Project number: 5900
Funding source: Dairy Levy

Date: December 2013
Project dates: Sept 2009 – Dec 2013

Investigation of prevalence, risk factors and preventative measures relating to non-regulated infectious diseases in Irish dairy herds

Key external stakeholders:
Animal Health Ireland
The Irish Cattle Breeding Federation (ICBF)
Dairy Farmers
Veterinarians

Practical implications for stakeholders:
This study has
- Highlighted sub-optimal implementation of biosecurity nationally on dairy farms
- Highlighted poor communication between farmer support networks in relation to biosecurity
- Generated national prevalence data for a total of eight non-regulated infectious diseases in Ireland, namely, BVD, IBR, Leptospirosis, Salmonellosis, Neosporosis, Fasciolosis, Dictyocaulosis and Ostertagiosis which will support Animal Health Ireland (AHI) in prioritizing and monitoring non-regulated diseases
- Identified management practices (i.e. risk factors) associated with exposure to each of these pathogens in order to highlight the control measure necessary to prevent and contain these diseases
- Identified production losses associated with exposure to each of these pathogens which will prove of immeasurable benefit in displaying the cost-benefit of disease control to the farming community. It will also prove of great value to AHI in promoting national eradication schemes
- Highlighted the usefulness of bulk milk testing for the purposes of herd health planning on farm
- Created an awareness amongst dairy farmers of the value of herd health planning and diagnostics as a means of strategically controlling disease on farm

Main results:
- Biosecurity implementation on Irish dairy farms is sub-optimal
- Unregulated diseases are present at unacceptably high levels on Irish dairy farms
- Significant production losses are associated with exposure to these diseases at individual farm level, Salmonella and Bovine herpesvirus 1 (IBR) proving exceptionally costly as well as uncontrolled parasitism in adult dairy cows.

Opportunity / Benefit:
One the prevalence, risk factors, and economic impact of a disease are known, an informed risk-analysis can be completed at farm level in order to allow farmers to prioritise diseases for control and initiate mitigation strategies to reduce the production impact of the pathogens investigated in this study. This project definitively highlights the non-regulatory infectious diseases requiring prioritisation in Ireland based on prevalence and economic impact data. In terms of on-farm health planning, it should result in an increased awareness and implementation of biosecurity, continuous disease monitoring, appropriate vaccination, and farm-specific health statements on Irish dairy farms. The baseline data generated in this study will act as a benchmark against which the impact of future herd health strategies and their contribution towards sustainable dairy farming can be measured.

Collaborating Institutions:
University College Dublin
Irish Cattle Breeding Federation
Merial

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1. Project background:

Sustainability of food production has been identified as a critical component of farming into the future. If one defines sustainable agriculture as the production of enough food to meet current needs without compromising future productivity, then measures are required on dairy farms to optimise the current health status of dairy herds in order to optimise productivity into the future. The health profile of a dairy herd will determine its success in terms of milk production, reproductive status and growth rates i.e. the key aspects in a successful dairying operation. A number of non-regulated diseases e.g. Bovine Viral Diarrhoea (BVD), Infectious Bovine Rhinotracheitis (IBR), Johnes Disease (JD), and Leptospirosis are having an immeasurable impact on sustainable dairy production in Ireland. Diseased animals perform sub-optimally and decrease on-farm efficiency and profitability through waste feed, labour and veterinary costs. A herd health programme is therefore critical to sustainable dairying. A number of countries both within and outside the EU have developed and are implementing specific disease control and herd health programmes. Ireland is currently lagging behind it's global trading partners in terms of on-farm health planning and general herd health (More, 2008) although through initiatives such as this project and the establishment of AHI, significant improvements continue to be made.

Herd health programmes employ a combination of biosecurity, vaccination and diagnostics to determine the health status of a dairy herd.   In the past, farm health planning and biosecurity has been imposed on Irish dairy farmers through TB and brucellosis eradication schemes; voluntary practice has never been promoted nor encouraged. With the increasing prevalence of non-regulated, biosecure diseases such as BVD and IBR, dairy farmers will need to take these practices on board in order to maintain competitiveness. "Biosecurity practices are becoming substantial components of modern farming" (Ortiz-Pelaez, 2006) and as all herds are impacted by infectious disease, all are likely to benefit from the preparation and implementation of a biosecurity/herd health plan (Maunsel & Donovan, 2008).

2. Questions addressed by the project:

This project will contribute to sustainable dairying by providing the necessary data to carry out disease risk analyses at farm level. It has generated prevalence, risk factor and production data to allow informed decision making with regard to disease prioritization and control. It provides baseline data which can ultimately be used to improve the health profile of the Irish dairy herd.

3. The experimental studies:

- A total of four national surveys (dairy farmersx2, vets, advisors) and one international survey (vet experts) were conducted to examine biosecurity and herd health management on Irish dairy farms.
- A seroprevalence survey of 320 herds using bulk milk ELISA analysis over the 2009 lactation was completed to generate baseline data for 8 non-regulated disease in Ireland.
- Risk factors for being bulk milk positive for each disease in the seroprevalence study were identified using regression methods using bulk milk survey data, herd demographic data from the ICBF database, and self-declared farm management data.
- The production losses associated with non-regulatory diseases were investigated using herd performance data (milk, fertility, mortality) sourced from the ICBF database. Suitable data were available on over 270 herds and economic modeling was also conducted on Salmonella, Neospora and Leptospirosis.
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4. Main results:

- Implementation of biosecurity on Irish dairy farms is poor, and reflects a lack of biosecurity knowledge amongst farmers and a lack of coordinated message delivery from supporting networks
- A willingness exists amongst dairy farmers and service providers to engage in preventative medicine. Mechanisms must be found, however, to ensure that financial incentives exist for all stakeholders to ensure they actively promote and participate in herd health initiatives.
- Seroprevalence of many non-regulated disease in Irish dairy herds is unacceptably high; BVD (>90%), BoHV-1/IBR (80%), Neospora (19%), Salmonella (49%), Leptospira (86%), Liver fluke

(75%), Gut-worm/Ostertagia (100%), Lungworm (29%).

- Bulk milk analysis has been shown to be a useful diagnostic method for many non-regulated diseases in Ireland. Multiple tests across the year are most useful for naïve herds (any disease), Salmonella (non-vaccinating herds), liver fluke and lungworm. An annual bulk milk sample for BVD and IBR is sufficient in exposed herds unless an intervention takes place to significantly reduce the number of positive animals in a herd.
- In general, production losses were recorded for all herds exposed to non-regulated disease compared to herds not exposed to the disease. For example, total annual profits in unvaccinated herds were reduced by €94 per cow as a result of exposure to Salmonella. Exposure to *N. caninum* and *L. hardjo* resulted in a reduction in annual farm profits of €12 and €14 per cow, respectively. Given such production losses, consideration should be given to introduction of nationally coordinated control programmes.
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5. Opportunity/Benefit:

Primary producers must operate with, i) reduced costs, ii) higher productivity, and iii) produce higher value outputs. Generating scientific evidence to allow stakeholders in the Irish dairy industry to apply appropriate and effective disease control is essential. The research outputs of this research programme will make an important contribution to the control of non-regulated diseases in Ireland and support AHI prioritised aims.

6. Dissemination:

International conferences

Bloemhoff, Y.Y.G., Forbes, A.B., Good, B., O'Doherty, E., Mulcahy, G., Sayers, R. (2011). The prevalence of *Fasciola hepatica* and IBR in pasture-based dairy herds in Ireland. Proceedings of the World Association for the Advancement of Veterinary Parasitology, Buenos Aires, Argentina.

Bloemhoff, Y., Danaher, M., Forbes, A., Good, B., Morgan, E., Mulcahy, G. Sayers, R., (2010). Dictyocaulus viviparus: a longitudinal study of bulk milk seropositivity in a subset of Irish dairy herds. Association for veterinary parasitology (BAVP), Liverpool, UK.

National Conferences and seminars

Presented at the Agricultural Research Forum and AVTRW (approx. 13 abstracts) throughout the duration of the project and at the National Dairy Conference for four years of the project. Data was also presented at additional national conferences such as the Irish Grassland Conference and AHI conferences.

Open Days

Presented at all Moorepark open days and frequently at open days in Solohead and Ballyhaise.

Industry consultation days, famer discussion groups

Presented and discussed at several industry meeting days and at numerous farmer discussion groups, farm walks and seminars.

Theses

This project will generate 3 PhD theses, two of which have been submitted at the point of writing this report.

Main publications:

Sayers, R.G., Sayers, G.P., Mee, J.F., Good, M., Bermingham, M.L., Grant, J., Dillon, P. (2013). Implementing biosecurity measures on dairy farms in Ireland. The Veterinary Journal 197, 259-267.

R.G. Sayers, M. Good, G.P. Sayers, 2014. A survey of biosecurity-related practices, opinions and communications across dairy farm veterinarians and advisors. The Veterinary Journal 200, 261-269.

O'Doherty, E., Sayers, R., O'Grady, L., (2013). Temporal trends in bulk milk antibodies to Salmonella, Neospora caninum, and Leptospira interrogans serovar hardjo in Irish dairy herds. Preventive Veterinary Medicine. 109, 343-348.

Popular publications:

Bloemhoff, Y., Byrne, N., Good, B., Sayers, R. (2012). Liver fluke in Irish dairy herds. TResearch 7, 32.

Sayers, R. and Mee, J.F. (2009). Is dairy farm biosecurity good enough to deal with herd expansion?. Irish Farmers Monthly July p. 28.

83.   O'Brien, B., Sayers, R. and Jordan, K.N. (2010). Caution required in the use of flukicides. Irish Farmers Journal 9/12/10

Sayers, R. (2009). Can you afford NOT to control BVD. Irish Farmers Journal Sept 12

Sayers, R. (2009). Protecting Irish Herds. Farming Independent June 23

Sayers, R. (2009). Dealing with IBR in Irish Dairy Herds. Farming Independent p.12

Sayers, R. (2009). Stop BVD costing you LDS-how to recognise and control BVD. Todays Farm

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