Development of a welfare assessment protocol for dairy calves from birth through to weaning

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Abstract

The aim of this study was to develop a welfare assessment protocol using different indicators, for pre-weaned dairy calves, that is feasible and time efficient. To this end, the protocol had to combine animal-based indicators (measurements on physiology, general appearance and behaviour) providing the basis for welfare assessment, with resource-based indicators (measurements on management and the environment) providing the basis for identifying risk factors. Indicators, both animal- and resource-based, were selected by a review of existing literature and a process of expert consultation. Following the formulation phase, the protocol was then applied on five Irish dairy farms to develop further for completeness and on-farm feasibility. After each on-farm application, the protocol was critically evaluated, and modifications were made accordingly. Upon completion of the on-farm application phase, a feasible, reliable and time-efficient protocol was produced.

Keywords: animal welfare, behaviour, dairy calves, health, housing, management

Introduction

Animal production systems are continually evolving in an effort to improve production efficiency and meet increasing demand for animal-derived protein (Thornton 2010; Boland et al 2013). Evolution of animal production, however, has not always been in sync with animal welfare. In the dairy industry, for example, intense selection for milk production resulted in declining fertility, and increasing rates of lameness and metabolic disorders (Webster 2005; Rauw 2009; Oltenacu & Broom 2010). Welfare assessments are required to identify potential risk factors of diminished animal welfare (Lundborg et al 2005; Brscic et al 2012; Leruste et al 2014) in evolving production systems. These can be carried out on-farm, through human application and technological applications using sensor data or vision technology. Potential technological applications include using 3D imagery to detect lameness, or thermal imagery to detect mastitis (Hovinen et al 2008; Song et al 2008; Rushen et al 2012; Viazzi et al 2014). Evaluation of routinely collected herd data, such as mortality, productivity, and fertility parameters, can also be used to assess welfare. Mortality rates provide a good starting point for identification of physiological health issues as these rates can be reflective of basic herd-level health and functioning (Ortiz-Pelaez et al 2008; De Vries et al 2011), however mortality has limited meaning with respect to animal welfare (Ortiz-Pelaez et al 2008). In North America and some European countries, calf mortality rates of ≥ 10% have been identified (Compton et al 2017). Differences have also been identified in mortality rates based on gender, with rates of mortality approximately 40% higher among male calves compared to females in commercial Irish dairy herds (Department of Agriculture, Food and the Marine [DAFM] 2013, 2014, 2015).

Although using routinely collected data to estimate welfare has some merit (Sandgren et al 2009; De Vries et al 2014; Parker Gaddis et al 2016), on-farm assessments remain necessary for confirmatory purposes, for conducting other welfare measurements that would not be routinely collected (eg behavioural observations), but also due to discrepancies in data recording. Such discrepancies could exist as a result of unintentional errors in the recorded data, or manipulation of data, in an attempt to conceal welfare issues, enhance breeding values, or to avoid inspections, or potential financial penalties to subsidies received. Such penalties may arise from having elevated values for parameters, such as calving difficulty or mortality rates. Routinely collected data often focus on performance traits, such as herd fertility or herd productivity, and as welfare is determined by factors beyond that of physical performance, this limits the capabilities of routine herd data to provide an indication of welfare. Traditionally, on-farm welfare assessments for dairy cattle, such as the ‘Animal Needs Index’, have used mainly resource-based (management and environment) indicators to assess welfare (Bartussek et al 2000). These assessments...