Effects of environment and breed on growth performance and meat quality of fattening pigs

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Abstract

Meat quality is not only influenced by breed but also rearing environment. The aim of this study was to evaluate the influence of different housing environments on growth performance, carcase traits, meat quality, physiological response pre-slaughter and fatty acid composition in two pig breeds. A total of 120 growing pigs at 60–70 days of age were arranged in a 2 × 2 factorial design with the breeds (Duroc × Landrace × Large White [D × L × LW] and Duroc × Landrace × Min pig [D × L × M]) and environmental enrichment (barren concrete floor or enriched with straw bedding) as factors. Each treatment was performed in triplicate with ten pigs per replicate. The pigs housed in the enriched environment exhibited a higher average daily gain, average daily feed intake, saturated fatty acid percentage and backfat depth than the pigs reared in the barren environment. Plasma cortisol levels were lower and growth hormone higher in enriched compared to barren pens. The D × L × M pigs showed lower cooking loss compared with the D × L × LW pigs. Moreover, the D × L × M pigs exhibited poor growth performance but had a better water-holding capacity. Only carcase traits and meat quality interaction effects were observed. We concluded that an enriched environment can reduce pre-slaughter stress and improve the growth performance of pigs and modulate the fatty acid composition of pork products.

Keywords: animal welfare, environment, growth performance, meat quality, pig breed, pigs

Introduction

Livestock housing systems can affect many aspects of pork production, such as eating quality of pork products, environmental impact of pig farming, animal welfare and production costs. It has been demonstrated that the different housing systems and pigs’ breed may influence meat quality in the fattening pig (Bonneau & Lebret 2010). However, many studies investigating the effect of housing system on both growth performance and meat quality have yielded mixed results (van de Weerd et al 2005; Lebret et al 2006; Teixeira et al 2012; Loponte et al 2018). While some studies reported that growth performance and carcase quality differ between barren housing and enriched environment (Beattie et al 2000; Lebret et al 2006; Loponte et al 2018), others found no differences (Klont et al 2001; van de Weerd et al 2005; Teixeira et al 2012). Furthermore, we currently lack knowledge regarding the adaptability of pig breeds to enriched rearing and the choice of breed may also have an impact on meat quality (Terlouw et al 2009; Lebret et al 2011).

This paper focused on the effects of the housing system (straw bedding vs the conventional barren concrete floor) and breed on various parameters of pork production. The two breeds investigated were D × L × LW (Duroc × Landrace × Large White) and D × L × M (Duroc × Landrace × Min pig) pigs. The Min pig is a local breed in North-eastern China and a source of good meat; it also shows high tolerance towards poor feed quality and cold climate (Wang et al 2002; Liu et al 2017). D × L × M is a tertiary offspring produced by the binary offspring sows and Duroc boars, with the Min pigs as the female parent and Landrace as the male. Local pork production chains often claim this breed to be of typical or high eating quality; hence, there was a need to study differences in product properties between the local and the conventional breed (D × L × LW) when analysing the effect of rearing systems. Here, we reported the influence of different housing environments on growth performance, carcase traits, meat quality, physiological response to stress, and fatty acid composition in the two different breeds, in order to provide a valuable assessment of the meat quality of the local breed for future swine production.