Animal health and welfare state and technical efficiency of dairy farms: possible synergies

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Abstract

This study sought to investigate whether animal health and welfare state and changes were associated with technical efficiency in a sample of 34 Austrian dairy farms. Health and welfare were assessed twice using the Welfare Quality® (WQ) assessment protocol for dairy cattle. Following a baseline welfare assessment, farm-specific health and welfare planning was conducted on the farms. This included the identification, selection and implementation of measures in housing and management that aimed at improving health and welfare states. One year after implementation, farms were reassessed to evaluate changes in health and welfare states and consequences for farms’ technical efficiency were analysed using the Malmquist index. Our results indicated that farms with a higher health state (WQ principle score ‘Good health’) achieved higher technical efficiencies. However, we could not show that changes in the welfare state within a one-year period affected technical efficiency: across all farms, technical efficiency remained stable and Malmquist indices (indicating efficiency and technological change) could not be explained by the different welfare scores. Nevertheless, our study showed data envelopment analysis to be a valuable method for analysing the relationship between animal welfare and farm success and our results indicate substantial potential synergies between these two aspects.

Keywords: animal welfare, dairy cows, data envelopment analysis, Malmquist index, on-farm assessment, Welfare Quality®

Introduction

Animal health and welfare plays an important role in successful dairy cattle husbandry. However, the prevalences found in on-farm surveys of, for example, health-related welfare impairments often exceed the levels beyond which experts consider improvement necessary (Whay et al 2003; Green et al 2007; Leach et al 2010; Tremetsberger & Winckler 2015). The extent to which health and welfare may be improved has been investigated, for example, in the case of mastitis (eg Green et al 2007; Ivemeyer et al 2008; Tremetsberger et al 2015) and lameness (eg Main et al 2012). These studies report primarily on the effect of intervention measures addressing management and provision of resources at the farm level on animal health (ie udder and leg health, respectively) and welfare of dairy cows. However, animal welfare is not only shaped by animal health. A comprehensive view on animal welfare also includes the animals’ feelings (affective state) and their ability to express natural behaviour (natural living) (Fraser et al 1997).

In the past decade, attempts have been made to assess, scientifically, animal welfare at the farm level and comprehensive protocols, such as the Welfare Quality® (WQ) assessment protocol for cattle, have been developed (Welfare Quality® 2009). Recent studies on dairy cow and beef cattle welfare have been based on this protocol (Ivemeyer et al 2012; Andreasen et al 2013; De Vries et al 2013; Kirchner et al 2014; Tremetsberger et al 2015). The assessment allows welfare problems to be identified, thereby seeking to facilitate introduction of appropriate interventions on the farms, eg in terms of changes in management routines and housing systems.

Compromised health and welfare states may also have economic implications (eg Kossaibati & Esslemont 1997; Huijps et al 2008). For instance, Hansson et al (2011) identified preventive measures against mastitis, such as revision of hygiene routines, as beneficial for the whole-farm economic outcome. Farms’ economic performance can also be expressed in terms of technical efficiency, basically benchmarking input-to-output relations of single farms (Coelli et al 2005). Technical efficiency has been used in several studies to assess the economic performance of dairy farms in different production systems (Barnes et al 2011; Hansson et al 2011; Kelly et al 2012a; Steeneveld et al 2012; Heinrichs et al 2013). With regard to animal welfare,