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**Animal Science Research Centre – Trial Results – 2008 (e)**

**Evaluation of out-wintering systems based on stubble turnips for  
replacement heifers**

**Introduction:**

In-calf dairy heifers have recently been commercially out-wintered and strip grazed on stubble turnip and forage rape based systems at Harper Adams. The forage crops are grown as 'catch crops' following whole crop winter wheat. Following grazing of the forage crops the fields are subsequently planted with maize. The Harper Adams out-wintering system is based on extensive stocking within a low cost system to provide soil protection.

Whilst it is acknowledged that stubble turnips and forage rape are regarded as 'short keep' crops, recent mild winters have enabled these forages to be effectively grazed through to spring at Harper Adams. Dry matter yields are usually significantly lower with stubble turnips and forage rape compared to kale at 4.2-5t DM/ha and 10t DM/ha respectively (French *et al.*, 2006), however the standard recommendation is to sow kale in late April to early July following a cut of silage. Stubble turnips and forage rape can be sown from late July to the end of August as a catch crop following cereals on a mixed arable and livestock farm and is thus the preferred choice at Harper Adams.

The objective of this experiment was to evaluate the performance of in-calf dairy heifers either housed or out-wintered on stubble turnips with the target to achieve a DLWG of 0.7 to 0.8kg required for calving heifers at 2-2½ years old.

**Materials & Methods:**

The study commenced on the 21<sup>st</sup> of November 2007 and involved 28 in-calf dairy heifers aged 21.8 months old with a mean weight of 476kg.

The out-wintered heifers were initially offered *ad libitum* straw however this was replaced with haylage (10.6 ME MJ/kg DM) after 48 days. Mineral blocks (Rumenco Cattle Plus TABs) were offered for free access feeding. The electric fence was moved every two to three times a week. This was implemented to reduce labour costs and it was not an objective to achieve 70-100% utilisation of the stubble turnips since it was considered that this could restrict dry matter intakes (DMI) and hence DLWG on a 'low cost system with extensive stocking'.

The housed heifers were fed *ad libitum* grass silage (11.1 ME MJ/kg DM) and whole crop (10.3 ME MJ/kg DM). They were initially fed 1.5kg/concentrates/day. This was replaced with 100g of minerals after 48 days. Both groups of heifers were turned out

onto grass on the 20<sup>th</sup> of March 2008 and performance subsequently monitored until the 1<sup>st</sup> of July 2008 when the first heifers started to calve-down.

## Results:

Table 1: Animal performance

DLWG (kg)	Housed	Out-wintered	s.e.d	Sig
Start - 48 days	0.77	-0.30	0.090	***
48 days - turnout	0.90	1.37	0.085	***
Start - turnout (120 days)	0.85	0.70	0.063	*
Turnout - 34 days	0.19	1.00	0.089	***
Turnout - finish (103 days)	0.78	1.08	0.061	***
Start - finish	0.82	0.88	0.037	NS
<b>Liveweight (kg)</b>				
Start	476.6	476.4	11.45	NS
Turnout	578.1	560.4	15.45	NS
Finish	658.6	672.1	17.72	NS

The initial negative DLWGs for the out-wintered heifers necessitated the change from feeding straw to haylage. Significant compensatory growth was subsequently recorded. The housed heifers recorded a marked growth check following turnout which therefore resulted in there being no significant differences in overall DLWG from start to finish.

There were no significant differences in locomotion or dirtiness score and condition scores, except after 48 days when the housed heifers recorded a higher ( $P < 0.05$ ) score.

Silage dry matter intakes of 10.2kg/d were recorded for the housed heifers. Estimated intakes of stubble turnips ranged from 37-51kg/h/d (4.2-5.8kg DM/h/d) plus 7.5kg/h/d (6.2kg DM) of haylage and 90g/h/d of mineral block. Utilisation of the stubble turnips was estimated at 38-44%. The majority of the stubble turnips left ungrazed were the roots with the heifers having a preference to eat the leaves. It was estimated that utilisation of the leaves was 90%. In this study 0.75ha provided sufficient stubble turnips for 1 heifer for 120 days.

In conclusion the experiment has indicated that:

- Target DLWGs of 0.7-0.8kg to achieve 2 year calving can be achieved with out-wintering systems based on stubble turnips and good quality haylage/silage on a low cost extensive system.
- Out-wintered heifers do not suffer a growth check when moved onto a grass sward in the spring.
- There were no welfare implications for the out-wintered heifers.
- Overall (winter + summer) fixed and variable costs per kg gain were almost halved with out-wintering (£0.78 v £1.50/kg).

### **Farmer Recommendations:**

To achieve the target of 0.7-0.8kg DLWG for replacement heifers out-wintered on stubble turnips the following recommendations are suggested:

- Offer good quality haylage/silage *ad libitum*. **Do not feed straw**. Bales should be placed across the field before grazing to minimise soil structure damage.
- Offer mineral blocks.
- Weigh record on a monthly basis to monitor performance.
- Allow 1 hectare of stubble turnips per heifer for a 160 day winter.
- In the study the stubble turnips were established using minimal cultivation techniques and sown with a 12m headland run back area. With low stocking rates consider either a zero or 6m run back area.
- Be prepared to accept relatively low stubble turnip utilisation rates of 35-45%, especially from the roots. Increasing utilisation rates may restrict DMI and DLWG. Roots could subsequently be grazed by sheep.
- Out-wintering will significantly reduce fixed costs. Buildings could be released for herd expansion or an alternative enterprise.

### **Acknowledgement:**

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### **Reference:**

French, P., Keogh, B., Shalloo, L. and McGrath, T. (2006). Forage crops for winter grazing, what are the options? In: *Alternative Options for Dairying*, Moorepark Dairy Levy Research Update 11-12<sup>th</sup> January 2006 Series No.1. Pp. 3-8

Marsh, S.P., Billington, P., Brizuela, C. and Kirby, S. 2009. Evaluation of the performance of in-calf dairy heifers either housed or out-wintered on forage brassicas (stubble turnips). *Proceedings of the British Society of Animal Science*. Paper 9.

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