigated on SAC's farms in both Years 1 and 2 is a field of permanent pasture, at approximately 800 feet above sea level.

After either a late first cut of silage or cows grazing the field it is then shut up (13<sup>th</sup> July) and applied with fertiliser. No second cut of silage is taken but in Mid November cows are strip grazed on it.

### Selection of Cows for the SAC Outwintering Year 2

3 Groups of Spring Calving Cows were put onto their Outwintering Demonstration fields on the 17<sup>th</sup> November 2005. A fourth group (control) was then also housed. (See table 1)  
To allow comparisons between each group at the end of winter it was determined that each group must be similar in terms of:

- Breed (even split of Angus and Limousin Crosses).
- Age: even split of ages. No cows were put on the Outwintering that were first or second calvers along with cows over 9 years age. Stockman wished to have those cattle inside under tighter control.
- Weight: All groups weighed on average between 722 kg to 745 kg.
- Condition Score: Aim was to have them at Condition Score 3 as they went on to the Demos, then Score 2.5 at 1 month before calving and then score 2 at calving. No thin cows (under condition score 2.5) were considered for the Outwintering.

**Table 1: Breakdown of Spring Calving Cows on Demonstration Areas.**

Groups	Number of cows in group	Average Age (years)	Average weight Kg	Average Condition Score
A. Kale	15	5.53	727	2.95
B. Stubble Turnips	19	6.07	745	2.98
C. Deferred Grazing	19	5.93	734	2.97
D. Control	20	6.00	722	2.93

## SUMMARY OF YEAR 2

All the groups performed well above expectation. Factors aiding this were:

1. Beneficial weather through the winter period with the cows at no time showing signs of stress or discomfort. Cows appeared contented at all times.
2. Putting the ideal cows on: No first or second calvers and no cows under condition score 2.5 were considered.
3. Importance of choosing the correct variety of Kale and Stubble turnips.
4. Knowing what crops would only carry cows for a limited period – Deferred Grazing.
5. Correct choice of fields – a free draining soil type.
6. Good dry lying areas.
7. Adequate shelter.
8. Straw available at all times Silage/ haylage successfully used on other farms.
9. Moving fences each day reduced wastage to minimal levels.
10. Easy movement of electric fences: Wire rope supplied by RAPPA Electric fencing
11. Good stockmanship.

### Important note:

At the start the groups averaged C.S. 3. This meant that some cows were put into the fields in fit condition and it became apparent in January that they were not losing condition at the rate desired. After discussion 12 cows were brought into the sheds to allow them to be thinned down pre calving.

### Question asked

“Why do you not simply restrict further their feed allowance?

This could not be done as it would restrict all the cows in the group and the majority were losing condition on target. It could lead to some cows getting too thin

Table 2 shows the performance of the cows to January.

**Table 2: Performance to January 2006**

Group	Number of cows	Start Weight (kg)	12/1/06 Weight (kg)	Loss/Gain Kg/Day	Start Condi tion. Score	12/1/06 Condition Score	Loss/Gain score over period
Kale	15	727	736*	0.13	2.95	2.92	- 0.03
Stubble Turnips	19	745	757	0.16	2.98	2.80	- 0.18
Deferred Grazing	19	734	705	- 0.45	2.97	2.46	- 0.50
Control	20	722	733**	0.13	2.93	2.60	- 0.40

\*Kale weigh date 17/1/06

\*\*Control Group weight date 26/1/06

All the groups had done well up to this point although those on the deferred grazing had started to lose condition and weight.

### **Deferred Grazing**

Table 2 reinforces the findings in year 1 which showed that the deferred grass was only capable of keeping the cows up to New Year as after this the reducing quality of the grass was insufficient to meet the increasing demands of the calf. Additional feed would have had to be introduced if these cows were to stay longer on deferred grass.

The field was only targeted to take these cows to the New Year. After being weighed on 12/1/06 they were moved to the stubble turnip field where over a period of 32 days to 13/2/06 they maintained their weight, although losing more condition from C.S. 2.46 to 2.30. The condition of these cows in mid February was thinner than the target score 2.5, 1 month prior to calving and reducing to score 2 at calving.

These cows will continue till the New Year after which they are removed.

The grass maintains the cows well but, after about New Year the energy and protein in the grass is not sufficient to support the cow due to the unborn calves demand. Result is that the cows drop condition rapidly. (See table 2)

In year1 half the field was taken for second cut silage, wrapped and left in the field for the cows to have both silage and deferred grazing.

It was felt that the overwintering utilising second cut big baled silage was not particularly successful, particularly due to the subsequent sward damage from feeding the bales in situ.

**This system if carried out in the correct fields will be a low cost option to many where housing could be delayed for up to 2 months = less straw usage or slurry storage.**

### **Kale**

After being weighed on 12th January the group were housed. (See table 2). The reason was that the steers were performing very well on the kale and needed the remainder of the field to take them through the rest of winter.

Cows on kale again did well gaining weight and only losing minimal condition. As with all the groups up to end February the outside conditions favoured the cows with no significant wet weather or extreme cold conditions. There was only a week period when the ground conditions started to deteriorate but this was only temporary. The ground was aided, as it had not been ploughed prior to sowing but was sown direct into the grass after roundup applied 7 days before strip seeding took place. Kale has again proved to be a successful crop to outwinter stock on.

The group that continued outside after the weighing in January was the Stubble turnip group.

## Stubble Turnips

As shown previously in table 2 the cows on stubble turnips put weight on at 0.16 kg/day to January 2006. After this the cows started to lose weight resulting in an overall loss of only 5 kg (0.05 kg/day) from November 2005 to the end of February 2006. (See table 3). In comparison the cows constantly lost condition over the winter starting at C.S 2.98 dropping to 2.80 in January and a final score of 2.70 in February. They were then housed one month prior to calving carrying slightly more condition than targeted.

**Table 3: Performance at second weighing for Stubble Turnips and Control Groups**

Group	November Start Weight (kg)	13/2/06 End Weight (kg)	Loss Kg/Day	November Start Condition Score	13/2/06 End Condition Score	Loss over period
Stubble Turnips	745	740	0.05	2.98	2.70	0.28
Control	722	719	0.03	2.93	2.60	0.33

## Control Group

Group was housed in a straw bedded court with restricted silage and straw. From the start weight to interim weighing in January they gained 11 kg average which equates to 0.13 kg day. However they then lost 14 kg resulting in the control group only losing 3 kg throughout the whole demonstration period.

The control group lost 0.33 condition score overall to be at Score 2.60 in mid February.

**Note: All cows again will be housed 1 month before calving for management purposes.**

Our target is to maintain liveweight and condition up to the New Year. After this period the increasing demand from the unborn calf results in the cows losing condition up to calving. Our aim will be to continue keeping the cows in good condition to the New Year and then allow them to ease off.

## SAC STOCKING RATES AND SOWING DATES

### **Kale Spring Calving Cows**

Stocking rate was based on 10 cows to 1 hectare for 100 days

SAC sowing date 1<sup>st</sup> June (direct seeding) – field was not ploughed. Area to be sown applied with roundup 7 days prior to direct seeding.

*Variety: Maris Kestrel at 2.5kg /acre*

**Note:** In future years the intention is to get a cut of silage prior to sowing. 7 days prior to cutting silage, the area to be direct seeded would be sprayed with roundup. Silage taken leaving bare area, ready for sowing. Not the entire field was applied with roundup, as grass runback area required during winter.

### **Steers**

Stocking rate was based on 10 steers (330 kg to 400 kg) to a hectare for 100 days. This was based on a higher allowance to encourage steers to eat the high quality leaf and leave more of the stem, which is low in protein. Steers have higher allowance of wastage.

### **Stubble Turnips Spring Calving Cows**

Stocking rate based on 3.9 cows to 1 hectare for 100 days. This is based on very high germination of stubble turnips (90% over whole field).

SAC Sowing date 14<sup>th</sup> August. Would not target sowing stubble turnips later than mid August. Need 100 growing days which takes it to end November.

*Variety: Vollenda at 2.5kg/acre*

**Note:** if dry conditions then best practice would be put the seed under the soil about 1 inch to gain moisture for seed to germinate. A number of crops failed in 2005 due to being spread on top of ground and limited germination occurred. Fields need rolled. SAC also gave the field prior to sowing a light discing.

### **Deferred Grazing Spring Calving Cows**

Stocking rate was based on 7 cows to 1 hectare for 60 days.

SAC field closed off in Mid July. Aim is to shut up the field either after silage/hay or grazing until mid July.

Fertiliser then applied as though another cut would be taken.

**Note:** Aim is only to have cows on this to New Year. If cows were to stay on longer then likely would need additional feed.

## COW OUTWINTERING COSTS OVER WINTER

**Table 4: Costs per day and savings made**

<b>Groups</b>	<b>Cost/cow/ day</b>	<b>Saving versus Control per day</b>
Control	£1.08	0
Kale	£0.63	£0.45
Stubble Turnips	£0.59	£0.49
Deferred Grazing	£0.41	£0.67

Detailed costings are given further on in this Handout.

### **Important points to Note on the results for Table 4:**

1. All costs include labour
2. Control Group has machinery and building costs also included.
3. All straw based at £30 per tonne.
4. The control Group are cows inside in straw courts being fed a silage /straw based diet costing 60p/day.
5. Cost of straw bedding per day is 16p, which will not be a cost incurred with cubicles or slats.
6. Due to the cows being run in small groups of only up to 20 the labour input is high. It has been taking between 15 to 20 minutes to feed each group, while other farms will spend the same time yet feed two to three times the number of cows in the field.
7. Growing costs have been put in based on contractor charges yet other farms will carry out the operations themselves with lower costs.
8. Deferred grazing has most savings per day but as will be reported it is only beneficial for about 60 days while the rest are based on about 100 days.
9. Stubble turnips should have been cheaper than the results but the cows have been overfed resulting in the cows coming off in fit condition.

### Kale Costing Calculation (Table 6)

Farm	Bush	Maris Kestrel
Crop	kale	
Ha	1.42	
acres	3.5	
cows	22	
start date	17-Nov-05	
end date	17-Jan-06	
grazing days/cow	61	
grazing days per ha	947	
grazing days per ac	383	

Item	cost per acre	per cow	per cow/day
Cultivations	24.29		
Seed	50.00	2.5kg/acre	
Fertiliser	37.43		
Spreading fertiliser	8.29		
Spray	7.71		
Spraying costs	6.29		
Growing cost/acre	134.00	<b>Kale</b>	<b>£0.35</b>
	<b>total costs</b>		
<b>Growing cost total</b>	469		
Straw	161	<b>4kg/day</b>	<b>£0.12</b>
Other	0		
<b>Forage costs total</b>	161		
<b>Feed costs</b>	630	<b>£28.64</b>	<b>£0.47</b>
Moving fence	£220	<b>£10/hour</b>	
Feeding forage	£0		
<b>Labour costs total</b>	£220	<b>£9.98</b>	<b>£0.16</b>
<b>Equipment costs</b>	£0	<b>£0.00</b>	<b>£0.00</b>
<b>Costs total</b>	£849.64	<b>£38.62</b>	<b>£0.63</b>

#### Notes on Table 6:

- £0.63 per day
- Reduced cost in 2005/2006 due to excellent yield and reduced growing costs ex. Slug pellet applications and sprays.
- Cow condition on target when they came off and so it can be concluded that we were more accurate with their feed allowance in comparison to the Stubble Turnips.
- Cows only on for 61 days as the Kale was required for the steers.

## **Kale Diary**

### **11<sup>th</sup> May 2005**

Kale Field measured with about 9.5 acres of Kale and 3.5 of Run back.

### **30<sup>th</sup> May.**

Poor cold wet weather has reduced efficiency of Roundup.

Sow Kale with Amazon direct seeder at 2.5kg per acre.

Kale is **Maris Kestrel** treated with Ultra Strike.

### *British Seed Houses*

*"Is a leafy hybrid variety with short stems that has been bred for low stem fibre content and high digestibility. It is resistant to lodging and has good winter hardiness".*

### **31<sup>st</sup> May**

Kale Field rolled

### **1<sup>st</sup> June**

Very wet and mild spell.

### **15<sup>th</sup> June**

Liquid Nitrogen applied to the Kale

87.5kg/Ha Nitrogen = 250 litres /Ha

Kale coming through.

Noted that it seemed to be heavy sown and some of it bunched together.

### **20<sup>th</sup> June**

Kale well through with the lines drawn up.

Weather has been very warm encouraging ideal growth

### **28<sup>th</sup> June**

Kale now growing vigorously due to extreme hot weather.

### **13<sup>th</sup> July 2005**

Fertiliser applied @ 300Kg/Ha,

the Selenium added was applied to the end nearest Boghall.

Fertiliser 25:05:05 = 75 kg /Ha Nitrogen.

### **Monday 1<sup>st</sup> August**

**Kale:** Run back areas cut

### **Thursday 17<sup>th</sup> November**

Cows put into the field.

### Kale test November 2005

	<b>Whole Plant/metre sq.</b>	<b>Tops</b>	<b>Stem</b>
<b>Weight</b>	777.3	238.2	535.8
<b>%</b>	100	32	68
<b>Dry Matter</b>	135	135	135
<b>CP</b>	110	179	58.1

### Calculations for strip feeding Kale

Initial estimations made by Nutritionist:

There is no doubt that outwintered cows need more feed than housed cows to maintain their condition. But how much more do they need? This is difficult to answer, because we need to define what the 'average' weather conditions are. A rough 'guestimate' would be that energy allowances ought to be pitched about 15% higher than housed cows giving a requirement of nearer 90 MJ rather than 80 MJ/day.

To achieve this it was predicted that the cows should be allocated 5 kg DM of kale per day with another 15% added for wastage to give an overall allowance of about 5.75 kg kale DM/day. The field was measured for yield with an average of 5.6 kg fresh/metre square. This equates to 56 tonnes/ hectare (range was 48 t/ha to 65 t/ha) and at 13% DM it will give approximately 7.28t/ha.

There are 24 Spring Cows in the group so the total required per day is 138 kg/DM.

Each metre square is 5.6 kg fresh at 13% dry matter = 0.70 DM/metre square

So requirement is 138 kg DM/day divided by 0.70 = 197 sq. m/day.

Feeding face on the kale is 150 m wide so the fence should be moved 1.3 m/day.

Straw will be offered at all times with average intake calculated at 4 to 7 kg fresh per day.

Yield can vary considerably and so this highlights that measurements should always be taken to allow accurate feeding.

### Stubble Turnips Costing (Table 5)

Farm	Bush	Vollenda
Crop	stubble turnips	
Ha	5.67	
acres	14	
cows	21	
start date	17-Nov-05	
end date	18-Feb-06	
grazing days/cow	93	
grazing days per ha	345	
grazing days per ac	140	

Item	cost per acre	per cow	per cow/day
Cultivations	15.00	2.5kg/acre	<b>£0.28</b>
Seed	10.00		
Fertiliser	10.21		
Spreading fertiliser	3.21		
Spray	0.00		
Spraying costs	0.00		
Growing cost/acre	38.43		
	<b>total costs</b>		
<b>Growing cost total</b>	538	<b>5.5kg/day</b>	<b>£0.17</b>
Straw	332		
Other	0		
<b>Forage costs total</b>	332		
<b>Feed costs</b>	870	<b>£41.43</b>	<b>£0.45</b>
Moving fence	£279	£10/hour	
Feeding forage	£0		
<b>Labour costs total</b>	£279	£13.29	<b>£0.14</b>
<b>Equipment costs</b>	£0	£0.00	£0.00
<b>Costs total</b>	£1,149.01	£54.71	<b>£0.59</b>

Over the 93 days on the stubble turnips the cost was £0.59 per day.

Yield was 1.7tonnes Dry Matter per acre

#### Notes on Table 5:

- Higher cost per day in comparison to previous year due to the cows appearing to be overfed. As stated previous the cows gained condition on the Stubble so it can be assumed that they have been allocated too much per day. SAC have run at 140 grazing days per acre while other farms with similar levels of yield have achieved 200 days per acre.
- Extra cultivation was carried out with a light discing of the field which is not common but it was required due to amount of straw lying in the field after it was taken for wholecrop. Felt necessary for good results that more cost would need to be put in to achieve a good emergence and this was achieved.
- Important to remember that the field has produced 2 crops. (Productivity)

## Stubble Turnips Diary

### 12<sup>th</sup> August

Wholecrop taken off the tearoom field.  
Heavy crop with some straw lying flat.

### Saturday 13<sup>th</sup>

Tearoom field topped to chop down the long straw.  
Field then disked.

### Monday 15<sup>th</sup>

Vollenda sown in Tearoom field at 2.5kg/acre plus Cambridge rolled.

*British Seed Houses*

*"Vollenda has very high yields and dry matter. Its leaf to root ratio is 60:40 and its resistance to bolting is unrivalled. Good winter hardiness ensures palatability is retained. Offers good resistance to Clubroot".*

### Thursday 18<sup>th</sup> August

Liquid Nitrogen applied at 50 units to Stubble Turnips.  
First day of rain for some considerable time.

### Monday 22<sup>nd</sup> August

Stubble Turnips germinating especially on the heavier soils.

On Lighter soil slower to emerge.

However where heavy amounts of straw remain the turnips have emerged well due to moist conditions.

### Thursday 17<sup>th</sup> November

Cows put into the field.

## Stubble Turnips Feed Value- November 2005

	<b>Total kg</b>	<b>Tops</b>	<b>Bulb</b>
<b>Average</b>	4.45	2.93 (66%)	1.52(34%)
<b>Dry Matter</b>	90.5g/kg	91.4g/kg	90.3g/kg
<b>ME</b>	11.3	11.4	11.2
<b>CP</b>	210	240	171

4.45 kg = 44.5tonnes per hectare = 4 tonnes DM

At 90.5g/kg DM = 4.2tonnes per hectare DM = 0.42kg/metre square

Allowance is for 6kg DM per day.

19 cows = 114 total per day

114 divided by 0.42 = 270metre square per day or 1890 metres square per week.

Initially starts at 250 metres but moves to 160 metres

Based on 160 metres then needs to move = 1.7 metres per day.

Cows were fed more than this initially = 2.5metres

## Deferred Grazing Calculations (Table 7)

Farm	Bush
Crop	deferred grazing
Ha	2.71
acres	6.7
cows	19
start date	17-Nov-05
end date	12-Jan-06
grazing days/cow	56
grazing days per ha	392
grazing days per ac	159

Item	cost per acre	per cow	per cow/day
Cultivations	6.72		
Seed	10.00		
Fertiliser	15.67		
Spreading fertiliser	2.00		
Spray	0.00		
Spraying costs	0.00		
Growing cost/acre	34.39		£0.22
	<b>total costs</b>		
<b>Growing cost total</b>	230		
Straw	0		
Other	0		
<b>Forage costs total</b>	0		
<b>Feed costs</b>	230	£12.13	<b>£0.22</b>
Moving fence	£202		
Feeding forage	£0		
<b>Labour costs total</b>	£202	£10.61	<b>£0.19</b>
<b>Equipment costs</b>	£0	£0.00	<b>£0.00</b>
<b>Costs total</b>	£432.00	£22.74	<b>£0.41</b>

### Notes on Table 7:

- £0.41 per day.
- Time spent by the cows is limited as it is concluded that it is only best carried out for approximately 2 months without any supplementation. Grass quality continually deteriorates and by New Year, the nutrients are not sufficient to hold the cows condition as the unborn calf increase demand.
- As field is well eaten down in early winter it requires more time in spring to regenerate and it can be concluded that it would not support stock such as sheep until late spring (late April)
- May need to broadcast some grass seed over areas where cows have sheltered. Field used was given 10kg/acre grass seed as it had been used the previous year for Deferred Grazing.
- If heavy snow fell in November /December then additional feed would need to be offered

## Deferred Grazing Diary

### 11<sup>TH</sup> April 2005

Grass harrowing of the deferred grazing field.

### 19<sup>th</sup> April 05

Deferred grazing field rejuvenated with spring tine direct seeder (Kockerling Harrow)

GrassMax

3.5kg Tetraploid Hybrid – Aber excel

2.0kg Tetraploid Intermediate Napoleon

1.5kg Tetraploid Intermediate Calibra

3kg Late Heading Tetraploid Piveoli

= 10kg/acre

Put on at 25kg per hectare.

### 16<sup>th</sup> May

Field received: 250kg/ha 26:13:00

### 20<sup>th</sup> May

Decision taken not to roll the Deferred Grazing Field.

Weed management required at a later date.

### 13<sup>th</sup> July 2005

Cows removed from Deferred Grazing Field

### 15<sup>th</sup> July 05

Deferred Grazing field topped.

### 28<sup>th</sup> July

Fertiliser put on the deferred Grazing along with grass seed thrown on the bare areas. 280kg/Ha  
25:05:05

### Thursday 17<sup>th</sup> November

Cows put into the field.

### Feed analysis taken November 05 and December 05

Analysis on 1/11/05	Near End to Flotterstone		Far End	
	1/11/05	5/12/05	1/11/05	5/12/05
Dry Matter (g/kg)	204	186	189	198
D Value (%)	67	63	61	66
Protein (g/kg)	103	84	100	97
ME (MJ/kg)	10.1	9.4	9.2	9.8
Sugar (g/kg)	81	71	29	73

For 85MJ= 9.5kg DM + 15% allowance = 10.9kg

19cows = 207kg per day

1 metre square = 2.5kg Fresh = 0.5kg DM/metre square

= 414metre square

Face = 165metres = 2.5 metres per day.

## **SPRING BORN 2005 STEERS ON KALE**

Throughout Scotland the majority of spring calves will be weaned in October/November and will be housed for their 1<sup>st</sup> winter; then in the spring put back out to grass and, in late autumn, rehoused for their 2<sup>nd</sup> winter when they will be finished. The majority will be sold at over 20 months +.

Although the age is relatively acceptable it may not always be cost effective due to the high costs involved in spending 2 winters inside, even though the feed cost per day has been kept low.

Those that spend extra time to slaughter need to have their costs well rewarded with a specified target market: ex Angus/Hereford/Shorthorn schemes or for some the live market where the butchers pay premium. But may only suit a few.

This has to be contrasted with those putting their bulls, steers and heifers away at 13 months+ on an intensive ad-lib systems maximising efficiency, weight gain and feed conversion rates while keeping days to finish (fixed costs) down. Yet this system too has its costs especially with the feed levels and labour.

We need to look at a system where the cattle may not get to the heaviest weights or at the earliest age, but where they could be profitable if the everyday costs are kept low.

At Easter Howgate 3 Groups of Limousin and Angus steers were weaned in late October housed for two weeks and then put on kale with one group supplemented with straw and the other silage. The third group (control) was housed on slats. All groups consist of 15 steers.

Rations calculated for them to achieve 0.8 kg per day but may level out at 0.75 kg due to the initial adjustment period.

Steers will then be put to grass, in late summer supplemented with concentrates and then in late autumn brought into sheds for about two months to be finished. There is a possibility that some could be finished off grass.

Will it be possible that some cattle may never be housed during their lifetime?

Labour time, as with the cows, will not be reduced due to checking of stock and moving fences. The savings are in the machinery and shed costs.

Can we achieve satisfactory performance levels from the steers outside through their first winter after weaning?

As with the cows the majority of Scottish Beef Producers will not have the right conditions, climate and soil types to carry it out.

However we have to try and show those that have the ability and resources what can be carried out and let them see if they can give an opportunity not only to themselves but also to others unable to carry it out in their climate.

## PERFORMANCE OF WEANED SPRING BORN CALVES OUTWINTERED ON KALE

At Easter Howgate Limousin x and Angus x steers were weaned in late October 2005, housed for two weeks and then turned out again to strip graze kale. Half were supplemented with straw and the group with grass silage. A third group (control) was housed. All groups consisted of 15 steers. Rations were formulated to target a growth rate of between 0.7 kg – 0.8 kg.

**The control group were fed wholecrop supplemented with 1 kg barley and 0.8 kg rapemeal to achieve a gain of 0.8 kg per day. All groups were supplemented with minerals those on kale receiving a mineral with high levels of copper, selenium and iodine.**

Table 8 shows the overall performance of the steers to 8<sup>th</sup> March, when the kale was finished. The steers are continuing in the field being fed *ad-lib* grass silage with 1.8 kg concentrate mix until spring grass is available.

**Table 8: Overall Performance**

Group	Kale + Straw	Kale + Silage	Control Group (Wholecrop) + Concentrate
<b>Weaning Weights (kg) 1/11/05</b>	306	307	302
<b>End Weight (kg) 8/3/06</b>	400	403	412
<b>Kg Gain (kg)</b>	94	96	110
<b>Overall Gain (kg/day)</b>	<b>0.74</b>	<b>0.76</b>	<b>0.87</b>

After a period of 127 days the control group had put on 16kg more weight than the steers on kale (0.87 kg/day versus 0.74 kg/day) supplemented with straw and 14 kg more than those supplemented with silage (0.87 kg/day v 0.76 kg/day).

### Initial Conclusions

- Confidence has been gained with these steers outwintered on kale having achieved the target growth rate of between 0.7 to 0.8 kg/day and have not spent a winter inside, eliminating bedding costs and freeing up a shed for other options.
- Although the outwintered steers will go to grass this spring lighter than the control group they will however already be acclimatised to being outside and they may then perform better than the control group during spring. The spring/early summer weighings may prove that eventually there is little if any difference between the groups.
- Small difference between the 2 groups on kale. It does however give a choice for farms as they can use either straw or silage – which is the cheapest for them.
- Beneficial weather through the winter with the steers at no time showing signs of stress or discomfort. Good shelter was available.
- Steers supplemented with straw ate more of the stems than those supplemented with silage. However no more kale allowance was given to them.

**Footnote:** Steers continue to be in excellent condition outside, no dumpiness having put on excellent scale and in appearance are very clean with little if any mud sticking to them. It will be interesting to compare their final carcass weights, grades and slaughter dates.

## STEERS PER DAY COST CALCULATION

Steers on the Kale had the same crop growing costs as the cows on a per acre basis. Both groups on Kale were given the same crop allowance per day with the only difference being their supplementation with either straw or silage. Table 9 gives the grazing days per hectare. Please note that the initial weighings were taken from weaning and not when the steers went onto the Kale, which was 21 days later.

**Table 9: Grazing Days**

Farm	Bush
Crop	kale steers
Ha	2.43
acres	6
steers	30
start date	21-Nov-05
end date	16-Feb-06
grazing days/cow	87
grazing days per ha	1074
grazing days per ac	435

Table 10 breaks down the costs on a per day basis.

**Table 10: Costs per day including control group**

	<b>1.Kale + Straw</b>	<b>2.Kale + Silage</b>	<b>Control Group</b>
Kale cost per day	£0.31	£0.31	
Concentrate cost per day			£0.18
Wholecrop cost per day			£0.38
Straw cost per day @ £30/t	£0.06		
Silage cost per day @ £20/t (30% DM)		£0.08	
Labour cost per day @ £10/hr	£0.12	£0.12	£0.08
Fixed costs (machinery)			£0.15
<b>Total cost per day</b>	<b>£0.49</b>	<b>£0.51</b>	<b>£0.79</b>

- Group 1: consumed 2kg /day straw per head.
- Group 2: consumed 4kg /day silage per head.
- Control Group: consumed 15kg wholecrop per day (Dry Matter = 35%)
- Control Group were on slats so no bedding costs incurred
- Care should be taken on an individual farm basis to put their own forage/ wholecrop costs in.

## COSTS IN RELATION TO WEIGHT GAIN

As table 8 showed the control group performed above the 2 groups on Kale. However Table 11 shows the cost for each group if they were to put on 1 kg gain in growth. Both Kale groups are approximately costing £0.24 less to put 1kg weight on.

**Table 11: Cost of putting on a kg in weight**

	<b>Kale + Straw</b>	<b>Kale + Silage</b>	<b>Control Group</b>
Total cost per day	£0.49	£0.51	£0.79
Overall gain per day	0.74kg/day	0.76kg/day	0.87kg/day
Cost per kg gain	£0.66	£0.67	£0.91

## FEED ALLOWANCE FOR STEERS

### How the allowance was initially calculated

Included a wastage factor of 30% over expected intakes.

For a gain of 0.8kg/day the cattle need to eat about 35kg (4.70kg DM at a DM of 13.5%) and about 3kg straw. Including wastage it now totals 6.1kg DM Kale. As both kale and straw will be available to appetite don't really know how much of each feed they will eat.

Assuming this level of kale intake, the 15 cattle on straw will need a daily allowance of about 91 kg DM/day which, = 125 m square and so with a feeding face of 70 m means the fence will need to be moved about 1.8 m/day. (2 metres)

The other 15 cattle are to get baled silage rather than straw and, in theory at least, they will need to eat slightly less kale to give 0.8 kg/day. However, inclined to offer this lot the same allowance as the straw ones so that we can evaluate and compare the performance of the cattle with the two contrasting supplementary forages. The comparison should hopefully indicate which is the best forage type for this system.

As to a min/vit mix, these stores (in theory) need a slightly different mineral mix from the one that the cows are getting – in that the Mg and P levels need not be as high. However, to simplify things we could offer the cow mineral to these as the higher Mg and P intakes will do no harm.

## **IMPORTANT FACTORS IN SUCCESSFUL OUTWINTERING**

### **Shelter and Soil Type**

Visitors to SAC's Outwintering plots have asked, "which is more important, a dry lie or shelter?" These two objectives are often incompatible; a field, which is too well sheltered, may not be exposed to drying winds and can often dry out slowly. Cows really need both, and so the best option is to use fields where the vast majority of the land dries out rapidly and provides as dry a lie for outwintered stock as possible. Fields, which does not have this capability, should not be considered for Outwintering. There also needs to be a degree of shelter to provide protection during extreme conditions. Cows exposed to the elements during extreme conditions will suffer stress.

Where soils are heavy and not well draining, they will poach easily. This results in an immediate welfare problem and problems with regeneration and establishment of crops – and GAEC issues in the future. Runback areas have to be available and capable of taking cattle over winter months. Cows must also have good lying areas. It is advantageous to have two runbacks so that during the winter the cows can move onto fresh ground allowing the other runback to regenerate.

### **Field Choice**

Important that the field is not significantly sloping which is higher risk for soil erosion. Fields in close proximity to watercourses or drinking water supplies such as spring or boreholes should be avoided.

### **Restricted Vehicle Access**

Often deep ruts in the ground cause severe run off and damage to the soil structure. A consequence is that rainwater simply lies in ruts made by the cow's hooves and does not move away apart from natural drainage. All SAC Outwintering demonstration areas had all their winter feed put in the fields prior to the cows entering and so, no tractors, machinery or bikes entered the fields afterwards. This was carried out by putting all the straw required to supplement the Brassicas, in the fields at harvest time along the end rigs. Damage to the fields, especially the gateways was significantly reduced and run off and erosion minimised.

### **Feeding Practice**

GAEC proposals highlight the need to avoid damage due to heavy concentrations of stock around supplementary feeding areas. Strip grazing with daily movement of the electric fences by 1 metre provided an Outwintering set-up, which adhered easily to the instruction to rotate feeding sites. The cows were able to move to fresh feed and stand where the crop had been the previous day. This helped minimise any poaching.

### **Non Ploughed Fields**

Sowing kale directly into an existing grass sward, which had glyphosate, applied was a major factor in the success of the Outwintering trials on the kale crop. As the ground had not been ploughed, cows were able to graze the crop on very firm ground. There was limited soil damage on the kale area in comparison with the yellow turnip area, which had been ploughed.

Ploughing has not been used to establish any of the systems for the winter 2005/2006 demonstrations; this practice is vital for success.

## **Extensive Grazing**

The Brassicas in the trial, such as kale, yellow turnips and stubble turnips, were sown later in 2004 and did not produce to predicted yields and resulted in the demonstration running the cows extensively. This proved to be beneficial as the cows moved over the ground quickly minimising soil damage and could be a positive option for the future. Many arable farmers were delighted to see the negligible levels of soil damage, especially in the lower yielding stubble turnips, indicating that they could consider taking cows and stocking them extensively over a large acreage whilst keeping their ground in GAEC.

## **Further Stock Welfare**

There are other benefits to having cattle outside in the right conditions:

- Heavily stocked sheds throughout winter can lead to health problems such as pneumonia in young calves.
- Reducing indoor stocking helps all round health and welfare.
- Cattle wintered outside in the right soil conditions appear contented and healthy.

Another key factor to successfully outwintering cattle is minimising poaching. In the ideal situation, when strip grazing, cows would never move more than 4 – 5 yards away from the electric fence, eating off clean ground underneath the fence and then using it for lying on.

One of the worst animals for heavily poaching ground, even in the summer or being responsible for making bedding very wet and dirty indoors in the bulling animal. This would be particularly true for large heavy cows. Outwintering systems are therefore best suited to non bulling or pregnant cattle i.e. spring calving herds.

SAC will continue to house the spring calving cows from the Outwintering demonstration one month prior to calving. This allows easier control and management for the stockman. Calving on the brassica crops was not considered due to the ground being dirty for the newborn calves, which can lead to navel problems.

There was no significant difference at calving between any of the outwintered groups and the group housed all winter. Provided the different systems are managed correctly then calving should not be a concern. Of the 50 cows outwintered only three (6%) needed to be assisted in 2005.

Keep land in “Good Agricultural and Environmental Condition” by observing the 18 measures in the guidance published by SEERAD (including the PEPFAA code).

## QUESTIONS AND ANSWERS

### 1. Did Steers easily settle when first moved on?

Settled well and easier than expected. Cows were close by and there was never any risk of the steers going over fences, as they were well aware of the electric fences.

### 2. Cows onto Kale?

Cows took a week to fully start consuming the Kale as the runback had good supplies of fodder. The cows slow to fully eat the stems. Would be worthwhile in future years not to allow them full access to all the runback initially. More runback would become available as the winter progressed and conditions deteriorated.

### 3. Cows on stubble Turnips?

Full utilisation of the crop from the start. Cows did very well on the crop but has been concluded they were given a higher allowance than required.

### 4. Cows onto Deferred Grazing?

Cows initially appeared to be utilising the near end of the field, which was cut for silage in Year one. In the analysis it has higher sugars and better digestibility.

### 5. How did you choose your Brassica varieties?

With the Kale it was important to get a variety that would give good production results as steers were being put on it. In discussions with British Seed Houses it was decided to use Maris Kestrel due to its superior leaf to stem ratio.

Previous year Bittern was used but it was only for Spring cows on a maintenance diet with more stem and less leaf.

### 6. Did you find differences with the bales that were wrapped 5.5 times and those 2 times?

Each time a group has visited we have asked them to lift the bales on the end and asked them to tell us if they notice the difference between them. Each group has remarked how much lighter the 5.5 times wrapped was indicating that it has indeed carried out its task of acting as a protective layer. The main benefit has not been with rain falling on it but the amount of moisture soaked up from the ground. The twice wrapped bales soak up considerably more water causing difficulties when turning on their end to unwrap.

### 7. Was all the straw placed in the fields prior to the cows entering?

Straw was placed on the end rigs in a single line before the cows entered and as the electric fence was moved each day for fresh feed the next bale of straw was put on its end and the net taken off allowing the cows access from behind the wire.

**8. You have had no machinery going into the fields. Has that made a difference?**

What is noticeable is that there is no run off and this is a vital result for the demonstration. Other farmers have remarked on this due to them having deep rutted fields now and the water is running out of the fields due to the wheel damage caused in the fields. Our demonstration has not got this problem as the water is contained within.

**9. Did you have any problems with the Electric Fences?**

The RAPPAs fences were easily moved and the cows never pushed through the fences adapting to the fence from a very early stage. Indeed initial thoughts were that the cows should have been exposed to an electric fence before they went on into the fields but this was not shown to be necessary. The cows can eat under and through about another 3 feet when standing behind the wires.

**10. Is there a noticeable difference between the rope and wire reel systems?**

Yes, the wire reel has broken a couple of times due to it developing kinks when being reeled out and then when being retightened, it breaks. The rope is more suited to each day movement of the fence.

**11. Some of the cows were using a new type of drinking trough. Did you find any noticeable difference with it?**

Yes, there was hard frost one evening and the next day it was the only trough not frozen. The difference is that the water from the incoming pipe flows in from the bottom and not the top so not exposing the pipe.

**12. What height was the electric fence?**

They were all set at 29 inches

## FORAGE BRASSICAS SUPPLEMENTATION

**The minerals have been supplied by Rumenco, which have been specifically formulated to include high levels of Copper, Selenium and Iodine.**

The major source of energy in the brassicas is in the form of sugars, not starch as in barley. These sugars ferment rapidly in the rumen and care must be taken to introduce these feeds slowly to avoid problems such as acidosis and bloat.

The brassicas, particularly kale, contain compounds, which can cause problems (antinutritive factors). In particular one compound, SMCO, is converted by the rumen microbes to a compound, DMDS, which destroys the haemoglobin in red blood cells. For this reason the amount fed is usually restricted. Other compounds, goitrogens, block the uptake of iodine leading to reduced thyroid hormone production.

Brassicas are also low in the trace elements selenium, iodine and copper. The antinutritive compounds and low trace element status combine to give a “double whammy” effect. Selenium is contained in an enzyme, which protects animal cells from oxidation by compounds like DMDS so it is important that selenium supplements are given to maximise enzyme activity. Extra iodine supplementation is required to overcome the low status and the effects of the goitrogens. Finally, brassicas have high levels of sulphur which, in the rumen, lock up the little copper that there is, so again copper supplementation is required for cattle.

### **Iodine**

Iodine is a trace element and is required by animals so that they can make the thyroid hormone, thyroxine. This hormone controls the rate of biochemical processes in the animal's cells and is important in the development of foetal organs (heart, brain lungs, wool follicles etc.) and it sets metabolic rate, controls the ability to maintain body temperature (especially in the new born lamb) and has influence over immune defence and reproduction. Thus the hormone is very important and an adequate intake of iodine is essential.

The iodine content of grass declines as the sward matures and cereals are a poor source of iodine. So, appropriate supplementation of rations with iodine is important to avoid deficiencies. There are many symptoms of deficiency but the most common include late abortions and the birth of weak or dead lambs and calves with enlarged thyroid glands (goitre) and, in mature animals, infertility and poor conception rates.

The requirement for iodine in the ration is small – only 0.5 mg/kg dry matter or 2 mg/kg DM when brassicas or rapeseed meal are fed (to overcome the effects of the goitrogenic compounds). The simplest way to ensure that iodine intake is adequate is to give a mineral and vitamin supplement containing the appropriate level of iodine inclusion for the daily allowance suggested. This could be included with bruised cereals or sprinkled on silage. Provision of minerals in free access licks or blocks is convenient in certain circumstances but can be problematic in that the variability in intake is high and some animals will not receive sufficient supplement whereas others will consume an excess.

Thyroid hormone occurs in inactive and active forms. The inactive form is used for storage and transport around the body and the active form is created where and when it is needed. This conversion of the inactive to the active form is carried out by an enzyme containing another trace element, selenium. So, just to complicate matters, the intake of selenium must be adequate too to ensure efficient thyroid hormone function.



