

Project number: RMIS 5401

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Evaluation of alternative forages for lost cost in-situ winter feeding of spring calving dairy cows in Ireland



Key external stakeholders:

Dairy farmers, dairy industry stakeholders and drystock farmers

Practical implications for stakeholders:

Forage *brassic*as and fodder beet can provide high dry matter yields and with excellent forage quality over the winter for *in situ* utilisation. Overall, the results suggest that *in situ* utilisation of forage *brassic*as and fodder beet had no negative/deleterious effects on dry cow performance *pre* and *post partum*. The outcome of the research programme has highlighted the benefits of forage *brassic*as for dairying systems through potential reductions in fixed and variable costs

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Funding source:	Teagasc Core funding, Dairy Levy.
Start date:	January, 2005
Completion date:	October, 2008
Key Impact Indicator:	Develop blueprint guidelines which increase farm profit to the levels stated in the 'Roadmap targets' and demonstrate these blueprints on Research farms

1. Project background:

Milk production in Ireland is dominated by seasonal, pasture-based production systems. In seasonal pasture based systems, winter feed and housing account for a large proportion of the costs. While grazed grass is the cheapest form of feed available in temperate climates, grass utilisation during winter may be constrained due to climatic factors and soil type and can only be managed at low stocking rates. In situ utilisation of forage brassicas is of interest within dairy production systems in Ireland because it has the potential to extend the grazing season into the autumn and winter and reduce both fixed and variable costs.

2. Questions addressed by the project:

There is a scarcity of published literature reporting the effects of these forages offered *in situ* on the production performance, health and metabolic status of the dairy cow in Ireland.

3. The experimental studies:

To address these issues, a series of experiments were conducted with *brassicas*, fodder beet and grass silage. Non lactating dairy cows were offered a range of these forages at different allowances from dry-off in late November until calving in mid-February and the impact on animal performance and well being was quantified. Agronomic factors such as sowing date, cultivar and nitrogen application level affecting the production of forage rape, forage oats and stubble turnips for *in situ* utilisation were also evaluated.

4. Main results:

- Dairy cows offered kale, swedes or fodder beet *in-situ* (outdoors) had moderate body condition score gain relative to grass silage offered indoors (0.20, 0.14 vs. 0.50 BCS units, respectively) during the winter.
- Offering forage *brassicas in situ* to dairy cows *pre partum* had no negative effects on milk and milk compositional yields relative to offering grass silage.
- Offering *brassicas* and fodder beet *in situ pre partum* had no negative effects on *periparturient* cow performance and health (gestation length, calving difficulty, calf birth weight, somatic cell count and subsequent fertility parameters).
- Cows offered kale *in situ pre partum*, had significantly lower plasma copper and iodine concentrations *pre partum* and at *parturition* relative to those offered grass silage and fodder beet, suggesting that supplementation with copper and iodine may be essential to maintain performance and health
- Cows offered kale *pre partum* had elevated concentrations of plasma IGF-1 immediately *post partum* relative to those offered fodder beet and grass silage, which is an important predictor of reproductive performance.
- Offering kale as the sole forage had no effect on rumen pH and total volatile fatty acid concentration. However, offering 850 g kg⁻¹ DM of kale in a forage mixture with grass silage reduced rumen pH below acceptable thresholds for over seven hours potentially inhibiting cellulose digestion. Further research is warranted.
- Sowing date had a greater impact on forage rape and stubble turnip dry matter yields than nitrogen fertiliser level. The optimal sowing date for forage rape and stubble turnips was early August.
- A delay in sowing from the 1 August to 31 August led to a characterised 48% to 77% decrease in forage rape and stubble turnip DM yield.
- The ability of forage *brassicas* and fodder beet to maintain crude protein concentrations over the growing season allows considerable flexibility when utilising these forage crops *in situ*.

5. Technology transfer:

5. Opendays

Three open day events were held during the project (January 11 & 12th, 2006; January 10 & 11th, 2007 and January 6 & 7th, 2009) to provide local dairy farmers and industry representative's research information and system development technology. The objective of these events was to highlight research technologies that will increase farm profitability by extending the grazing season through reductions in fixed and variable costs and while having no deleterious or negative effects on animal performance or health.

Dissemination through Teagasc Advisory

In addition to open day events, individual discussion groups frequently visited the experiment during the project. Topics covered at these events by research and advisory staff included brassica management (sowing and utilisation management or best practice advice), animal performance and health recommendations and economic implications of research results.

Main publications:

- Keogh, B., French, P., McGrath, T., Storey, T. and Mulligan, F.J. (2009). Comparison of the performance of dairy cows offered kale, swedes and perennial ryegrass herbage *in situ* and perennial ryegrass silage fed indoors in late pregnancy during winter in Ireland. *Grass and Forage Science* 64:49-56.
- Keogh, B., French, P., McGrath, T., Storey, T. and Mulligan, F.J. (2009). Effect of three forages and two forage allowances offered to pregnant dry dairy cows in winter on periparturient performance and milk yield in early lactation. *Grass and Forage Science* 64:292-303.
- Keogh, B., French, P., Murphy, J.J., Mee, J., McGrath, T., Storey, T., Grant, J. and Mulligan, F.J. (2009). The effect of dietary proportions of kale (*Brassica oleracea*) and grass silage on rumen pH and volatile fatty acid concentrations in dry dairy cows. *Livestock Science* 126: 302 – 305.
- Keogh, B., French, P. and Mulligan, F.J. (2010). The effect of dietary proportions of kale (*brassica oleracea*) and grass silage on rumen pH and volatile fatty acid concentrations in dry dairy cows. In: *Proceedings of the British Society of Animal Science and Agricultural Research Forum, Belfast, 12-Apr-2010*, p. 27
- Keogh, B., French, P., McGrath, T., Storey, T. and Mulligan, F.J. (2008). The effect of forage allowance and forage system during the dry period on the performance of dairy cows. *New Zealand Society of Animal Production, Brisbane, Australia, 24-June-2008*, p. 16-19.
- Keogh, B., French, P., McGrath, T., Storey, T. and Mulligan, F.J. (2008). Effect of forage allowance on the performance of non-lactating dairy cows offered fodder beet, kale and perennial ryegrass silage. In: *Agricultural Research Forum, Tullamore, 12-Mar-2008*, p. 116.
- French, P. and Keogh, B. (2009). Out-wintering on forage crops - options for maiden heifers - *Moorepark Dairy Levy Update: Components of Dairy Herd Expansion: Heifer Rearing and Herd Health*. Teagasc IE p. 23-28 ISBN 18227

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