

Production of entire males: the effect on welfare and meat quality

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Surgical castration of pigs at an early age is carried out in most countries to prevent boar taint, increase intramuscular and subcutaneous fat content for certain quality products and prevent aggressive behaviour.

Although castration can be legally performed without analgesia in the first seven days of life, available evidence shows that castration even in piglets younger than eight days of age is painful, and may have a detrimental influence on health. Therefore, welfare concerns of consumers are increasing the pressure on the pig industry to abandon this practice.

Three farm level alternatives

Currently, three farm level alternatives to surgical castration are available: castration with anaesthesia, vaccination against gonadotrophin-releasing factor (GnRF), also known as immunocastration, and production of entire males with management practices to reduce boar taint.

Production of entire males improves welfare of these animals in early life, in that they



are not subjected to the pain and discomfort of castration. It also presents other advantages: more efficient growth and greater carcass lean content and thereby reduces the overall cost of producing a kilogram of lean meat. However, the welfare of entire males may be impaired during the late finish period, coinciding with sexual maturity.

During this period and influenced by gonadosteroids, entire males spend less time feeding and more time in mounting and aggressive behaviour than females, surgical castrated, and males vaccinated against GnRF.

When puberty is reached, boars become less interested in feed, but social and sexual activity increases, so that competition for other resources than feed increase.

Tuytens et al. (2008) also confirmed that entire males are generally more aggressive than females and castrates, when studying pigs kept in sibling groups from farrowing until slaughter.

Animal welfare problems

Aggression and mounts are animal welfare problems: first, because it cause injuries, pain and, in extreme cases, death; secondly, this behaviour together with increased general activity may stress pigs, depress the immune system and decrease feed intake.

Mounting behaviour may also cause health problems involving lameness or injured legs or feet, in addition to unrest and irritable aggression because victims of the behaviour are unable to avoid the harasser.

Split marketing (removal of the heaviest pigs from a pen for slaughter) of entire males may enhance the fighting due to hierarchy reformation, even if the remainder of the group are left intact.

Pigs of uniform weight fight more than pigs of different weight in order to establish a hierarchy.

It is also likely that limiting factors in the rearing environment, that create competitive conditions, become more critical due to higher boar aggression.

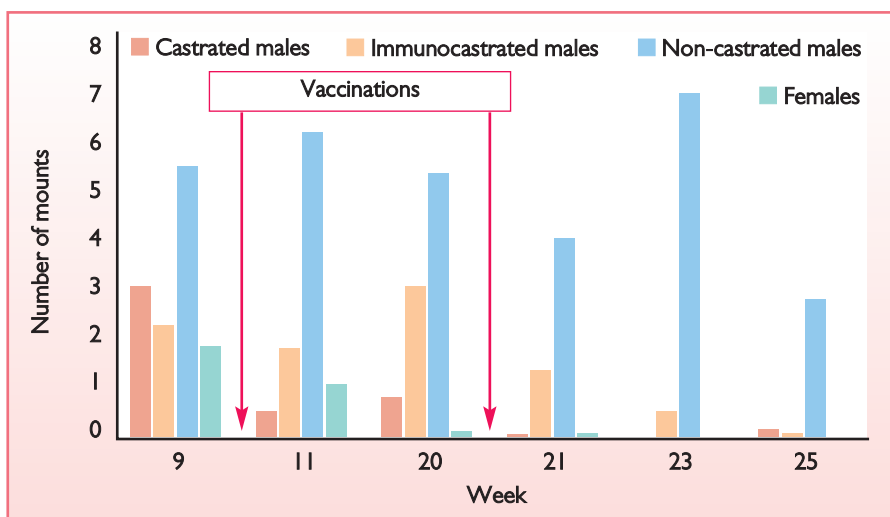
The higher level of aggression and mounting behaviour lead in most cases to increased levels of androstenone and boar taint. Dominant entire males have significantly higher levels than subordinates, and high levels in a group have a stimulating effect on others in that group.

Fighting during transport

A major welfare and management issue with entire males is also the potential for increased activity and fighting among mixed group during transport and lairage at abattoirs leading to carcass damage.

Velarde et al. (2007) reported significantly

Fig. 1. Number of mounts for the different genders and weeks (Fàbrega et al., 2010).



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higher number of skin damage on the carcass in entire males than in immunocastrated and females.

Fighting sometimes results in only superficial skin blemishes, but in other cases, it can cause major carcass bruising and consequently financial losses to the meat industry.

Carcasses of pigs showing greater skin damage due to fighting have progressively higher levels of cortisol, CPK and lactate in their blood at slaughter. Fighting and exhaustion lead also to deterioration of meat quality measured by higher frequency of dark, firm and dry (DFD) meat.

There is no scientific documentation to support the opinion that entire males at normal slaughter weight (90-120kg liveweight) are more aggressive towards humans and therefore more difficult to handle. However, measures of free and total thyroxin could indicate that entire males are more sensitive to stressors than females or castrates.

Different responses

Giersing (1998) did find that entire males responded differently from females to repeated challenges consisting of restraint in a nose sling and procedures for obtaining fat and blood samples.

Males had a higher initial plasma cortisol response, but lower response to an additional stressor, compared with females – which indicated greater sensitivity/emotion towards the procedure.

Fredriksen et al. (2008) found reduced levels of aggression and skin lesions shortly before slaughter in groups of pigs that stayed in the same pen from birth to slaughter, when compared with groups where pigs



	Mixed		Single-sex		p-value
	Entire males (n=96)	Females (n=95)	Entire males (n=105)	Females (n=1070)	
In total					
Leg problems (% of pigs)	12	4	18	7	0.01
Euthanised due to leg problems (% of pigs)	2	0	3	1	
Per inspection					
Bites (freq/pig)	2.5 ^a	2.4 ^a	4.5 ^b	2.4 ^a	0.001
Scratched (freq/pig)	1.7 ^a	2 ^a	2.3 ^a	1 ^b	0.001

Table 1. Frequency of leg problems occurring in pigs at least once during rearing, and of average frequency of skin injuries at biweekly inspections (Rydhmer et al., 2006).

	Castrated males	Improvac vaccinated	Entire males	Females
Lesions	4.49 ^b	4.05 ^b	6.00 ^a	3.98 ^b

Table 2. Skin lesions in the left carcass. Means with different superscripts are different (P<0.05) (Velarde et al., 2007).

Country	Percentage PSE	Percentage DFD	Reference
USA	16	10	Cassens et al., 1992
Australia	10	15	Warner and Eldridge, 1988
Australia	32	15	Trout, 1992
Canada	20-90 ^a	-	Fortin, 1989
Portugal	30	10	Santos et al., 1994
Various ^b	<20	<35	Warris, 1987

Table 3. Estimates of the prevalence of PSE and DFD pork. ^aPale meat; ^breported in various studies (Warris 2000).

were mixed at 25kg. By keeping littermates together in stable groups, the level of aggression is low, and the initiation of puberty may, moreover, be inhibited.

Consequently, the levels of androstenone, and probably also skatole, will remain at a lower level. However, entire male siblings in the farrow-to-finish system still exhibited a higher degree of aggression than castrates.

Management methods (including factors concerning space, stocking rate, grouping method and enrichment provision) to minimise the level of aggression, sexual behaviour and boar taint in the production of entire males, and thus improve welfare of the animals, require further research.

Carcass comparisons

Gispert et al. (2010) compared the meat and carcass quality among entire males, surgical castrated males, immunocastrated, and females (Landrace x Duroc) x Pietrain crossbred pigs.

Castrated and immunocastrated males were fatter than female and entire males in the loin area but, in the ham area, castrated males were the fattest, and entire males the leanest. Intramuscular fat of castrated males (2.5%) was higher than females (1.7%) and entire males (1.8%).

Finally, they did not find differences among treatments in meat quality. Although meat

colour was lighter in castrated and immunocastrated males than in entire males, the lightness for those treatments was considered to be normal for loin meat. It was neither too dark nor too pale, with no evidence of being either pale, soft, and exudative (PSE) or DFD. ■

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Full details of the references are available from the author on request antonio.velarde@irta.cat