THE CURRENT CAUSES OF BOVINE PERINATAL MORTALITY - A NEW DIAGNOSTIC PERSPECTIVE

John F Mee
Animal and Bioscience Research Department, Teagasc, Moorepark Research Centre, Fermoy, Ireland

Introduction: Perinatal mortality is a problem in all eutherian species but particularly so in Holstein-Friesian-dominated dairy industries internationally (Mee et al. 2008). Perinatal mortality may be defined as perinatal death prior to, during or within 48 hours of calving, following a gestation of at least 260 days (Mee 2009). Despite these losses, recent questionnaire surveys of both veterinary practitioners and research workers in bovine perinatology worldwide revealed that necropsy examinations were not commonly carried out following fetal death (‘Do farmers in your country commonly have stillborn calves necropsied?’: 97% of veterinary practitioners and 86% of research workers responded ‘No’) (Mee 2008). This indicates reluctance among producers and veterinarians to systematically investigate affected herds. Where loss rates appear higher than norm-reference values ad hoc investigation may be initiated often involving gross necropsy examination of a single carcass or infection screening alone; diagnostic rates in such cases are low (~20%) (Murray 2008). In this communication a model is presented whereby investigation involves four elements; anamnesis, records, necropsy and laboratory assay.

Materials and methods: When incidence rates exceed norm-reference values for national benchmark metrics (e.g. >5%) detailed investigation is warranted. Data for primiparae and pluriparae should be examined separately as loss rates are normally higher in the former (Mee 2008). Clinical anamnesis Given that calf losses will generally only be investigated where they exceed a herd-level incidence threshold, information on risk factors at both the herd- and the animal-level are required. Herd-level details pertinent to perinatal calf mortality can best be collected using a questionnaire pro forma. Key information includes calving pattern (seasonal, all-year-round), herd genotype (selection indices for calving ease/calf survival and breeds of sires used on heifers and on cows, heifer and cow breeds and crossbreeds), nutritional management (dry period diet, micronutrient supplementation, hypocalcaemia management, pre-calving body condition score (BCS)), breeding management [early (< 42 day) pregnancy detection by amniotic vesicle palpation], infectious disease management (test results, vaccinations, placental disposal, farm dogs) and calving management (maternity movement, maternity unit type, unit:cow ratio, supervision rota, staff calving competencies, staff:cow ratio, intervention policy, calving aids, calf resuscitation practices). Details surrounding the death of a calf at birth can also best be collected using a pro forma. Key signalment information includes dam details (number, parity, BCS, breed, last service date), calf details (number, single/twin, sire, breed, sex, time-of-death, clinical signs) and calving details (date, day and time, duration, assistance score, calving problems, e.g. malpresentation, premature placental expulsion, poor udder development, dam illness). Critical to subsequent investigation is the recording of this information at every calving (active surveillance), not just when a problem emerges (passive surveillance), as subsequent outbreaks of mortality cannot be predicted and much of this information cannot then be retrieved. This level of recording is not likely to be implemented on small family-run farms but should be routine best-practice on large manager-operated units (Boersema et al. 2010). This information is often the most important of the four elements of perinatal calf loss investigation, particularly where no assignable cause is evident upon necropsy. Records analysis Key outputs from records analyses should include the perinatal mortality rate (number of calves born, live and dead) in the period under investigation and categorisation by risk factors (gender ratio, parity, age-at-calving for primiparae, breed, sire, calving assistance score, single/multiple, month, day, time). Additionally, free text comments may yield useful information lacking in pre-coded fields, e.g. slow calvings, induced calvings, placenta passing with the calf, milk fever cases, age-at-death. Necropsy examination A systematic macroscopic external and internal examination should ensure detection of evidence of dystocic trauma, prolonged calving, anoxia, lethal and non-lethal congenital defects, possible micronutrient imbalances, infections, anaemia, haemorrhage, intrauterine growth retardation, estimated gestation length, time-of-death and other aetiological findings. Key to necropsy examination is following the same routine in every carcass irrespective of the calving history or the apparent obvious cause of death, recognising normality and differentiating autolysis from pathological change. Laboratory assay Unlike in cases of abortion where infectious agents are more likely to be detected, laboratory analyses are of relatively lesser importance in cases of perinatal mortality. However, sampling tissues and fluids (including placenta and maternal blood where submitted) for evidence of infections (abomasal contents, kidney, lung, liver, brain, myocardium, blood) and micronutrient imbalances (thyroid, kidney, liver) is recommended.

Results: In support of this conceptual investigative model, the following examples are illustrative. In some cases the anamnesis provided the diagnostic information which was not necessarily detectable by other techniques. For example, in cases of anamnesis-diagnosed premature placental separation (n = 24), the majority of affected calves did not have classical lesions of anoxia at necropsy (meconium-stained hair 27%, hemorrhages on the pleura 11%, thymus 8%, trachea 29%, endocardium 33% and meningeal congestion 42%). In contrast for other cases the necropsy yielded diagnostic information unavailable from other sources. For example, in cases of necropsy-diagnosed haemoperitoneum (n = 13), the majority of affected calves did not suffer dystocia (69%) and blood was only observed in the bedding in a minority of cases (8%). Similarly in only 25% of cases of necropsy-diagnosed intestinal atresia (n = 32) did the producer make a correct presumptive diagnosis from the anamnesis. In the case of infectious agents the likelihood of sources other than laboratory analyses yielding useful diagnostic information is dependent upon the infection involved. For example, in only 9% of Salmonella Dublin culture-positive cases (n = 91) was an additional probable cause of death diagnosed. Records analysis can also reveal whether the producer has been actively investigating losses or has ‘normalised’ them. For example, a farmer who lost 49 calves over three years (7%/yr.) but records showed he only submitted four cases for necropsy.

Discussion: These examples highlight the value of combining clinical anamnesis, records analysis, necropsy examination and laboratory assay when investigating perinatal mortality. Unlike in other forms of mortality, in perinatal loss gross lesions are not always visible and causal infectious agents are not routinely detected, hence, anamnestic information and record analysis are essential to complete the diagnostic picture. The veterinary practitioner is central to this investigative approach having unique access to both client and laboratory records and herd- and case-specific first-hand clinical information and the knowledge to correct
management deficiencies (Mee 2008c). It is hoped that presenting this model will promote formulation of best-practice consensus on investigation of bovine perinatal mortality internationally.

**Key words:** perinatal mortality, investigation, necropsy, veterinary practitioner.

**References:**


