Project number: 5404
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Project dates: Jan 2005 – Dec 2008

Development of a budgetary simulation model of a beef farm

Key external stakeholders:
Beef farmers, beef industry stakeholders, beef farm systems researchers, whole farm systems modellers

Practical implications for stakeholders:

- This project involved the development of a bioeconomic simulation model of suckler beef production systems. The model simulates the impact of multiple market, policy and technical scenarios and the implications of these scenarios on financial and technical performance of suckler beef production systems. Applications of the model to date have focused on replacement policies for suckler beef cow herds and the effect of turnout date to pasture and calving date in spring.

Main results:
Two applications of the model investigated (1) cow replacement strategies and (2) the effect of turnout date to pasture and calving date in spring.

(1) In Ireland, replacement breeding heifers for suckler beef production are increasingly being sourced from within the suckler herd resulting in an upgrading of many suckler beef cows to pure breeds and a subsequent reduction in cow milk production, pre-weaning growth rates and carcass weights of suckler progeny. The impact of this breeding policy on profitability of grass-based suckler beef production was investigated. Sourcing replacements from the dairy herd resulted in greater profitability (~18%) due to higher output; a consequence of heavier liveweights at sale and greater numbers of animals sold. Although, the availability of suitable breeding females from the dairy herd for suckler beef production is increasingly limited, the results highlight the importance of milk yield in suckler beef cows. Where adequate replacements are available, the effect of replacement rate on profitability was modest with higher replacement rates reducing profitability marginally and with the impact greater for calf-to-finishing systems than for calf-to-weanling systems.

(2) Early turnout to pasture in spring is one strategy for reducing production costs by increasing the proportion of grazed grass in the annual feed budget, replacing relatively expensive grass silage and concentrates. Where soil and weather conditions are suitable and where there is an adequate herbage supply, analysis showed that earlier calving and turnout date to pasture can lead to greater profitability in suckler beef systems by reducing slurry handling and feed costs. The impact of advancing calving date and turnout date by one day was to increase net margin by €1.75 ha^{-1} (€1.41 cow^{-1}) and €1.90 ha^{-1} (€1.54 cow^{-1}), respectively in calf-to-beef systems. For yearlings, the analysis indicated that advancing turnout to grass by one day increased net margin by €1.17 ha^{-1} (€0.95 cow^{-1}).

Opportunity / Benefit:
Economically quantified the impact of alternative replacement strategies and different turnout dates for suckler beef farms.

Collaborating Institutions:
University College Dublin

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External collaborators: Dr. M. Wallace, University College Dublin

1. Project background:

Decoupling of EU common agricultural policy (CAP) support payments from production (Fischler reforms) means that beef production systems can now be evaluated without the constraints imposed by the previous CAP premia regime (Agenda 2000) and therefore, farmers are free to decide what production system will return the largest profit based on market returns. This study involved the development of an integrated model for evaluation of existing and prototype beef production systems from a biological and economic perspective. An integrated computer modelling system based on empirical production data generated under Irish conditions provides the opportunity to quickly, repeatedly and inexpensively evaluate different systems of beef production. The objective of this study was to develop, validate and use a bioeconomic simulation model of beef production systems.

2. Questions addressed by the project:

The overall objective was to develop an integrated modelling system for evaluation of existing and prototype beef production systems with respect to technical and economic benchmarks. Farm level models were used to identify viable systems, indicate the cause of failure of non-viable prototypes, and suggest areas where scientific research should be strengthened for various beef production systems. The project aimed to:
(1) develop a bioeconomic model which adequately reflected beef farming systems in Ireland in relation to technical inputs and outputs as well as economic indices and
(2) offer insight into the possible consequences of changing circumstances on beef farms through application of the model.

3. The experimental studies:

This was a desktop study. The constructed simulation model, the Grange Beef Systems Model (GBSM), was based on a stochastic dairy simulation model as described by Shalloo et al. (2004). The model was structured as a whole farm budgetary simulation model and was developed in MS Excel. It consists of input, planner and output worksheets. The input worksheet provides a detailed input interface and enables the user to specify the details and pricing structure of the production system to be simulated. Specifications include utilisable agricultural area, calving date, finishing strategy, forage conservation strategy, nitrogen (N) application rate on the grazing area and price and costs variables. The model structure is formulated in the planner worksheet. The primary farm activities of a typical Irish beef-cow farm are specified. Animal groupings include suckler cow, bull and heifer calf, steer and heifer yearling and a range of finishing activities. Forage production is described as monthly yields of DM and is based on N application rate and conservation strategy. The animal and forage components are coupled and the annual carrying capacity of the farm area simulated is calculated. Financial parameters relating to animal, forage and fixed cost items are specified and permit a detailed economic analysis of the simulated production system. Output worksheets include technical (average animal numbers, stocking rate, key liveweights (e.g. weaning), carcass output, feed consumption) and financial (profit and loss, balance sheet, cash flow) performance.

4. Main results:

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5. Opportunity/Benefit:

- A model of suckler beef production systems was developed.
- Highlight the importance of milk yield in suckler beef cows.
- Quantified the effect of replacement rate on profitability .
- Quantified the impact of advancing calving date and turnout date by one day for suckler cows and yearling progeny.

6. Dissemination:

Conference abstracts

Crosson P. (2007) An economic comparison of replacement rates on suckler beef farms in Ireland – a modelling approach Proceedings of the International Suckler Cow Workers Group Meeting, 11-12 September 2007, Greenmount Campus, CAFRE, Antrim, Northern Ireland.

Crosson P. (2008) The impact of cow genotype on the profitability of grassland-based suckler beef production in Ireland. Proceedings of the 22nd Annual Meeting of the European Grassland Federation, Uppsala, Sweden, 9-12 June 2008, p.771

Crosson P., McGee M. and Drennan M.J. (2009) The economic impact of calving date and turnout date to pasture in spring of suckler cows. Proceedings of the Agricultural Research Forum, Tullamore, Co. Offaly, Ireland, 12-13 March 2009, p.68

Crosson P. McGee M. and Drennan M.J. (2009) The economic impact of turnout date to pasture in spring of yearling cattle on suckler beef farms. Proceedings of the Agricultural Research Forum, Tullamore, Co. Offaly, Ireland, 12-13 March 2009, p.77

Popular publications

Crosson P. (2009) The economic impact of calving date and turnout date to pasture in spring for suckler beef farms, Teagasc Beef Advisory Newsletter, Teagasc, Oakpark, Carlow, Ireland, April 2009.

Crosson P. and McGee M. (2009) Profitable beef production – the influence of calving and turnout date on farm margins, Irish Farmers Journal, 4 April, 2009

Journal, 18 April, 2009

7. Compiled by: Dr. Paul Crosson

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