

Castration at 3 days of age temporarily slows growth of pigs

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Summary

Objective: To determine whether castration, at 3 days or at 10 days of age, was associated with subsequent weight gain.

Methods: Male piglets within a litter were randomly assigned at birth to one of two treatment groups: either castrated at 3 days (“early”) or castrated at 10 days (“late”). All pigs in the litter were weighed at 1, 3, 4, 6, 10, 11, and 13 days of age and at weaning. For statistical analysis, castrated pigs were paired with non-castrated littermates (“early controls” and “late controls”) of the nearest weight on the day of castration. Weight gain 1 and 3 days postcastration was compared between castrated and weight-matched pigs.

Results: Pigs castrated early gained less weight than their weight-matched littermates at 1 day postcastration ($P=.01$). These pigs also tended to gain less weight to 3 days postcastration ($P=.06$). Weight gain did not differ significantly between the late castrates and their littermate controls. By weaning, weight gain no longer differed between the early and late castration groups.

Implications: Castration interferes with piglet growth when performed early in the preweaning period. Castration at 3 days of age temporarily reduces weight gain. Castration at 10 days of age does not affect weight gain.

Keywords: swine, castration, weight gain

Received: December 3, 1998

Accepted: April 26, 1999

Castration is routinely conducted on boars in the North American swine industry, usually before the onset of sexual maturity to prevent boar taint. Although the current literature offers a wide range of suggestions for age of castration, producers typically castrate at the time that their labor and resources allow. Ideally, the producer should castrate at the age that causes the least stress for the pig, for both animal welfare and economic reasons. By using weight gain or loss as a measure of stress, it is possible to recommend optimum times for the producer to castrate. McGlone, et al.,¹ suggest that weight gains to weaning are reduced less in pigs castrated at day 14 compared to those castrated at day 1 of age. In the Ontario swine industry, it is more common for producers to castrate at 3–5 days of age or at 10–14 days of age.

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This article is available online at <http://www.aasp.org/shap.html>.

The objective of this trial was to compare weight gain after castration between piglets castrated at a typical early (day 3) and late (day 10) day of age.

Materials and methods

Herd and facilities

We conducted the trial in a commercial 700-sow farrow-to-feeder pig operation. The herd was begun in 1997 and is free of *Mycoplasma hyopneumoniae* and porcine reproductive and respiratory syndrome virus (PRRSV). The 578 piglets were housed in one of four fully slatted farrowing rooms, each containing 24 sows in conventional farrowing crates. The rooms were mechanically ventilated and heat lamps with covered creep areas were provided. The rooms were filled all-in-all-out (AIAO) and were cleaned and disinfected between groups. The piglets had unlimited access to water nipples. Piglets on this farm were typically processed on day 1 of age; processing included an injection of 100 mg of iron, teeth clipping, and tail docking. Pigs were weaned at 20.3 (SD=2.3) days of age. Cross fostering was not performed during the course of the trial.

Study design

Pigs from 36 litters were ear tagged and weighed within 36 hours of birth. One hundred and twenty four male pigs were randomly (determined by a coin toss) assigned to an “early” treatment group that was castrated at 3 days of age. Each “early” castrate was matched to the noncastrated (either a gilt or an intact male) littermate closest to its weight on day 3 of age, to serve as its paired “early control” for statistical analysis.

On day 10 of age, the remaining intact males ($n = 117$) were castrated, and each was matched to the littermate (either a gilt or an “early” castrate) closest to its weight at day 10 of age, to serve as its paired “late control” for statistical analysis.

Pigs in the study were individually weighed on days 1, 3, 4, 6, 10, 11, and 13 of age and at weaning using a heavy-duty shipping scale (Pelouze®, Bridgeview, Illinois). The scale has a capacity of 65 kg (150 lb) and a resolution of 0.1 kg (0.2 lb). A crate was placed on the scale, the crate was zeroed, and then the pig was put into the crate for weighing.

Nonviable pigs were removed from the trial.

Castration

During the trial, all pigs were castrated by the researchers, using the open method of castration.² A sterile scalpel blade was used to make two vertical cuts into each testicle. To decrease the likelihood of

bacterial infection and abscess formation, care was taken to ensure that each testicle was completely removed and that no fibrous tags were left. Scalpel blades were changed on a daily basis. Cryptorchid pigs and pigs with inguinal hernias were not castrated.

Statistical analysis

Weight gain to one and three days post castration was compared between:

- “early,” and
- their matched “early control” pigs (gilts or noncastrates),

and between:

- “late,” and
- their matched “late control” pigs (gilts or “early” castrates)

using a paired Student’s t-test. For all male pigs, a two-sample t-test was used to compare weaning weights of early and late castrates. A χ^2 was used to compare the proportion of pigs with inguinal hernias that were castrated at 3 days with those with inguinal hernias castrated at 10 days. Descriptive statistics were conducted using Statistix. Paired t-tests and χ^2 tests were conducted with PC/SAS.

Results

Control littermates gained more weight from day 3–day 4 than did their weight-matched “early” castrates ($P=.01$) (Figure 1). Control littermates also tended to gain more weight from day 3–day 6 ($P=.06$) than did their matched “early” castrates.

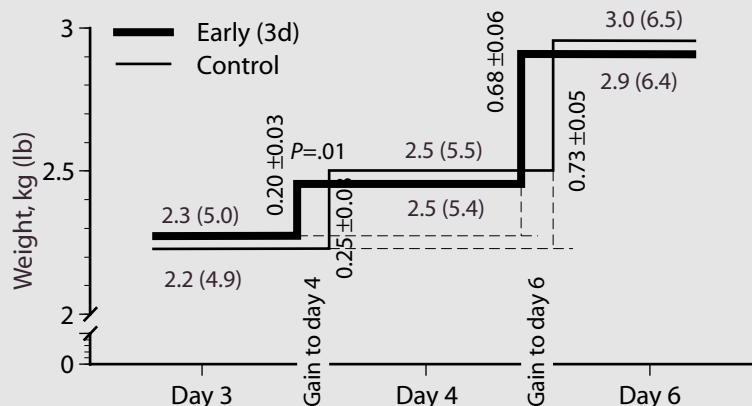
The bodyweights (Figure 2) and weight gain (Figure 1) of “late” castrates did not differ from their weight-matched “late control” littermates. By weaning, the weight of the early castrates (6.5 kg) did not differ from that of the late castrates (6.4 kg).

During the trial, three pigs with inguinal hernias were inadvertently castrated at 3 days of age but no pigs at 10 days were castrated with hernias. These numbers did not differ significantly.

Discussion

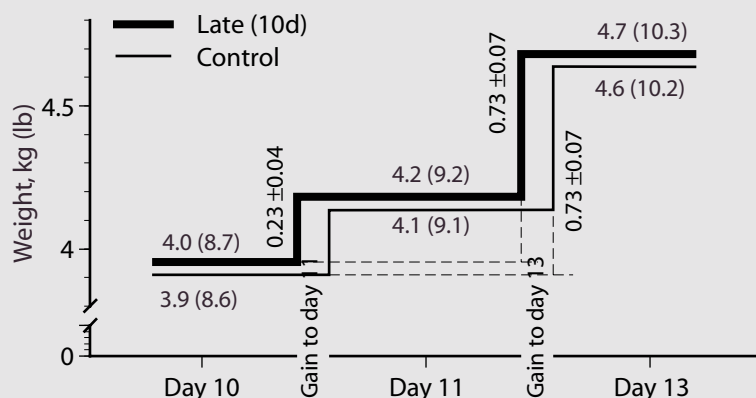
Growth rates in the preweaned pig can be quite variable depending on genetic potential, environmental conditions, availability of nutrition, and stressful events.^{3–6} The bodyweight of the nursing pig is very important. Lightweight pigs are more susceptible to hypothermia, cannot fight as aggressively for the best nipple, or maximize time at a nipple, and are therefore more susceptible to subclinical and clinical

Figure 1



Paired analysis of weights and weight gain for 3-day (“early”) castrates and weight-matched controls.

Figure 2



Paired analysis of weights and weight gain for 10-day (“late”) castrates and weight-matched controls.

diseases.^{6–9}

Pigs in the Ontario swine industry are typically castrated either at 3–5 days of life when the pigs receive iron injections² or at 10–14 days of life. Producers usually decide to castrate early, when iron is given, to decrease labor. Producers may decide to castrate later in life because the producer finds castration technically easier in an older pig and/or inguinal hernias are larger and therefore easier to identify. Castrating pigs at 1–3 days of age is difficult for some producers because the testicles are very small.

Research by McGlone, et al.,¹ indicated that pigs castrated at 1 day of life gained less weight than those castrated at 14 days of life. Pigs take 48 hours to become established on a nipple.³ Also, the pig’s thermoregulatory system is not fully developed in the first week of life.⁴ For these reasons, it is not surprising that McGlone, et al., found a negative impact with day-1 castration.¹ However, whether the negative impact of

castration would still be present in pigs at 3 days of age is not known. Our results show that early castration—in 3-day-old pigs—is associated with a temporary reduction in weight gain compared to littermates matched for body weight. This suggests that 3-day-old pigs are susceptible to the negative impact of castration.

We expect the heaviest nursing pigs to gain the most weight on a daily basis. Although the castrates in our study tended to be heavier on the day of castration, the early castrates weighed less than control littermates 3 days after castration. We assume this can be attributed to disrupting the establishment of the young pig within the litter. In the first few days, piglets need to become fixed on a specific nipple, determine their place in the hierarchy of the litter, and learn to find the creep area for sleeping. Disrupting these events within the first several days of the pig's life has detrimental effects on weight gain.^{6–8} The trauma of castration can reduce activity, and decrease suckling behavior of young pigs during the critical period when they are becoming established on the nipple¹ and are having to compete with littermates. This has the potential to set the early castrates behind because they aren't as aggressive in searching out and competing for space on the udder.

In the late castrates, we observed no decrease in postcastration weight gain compared to littermate controls. By 10 days of age, the pig has already become firmly established within the litter and on the nipple, allowing a castrate to return to normal behavior more rapidly and maintain a positive growth rate. It has also been suggested that pigs are simply stronger at 10–15 days and can better handle the procedure.⁵ Plasma cortisol concentrations in castrates also support the suggestion that late castration is less stressful for the pig.¹⁰ From a practical standpoint, we also found that it was considerably easier to identify inguinal hernias at 10 days of age, reducing the potential for castration-associated mortality.

Our observation that the significant differences in weight gain between castrates and controls had disappeared by weaning suggests that the negative impact of early castration does not have long-term implications. Castration at any age leads to less time nursing and standing and

more time lying down.¹ This may have the most adverse effects in piglets that are castrated early and may lead to more clinical and subclinical disease and mortality.^{5–7} Regular consumption of milk is required for control of gastrointestinal diseases of the preweaned pig.⁴ Similarly, hypoglycemia, starvation, and crushing are all related to maintaining the energy reserves of the pig through adequate colostrum and milk consumption.⁷ Because lightweight pigs are most susceptible to diseases and the negative impact of environment, the impact of early castration may have the largest impact on the smallest pigs.³

Implications

- Castration at 3 days of age temporarily reduces weight gain.
- Castration at 3 days of age does not interfere with weaning weights.
- Postponing castration until after 3 days of age maximized growth in the neonatal period.

References

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