

Tooth Resection

Piglets are born with eight sharp needle teeth which are either cut just above the gum-line (with sharp side cutter pliers) or the tip is ground (with a rotating grindstone), shortly after birth. Teeth clipping and grinding are collectively known as tooth resection, practiced to prevent damage to sows' udders and facial fighting lesions of piglets during lactation. Routine tooth resection is not permitted under EU legislation (Commission Directive 2001/93/EC) and teeth-clipping (as opposed to teeth grinding) is not permitted in some countries, such as Germany, Denmark, Norway and Switzerland.

Tooth Clipping

Tooth clipping is known to cause pain and severe injury to teeth (Heinritzi et al., 1994; Hay 2004; Gallois et al., 2005) whilst 'teeth champing' behaviour following the procedure suggests it causes distress (Noonan et al., 1994). Hutter et al (1993) reported nerve infections in 92% of teeth clipped with side cutting pliers. Almost half of all clipped teeth bled, and there was a 10.6% and 3.3% incidence of haemorrhages and fractures, respectively (Gallois et al., 2005). Previously, Hay et al (2004) reported pulp opening in 60% of teeth after clipping with significant incidence of macroscopic lesions: fractures (38%), haemorrhages (63%) and abscesses (21%), all of which are known to cause severe pain in humans. Lesions and inflammation of the mucosa of the upper lip, brought about by sharp-edged splinters, were also prevalent (Heinritzi et al., 1994; Bataille et al., 2002) which impaired suckling ability and growth rate (Heinritzi et al., 1994). Finally, a reduction in play behaviour of piglets with clipped teeth provides behavioural evidence of a reduction in welfare (Boyle et al., 2002).

Udder lesions/damage of the caudal teats, particularly of crated sows, may be caused by the sow's hind limbs as opposed to her litter (Gallois et al., 2005; Verhovsek et al., 2007); only lesions of the anterior and median teats are therefore considered. Lesions were more frequent (~18-20% of sows compared to ~2%) in sows with intact litters than teeth-clipped litters on day 8 of lactation (Gallois et al., 2005); damage was transient and small however with no effect of treatment on days 15 and 27.

The percent incidence of piglet whole body skin lesions was higher on days 8 and 27 in litters with intact teeth (80% of piglets per litter compared to 62-72% for litters with clipped teeth), and lesions were predominantly mild severity (Gallois et al., 2005). Boyle et al (2002) also noted lesions were only superficial whilst Delbor et al (2000) found differences between treatments were no longer apparent at weaning. Tooth clipping was generally not found to improve productivity (Boyle et al., 2002; Gallois et al., 2005), and in some cases was found to decrease weight gain (Bataille et al., 2002) especially in low birth weight piglets (Fraser and Thompson, 1991).

Tooth Grinding

Tooth grinding may be preferable to clipping in terms of welfare (Lewis et al., 2005; Llamas Moya et al., 2006) but the scientific literature is not wholly conclusive (Gallois et al., 2005; Marchant-Forde et

al., 2009). Although grinding does lead to lesions, they are significantly less prevalent than following teeth-clipping. Hutter et al (1993) reported pulp inflammation in nearly 50% of teeth that had been ground, whilst Hay et al (2004) found 38% pulp cavity opening, 41% haemorrhage and 3% fracture. In contrast, Gallois et al (2005) found only 0.2% incidence of haemorrhage and fractures. There was no marked effect of teeth grinding on sow udder lesions (Bataille et al., 2002; Gallois et al., 2005) however whole body piglet skin lesions were intermediate between intact and teeth-clipped litters on day 8 and the same as intact litters on day 27 (Gallios et al., 2005). Lip lesions at 7 days were also more prevalent than in intact piglets (Bataille et al., 2002) and lower growth rates were found in litters following teeth grinding in one study (Marchant Forde et al., 2008).

Teeth grinding takes longer than tooth clipping, so is associated with greater handling stress, demonstrated by increased cortisol levels following the procedure (Llamas Moya et al., 2006; Marchant-Forde et al., 2009). Only the tip of the tooth should be ground not to expose the sensitive pulp; this may however lead to a higher incidence of skin lesions in piglets. Hay et al (2004) conclude that both procedures '*induce major teeth lesions...likely to induce pain and cause health disorders*' however, they also recommend that, where breeders maintain tooth resection, grinding should be practiced as '*lesions are less frequent with this technique*'.

Avoiding Tooth Resection

Piglet's sharp canine and incisor teeth are designed, from birth, to enable them to compete for the best teats (Fraser and Thompson, 1991). Competition between piglets increases in larger litters and is also affected by sow health and milk production (EFSA, 2007). Risk of damage to teats and to each other's face is reduced if all piglets get a plentiful milk supply. Ensuring sustainable milk supplies can be achieved by a combination of breeding sows with smaller litters, selecting sows with sufficient numbers of teats and breeding, managing and feeding sows so that they reliably produce sufficient milk for their piglets.

Space allowance per animal plays an important role in reducing aggressive and competitive behaviours. Piglets housed in small pens (3.6m² or 6.8m²) where the sow could not move freely showed increased aggressive behaviour, including biting of other pigs compared to piglets housed in larger pens (29m²) where the sow could move freely (Hvozdk et al, 2002). Risk of aggression in older pigs is also increased in barren and crowded conditions (Beattie et al, 2000).

Sows in crates are unable to move away from their piglets and the restricted space impairs transitions in standing and lying postures (EFSA, 2007). It is therefore likely to be more difficult for the sow to change position quickly if her teats are bitten. Sow nursing behaviour is improved in non-confinement systems compared to crates (Cronin and Smith, 1992; Dybjaer et al., 2001; Litschauer et al., 2006; Devillers and Farmer, 2008) and increased successful nursing events lead to reduced time spent at the teats (Devillers and Farmer, 2008) which may in turn reduce the occurrence of lesions.

In systems with little or no environmental enrichment, there may be increased damage to sows' teats as piglets spend less time engaging with their environment and more time engaging with the sow (Lewis et al, 2006). Enrichment is not commonly provided in farrowing crates (EFSA, 2007). Finally, a number of studies indicate that tooth clipping is not necessary in outdoor farrowing

systems (Brown et al, 1996; Delbor et al, 2000) where bedding is a necessary provision and significantly more space is available to the sow and her litter.

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