

## Non-regulatory cattle health issues

<b><i>Animal Health Ireland</i></b> .....	<b>64</b>
<b><i>Biosecure diseases</i></b>	
- Biosecurity .....	<b>66</b>
- Johne's disease .....	<b>67</b>
- Bovine viral diarrhoea (BVD) .....	<b>70</b>
- Infectious bovine rhinotracheitis (IBR) .....	<b>71</b>
- Leptospirosis .....	<b>72</b>
<b><i>Non-biosecure diseases and conditions</i></b>	
- Milk quality .....	<b>74</b>
- Fertility .....	<b>78</b>
- Calf health .....	<b>80</b>

# Animal Health Ireland

## Food chain control - pre-harvest phase

More, S.J.<sup>1, 2</sup>

<sup>1</sup> UCD CVERA, <sup>2</sup> UCD School of Veterinary Medicine

A global approach is needed, from farm to table, to ensure that food for humans is safe to eat. The pre-harvest phase, during primary production, is the first step in the food chain. Controls at this stage of the food chain are critical. In this document, attention will be paid to three broad components of food chain control in the pre-harvest phase: the safety of animal feeds, animal health, and traceability. By necessity, this is a brief overview of a complex subject, and more-detailed reviews are available (including Smulders and Collins 2002).

## Animal Health Ireland: providing national leadership and coordination of non-regulatory animal health issues in Ireland

More, S.J.<sup>1, 2</sup>, Doherty, M.L.<sup>2</sup>, Downey, L.<sup>3</sup>, McKenzie, K.<sup>4</sup>, Devitt, C.<sup>3</sup>, O'Flaherty, J.<sup>5</sup>

<sup>1</sup> UCD CVERA, <sup>2</sup> UCD School of Veterinary Medicine, <sup>3</sup> Private consultant, <sup>4</sup> UCD School of Public Health, Physiotherapy and Population Science,

<sup>5</sup> Animal Health Ireland

**Revue scientifique et technique / Office international des épizooties (OIE Scientific and Technical Review) 30, 715-723 (2011)**

Livestock production plays an important role in the Irish economy. Regulatory animal health issues are the responsibility of government, but until recently there has been no national coordination of non-regulatory animal health issues. This gap has recently been filled with the establishment of Animal Health Ireland (AHI), a not-for-profit, partnership-based organisation providing national leadership and coordination of non-regulatory animal health issues in Ireland. Animal Health Ireland provides benefits to livestock producers and processors by providing the knowledge, education and coordination required to establish effective control strategies, both on-farm and nationally. This paper presents a brief overview of the context for AHI, and of its establishment and initial activities. Non-regulatory animal health issues have been prioritised. A series of work programmes (each focusing on a high-priority issue) have been established. Partnership is critical to success, both for AHI as an organisation and for effective farm-level transfer of knowledge. This model for national leadership and coordination of non-regulatory animal health issues may be of relevance elsewhere.

*Reproduced with permission from the World Organisation for Animal Health (OIE) ([www.oie.int/en/publications-and-documentation/scientific-and-technical-review-free-access/list-of-issues/](http://www.oie.int/en/publications-and-documentation/scientific-and-technical-review-free-access/list-of-issues/)).*

## Setting priorities for non-regulatory animal health in Ireland: results from an expert Policy Delphi study and a farmer priority identification survey

More, S.J.<sup>1,2</sup>, McKenzie, K.<sup>3</sup>, O'Flaherty, J.<sup>4</sup>, Doherty, M.L.<sup>2</sup>, Cromie, A.R.<sup>5</sup>, Magan, M.J.<sup>4</sup>

<sup>1</sup> UCD CVERA, <sup>2</sup> UCD School of Veterinary Medicine, <sup>3</sup> UCD Institute for Food and Health, <sup>4</sup> Animal Health Ireland, <sup>5</sup> Irish Cattle Breeding Federation

### Preventive Veterinary Medicine 95, 198-207 (2010)

Agriculture is a very important contributor to the Irish economy. In Ireland, national animal health services have been a government, rather than an industry, responsibility. In 2009, Animal Health Ireland (AHI) was established to provide a partnership approach to national leadership of non-regulatory animal health issues (those not subject to national and/or EU regulation). The objectives of this study were to elicit opinion from experts and farmers about non-regulatory animal health issues facing Irish livestock industries, including prioritisation of animal health issues and identification of opportunities to maximise the effective use of AHI resources. The study was conducted with experts using Policy Delphi methodology over three rounds, and with farmers using a priority identification survey. Non-regulatory bovine diseases/conditions were prioritised by both experts and farmers based on impact and international competitiveness. For each high-priority disease/condition, experts were asked to provide an assessment based on cost, impact, international perception, impediment to international market access and current resource usage effectiveness. Further information was also sought from experts about resource allocation preferences, methods to improve education and coordination, and innovative measures to improve prevention and management. There was close agreement between responses from experts and dairy farmers: each gave highest priority to 3 diseases with a biosecurity risk (subsequently termed 'biosecure diseases') (bovine viral diarrhoea [BVD], infectious bovine rhinotracheitis [IBR], paratuberculosis) and 4 diseases/conditions generally without a biosecurity risk ('non-biosecure diseases/conditions') (fertility, udder health/milk quality, lameness, calf health). Beef farmers also prioritised parasitic conditions and weanling pneumonia. The adverse impact of biosecure diseases is currently considered relatively minor by experts, but would increase substantially in time. There are already substantial costs to farms and agribusiness from non-biosecure diseases/conditions. Experts preferred an equal allocation of resources between these biosecure and non-biosecure diseases/conditions, with emphasis on adopting/adapting international models, education and awareness-raising. The results from this study provide robust insights about non-regulatory animal health priorities in Ireland, as perceived by experts and farmers, using methodologies that are both transparent and inclusive. They have already been extremely influential in shaping national policy, as a foundation for interdisciplinary (and multi-agency) cooperation, as a contribution to efforts to encourage stakeholder responsibility-taking, and to ongoing development of postgraduate and undergraduate veterinary education in Ireland.

*Reprinted from Preventive Veterinary Medicine, 95, More, S.J., McKenzie, K., O'Flaherty, J., Doherty, M.L., Cromie, A.R., Magan, M.J., Setting priorities for non-regulatory animal health in Ireland: results from an expert Policy Delphi study and a farmer priority identification survey, 198-207, Copyright 2010, with permission from Elsevier.*

## Biosecure diseases

### *Biosecurity*

#### Design of a model for prediction of the probability of introduction of infectious agents into animal populations

Geraghty, T.<sup>1</sup>, O'Grady, L.<sup>1</sup>, Jonsson, N.<sup>2</sup>, More, S.J.<sup>1,3</sup>

<sup>1</sup> UCD School of Veterinary Medicine, <sup>2</sup> School of Veterinary Medicine, University of Glasgow, Glasgow, Scotland, <sup>3</sup> UCD CVERA

The consequences of disease introduction into animal populations are increasingly understood. Quantitative risk assessment models for disease introduction have been described for national import risk analysis but their use at individual farm level is limited. We describe the design of a quantitative deterministic model to estimate the probability of introduction of infectious disease into susceptible individual farm populations. The model needs to take account of three components: (1) exposure of the farm animals to external, potential sources of infection, (2) the presence of infectious agent in the potential infection source, and (3) exposure sufficient to support transmission to a farm animal. The first of these components is influenced by farm-specific variables, the third by agent-specific variables and the second by both. This model offers advantages over existing risk assessment tools. Total probability of disease introduction and probability of introduction from a single farm variable can be calculated and used for benchmarking herds and to identify high risk farm variables respectively.

#### Bioexclusion of diseases from dairy and beef farms: Risks of introducing infectious agents and risk reduction strategies

Mee, J.F.<sup>1</sup>, Geraghty, T.<sup>2</sup>, O'Neill, R.<sup>3</sup>, More, S.J.<sup>2,4</sup>

<sup>1</sup> Teagasc Moorepark, <sup>2</sup> UCD School of Veterinary Medicine, <sup>3</sup> DAFM Veterinary Laboratory Service, <sup>4</sup> UCD CVERA

Infectious diseases represent a major threat to the health and welfare of cattle herds internationally. Introduction of infectious agents into dairy and beef farms may be either through direct (purchased cattle, movement of resident cattle and contact with contiguous cattle) or indirect (visitors, fomites, biological materials and the environment) transmission routes. In this review, the evidence supporting these transmission routes for the introduction of infectious diseases is presented. In the absence of eradication programmes for many endemic infectious diseases, bioexclusion is the key management process to reduce the risks that they present. Various ameliorative bioexclusion strategies have been recommended in the literature and the evidence supporting these protocols is also reviewed here.

## Johne's disease

### Risk factors associated with Johne's disease test status in dairy herds in Ireland

Barrett, D.J.<sup>1</sup>, Mee, J.F.<sup>2</sup>, Mullowney, P.<sup>3</sup>, Good, M.<sup>3</sup>, McGrath, G.<sup>4</sup>, Clegg, T.<sup>4</sup>, More, S.J.<sup>4, 5</sup>

<sup>1</sup> DAFM Veterinary Laboratory Service, <sup>2</sup> Teagasc Moorepark, <sup>3</sup> DAFM, <sup>4</sup> UCD CVERA, <sup>5</sup> UCD School of Veterinary Medicine

**Veterinary Record 168, 410 (2011)**

Johne's disease is a chronic, granulomatous enteritis of ruminants caused by *Mycobacterium avium* subspecies *paratuberculosis* (MAP). Although the recent prevalence and economic impact of clinical and subclinical Johne's disease in Irish dairy herds have been reported, there are no published studies examining the risk factors for detection of MAP by individual faecal culture (IFC) in Irish dairy herds. This short communication describes a case-control study aiming to identify the risk factors associated with detection of MAP by IFC in Irish dairy herds. Case herds ( $n=86$ ) were defined as herds with one or more IFC-MAP-positive results in the DAFM Veterinary Laboratory Service database from samples voluntarily submitted by private veterinary practitioners between 1995 and 2007. Control herds ( $n=125$ ) were defined as herds with no IFC-MAP-positive results in the DAFM Veterinary Laboratory Service database in the same period and with no ELISA-positive animals (over 12 months of age) in whole-herd sampling carried out as part of a national serosurvey in 2005. A questionnaire was designed to collect data on herd and management factors plausibly linked to the detection of MAP in dairy herds. The questions related to practices carried out before and after the year of MAP detection in the case herds and the same year (the reference year) in the control herds. Proportionally, more case herd owners operated a dairy-only enterprise compared with control herd owners. There was no geographical clustering in the distribution of case and control herds. Three significant risk factors (cattle importation, depopulation and herd size) and one protective factor (borrowing colostrum) remained in the final model. With the impending abolition of milk quotas in the European Union in 2015, many dairy herds are likely to be expanded. This study highlights the potential biosecurity risks for Johne's disease associated with herd expansion.

*Adapted from Veterinary Record, Barrett, D.J., Mee, J.F., Mullowney, P., Good, M., McGrath, G., Clegg, T., More, S.J., 168, 410, Copyright 2011, with permission from BMJ Publishing Group Ltd.*

### Genetic associations between Johne's disease and susceptibility to *Mycobacterium bovis* and *Mycobacterium avium* subsp *avium* in Irish Holstein Friesian dairy cows

Bermingham, M.L.<sup>1</sup>, More, S.J.<sup>2, 3</sup>, Good, M.<sup>4</sup>, Cromie, A.R.<sup>5</sup>, Mullowney, P.<sup>4</sup>, Higgins, I.M.<sup>2</sup>, Berry, D.P.<sup>6</sup>

<sup>1</sup> The Roslin Institute, University of Edinburgh, Scotland, <sup>2</sup> UCD CVERA, <sup>3</sup> UCD School of Veterinary Medicine, <sup>4</sup> DAFM,

<sup>5</sup> The Irish Cattle Breeding Federation, <sup>6</sup> Teagasc Moorepark

Johne's disease in cattle is caused by *Mycobacterium avium* subsp *paratuberculosis* (MAP). A recent study demonstrated that significant genetic variation exists for susceptibility to MAP infection in Irish Holstein Friesian dairy cows. Nevertheless, data on Johne's disease occurrence is not collected routinely on Irish dairy farms. The objective of this study was to estimate the genetic associations between resistance to MAP infection and measures of susceptibility to *M. bovis* and *M. avium* subsp *avium* infection. Serological response to MAP was used as a measure of cow susceptibility to Johne's disease. The single intradermal comparative tuberculin test was used as a measure of susceptibility of cows to *M. bovis* and *M. avium* infection. A total of 4,581 cow serological response to MAP records, 19,663 *M. bovis*-PPD responsiveness records and 15,824 *M. avium*-PPD responsiveness records were available for inclusion in the analysis. Genetic and residual (co)variance components between serological response to MAP and susceptibility to *M. bovis*-PPD and *M. avium*-PPD responsiveness were estimated using bivariate linear animal models. Serological response to MAP was strongly positively genetically correlated ( $0.84 \pm 0.20$ ) with susceptibility to *M. avium*-PPD responsiveness.

Susceptibility to *M. avium*-PPD responsiveness was not genetically correlated ( $0.03 \pm 0.32$ ) with serological response to MAP. The results from study suggest that selection for reduced *M. avium*-PPD responsiveness may indirectly increase resistance to MAP infection within the national Holstein Friesian dairy herd.

## Genetic variation in serological response to *Mycobacterium avium* subspecies *paratuberculosis* and its association with performance in Irish Holstein-Friesian dairy cows

Berry, D.P.<sup>1</sup>, Good, M.<sup>2</sup>, Mullowney, P.<sup>2</sup>, Cromie, A.R.<sup>3</sup>, More, S.J.<sup>4,5</sup>

<sup>1</sup> Teagasc Moorepark, <sup>2</sup> DAFM, <sup>3</sup> Irish Cattle Breeding Federation, <sup>4</sup> UCD CVERA, <sup>5</sup> UCD School of Veterinary Medicine

**Livestock Science 131, 102-107 (2010)**

Paratuberculosis, also referred to as Johne's disease, is a contagious and chronic disease in ruminants caused by *Mycobacterium avium* subspecies *paratuberculosis* (MAP). Few estimates of the genetic variation in measures of susceptibility to MAP are available in the literature and even less have attempted to elucidate the genetic associations between measures of susceptibility to MAP and performance in dairy cattle. The objectives of this study were to estimate the genetic variation in serological response to MAP in 4,789 Holstein-Friesian dairy cows from 44 Irish dairy herds, and to quantify its genetic association with performance traits measured in the first three lactations of genetically related animals. Univariate mixed linear and threshold animal models were used to estimate variance components and genetic correlations were estimated using bivariate animal linear mixed models; MAP serological response was treated as a continuous variable and dichotomous variable. The prevalence of MAP in the sample population was 4.4%. This figure cannot be extrapolated to the national dairy herd as the sample population was biased towards herds with increased likelihood of MAP infection. Estimates of heritability for MAP serological response varied from 0.07 to 0.15 depending on the model of analysis and whether serological response was treated as continuous or binary; standard errors varied from 0.024 to 0.062. Genetic correlations between MAP serological response and lactation milk, fat and protein yield were negative or close to zero although not always more than two standard errors from zero; stronger negative genetic correlations were evident in older parity animals. Serological response to MAP was not genetically correlated with milk fat concentration but was positively genetically correlated with milk protein concentration in first lactation and negatively correlated with calving interval. There was little or no genetic association between serological response to MAP and survival. Results from this study corroborate previous international suggestions that selection for reduced serological response to MAP is possible, although this does not necessarily imply a concurrent selection for either reduced prevalence of clinical disease or increased resistance to MAP infection.

*Reprinted from Livestock Science, 131, Berry, D.P., Good, M., Mullowney, P., Cromie, A.R., More, S.J., Genetic variation in serological response to Mycobacterium avium subspecies paratuberculosis and its association with performance in Irish Holstein-Friesian dairy cows, 102-107, Copyright 2010, with permission from Elsevier.*



## Control of Johne's disease: an international review

Geraghty, T.<sup>1</sup>, Graham, D.<sup>2</sup>, Mullowney, P.<sup>3</sup>, More, S.J.<sup>1,4</sup>

<sup>1</sup> UCD School of Veterinary Medicine, <sup>2</sup> Animal Health Ireland, <sup>3</sup> DAFM, <sup>4</sup> UCD CVERA

National bovine Johne's disease (JD) control programmes exist in several countries including Australia, Canada, Denmark, the Netherlands, the United Kingdom and the United States of America. Programme design varies with industry specific variables, the goals of the programme and the nature of the implementing body. Important differences also arise from the necessary subjective interpretation of incomplete scientific literature in areas including test reliability and epidemiology. Organisations developing new JD control programmes can benefit from the combined experiences of existing national control programmes. This article reviews the structure (laboratory and non-laboratory herd screening, herd classification, intervention guidelines, ability to respond to new scientific developments), implementation and limitations of existing JD control programmes to inform the development of a voluntary national programme in Ireland.

## Evaluation of alternative testing strategies for estimating likelihood of infection with Johne's disease in Irish cattle herds

More, S.J.<sup>1,2</sup>, Sergeant, E.S.G.<sup>3</sup>, Strain, S.<sup>4</sup>, Kenny, K.<sup>5</sup>, Cashman, W.<sup>6</sup>, Graham, D.<sup>7</sup>

<sup>1</sup> UCD CVERA, <sup>2</sup> UCD School of Veterinary Medicine, <sup>3</sup> AusVet Animal Health Services, Orange, Australia, <sup>4</sup> Agri-Food and Biosciences Institute, Belfast, Northern Ireland, <sup>5</sup> DAFM Veterinary Laboratory Service, <sup>6</sup> Glanmire, Cork, <sup>7</sup> Animal Health Ireland

Animal Health Ireland (AHI) is facilitating national discussion and action on a range of non-regulatory animal health issues in Ireland, including Johne's disease (JD). A technical working group is currently working to develop the framework for a voluntary national JD control programme, drawing on international and national science and best-practice. The programme will involve herd classification. However, testing requirements for initial herd screening and subsequent testing for JD in suckler and dairy herds in Ireland are currently not known. Some data are available from earlier scientific work (Sergeant *et al.* 2008; Tavoranpanich *et al.* 2008) and country programmes, however, these are not directly applicable to Ireland. The objective of the current project is to develop and test an epidemiological model to evaluate a range of testing strategies in an Irish context, with a focus on detection probability (given a specified design prevalence) and cost effectiveness. A simulation model was developed in the programming language R. Key model inputs included test sensitivity and specificity estimates, the design prevalence, testing options and testing costs. Only three tests are considered in the model (the individual serum ELISA, the individual milk ELISA and the faecal culture), as these are the only tests where sufficiently robust scientific data are available through international peer reviewed publication. Key model outputs include SeH (the probability that infection will be detected, if present at the design prevalence or greater) and ProbF (the probability that infection in the herd is either absent or at very low prevalence (less than the design prevalence)). ProbF, which is influenced by SeH, the prior probability of infection and the probability of introduction, could form the basis for herd classification.



## Bovine viral diarrhoea (BVD)

### Considerations on BVD eradication for the Irish livestock industry

Barrett, D.J.<sup>1</sup>, More, S.J.<sup>2,3</sup>, Graham, D.A.<sup>4</sup>, O'Flaherty, J.<sup>4</sup>, Doherty, M.L.<sup>3</sup>, Gunn, H.M.<sup>1</sup>

<sup>1</sup> DAFM Veterinary Laboratory Service, <sup>2</sup> UCD CVERA, <sup>3</sup> UCD School of Veterinary Medicine, <sup>4</sup> Animal Health Ireland

**Irish Veterinary Journal 64, 12 (2011)**

Animal Health Ireland has produced clear guidelines for the control of Bovine Viral Diarrhoea (BVD) infection in Irish cattle herds. In the course of developing these guidelines it was clear that a framework for regional and/or national BVD control would be required to increase the uptake of BVD control at farm level and reduce the overall prevalence of the disease. This paper assessed the economic impact of BVD, epidemiological aspects of the disease to its control, models of BVD control and international experiences of BVD control programmes. The technical knowledge and test technology exists to eradicate BVD. Indeed, many countries have done so successfully and others are embarking on control of the disease. The identification and prompt elimination of PI cattle will form the basis of any control programme. The trade of such animals must be curtailed. Pregnant and potentially pregnant bovines carrying PI fetuses pose a significant threat. International experience indicates systematic, well coordinated programmes have the most success, while voluntary programmes can make good initial progress but ultimately fail. The farming community must buy into any proposed programme, and without their support, failure is likely. To buy into the programme and create such a demand for BVD control, farmers must first be well informed. It is likely that stemming economic loss and improving productivity will be the primary motivator at individual farm level.

*Copyright 2011 Barrett et al. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/2.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.*

### Aspects of bovine viral diarrhoea virus seroprevalence and vaccination in dairy and beef herds in the Republic of Ireland

Cowley, D.J.B.<sup>1</sup>, Clegg, T.A.<sup>2</sup>, Doherty, M.L.<sup>3</sup>, More, S.J.<sup>2,3</sup>

<sup>1</sup> MSD Animal Health, <sup>2</sup> UCD CVERA, <sup>3</sup> UCD School of Veterinary Medicine

Bovine-viral diarrhoea (BVD) is an infectious disease of cattle with a worldwide distribution. Herd-level prevalence varies among European Union (EU) member states, and prevalence information facilitates decision-making and progress-monitoring with regard to control and eradication programmes. The primary objective of the present study was to describe aspects of herd BVD seroprevalence (based on pooled sera) and control on Irish farms, including vaccine usage. Preliminary validation of an indirect BVD antibody ELISA test (SVANOVA, Biotech AB, Uppsala, Sweden) using pooled sera was conducted as part of the present study. This test was then used in a cross-sectional study of a stratified random sample of 1171 Irish dairy and beef cow herds in 2009, for which vaccination status was determined by telephone survey, and the seroprevalence of BVD in Ireland was estimated in non-vaccinating herds. Comparison of herd-level classification was conducted in a subset of 111 dairy herds using the same ELISA on bulk milk tank (BMT) samples. Associations between possible risk factors (herd size (quartiles)) and herd-level prevalence were determined using chi-squared analysis. The herd-level BVD prevalence in non-vaccinating herds was 98.7% (95% CI - 98.3-99.5%) in the cross-sectional study with no significant difference between dairy and beef herds (98.3% vs 98.8%, respectively,  $p=0.595$ ). 95.4% agreement in herd classification of seroprevalence was found with bulk milk compared to serum pool results in non-vaccinating herds. 19.2 percent of farmers used BVDV vaccine; 81% of vaccinated herds were dairy. The results from this study indicate that the true herd-level seroprevalence to Bovine Virus Diarrhoea (BVD) virus in Ireland

is approaching 100%. The present study will assist Animal Health Ireland (AHI), an industry-government partnership charged with the national leadership and coordination of non-regulatory infectious diseases in Ireland, by providing useful information to guide policy and evaluate progress towards control.

## Cost benefit analysis of Irish BVD eradication programme

Stott, A.W.<sup>1</sup>, Humphry R.W.<sup>1</sup>, Gunn G.J.<sup>1</sup>, Higgins, I.M.<sup>2</sup>, Hennessy, T.<sup>3</sup>, O'Flaherty, J.<sup>4</sup>, Graham, D.A.<sup>4</sup>

<sup>1</sup> Scottish Agricultural College, Edinburgh, Scotland, <sup>2</sup> UCD CVERA, <sup>3</sup> Teagasc, <sup>4</sup> Animal Health Ireland

Bovine viral diarrhoea virus (BVDV) causes an economically important endemic disease (BVD) of cattle in Ireland and worldwide. Systematic eradication by detection and removal of infectious (BVDV carrier) cattle has been successful in several regions. We therefore assessed the benefits (disease losses avoided) and costs (testing and culling regime) of a possible future eradication programme in Ireland. Published bio-economic models of BVDV spread in beef suckler herds and dairy herds were adapted to estimate the benefits of eradication in Ireland. A simple model of BVDV spread in beef finisher herds was devised to estimate the benefits of eradication in this sector. A six year eradication programme consisting of 5 inter-related virological and serological testing programmes is outlined and costed. We found that the annualised benefits of BVDV eradication in Ireland exceeded the costs by a factor of 5 in the beef suckler sector and a factor of 14 in the dairy sector. Corresponding payback periods were 1.2 and 0.5 years respectively. These results highlight the significant economic impact of BVD virus on the Irish cattle industry and suggest a clear economic benefit to eradication using the proposed approach. This type of cost-benefit analysis is considered an essential prerequisite prior to undertaking an eradication campaign of this magnitude.

## *Infectious bovine rhinotracheitis (IBR)*

### Aspects of bovine herpesvirus-1 infection in dairy and beef herds in the Republic of Ireland

Cowley, D.J.B.<sup>1</sup>, Clegg, T.A.<sup>2</sup>, Doherty, M.L.<sup>3</sup>, More, S.J.<sup>2,3</sup>

<sup>1</sup> MSD Animal Health, <sup>2</sup> UCD CVERA, <sup>3</sup> UCD School of Veterinary Medicine

**Acta Veterinaria Scandinavica 53, 40 (2011)**

Infection with bovine herpesvirus-1 (BHV-1) causes a wide range of disease manifestations, including respiratory disease and abortion, with world-wide distribution. The primary objective of the present study was to describe aspects of BHV-1 infection and control on Irish farms, including herd-level seroprevalence (based on pooled sera) and vaccine usage. The characteristics of a diagnostic indirect BHV-1 antibody ELISA test when used on serum pools were evaluated using laboratory replicates for use in the seroprevalence study. The output from this indirect ELISA was expressed as a percentage positivity (PP) value. A proposed cut off (PCO) PP was applied in a cross-sectional study of a stratified random sample of 1,175 Irish dairy and beef cattle herds in 2009, using serum pools, to estimate herd seroprevalence. The study was observational, based primarily on the analysis of existing samples, and only aggregated results were reported. For these reasons, ethical approval was not required. Bulk milk samples from a subset of 111 dairy herds were analysed using the same ELISA. Information regarding vaccine usage was determined in a telephone survey. A PCO PP of 7.88% was determined to give 97.1% sensitivity and 100% specificity relative to the use of the ELISA on individual sera giving maximization of the prevalence independent Youden's index, on receiver operating characteristics analysis of replicate results. The herd-level BHV-1 seroprevalence was 74.9% (95% CI - 69.9%-79.8%), with no significant difference between dairy and beef herds. 95.5% agreement in herd classification was found between bulk milk and serum pools. Only 1.8 percent

of farmers used BHV-1 marker vaccine, 80% of which was live while 75% of vaccinated herds were dairy. A significant association was found between herd size (quartiles) and seroprevalence (quartiles). The results from this study indicate BHV-1 infection is endemic, although BHV-1 vaccines are rarely used, in the cattle population in Ireland.

*Copyright 2011 Cowley et al. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/2.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.*

## Dynamics of individual animal Bovine Herpes Virus-1 antibody status on 9 commercial dairy herds

Geraghty, T.<sup>1</sup>, O'Neill, R.<sup>2</sup>, More, S.J.<sup>1,3</sup>, O'Grady, L.<sup>1</sup>

<sup>1</sup> UCD School of Veterinary Medicine, <sup>2</sup> DAFM Veterinary Laboratory Service, <sup>3</sup> UCD CVERA

### Research in Veterinary Science (in press)

Bovine Herpes Virus 1 (BoHV-1) is an important viral disease of cattle worldwide. In endemically infected herds, there is an incomplete understanding of the epidemiology of BoHV-1 infection. We describe the dynamics of animal-level BoHV-1 antibody status on 9 endemically infected commercial dairy herds, based on the results of serial milk antibody testing. Results were used to identify primary exposure, secondary exposure (from re-activation or re-exposure) and development of test-negative latent carrier (TNLC) status. 4,153 test results from 828 cow-lactations were analysed. Primary exposure occurred on two herds, secondary exposure occurred on all herds and development of TNLC status occurred in eight herds. Incidence of secondary exposure reduced over time and may have been related to increasing time since parturition. Regular secondary exposure is required to maintain measurable antibody status.

*Reprinted from Research in Veterinary Science, Geraghty, T., O'Neill, R., More, S.J., O'Grady, L., Dynamics of individual animal Bovine Herpes Virus-1 antibody status on 9 commercial dairy herds, in press, Copyright 2012, with permission from Elsevier.*

## Leptospirosis

### Seroprevalence of *Leptospira* Hardjo in the Irish suckler cattle population

Ryan, E.G.<sup>1</sup>, Leonard, N.<sup>1</sup>, O'Grady, L.<sup>1</sup>, More, S.J.<sup>1,2</sup>, Doherty, M.L.<sup>1</sup>

<sup>1</sup> UCD School of Veterinary Medicine, <sup>2</sup> UCD CVERA

Prior to the present study, the seroprevalence of leptospirosis in Irish suckler herds was unknown. In this study, we describe the herd and animal-level prevalence of *Leptospira* Hardjo infection in the Irish suckler cattle population. For the purposes of the study, the 26 counties of the Republic of Ireland were divided into 6 regions from which a representative number of herds were selected. A herd was considered eligible for sampling if it was not vaccinating against leptospirosis and if it contained  $\geq 9$  breeding animals of beef breed  $\geq 12$  months of age. In total, 288 randomly selected herds were eligible for inclusion in the seroprevalence dataset analysis. Serological testing was carried out using a commercially available monoclonal antibody-capture ELISA, (sensitivity 100%; specificity 86.67%). Herds were categorised as either "free from infection" or "infected" using the epidemiological software tool, FreeCalc 2.0. Using this classification, 237 herds were "infected" (82.29%). The South West and South East regions had the highest herd prevalence. The regional effect on herd prevalence was largely mirrored by breeding herd size. A true animal-level prevalence of 41.75% was calculated using the epidemiological software tool, TruePrev. There was a statistically significant regional



trend, with true prevalence being highest in the South East ( $P<0.05$ ). The median Breeding Herd Size (BHS), when categorised into quartiles, had a statistically significant influence on individual animal true seroprevalence ( $P<0.001$ ); true seroprevalence increased with increasing BHS. Leptospirosis is a widespread endemic disease in the Republic of Ireland. It is possible that economic losses due to leptospirosis in unvaccinated Irish suckler herds may be underestimated.

## Herd-level risk factors associated with *Leptospira* Hardjo seroprevalence in the Republic of Ireland

Ryan, E.G.<sup>1</sup>, Leonard, N.<sup>1</sup>, O'Grady, L.<sup>1</sup>, Doherty, M.L.<sup>1</sup>, More, S.J.<sup>1, 2</sup>

<sup>1</sup> UCD School of Veterinary Medicine, <sup>2</sup> UCD CVERA

The aim of the present study was to investigate risk factors for herd seropositivity to *Leptospira* Hardjo in Irish suckler herds. Herds were considered eligible for the study if they were unvaccinated and contained  $\geq 9$  breeding animals of beef breed which were  $\geq 12$  months of age. The country was divided into six regions using county boundaries. Herd and individual animal prevalence data were available from the results of a concurrent seroprevalence study. Herds were classified as “free from Infection” or “infected” at a minimum expected 40% within-herd prevalence. Questionnaires were posted to 320 herds chosen randomly from 25 counties in the Republic of Ireland. The questionnaire was designed to obtain information about vaccination; reproductive disease; breeding herd details; the presence of recognised risk factors from previous studies; and husbandry on each farm. Data collected from 128 eligible herds ( $n=128$ ) were subjected to statistical analysis. Following the use of Pearson's Chi-Square Test, those variables associated with a herd being “infected” with a significance level of  $P<0.2$  were considered as candidates for multivariable logistic regression modelling. Breeding herd size was found to be a statistically significant risk factor after multivariable logistic regression. The odds of a herd being positive for leptospiral infection were 5.47 times higher ( $P=0.032$ ) in herds with 14 to 23 breeding animals compared with herds with  $\leq 13$  breeding animals, adjusting for region, and 7.08 times higher ( $P=0.033$ ) in herds with 32.6 to 142 breeding animals. Breeding herd size was identified as a significant risk factor for leptospiral infection in Irish suckler herds, which was similar to findings of previous studies of leptospirosis in dairy herds.

## Non-biosecure diseases and conditions

### Milk quality

#### A HACCP-based approach to mastitis control in dairy herds. Part 1: Development

Beekhuis-Gibbon, L.<sup>1</sup>, Whyte, P.<sup>1</sup>, O'Grady, L.<sup>1</sup>, More, S.J.<sup>1,2</sup>, Doherty, M.L.<sup>1</sup>

<sup>1</sup> UCD School of Veterinary Medicine, <sup>2</sup> UCD CVERA

**Irish Veterinary Journal 64, 2 (2011)**

Hazard Analysis and Critical Control Points (HACCP) systems are a risk based preventive approach developed to increase levels of food safety assurance. This is part 1 of a pilot study on the development, implementation and evaluation of a HACCP-based approach for the control of good udder health in dairy cows. The paper describes the use of a novel approach based on a deconstruction of the infectious process in mastitis to identify Critical Control Points (CCPs) and develop a HACCP-based system to prevent and control mastitis in dairy herds. The approach involved the creation of an Infectious Process Flow Diagram, which was then cross-referenced to two production process flow diagrams of the milking process and cow management cycle. The HACCP plan developed, may be suitable for customisation and implementation on dairy farms. This is a logical, systematic approach to the development of a mastitis control programme that could be used as a template for the development of control programmes for other infectious diseases in the dairy herd.

*Copyright 2011 Beekhuis-Gibbon et al. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/2.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.*



## A HACCP-based approach to mastitis control in dairy herds. Part 2: Implementation and evaluation

Beekhuis-Gibbon, L.<sup>1</sup>, Devitt, C.<sup>2</sup>, Whyte, P.<sup>1</sup>, O'Grady, L.<sup>1</sup>, More, S.J.<sup>1,3</sup>, Redmond, B.<sup>2</sup>, Quin, S.<sup>2</sup>, Doherty, M.L.<sup>1</sup>

<sup>1</sup> UCD School of Veterinary Medicine, <sup>2</sup> UCD School of Applied Social Science, <sup>3</sup> UCD CVERA

**Irish Veterinary Journal 64, 7 (2011)**

Part 1 of the study described the development of a Hazard Analysis and Critical Control Point (HACCP) based programme and accompanying handbook for the control of mastitis. This paper describes the implementation and evaluation of customised HACCP-based programmes, which were developed from the handbook and assessed on six Irish dairy farms. Both quantitative and qualitative (action research) research methodologies were used to measure the success of implementation and efficacy of control of sub-clinical mastitis as measured by Somatic Cell Counts (SCC) and the degree of compliance by farmers in adopting and maintaining recommendations throughout the course of the study period. No overall differences in SCC before and during the implementation of the study were found when all six farms were considered together. Three of the six study farms experienced a significant decrease in herd milk recorded SCC during the implementation of the control programme. An essential part of the study was achieving initial agreement on recommendations as well as ongoing monitoring of compliance during the study. This pilot study shows that HACCP can be implemented on farms as a means of working towards the control of mastitis and that farmer attitude, and understanding of mastitis are crucial in terms of motivation irrespective of practical approaches used to manage mastitis.

*Copyright 2011 Beekhuis-Gibbon et al. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/2.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.*

## An estimation of the effect of dilution due to milk yield on milk somatic cell count across cow parities in a grass-based system

Boland, F.<sup>1</sup>, Kelly, P.T.<sup>2</sup>, O'Sullivan, K.<sup>3</sup>, Berry, D.P.<sup>4</sup>, O'Brien, B.<sup>4</sup>, More, S.J.<sup>5,6</sup>

<sup>1</sup> UCD School of Mathematical Sciences, <sup>2</sup> Munster AI, <sup>3</sup> University College Cork, <sup>4</sup> Teagasc Moorepark, <sup>5</sup> UCD CVERA, <sup>6</sup> UCD School of Veterinary Medicine

This study investigates the influence of parity on the association between SCC and milk yield. It is well recognised, based on published international work, that high SCCs are associated with a drop in milk yield. As yet, however, there is limited understanding of the relative importance of this effect across different parities. The results are important, both from the perspective of improved scientific knowledge, and also to provide key parameters for the Teagasc Moorepark economic modeling of mastitis impact.

## The relationship between herd size in Ireland and milk somatic cell counts: A retrospective cohort study

Canty, M.J.<sup>1</sup>, Higgins, I.<sup>1</sup>, McGrath, G.<sup>1</sup>, More, S.J.<sup>1,2</sup>

<sup>1</sup> UCD CVERA, <sup>2</sup> UCD School of Veterinary Medicine

Studies examining the relationship between herd size and elevated SCC have conflicting reports of the association between the two. The main objective of this study was to determine the relationship between herd size in Ireland and elevated individual cow geometric mean 24 h milk SCC above 200,000 cells/ml [MSCC200] and above 400,000 cells/



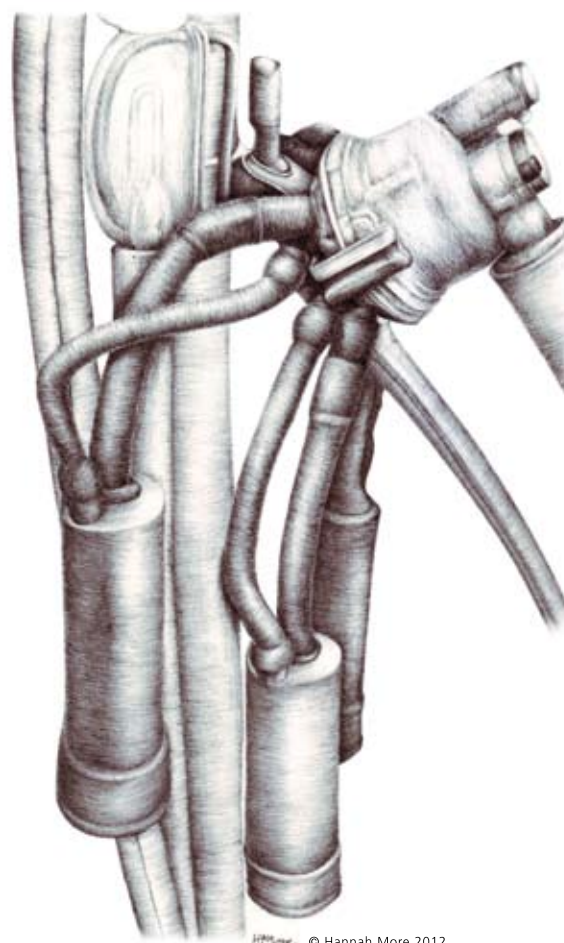
ml [MSCC400] in an entire lactation, and to determine the influence of herd expansion on these parameters. Individual cow monthly composite milk recordings from all Irish cows enrolled with ICBF were obtained for 2009. Multivariable random effect logistic regression models were fitted. The effect of herd expansion was examined by fitting an interaction term between herd size and herd expansion. Results show that 26.25% and 10.68% of cows had MSCC200 and MSCC400, respectively. The majority of these cows (62.59%) were from herds that had not expanded (33.45%) or had undergone  $\leq 15\%$  expansion (29.14%) in the past four years. Herd size was associated with MSCC200 and MSCC400 after adjusting for a number of variables, with the odds of MSCC200 and MSCC400 higher in larger herds. There was no interaction between herd size and herd expansion in the models fitted. In Ireland, larger milk recording herds may need to pay particular attention to their SCC status. Caution, however, should be taken when interpreting the results of the effect of herd size from this and other studies on SCC due to difference in determination and categorisation of herd size. Results also reveal that there was little herd expansion in these milk recording herds over the four years examined. However, this may change significantly in the near future given the growing global demand for dairy products.

## Drivers and constraints to improving milk quality in Ireland

Devitt, C.<sup>1</sup>, McKenzie, K.<sup>2</sup>, Heanue, K.<sup>3</sup>, More, S.J.<sup>4,5</sup>, McCoy, F.<sup>6</sup>

<sup>1</sup> Private consultant, <sup>2</sup> Motiveworks, <sup>3</sup> Teagasc, <sup>4</sup> UCD CVERA, <sup>5</sup> UCD School of Veterinary Medicine, <sup>6</sup> Animal Health Ireland

Approximately 85% of annual production from Ireland's dairy industry is exported, highlighting the need for ongoing improvement in quality in a competitive international trading environment. However, several recent studies have highlighted concerns with udder health/mastitis and associated intramammary antibiotic usage on Irish dairy farms. *CellCheck*, a national mastitis control programme, was launched by Animal Health Ireland (AHI) in late 2010. A process called 'terrain-mapping' was conducted to understand industry challenges and drivers to milk quality improvement. In-depth qualitative interviews were completed with  $n = 12$  representatives from different sectors of the Irish dairy industry. Disagreement exists in acknowledging individual stakeholder responsibility in contributing to milk quality improvement, and in agreeing on the best way forward. This is despite consensus on the need to redefine quality milk above current regulatory standards, and of the common recognition of opportunities. Disagreements translate into concerns about lack of commitment and active response to what should be an integrated industry-led response. Opportunities for incremental change in the Irish dairy sector are undermined by an emphasis on maintaining the private good over contributing to the public good. Animal Health Ireland provides an opportunity to build stakeholder agreement.



© Hannah More 2012

## Current practices to manage milk quality on Irish dairy farms

McCoy, F.<sup>1</sup>, Devitt, C.<sup>2</sup>, McKenzie, K.<sup>3</sup>, More, S.J.<sup>4,5</sup>, Heanue, K.<sup>6</sup>

<sup>1</sup> Animal Health Ireland, <sup>2</sup> Private consultant, <sup>3</sup> Motiveworks, <sup>4</sup> UCD CVERA, <sup>5</sup> UCD School of Veterinary Medicine, <sup>6</sup> Teagasc

A pilot programme of farmer workshops was recently conducted as part of the national *CellCheck* milk quality programme. The objective of this workshop was to deliver best science & practice information around mastitis control to farmers, and to encourage the uptake of key best practices in everyday milking routines. An opportunity arose, as part of this pilot, to report current practices to manage milk quality on Irish dairy farms. This project reports these findings, with early results highlighting differences between the reported frequency of key behaviours, and the quality of these behaviours, including liner change and teat disinfection.

## Mapping milk production in Ireland

McGrath, G.<sup>1</sup>, Clegg, T.<sup>1</sup>

<sup>1</sup> UCD CVERA

This project seeks to present a national map of milk production based on data supplied by the Irish Cattle Breeding Federation for milk recording herds. A Geographical Information System will be employed to generate a triangular irregular network to create a surface that will be representative of the entire country based on a sample of approximately 6,000 herds.

## Insights into udder health and intramammary antibiotic usage on Irish dairy farms during 2003-2010

More, S.J.<sup>1,2</sup>, Clegg, T.A.<sup>1</sup>, O'Grady, L.<sup>2</sup>

<sup>1</sup> UCD CVERA, <sup>2</sup> UCD School of Veterinary Medicine

This paper presents insights into udder health and intramammary antibiotic usage on Irish dairy farms during 2003-2010, based on data from several sources. Three data sources were used, including data on milk recording data, intramammary antibiotic sales and animal health assessment. The milk recording data included a single unadjusted herd-level somatic cell count (SCC) value for each herd at each milk recording, being the arithmetic mean of cow-level SCC of each cow at that recording, weighted by cow-level yield. These data were used to calculate the percentage of herds each month where the unadjusted herd SCC exceeded 200,000 and 400,000 cells/mL. Two logistic generalised estimating- equations (GEE) models were developed, the outcome variable being either the probability that the monthly SCC of a herd was greater than 400,000 cells/mL or less than or equal to 200,000 cells/mL. Spring herds had a lower probability of a high SCC (>400,000 cells/mL) during February to October compared to non-Spring herds but a higher probability between November to January. The odds of a high SCC were greater in 2005, 2006, 2009 and 2010 but less in 2007 and 2008 compared to 2004. Smaller herds had higher odds of having a high SCC compared to larger herds. We present the number of intramammary tubes and the quantity of active substance (kg) sold annually in Ireland during 2003-2010. We infer an incidence of clinical mastitis of 54.7 cases per 100 cow-years at risk, assuming 4 tubes per treatment regime, one affected quarter per cow, tubes restricted to clinical cases only and 100% of treated cases considered new cases, based on data collected on sales of in-lactation intra-mammary antibiotics. With differing assumptions, this estimate varied between 26.1 and 77.9 cases per 100 cow-years at risk. Using data on sales of dry cow therapy intra-mammary antibiotics, we also infer that most Irish dairy farmers use blanket dry cow therapy. Udder health is a concern on a number of Irish dairy farms. High SCC results were present throughout the year, but more marked towards the start and end of each milking season. Animal Health Ireland recently commenced a major national programme, *CellCheck*, in collaboration with a broad range of stakeholders, to support national SCC improvement.

## The effect of data adjustment for somatic cell counts, as outlined in EU legislation, on herd eligibility to supply raw milk for human consumption

More, S.J.<sup>1, 2</sup>, Clegg, T.A.<sup>1</sup>, O'Grady, L.<sup>2</sup>

<sup>1</sup> UCD CVERA, <sup>2</sup> UCD School of Veterinary Medicine

Regulatory SCC limits have been established in many dairy producing countries, to improve milk quality and herd productivity. Within the European Union, raw milk must comply with microbiological criteria and standards for plate count and somatic cell count, as required under EU Regulation 853/2004. In the current study, we examine the effect of data adjustment for somatic cell counts, as outlined in current EU legislation, on herd eligibility to supply raw milk for human consumption, using Irish data for illustration.

### Fertility

#### Breeding soundness evaluation of 36 bulls with reduced reproductive performance: a retrospective study

Beltman, M.E.<sup>1</sup>, Canty, M.J.<sup>2</sup>

<sup>1</sup> UCD School of Veterinary Medicine, <sup>2</sup> UCD CVERA

The objective of this study was to determine the fertility status of 36 bulls presented with a history of reduced reproductive performance to University Veterinary Hospital, University College Dublin between 27/11/2006 and 14/03/2011. A full breeding soundness evaluation (BSE) was performed on all bulls by the same clinician at submission. Components of the BSE included a full general clinical exam, assessment of the locomotion system and assessment of the reproductive tract. Reproductive tract evaluation comprised measurement of the scrotal circumference (cm), assessment of testicles for shape, symmetry and consistency. The penis and prepuce were assessed by inspection and palpation and the accessory glands were assessed via rectal palpation. Subsequently a semen sample was obtained by electro-ejaculation. Following semen collection the parameters assessed were; volume of the ejaculate (ml), colour of the ejaculate (1=almost clear, 2=skim milk, 3=milk), sperm concentration ( $\times 10^6$ ), sperm motility (1 to 5), percentage live sperm (%) and percentage normal sperm (%). These results were used to classify animals as fertile, sub-fertile or infertile on the day of examination. A chi-square test was used to assess the unadjusted relationship between fertility classification and colour, and fertility classification and motility. Age at examination, scrotal circumference, semen volume, concentration, percentage live sperm and percentage normal sperm, all continuous variables were divided into categorical variables based on quartiles. The average age of bulls at examination was  $2.7 \pm 0.21$  years (range 1.2 – 5.8). None of the 36 bulls presented with physical abnormalities. After the BSE and semen evaluation, 15 were classified as fertile, 8 as sub-fertile and 13 as infertile. Colour ( $P < 0.001$ ) and motility ( $P = 0.05$ ) were significantly associated with fertility classification. After converting from continuous to categorical variables, concentration ( $P < 0.001$ ) and percentage live sperm ( $P = 0.002$ ) were also associated with fertility classification. Of those bulls classified as infertile, motile sperm were found in only 3 samples examined. In conclusion, BSE was performed on 36 bulls with questionable fertility. Of these 36 bulls, none were physically abnormal and 15/36 (42%) had normal semen. Of the parameters measured colour of the ejaculate, sperm motility as well as concentration and percentage live sperm were directly related to overall fertility outcome.



## Effect of body condition score at key reproductive stages and vaginal mucus score on production and reproduction parameters in dairy cows

Beltman, M.E.<sup>1</sup>, Duane, M.<sup>1</sup>, Canty, M.J.<sup>2</sup>, Mulligan, F.J.<sup>1</sup>

<sup>1</sup> UCD School of Veterinary Medicine, <sup>2</sup> UCD CVERA

The objectives were two-fold: i) to investigate the effect of Body Condition Score (BCS) at calving and at 1st service on the following production and reproduction parameters: vaginal mucus score at 3-4 weeks post partum, calving-1st service, calving-conception, number of serves, peak daily milk yield, milk fat and protein at 1st milk recording, average milk yield during duration of the study, conception rates to 1st and 2nd service and overall pregnancy rate, and ii) to investigate the effect of vaginal mucus score at 3-4 weeks post partum on the same parameters, as well as total yield fat and protein. Ninety spring calving Friesian/Holstein cows on a commercial dairy farm were used. BCS was recorded on a scale from 1-5 at calving and at 1st service and vaginal mucus score was recorded between 3 and 4 weeks post partum on a scale from 0-3. All other production and reproduction parameters were collected at the end of the breeding season and all data were analysed using Chi square analysis. Cows with a BCS lower than 2.5 at calving tended to have a longer calving-1st service interval ( $p=0.068$ ). The group of cows that had a BCS of 2.5 had a significantly lower ( $p=0.04$ ) overall pregnancy rate and received more services than all other BCS groups. Cows with a BCS of 2.25 at 1st service had a lower pregnancy rate than the cows in all the other groups, but these cows also tended to have received less services per conception. Cows with a high vaginal mucus score at calving had a significant lower ( $p<0.05$ ) average daily milk yield in the experimental period and a significant lower total yield protein. In conclusion, low BCS had a negative effect on some of the reproductive parameters measured and uterine infection as measured by vaginal mucus score had a negative effect on some of the production parameters.

## Key factors affecting dairy cow fertility in Ireland - pilot study

Lane, E.A.<sup>1</sup>, Beltman, M.<sup>2</sup>, More, S.J.<sup>1, 2</sup>

<sup>1</sup> UCD CVERA, <sup>2</sup> UCD School of Veterinary Medicine

The analysis of herd management records allows for accurate assessment of the current status of the herd, a crucial decision making tool to implement effective change. The aim of this study is to evaluate the relative importance of some cow and management factors on reproductive indices in moderate yielding seasonal dairy herds. Breeding records of all cows were collected on 10 seasonal calving herds, during herd health visits, between 2007 and 2009. Individual cow identities ( $n = 1,174$ ), calving date, all service dates, lactation number, and pregnancy diagnosis outcomes were recorded for all milking cows. Logistic regression modelling will be used to determine the effect of cow factors including parity, timing of calving relative to start of breeding season and number of days post partum at first service, on reproductive indices. Herd factors including average heat detection efficiency and herd size will be investigated.

## Key factors affecting dairy cow fertility in Ireland - larger study

Lane, E.A.<sup>1</sup>, More, S.J.<sup>1, 2</sup>

<sup>1</sup> UCD CVERA, <sup>2</sup> UCD School of Veterinary Medicine

The analysis of herd management records allows for accurate assessment of the current status of the herd, a crucial decision making tool to implement effective change. Monitoring of such changes to ensure their effectiveness is essential to the success of any programme, while, participation in discussion groups, allows for peer comparisons, a key factor in motivating herd management change. The aim of this paper is to calculate the fertility indices of herds recorded on

the Irish Cattle Breeding Federation (ICBF)'s database to enable effective evaluation of the fertility performance of the Irish dairy herd and to determine the key drivers of infertility in the Irish dairy herd. Breeding record data of the 2009 breeding season from all spring calving Irish dairy herds registered for ICBF's Herd Plus service, that had a minimum of six recordings during 2009, were collected from database. Individual cow identities (jumbo tag and national identifiers), date of birth, lactation number, Estimated Breeding Index (EBI; milk and fertility) 2009 calving date, all service dates, sire and inseminator for each service, pregnancy diagnosis outcomes, subsequent calving date, recorded milk yields, fat and protein concentrations at each recording period were gathered for all milking cows within each herd. Logistic regression modelling using the statistical package STATA will be utilized to analyse the dataset. Analyses will be conducted at animal level taking clustering within herd into account.

## Calf health

### Calf health from birth to weaning.

#### I. General aspects of disease prevention

Lorenz, I.<sup>1</sup>, Mee, J.F.<sup>2</sup>, Earley, B.<sup>3</sup>, More, S.J.<sup>1,4</sup>

<sup>1</sup> UCD School of Veterinary Medicine, <sup>2</sup> Teagasc Moorepark, <sup>3</sup> Teagasc Grange, <sup>4</sup> UCD CVERA

**Irish Veterinary Journal 64, 10 (2011)**

Calfhood diseases have a major impact on the economic viability of cattle operations. This is the first in a three part review series on calf health from birth to weaning, focusing on preventive measures. The review considers both pre- and periparturient management factors influencing calf health, colostrum management in beef and dairy calves and further nutrition and weaning in dairy calves.

*Copyright 2011 Lorenz et al. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/2.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.*

### Calf health from birth to weaning.

#### II. Management of diarrhoea in pre-weaned calves

Lorenz, I.<sup>1</sup>, Fagan, J.<sup>2</sup>, More, S.J.<sup>1,3</sup>

<sup>1</sup> UCD School of Veterinary Medicine, <sup>2</sup> DAFM Veterinary Laboratory Service, <sup>3</sup> UCD CVERA

**Irish Veterinary Journal 64, 9 (2011)**

Calfhood diseases have a major impact on the economic viability of cattle operations. The second of this three part review series considers the management of diarrhoeic diseases in pre-weaned calves. In neonatal calf diarrhoea, oral rehydration therapy is the single most important therapeutic measure to be carried out by the farmer and is usually successful if instigated immediately after diarrhoea has developed. Continued feeding of milk or milk replacer to diarrhoeic calves is important, to prevent malnourishment and weight loss in affected calves. Indiscriminate antibiotic treatment of uncomplicated diarrhoea is discouraged, whereas systemically ill calves can benefit from systemic antibiotic treatment for the prevention of septicaemia or concurrent diseases. Ancillary treatments and specific preventive measures are discussed. Eimeriosis has a high economic impact on the farming industries due to direct cost of treatment and calf losses, but especially due to decreased performance of clinically as well as sub-clinically

affected animals. Emphasis lies on prophylactic or metaphylactic treatment, since the degree of damage to the intestinal mucosa once diarrhoea has developed, makes therapeutic intervention unrewarding.

*Copyright 2011 Lorenz et al. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/2.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.*

## Calf health from birth to weaning.

### III. Housing and management of calf pneumonia

Lorenz, I.<sup>1</sup>, Earley, B.<sup>2</sup>, Gilmore, J.<sup>3</sup>, Hogan, I.<sup>4</sup>, Kennedy, E.<sup>5</sup>, More, S.J.<sup>1,6</sup>

<sup>1</sup> UCD School of Veterinary Medicine, <sup>2</sup> Teagasc Grange, <sup>3</sup> Emlagh Lodge Veterinary Centre, <sup>4</sup> DAFM Veterinary Laboratory Service,

<sup>5</sup> Teagasc Moorepark, <sup>6</sup> UCD CVERA

**Irish Veterinary Journal 64, 12 (2011)**

Calfhood diseases have a major impact on the economic viability of cattle operations. A three part review series has been developed focusing on calf health from birth to weaning. In this paper, the last of the three part series, we review disease prevention and management with particular reference to pneumonia, focusing primarily on the pre-weaned calf. Pneumonia in recently weaned suckler calves is also considered, where the key risk factors are related to the time of weaning. Weaning of the suckler calf is often combined with additional stressors including a change in nutrition, environmental change, transport and painful husbandry procedures (castration, dehorning). The reduction of the cumulative effects of these multiple stressors around the time of weaning together with vaccination programmes (preconditioning) can reduce subsequent morbidity and mortality in the feedlot. In most studies, calves housed individually and calves housed outdoors with shelter, are associated with decreased risk of disease. Even though it poses greater management challenges, successful group housing of calves is possible. Special emphasis should be given to equal age groups and to keeping groups stable once they are formed. The management of pneumonia in calves is reliant on a sound understanding of aetiology, relevant risk factors and of effective approaches to diagnosis and treatment. Early signs of pneumonia include increased respiratory rate and fever, followed by depression. The single most important factor determining the success of therapy in calves with pneumonia is early onset of treatment, and subsequent adequate duration of treatment. The efficacy and economical viability of vaccination against respiratory disease in calves remains unclear.

*Copyright 2011 Lorenz et al. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/2.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.*

## Calf mortality in Ireland

Lorenz, I.<sup>1</sup>, Higgins, I.M.<sup>2</sup>, Canty, M.J.<sup>2</sup>

<sup>1</sup> UCD School of Veterinary Medicine, <sup>2</sup> UCD CVERA

The objective of this study is to determine the mortality rate of all calves in Ireland born between 1st July 2009 and 31st June 2010, and to identify risk factors associated with calf mortality.