The associations between animal-based welfare measures and the presence of indicators of food safety in finishing pigs

I Alpigiani*, C Bacci†, LJ Keeling‡, MD Salman§, F Brindani†, S Pongolini#, PL Hitchens‡ and S Bonardı†

Introduction

Animal production systems and practices differ worldwide and it is already established that some risk factors, mainly related to the provision of resource and management procedures, influence the prevalence of pathogens in food animals (Bahnson et al 2006; Garcia-Feliz et al 2009). Risk factors related to the animals’ behaviour are rarely investigated under routine commercial settings. However, even within the same system there can be variation between individuals in how they are affected by the resources available on the farm and by the management routines. Thus, it is becoming increasingly common in animal welfare assessment to make observations of animals and well-developed pig assessment protocols are now in place (eg Welfare Quality® 2009) using mainly animal-based measures. Animal-based welfare indicators are favoured for providing the most reliable insight into how well the animal is coping with the environment, irrespective of the animal production system (Whay et al 2003; EFSA 2012). It is thought that good welfare, as demonstrated by animal-based measurements, may reduce the risk of food-borne pathogens in farms, but this has not been explored in actual observational studies. Establishing associations between animal-based welfare outcome measures and the presence of specific infection could further motivate farmers to avoid practices associated with these poor welfare outcomes.

The mechanism by which stress can alter the outcome to infections in animals is well-known by scientists. Stress affects both pathogens and hosts and it is generally agreed that there is a dual mechanism linking reduced animal welfare (eg high levels of stress) and increased risk of infection. Firstly, stressed animals are more susceptible to new infections and may carry more pathogens in the intestine and lymphatic tissue (Rostagno 2009). This is because bacteria in the gastrointestinal tract respond to the presence of stress-induced catecholamines with increased microbial growth and pathogenic processes (Rostagno 2009; Verbrugghe et al 2011). In the host, catecholamines enhance gastric pH, thereby increasing gastrointestinal permeability to food-borne pathogens, allowing eventual pathogens to pass the gastric barrier and thus facilitating microbial invasion. Secondly, increased intestinal motility in subclinical carriers

Keywords: animal-based measures, animal welfare, finishing pigs, food safety, Salmonella enterica, Yersinia enterocolitica