

EFFECT OF LOCAL ANESTHESIA ON WEIGHT GAIN OF PRE-WEANING PIGLETS SUBMITTED TO CASTRATION

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ABSTRACT

The policies of welfare on animal production have been expanded to improve the animal needs and match the demands of the consumer market. Castration represents a questionable welfare factor related to pig production. The aim of this study was to investigate the influence of the use of local anesthesia before castration on productive performance in pre-weaning piglets, assessed by weight gain. Animals were divided into two treatments: 1) castration without local anesthesia (SURG; n = 52) and 2) castration after intra-testicular local anesthesia (SURG+LA; n = 52) when animals were three to seven days old. Piglets were weighed before (W0) and at seven (W1) and 14 days (W2) after orchiectomy, when they were weaned. Statistical analysis was performed by one-way analysis of variance (ANOVA) followed by Student-Newman-Keuls multiple comparison test to investigate differences between groups. There were no differences in Weight (W2) and weight gain at weaning between SURG+LA animals compared to SURG animals (3.57 ± 0.60 kg and 3.74 ± 0.71 kg, respectively; $p = 0.17$). According to the experimental conditions of this study, local anesthesia before castration of piglets does not affect weight gain at weaning, warranting further investigation following the effect of local anesthesia prior to castration until the slaughtering phase.

Keywords: animal welfare, livestock industry, orchiectomy, swine, weight gain.

EFEITO DA ANESTESIA LOCAL NO GANHO DE PESO DO NASCIMENTO À DESMAMA EM LEITÕES SUBMETIDOS A ORQUIECTOMIA

RESUMO

As políticas de bem-estar animal se expandiram para garantir as necessidades dos animais frente à demanda do mercado consumidor. A castração é questionável do ponto de vista de bem-estar na produção animal. Este estudo objetivou investigar o efeito da anestesia local antes da orquiectomia na desempenho produtivo de leitões até o desmame, por meio da avaliação do ganho de peso. Os animais entre três e sete dias de idade foram divididos em dois tratamentos: orquiectomia sem anestesia local (SURG; n = 52) e com anestesia intratesticular (SURG+LA; n = 52). Os animais foram pesados antes (W0), aos sete (W1) e 14 dias (W2) após a orquiectomia, com a última pesagem concomitante à desmama. A análise estatística foi realizada pela análise de variância (ANOVA) seguida do teste de Student-Newman-Keuls para avaliar as diferenças entre os grupos. Não houve diferenças no peso ou ganho de peso (3.57 ± 0.60 kg e $3,74 \pm 0.71$ kg, respectivamente; $p = 0.17$) à desmama. O uso de anestesia local não foi importante para o ganho de peso dos animais castrados nas condições experimentais

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propostas, contudo, considerando-se que o período de teste foi relativamente curto o estudo necessita de uma avaliação que alcance as demais fases do ciclo de produção.

Palavras-chave: bem-estar animal, castração, ganho de peso, suíno.

EFFECTO DE LA ANESTESIA LOCAL EN LA GANANCIA DE PESO DEL NACIMIENTO HASTA EL DESMAME DE LECHONES SOMETIDOS A ORQUIECTOMIA

RESUMEN

Las políticas de bienestar animal se expandieron para garantizar las necesidades de los animales frente a la demanda del mercado consumidor. La castración es cuestionable desde el punto de vista de bienestar animal en la producción animal. Este estudio tuvo como objetivo investigar el efecto de la anestesia local antes de la orquiectomía en la performance de lechones previo al desmame, mediante evaluación de la ganancia de peso. Los animales con edad entre tres y siete días fueron divididos en dos tratamientos: orquiectomía sin anestesia local (SURG; n = 52) y con anestesia intratesticular (SURG+LA; n = 52). Los animales fueron pesados antes (W0), a los siete (W1) y 14 días (W2) luego de la orquiectomía, siendo el último pesaje concomitante al desmame. El análisis estadístico fue realizado a través de análisis de variancia (ANOVA) seguida por test de Student-Newman-Keuls para evaluar las diferencias entre los grupos. No fueron encontradas diferencias entre el peso o ganancia de peso (3.57 ± 0.60 kg y 3.74 ± 0.71 kg, respectivamente; $p = 0.17$) al momento del desmame. El uso de la anestesia local no fue importante para la ganancia de peso de los animales castrados en las condiciones experimentales propuestas, sin embargo considerándose que el período experimental fue relativamente corto el estudio necesita una evaluación que alcance otras etapas del ciclo productivo.

Palabras clave: bienestar animal, castración, ganancia de peso, suíno.

INTRODUCTION

Global pork production was approximately 110.6 million tons in 2014 and according to that pig meat leads the world meat consumption (1). Nevertheless the meat producer is under constant pressure from the consumer market demand, both to increase production as well as health and quality of the meat. Beyond these requirements, the animal protection agencies and society require the implementation of welfare management practices to improve the quality of farm animal lives. Some practices have already been implemented by the European Union, ahead of other pig producing regions (2). According to that, the five freedoms have being well accepted and include, among others, the health freedom, where animals should be free from disease, pain and injuries.

This new concept in meat production was grounded on the basis for the production of “ethical” meat, in other words, when animals, from the beginning of the productive cycle until slaughter, are raised within the principles of animal well being, with respect to sustainability of the farms and environmental conservation (3).

One of the traditional management practices in pig farming is castration. This practice is required in some countries both by legislation and to avoid the undesirable meat smell or flavor, which devalues the carcass of entire male pigs who have already reached puberty. These characteristics are provided by the two compounds androstenone and skatole (3). These compounds produce a “urine and excrement” like smell or flavor after cooking the meat (4).

The meat is generally well accepted by consumers when androstenone and skatole carcass concentrations are below 0.5 ppm and 0.25 ppm, respectively.

Orchiectomy is one of the most questionable management practices in pig farming, because it is usually performed without the use of anesthetics or analgesics (5), which would produce intense pain and stress.

All European Union countries have banned pig castration in 2012, in order to reduce animal suffering, however some changes were performed in the production cycle, such as the need of an earlier slaughter. However this practice is not fully effective to minimize the smell and flavor of the entire male, and other alternative management practices have been investigated (6).

Approximately 50% of the European consumers are concerned about the well being of animals (7). Therefore financial value will be aggregated to the final meat product, when meat production is compromised with the animal well being.

Based on the hypothesis that local anesthesia improves weight gain in piglets submitted to castration, the aim of this study was to investigate the effect of local anesthesia prior to orchiectomy on productive performance of infant piglets.

MATERIALS AND METHODS

After approval by the Institutional Animal Research Ethical Committee, under the protocol number 215/2011-CEUA, the data was collected in January 2012 in a commercial farm. One hundred and four crossbred Large White and Landrace piglets, aging from three to seven days old were divided in two groups of same number and submitted to castration without local anesthesia (SURG) or castration with local anesthesia (SURG + LA).

The study was performed in a commercial pig farm. The piglets were born from twenty five sows and were placed with their sows in individual pens. Animals were selected on the basis of sex, weight, age and good clinical health of the litters.

To establish the best possible homogeneity between the groups and reduce the hierarchical differences, piglets with low, intermediate and high weight were similarly distributed between the groups in each pen.

Animals from each litter were selected according to their weight, ensuring that light, intermediate and heavy animals were equally distributed in pairs between groups, i.e. if a 3 kg pig was included in SURG group, another 3 kg or similar weight pig from the same litter was included in SURG+LA group, therefore mean and sum of the weight was very close at the beginning of the study in the two groups.

Local antisepsia was performed in all piglets and intra-testicular anesthesia was performed with 0.5 mL of lidocaine 2% with epinephrine in each testicle in animals of group SURG + LA only. These animals were replaced in the pen for 10 minutes. The surgical procedure was performed in animals from both groups, by incision of the skin of the scrotum, rupture of the vaginalis tunica and vas deferens, exposure and traction of the pampiniform plexus and removal of the testicle. At the end of the procedure, the animals were replaced in the pens.

Piglets were weighed before (W0) and at seven (W1) and 14 days (W2) after orchiectomy, when they were weaned.

Statistics Analysis

Weight gain data (W1-W0) and (W2-W0) were analysed by one-way analysis of variance (ANOVA), followed by Student-Newman-Keuls Multiple Comparisons Test using the SAS software (8). The significance level was 5%.

RESULTS

The anesthetic application required a maximum time of 30 seconds for each piglet, including the time spent to remove the animal from the pen.

The mean weights of both treatments, as well as the weight gain from W0 to W1 and, W0 to W2 and significance levels are shown at Table 1.

There were no differences in Weight (W2) and weight gain at weaning between SURG+LA animals compared to SURG animals. Numerical differences were 170 grams in weight gain at weaning.

Table 1: Mean weights and weight gains of piglets submitted to orchiectomy without local anesthesia (SURG; n=52) or with local anesthesia (SURG+LA; n=52) before and at seven (WG1) and 14 days (WG2) after orchiectomy.

<i>Treatment</i>	<i>weight and weight gain</i>				
	<i>Mean(w0) ±SD</i>	<i>Mean(w1) ±SD</i>	<i>Mean(w2) ±SD</i>	<i>Mean(wg1) ±SD</i>	<i>Mean(wg2) ±SD</i>
<i>surg</i>	2.76±0.62	4.56±0.78	6.33±1.01	1.79±0.32	3.57±0.6
<i>surg+la</i>	2.78±0.62	4.67±0.91	6.53±1.16	1.88±0.41	3.74±0.71
<i>p value</i>				<i>p = 0.2123</i>	<i>p = 0.1747</i>

Legend: surg – animals castrated without local anesthesia; surg+la – animals castrated with local anesthesia; w0 – weight before castration; w1 – weight at seven days after castration; w2 – weight at 14 days after castration and at weaning; wg1 – weight gain between w1 and w0; wg2 – weight gain between w2 and w0; SD= standard deviation

DISCUSSION

Little information is available in the literature about the influence of pain related to castration on growth performance of pigs. This study suggested that local anesthesia did not affect weight gain at weaning in piglets subjected to orchiectomy compared to those castrated without local anesthesia.

McGlone and Hellman (5) also reported no increase in weight gain in piglets subjected to orchiectomy under local anesthesia, however only 24 animals were used, against 52 animals in our study. This is a possible limitation of both studies as there is a relatively high coefficient of variation of the weight of litters in the farrowing house (9), when compared to other stages of the production cycle.

Otherwise it is well documented that castration without anesthesia significantly increases the hormone and neurotransmitter stress indicators (10,11,12), which was not suppressed by non-steroid anti-inflammatory treatment or CO₂ anesthesia (12). On the other hand, there is little information of the role of local anesthesia before castration in pigs, on the hormonal and biochemical indicators of stress. In calves subjected to orchiectomy, local anesthesia had only a limited effect on these variables (13,14), however the interpretation of the possible correlation of these indicators with pain should be cautious, given the high variability and the influence of other factors beyond pain (15).

Other physiological variables such as blood pressure, respiratory and heart rates might provide significant information for the evaluation of pain for some animal species, including the pig (16), but they are impractical for routine use in pigs, given the difficulty for physical restraint.

Vocalization is another possible method to investigate pain in pigs. Animals castrated without local anesthesia emitted a higher frequency sound compared to those castrated with local anesthesia (17,18).

Behavior is considered the gold standard to investigate the signs of pain in animals and specifically in pigs (19,20). Duration of defence behavior was longer (20) and nursing was shorter⁵ in animals castrated without local anesthesia when compared to animals castrated with local anesthesia.

Recent studies reported the influence of stressors, such as castration, on neopterin plasma concentrations of pigs (21). Neopterin is a marker of immune response and triggers a pre-inflammatory period in man (22). The antinociceptive effect produced by local anesthetics also might minimize the local inflammation and might produce antimicrobial action (23), since the drug blocks transduction and nervous transmission, which are important stages in the origin of nociception. It is well known that local anesthesia ensures the maintenance of the integrity of the peripheral and central nervous system and therefore minimizes the possibility of postoperative hyperalgesia and neuropathic pain (24). According to that it would be expected an improved weight gain in animals castrated with anesthesia.

Considering that local anesthesia little affected the weight gain in short term period, probably the most important limitation of this study was the short time of evaluation, as weight gain was investigated only until weaning. It may be speculated that long term weight gain might be affected, warranting further investigation following the effect of local anesthesia prior to castration until the slaughtering phase.

CONCLUSION

According to the experimental conditions of this study, local anesthesia before castration of piglets does not affect weight gain at weaning.

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