

Editorial: Pigs crying, silent fish and other stories about animal welfare assessment

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The study of animal welfare is now recognised as a scientific subject on its own, emerging from the combination of various disciplines and aiming to address the growing societal and political concern for the protection of animals (Veissier and Miele, 2014). To advance our knowledge of animal welfare and to operationalise it in every day practice it is essential that we know how to assess it in a consistent, feasible and valid way. This special topic of the journal *Animal* presents recent advances in the assessment of animal welfare and the benefits for animals and stakeholders. The manuscripts come from a selection of presentations at the WAFL (Welfare Assessment at Farm and Group Level) Conference held in September 2014 (Clermont-Ferrand, France).

The welfare of animals is a multidimensional concept that embraces – among other things – their health, emotions, and behavioural and physiological needs. Currently, many protocols for the assessment of all dimensions of animal welfare require a full day visit on a farm (e.g. Welfare Quality[®], 2009a, 2009b and 2009c), which for commercial purposes is too much. This puts constraints on the practical application of indicators, as they need to be cheap and easy to measure (e.g. not requiring animal handling), and at the same time relevant, sensible and reliable. Innovative approaches are presented in this special section. First, Telkänranta *et al.* propose a novel approach looking at tears in pigs, and more specifically tear staining (Telkänranta *et al.*, 2016). Interestingly enough, their findings suggest that pigs 'cry' more when they are injured (bitten tails or ears) and when they are reared in a poor environment. Second, Brenninkmeyer *et al.* observe that integument alterations on a cow's body are related to each other: a cow injured on a specific body segment has more chance to be injured on another specific segment due to the segments being in contact with cubicle partitions during movements of the cows (Brenninkmeyer *et al.*, 2016). This observation allows the authors to propose clusters of body segments that are prone to the same type of injuries, even when these segments are not necessarily close

to each other. Grouping injuries into clusters may also reduce the time needed to assess injuries and allow for a more accurate diagnosis of the causes of integument alterations. Third, Heath *et al.* propose an elegant way to reduce the number of observations on animals by adjusting the sample size (of animal observed) according to the prevalence of a disorder (Heath *et al.*, 2016). Thanks to sequential sampling, the prevalence is estimated on the basis of the first observations in a series, and the sampling can be stopped early depending on how many observations are necessary to correctly detect the prevalence. This approach was successfully applied to estimate the proportion of lame cows in a herd. These three options offer possibilities to facilitate the practical assessment of animal welfare.

Before slaughter, animals may be subjected to various stressors such as long distance transport, mixing with other animals, poor handling, long periods of fasting, etc. Gallo and Huertas describe the present situation in South America based on their assessment of welfare and call for better training of handlers in order to reduce injuries and improve the welfare of animals to be slaughtered (Gallo and Huertas, 2016). Welfare assessment techniques are also relevant at the abattoir. Pre-slaughter stunning is compulsory in many countries and aims at making the animal unconscious before it is bled. However, stunning is not always carried out effectively, and therefore it is essential to check that an animal is properly stunned before bleeding it. Parotat *et al.* propose to spray hot water on the nose of a stunned pig and to score its movements to rapidly check that the animal is unconscious (Parotat *et al.*, 2016). However, it is also relevant to note that immobilisation does not equal unconsciousness. Indeed, Gräns *et al.* found that CO₂-stunned fish are hyperactive until they fall unconscious, whereas electrically stunned fishes immediately immobilise (Gräns *et al.*, 2016). However, the blood cortisol levels of the latter are much higher, suggesting a higher level of stress. Here again, it is necessary to design methods to stun animals effectively and to check the response of the animals using indicators designed to assess the welfare state of the animal.

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Health plans to eradicate or diminish the occurrence of diseases that affect farm animal productivity are increasingly used. However, the impact of such plans on animal welfare is rarely questioned. Muri *et al.* report the experience gained from a Norwegian plan to eradicate *arthritis encephalitis, caseous lymphadenitis* and *paratuberculosis* in goats. Not only did these diseases regress, but implementing the plan also improved the overall welfare of animals, as shown by animals being less fearful of humans (Muri *et al.*, 2016). This suggests that win–win solutions can be found to improve the various dimensions of welfare, herd health and the human–animal relationship.

Two papers are focussed on the fact that scientific knowledge is not sufficient to put in place appropriate welfare plans. Butterworth *et al.* take the example of the European Union (EU) Broiler Directive (2007/43/EC) that introduced animal-based indicators of welfare, such indicators having been scientifically validated (Butterworth *et al.*, 2016). They show that EU member states may use different methods to record these indicators. More importantly, exchanges of technical information between member states may improve the implementation of the Directive. Nevertheless, although welfare problems are often easily recognised, it is not always easy to find remedial solutions accepted by stakeholders. As Weary *et al.* discuss in their conference contribution, this calls for bridging animal and social sciences to adequately address welfare problems in practice (Weary *et al.*, 2016).

The WAFL conferences offer such opportunities of cross-fertilisation between disciplines. The next WAFL will be held in The Netherlands in 2017.

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