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The behaviour of male fattening pigs following either surgical castration or vaccination with a GnRF vaccine

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ABSTRACT

Vaccination of male fattening pigs with a gonadotropin releasing factor (GnRF) vaccine is regarded as a possible solution to solve the welfare problem associated with surgical castration, which causes pain and stress even when performed under local or general anaesthesia. The objective of the present study was to compare the behaviour of male fattening pigs either surgically castrated without anaesthesia (T1) or vaccinated twice with a GnRF vaccine (T2). Data collection took place in a commercial German fattening unit. Each treatment comprised 8 groups of 12 pigs, housed in fattening pens with partially slatted floor and liquid feed provided three times a day. Data on postures were scored from 24-h videos recorded in every week of the fattening period (16 weeks) using scan sampling with 5 min intervals. Social behaviour was analysed in weeks 2, 4, 6, 8, 10, 12, 14, 15 and 16 by continuous behaviour recording of focus animals in four blocks of 2 h phased evenly during the day. Overall, during the whole fattening period, vaccinates (T2) were more active than surgical castrates (T1), indicated by a higher proportion of pigs standing (T1: 9.3%; T2: 10.74%; $P < 0.023$). T2 animals showed a significant decrease in standing and an increase of sitting and lying after the second vaccination of Improvac. No significant effects of treatment on the total number of agonistic interactions ($P = 0.064$) and on biting and fighting ($P = 0.151$) were found. In T2 the prevalence of aggressive behaviours decreased after the second vaccination ($P < 0.001$), which was not found in T1 during the same period. T2 animals showed a higher level of mounting behaviour compared with T1 animals, but on a very low level. Treatment had no effect on the prevalence of play behaviour and manipulating of pen mates. It is concluded that housing of male pigs vaccinated against GnRF in single sex groups of 12 individuals does not increase behavioural problems in the fattening period compared with surgically castrated males.

1. Introduction

Castration of male fattening pigs is a common procedure to prevent boar taint in pork. In most EU countries, pigs are castrated surgically within the first week of life without anaesthesia and post-operative analgesia. Although this procedure is legally allowed in the EU (EC, 2001) there is growing scientific and public concern from a welfare point of view. A number of studies have shown that surgical castration causes stress, acute and chronic pain, wound infections and a depression in weight gain (Prunier et al., 2006).

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In order to relieve pain, surgical castration may be performed under local or general anaesthesia. These methods have been investigated in several studies (EFSA, 2004; PIGCAS, 2009; von Borell et al., 2009). Alternatively to surgical castration, testicular function can be inhibited by down-regulation of the hypothalamic–pituitary–gonadal axis. Active immunisation of male pigs against GnRF reduces plasma gonadotropin and androgen levels and either inhibits the development or causes the regression of testicular parenchyma and the secondary male sex organs. Several studies have shown that vaccination against GnRF (also known as immunocastration) is effective in the prevention of boar taint in male fattening pigs (Dunshea et al., 2001; Jaros et al., 2005). The animals have to be vaccinated twice. The second dose, which is expected to elicit an immunological reaction with high antibody titre response against GnRF should be given no later than 4 weeks prior to slaughter, to allow any boar taint substances already present to be metabolised and eliminated. A commercial GnRF vaccine (Improvac^{TM}, Pfizer Animal Health) is registered for use in pig industries in the EU, Switzerland, Russia and in countries outside Europe such as Australia, Mexico and Brazil.

Much is known about the impact of GnRF vaccination on feed efficiency, growth rate, boar taint and pork quality (EFSA, 2004; PIGCAS, 2009; Mackinnon and Pearce, 2007). However, welfare aspects of immunisation of young male pigs against GnRF have been poorly investigated (Prunier et al., 2006). Only a few studies have focused on the behavioural consequences. It has been found that up to the second administration the GnRF vaccinated pigs behaved like entire males. Vaccinates were more active and social behaviour, including aggression and mounting, were more frequent compared to pigs castrated surgically (Cronin et al., 2003). Rydhmer et al. (2006) concluded that the rearing of entire male pigs may cause welfare problems (lameness or injured legs or feet), given their higher levels of aggression and sexual behaviour. The behaviour of effectively immunised male pigs (after the second vaccination) was similar to that of surgically castrated ones. Immunocastrates showed less social, manipulating and aggressive behaviour than entire male pigs (Cronin et al., 2003; Velarde et al., 2008) and remained sexually inactive in the mating test (Zamaratskaia et al., 2007).

Due to the lack of sufficient scientific evidence, the final report of PIGCAS (2009) recommended further research on management of vaccinated pigs and its consequences. The objective of our study was to analyse the behaviour of Improvac vaccinated and surgically castrated male pigs from the beginning to the end of the fattening period under commercial German production conditions. We hypothesised that vaccinates are more active than surgically castrated pigs both in general and in social behaviour prior to the second administration of Improvac (i.e., before effective immunocastration). However, there should be no difference after the second administration.

2. Materials and methods

2.1. Animals and housing

A total of 230 crossbred male piglets (EUROC Hybrid × Pietrain) from 55 litters (one to seven male piglets per litter) were initially enrolled in the study. As assessed by a veterinarian, all piglets were in good general health. Piglets were randomly selected within litters to avoid litter effects and assigned to two treatment groups ($n = 115$ in each group) at the age of 5.07 ± 0.80 days (range 3–7 days; group T1) and 5.07 ± 0.87 days (range 2–6 days; group T2). The same day, piglets were ear-tagged with three different tags for unambiguous identification: one tag with the number coding for the farm, and two red (T1) or green (T2) tags, one on each ear, for identifying group and animal ID. Lactating sows were housed in farrowing crates with partially slatted floors and red-light heat lamps in the piglet area. Piglets had ad libitum access to water, and between day 7 and weaning, were fed a commercially available starter feed with 15.5 MJ metabolic energy (ME) per kg dry matter (DM) and 1.25% lysine per kg DM (Denkapig Mini Start; Denkavit Futtermittel GmbH, Warendorf, Germany). A total of six piglets died during lactation (two in T1 and four in T2), and 113 and 111 piglets in T1 and T2, respectively, were weaned and moved to the nursery at the age of 27.1 ± 0.80 days.

In the nursery, all pigs were housed in six pens in one room. Subgroups of each treatment (i.e., 52, 31, and 30; and 50, 31, and 30 pigs per pen for T1 and T2, respectively) were randomly assigned to the nursery pens. Pens had fully slatted floors and multi-space feeders for dry feed. On the day of relocation to the nursery, pigs were continued on piglet starter feed and then switched to a phase 1 nursery diet containing 14.6 MJ ME and 1.45% lysine per kg DM (Optistart; Denkavit Futtermittel GmbH) given ad libitum. From day 15 until the end of nursery period at 10 weeks of age, pigs were fed ad libitum a phase 2 nursery diet containing 13.6 MJ ME and 1.25% lysine per kg DM (FA I-Super; Denkavit Futtermittel GmbH). During the nursery phase, two T1 and three T2 pigs died or were euthanized. A total of 111 and 108 pigs in T1 and T2, respectively, were moved into the grower-finisher unit at the age of 10 weeks. Of these pigs, 96 per group were randomly selected for further consideration.

The grower-finisher unit had a total of 36 pens, with 18 pens on each side separated by an aisle. The room was air conditioned in order to maintain an ambient temperature of between 18 and 22 °C. Pens measured 2.0 m × 5.2 m, housing 12 pigs with a space allowance of 0.87 m^2 per pig. Floors were partially slatted with a solid area (2.0 m × 0.5 m) arranged opposite to the gangway. The wall separating alternate pens accommodated a 4.5-m long trough, split longitudinally to feed animals of adjacent pens. The animals had permanent access to water (one nipple drinker per pen). All 192 pigs of T1 and T2 were confined in a total of 16 pens on one side of the unit. Pens were randomly assigned to treatment groups, and then pigs in a nursery group were randomly assigned to these pens. Animals from different nursery groups were not mixed in grower-finisher pens. Twelve of 15 remaining T1 pigs and the 12 remaining T2 pigs were housed in the