



Quantifying the impact of lameness on welfare and profitability of finisher pigs using expert opinions

T.B. Jensen*, H.H. Kristensen, N. Toft

Department of Large Animal Sciences, Faculty of Life Sciences, University of Copenhagen, Grønnegårdsvej 2, DK-1870 Frederiksberg C, Denmark

ARTICLE INFO

Article history:

Received 2 January 2012

Received in revised form

9 July 2012

Accepted 16 July 2012

Keywords:

Animal welfare

Expert opinion

Lameness

Pig

Profitability

ABSTRACT

Lameness in finisher pigs affects both animal welfare and farmers' profitability. However, information about the severity of pain and profit losses associated with individual causes of lameness is lacking. This study quantified and compared the pain and economic impact of nine different causes of lameness (e.g., infectious arthritis, claw lesions and osteochondrosis) using expert opinion. Six researchers working on animal behaviour and welfare and eight Danish pig veterinarians answered questionnaires regarding animal welfare and production, respectively. The probability of euthanasia, treatment with antibiotics and analgesics, and the changes in daily weight gain and feed conversion ratio were used to calculate the resulting profit loss for a pig suffering from each of the nine causes. To accommodate the uncertainty associated with the expert assessments, simulations were performed using probability distributions based on the minimum, median and maximum values. According to the experts, bone fractures caused the highest severity of pain and the largest reduction in profitability. Lesions to the claw wall and lesions to the volar area of the foot caused the lowest severity of pain. Arthritis due to *Mycoplasma hyosynoviae* and lesions to the volar area of the feet caused the smallest reduction in profitability. Considering the consequences of animal welfare and profitability concomitantly provides a transparent evaluation of the overall impact of lameness in finisher pigs.

© 2012 Elsevier B.V. All rights reserved.

1. Introduction

The increased focus on animal welfare in society today emphasises the need to obtain quantitative information in order to investigate the economic consequences of improving or not improving animal welfare. Though several studies have focused on quantifying the effects of endemic and epidemic animal diseases (e.g., Bennett, 2003; Boklund et al., 2009) only limited efforts have been made to determine the effects of animal welfare in an economic context.

A common disease complex affecting the welfare of finisher pigs are leg disorders causing clinical signs of lameness (Busch et al., 2003). Clinical signs of lameness are most often caused by infectious arthritis, physical injuries or osteochondrosis (Jensen and Toft, 2009). Lameness is a sign that movement may be associated with pain (Busch et al., 2003). Besides affecting animal welfare negatively, clinical signs of lameness also have a negative impact on productivity and hence, economy (Jensen et al., 2007). Lameness in growing-finisher pigs has been found to be the third most common reason for antibiotic treatment in finisher herds (Christensen et al., 1994). Moreover, pigs with clinical signs of lameness have an increased risk of being euthanized (Engblom et al., 2008).

As lameness in finishers affects both the animals and the farmers, there is a need to measure and compare the

* Corresponding author at: Present address: Danish Veterinary and Food Administration, Stationsparken 31-33, DK-2600 Glostrup, Denmark.

E-mail address: tibj@FVST.dk (T.B. Jensen).

consequences of lameness on both animal welfare and profitability. Assessing the consequences of different causes of lameness may be a demanding task, partly due to the limited information of effects of lameness on production in individual pigs, and partly due to the multi-dimensional nature of animal welfare. This challenges the assessment of the impact of lameness on the welfare of individual pigs. However, expert opinion has previously been found to be valuable in order to obtain inaccessible information in regard to both leg disorders (Jensen et al., 2009) and animal welfare (Rodenburg et al., 2008). Animal welfare is a multidimensional concept that can be based on the five freedoms (FAWC, 1992): (1) freedom from thirst and hunger, (2) freedom from discomfort, (3) freedom from pain, injury and disease, (4) freedom to express normal behaviour and (5) freedom from fear and distress. Pain may have a large effect on the welfare and behaviour of individual animals (Phillips, 2007). Hence, the pain involved in lameness may influence all five freedoms (Anil et al., 2009). In this study, we therefore used the level of pain as a proxy for the overall welfare of individual animals.

The overall objective of this study was, through the use of expert information, to quantify the impact of different causes of lameness on pain and productivity in order to investigate the relationship between animal welfare and profitability in individual finisher pigs. This will be the first step in aggregating the consequences of lameness to the herd level.

2. Materials and methods

This study deals with nine specific causes of leg disorders in finisher pigs (90–100 kg) that may cause clinical signs of lameness. The nine causes were selected as they are the commonest causes of lameness in finisher pigs (Jensen and Toft, 2009). The specific causes are infectious arthritis caused by (1) *Mycoplasma hyosynoviae* (*M. hyosynoviae*) (Nielsen et al., 2001), (2) *Erysipelothrix rhusiopathiae* (*E. rhusiopathiae*) (Buttenschøn et al., 1995), (3) *Haemophilus parasuis* (*H. parasuis*) (Nedbalcova et al., 2006) and (4) *Streptococcus suis* (*S. suis*) (Clifton-Hadley et al., 1986), physical injuries such as (5) bone fractures of the leg(s), (6) lesions to the claw wall (which includes white line lesions and wall lesions) (Penny et al., 1963) and (7) lesions to the volar area of the feet (which includes sole, toe and heel erosions) (Penny et al., 1963). Additionally, two different manifestations of osteochondrosis are considered: (8) osteochondrosis manifesta (OCM), where a thickened and uneven cartilage is observed and (9) osteochondrosis dissecans (OCD), where lesions of fissured articular cartilage are observed (Ytrehus, 2004).

2.1. Expert questionnaires

Two questionnaires were conducted in May 2010 focusing on the consequences of the nine causes of lameness on animal welfare and production. The questionnaire focusing on animal welfare was sent by e-mail to eight scientists from four different countries (Finland,

Sweden, UK and Denmark) with expertise in animal behaviour and welfare. The welfare experts were selected on the basis of their previous work on lameness, pain and welfare as well as their likely knowledge of the nine diagnoses of leg disorders. Likewise, the questionnaire dealing with production consequences was sent by e-mail to 10 Danish veterinarians with several years of experience in pig health and production. The production experts were selected based on their specialisation and working experience as pig veterinarians as well as interest in pig leg health. The welfare and production experts were selected from different criteria, and only three experts participated in both welfare and production questionnaires.

The severity of pain was used as a proxy for the level of animal welfare for each cause of lameness. Hence, for each cause of lameness, the welfare experts were asked to evaluate on an arbitrary scale from 0 to 100, the severity of pain that a lame pig would experience (pain index scale). On the pain index scale 100 was equivalent to insufferable pain, 75 was severe pain, 50 was equal to moderate pain, 25 equalled mild pain and 0 equalled no pain (modified from Morton and Griffiths, (1985)).

For each of the different lameness causes, the 10 production experts were asked about the probability of a pig being euthanized (0–100%), and the probability of a pig being treated with antibiotics and analgesics (0–100%). Moreover, the experts evaluated the likely change in the average daily weight gain (ADG) from –100 g/day to +100 g/day, and feed conversion ratio (FCR) from +0.3 feed units per kilogram weight gain (FU/kg) to –0.3 FU/kg for a pig suffering from each of the nine specific causes of lameness.

2.2. Simulation of the loss in profitability

The expert information regarding the consequences of each of the nine causes was used to form probability distributions, using the BetaPert distribution (Stärk et al., 2000; Vose, 2008), which expresses the uncertainty about a parameter using the minimum, maximum and most likely value. This distribution is commonly used to represent expert opinion in a wide range of fields. For this study, we used the median response from the experts as the most likely value, and the maximum and minimum individual response as minimum and maximum values to the BetaPert distribution. Prices in the study reflected the price level in 2010.

As presented in Eq. 1, the profit margin of a pig is the difference between the total revenue and the variable costs.

$$\text{Profit margin} = V_s - C_F - C_M - C_{\text{PIGLET}} \quad (1)$$

where, V_s is the slaughter value of a pig, C_F is the feed cost of a pig during the entire finishing period, C_M is the cost of medicine (antibiotics and analgesics) and C_{PIGLET} corresponds to the cost of a piglet at 30 kg (assumed to be 325 DKK in this study).

The formula for the slaughter value (V_s) is given in Eq. 2.

$$V_s = W_i + (ADG + \Delta ADG) * D * \text{Ratio} * Pr_s * (1 - P_{eu}) \quad (2)$$

Download English Version:

<https://daneshyari.com/en/article/2447417>

Download Persian Version:

<https://daneshyari.com/article/2447417>

[Daneshyari.com](https://daneshyari.com)