

## Article#3:

# Piglet Castration & Swine Welfare in Europe: overview of current situation

Attitudes towards farm animal pain and its management have considerably evolved in Europe in the last decade. However, much remains to be done in terms of swine welfare, especially with regards to painful nevertheless commonly performed husbandry procedures such as piglet castration and tail docking. Traditionally used to improve pork meat quality, piglet surgical castration is still commonly carried out in Europe, often without the provision of any pain relief or anaesthesia, even though it is commonly acknowledged that this

procedure causes acute pain. Unsurprisingly, piglet surgical castration has been under public scrutiny in the last few years, raising significant animal welfare concerns.

What is the current situation on piglet castration in Europe? How can vets and farmers work collaboratively to ensure welfare standards are properly met with regards to piglet castration, while still being pragmatic and easy to implement both for pig farmers and vets?

## Piglet surgical castration: why, how?

**Surgical castration** is an **invasive and painful husbandry procedure** commonly performed in piglets **before the age of seven days**. This standard practice is performed in most European countries. Technically, it consists of a scrotal incision, the blunt dissection of testicular tissue from the surrounding fascia, and the hyper-extension of the spermatic cord until it spontaneously ruptures or is cut<sup>1</sup>. The severing of the spermatic cord is thought to be the most painful part of the surgery for pigs<sup>2</sup>.

Piglet surgical castration is primarily used to reduce the occurrence of “boar taint”, an unpleasant odour often found in meat from entire male pigs, caused by androstenone (male sex hormone), skatole and indole (both are produced respectively in the intestine from the breakdown of tryptophan) which are deposited in the fat tissue<sup>3</sup>. Pork meat displaying boar taint is not suitable for human consumption. Methods of boar taint detection vary, although the human nose detection remains the most frequently used practice.

Surgical castration is also used to prevent undesired sexual and aggressive behaviour in male pigs. Castrated males are less aggressive and easier to manage<sup>4</sup>. In addition to being a painful procedure, surgical castration often results in increased feed costs and increased fat content of the carcass<sup>5</sup>.



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## Piglet castration: a painful procedure

According to the Federation of Veterinarians of Europe, castration of pigs without anaesthesia or post-operative analgesia conflicts with current animal welfare and ethics best practice<sup>6</sup>. Pig castration is a painful, invasive procedure that causes **prolonged pain**<sup>7</sup> and is therefore **detrimental to pig welfare**. Surgical castration leads to **behavioural changes**, which may be **indicators of pain**<sup>7,8</sup>. **Pain-related behaviours** associated with piglet castration include **stress vocalisation** (mainly associated with the pulling

and severing of the spermatic cord<sup>1,2,8</sup>), as well as **spasms, stiffness, prostration, trembling**, especially for the first few hours after castration<sup>9</sup>. Piglets also display behaviour changes related to pain such as **tail wagging**, huddling up, and **rump scratching** in the days following the procedure<sup>1,8,9</sup>. Surgical castration can also lead to **physiological changes** such as the activation of the hypothalamic-pituitary-adrenal axis and of the sympathetic nervous system<sup>9</sup>.

## How to mitigate pain caused by piglet surgical castration

**Current pain reduction strategies** include the **use of non-steroidal anti-inflammatory drugs (NSAIDs) prior to castration**, as well as the use of **local anaesthetics**, and **general anaesthesia**. Licensed medicines to use for anaesthesia and analgesia for pig castration are limited. Furthermore, anaesthetic and analgesic protocols need to be cost-effective, practical, efficacious, safe (for the pig, the farmer and/or the vet and the environment) and produce minimum stress and pain.

**Meloxicam**, ketoprofen and flunixin are the most commonly used NSAIDs, although some studies suggest that their effectiveness in alleviating pain during surgical castration is questionable<sup>10</sup>. The use of NSAIDs administered prior to the surgery seems to have an effect on post-operative pain, suggested by a reduction in pain-related behaviours post-surgically<sup>10,11</sup> (rump scratching, tail wagging). More specifically, the use of **meloxicam prior to piglet castration** seems to result in **less pain-related behaviours afterwards**, whether a local anaesthetic has been used or not<sup>7,12</sup>.

Procaine is the only licensed drug to be used for pig castration<sup>10</sup>. Lidocaine does not have a maximum residue limit (MRL) and is therefore not allowed for use in food-producing animals in Europe; however, some countries like France allow its use for piglet surgical castration. It is worth noting that the **injection of a local anaesthetic in the scrotum** and testicles can cause additional **pain and distress** to piglets. When

given a **local anaesthetic**, piglets exhibit a significant reduction in escape behaviour during castration<sup>7,13</sup>. The use of **topical anaesthetics** (short or long acting) on the severed spermatic cords after castration and on scrotal incisions **does not seem to result in a change of pain-related behaviours** (bottom scooting, huddling)<sup>14</sup>. Using anaesthetics seem to be beneficial to piglets during surgical castration (demonstrable reduction in pain perception and stress response); however, without a combined use of an analgesic, piglets seem to experience pain after the procedure<sup>10,15,16</sup>. **General anaesthesia** does not seem to result in any difference in pain-related behaviour after castration<sup>14,17</sup>, and is not commonly used for practical reasons, except in some countries such as Germany.

So, according to research, anaesthesia alone prevents pain during surgery, but not after, while analgesia alone mitigates pain after surgery, but not during it<sup>5</sup>.



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## Fattening of male boars and immunocastration: alternatives to piglet surgical castration

There are several alternatives to surgical castration. **Raising entire male pigs** is traditionally used in some countries such as Spain, Portugal, Ireland and the United Kingdom. From a welfare point of view, there is no castration, so no pain nor stress experienced by animals. There is no additional workload for the pig farmers either. However, uncastrated pigs can display **aggressive and sexual behaviours**, detrimental to their welfare<sup>18</sup>. Feed efficiency and carcass quality are better than in surgically castrated pigs, however the meat quality is lower<sup>18</sup> (presence of boar taint, reduced intramuscular fat content and reduced saturation of the fat). One way to address the presence of boar taint could be to slaughter entire males at a lower weight; however, this approach is not used currently for obvious economic reasons<sup>6</sup>. Some slaughterhouses have **implemented** “Human Nose Scores” based on recording boar taint after heating<sup>19</sup>. Also, research suggests the possibility of a **genetic solution to decrease boar taint** to abandon castration<sup>3,18,19</sup>. As a matter of fact, as androstenone and skatole have moderate to high heritability, it is technically possible to **genetically select against these compounds**. Although this method seems promising, implementing such genetic selections strategies has a cost. Modifications of diet and environmental conditions could also decrease boar taint<sup>3</sup>.

**Alternatives** to surgical castration also include immunological castration, often referred as **immunocastration**, which aims is to delay the onset of puberty. Immunocastration is not a hormonal treatment, meaning there are no hormonal residues issues, but stimulates the pig’s immune system to produce antibodies inhibiting testes function. The effect is temporary. It has been permitted in Europe since 2009. It requires **two injections at least four weeks apart** during the fattening phase of pigs, the second dose being given four to five weeks before slaughter<sup>20</sup>. Some countries, such as Belgium, display higher percentage of immunocastrated male pigs. Immunocastration **prevents the occurrence of boar taint, removes the pain** that would have been associated to a surgical castration, and prevents stress-related aggressive and sexual behaviours in male pigs<sup>5,20</sup>. In this aspect, immunocastration clearly displays **obvious welfare advantages** compared to surgical castration. However, immunocastrated male pigs can **sometimes display aggressive behaviour** before the second injection, as immunocastration is only effective after the second vaccination<sup>18</sup>.

## European law allows piglet castration without anaesthesia under 7 days of age

Europe is a dynamic marketplace for the pork industry, with respectively Spain, Germany, France, Denmark and the Netherlands being the biggest players in the European pork industry<sup>21</sup> (cf table 1). Spain, Netherlands, Germany, France also had the biggest growth in swine production in 2022<sup>22</sup>.

Considering the overall piglet population at a European level, piglet castration is more and more causing welfare concerns. What does European law say with regards to pig surgical castration?



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**Table 1. Annual Pig population by country in December 202321 (Thousand heads)**

Country	Annual Pig population (thousand heads)
Spain	33 803
Germany	21 223
France	11 794
Denmark	11 368
Netherlands	10 375
Poland	9 769
Italy	9 171
Belgium	5 380

In Europe, according to a **2008 directive**<sup>23,24</sup>, it is **legally allowed to surgically castrate piglets** up to seven days **without anaesthesia or post-operative analgesia**, despite the acknowledged fact that “castration is likely to cause prolonged pain”. After the seventh day of life of the piglet, European law requires that a veterinarian must perform the castration under anaesthesia and additional prolonged analgesia.

In **2010**, with the aim to address this major welfare concern, a working group including representatives of European pig farmers, meat industry, scientists, veterinarians and animal welfare non-governmental organisations produced several recommendations on pig castration. The **European Declaration on alternatives to surgical castration**<sup>25</sup>, also sometimes referred as the Brussels declaration, had two main requests: **use prolonged analgesia and/or anaesthesia with methods mutually recognised when performing surgical castration** in pigs by 2012; and **completely phase out surgical castration in pigs by January 1<sup>st</sup> 2018**. By signing this declaration, European countries committed to voluntarily end pig surgical castration by January 1<sup>st</sup> 2018.

Unfortunately, this deadline of ending surgical castration of pigs by early 2018 has not been met, and despite the willingness shown towards ending piglet castration in Europe<sup>26</sup>, numbers depict a different reality. The **lack of reliable statistical data on castrated pigs in Europe** and the significant differences between local regulations can prove quite challenging to find standardised data about pig castration in Europe. Recent, available and

comparable data differ by country; however, some consolidated reports can give a good understanding of the current situation at a European level. Back in 2016<sup>10</sup>, most European countries surgically castrated at least 80% of their male pig population. Some countries like Ireland, Portugal, Spain and the United Kingdom, have a history of raising entire male pigs. In 2017, Belgium presented the highest percentage of immunocastrated pigs in Europe<sup>19</sup> (15%). In a survey dating from 2016<sup>10</sup>, 61% of male pigs were surgically castrated in Europe, while 36% were not castrated, and 3% had immunocastration. Among castrated pigs, only 5% were castrated with anaesthesia and analgesia, while 54% were castrated without any anaesthesia or pain relief.



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## Piglet castration in Europe: an unharmonized situation, with different alternatives in countries

Overall, there is no harmonised situation with regards to piglet castration in Europe, as local regulations differ from one country to another. Countries across Europe have different approaches to piglet castration, closely linked to their traditions and local regulations. Where some countries have a history in raising and fattening entire male pigs such as Ireland, the UK, Portugal and Spain; surgical castration is more developed in other countries. Immunocastration remains quite episodic. In some countries such as the Netherlands, Belgium, France and Germany, pork food supply chains and retailers have successfully adapted best practices to end surgical castration of piglets, especially by increasing the number of entire male pigs<sup>19</sup>. For instance, between 2015 and 2017, France and Germany have increased the number of entire male pigs raised, respectively reaching 22% and 20% of their entire pig population<sup>19</sup>. Table 2 and maps 1 and 2 summarise the state of play by country.

There does not seem to be any real sense of urgency with regards to moving away from traditional practices and achieving the decision of completely phase out

piglet surgical castration stated in the 2010 Brussels declaration, where surgical castration of pig should have been abandoned by 2018. To date, there is no official deadline to ban piglet surgical castration.

Nevertheless, some progress seems to have been made in the last few years, and a few European countries are ready to switch towards more welfare-friendly protocols with regards to piglet castration. However, they remain a minority. Only six countries have passed laws banning piglet castration without any pain relief and/or anaesthesia, and alternatives differ from one country to another. In some countries, while there is no official deadline to end castration, there actually is a deadline to demand the use of analgesia (Finland in 2011 with an industry requirement; Denmark with an industry requirement in 2009 and a legal requirement in 2011), the use of anaesthesia (Switzerland, Germany, France), and the use of analgesia and anaesthesia (Norway, Sweden) (cf table 3). In addition to this, it is worth noting that, in general, no financial support is given to farmers to support them moving towards the adoption of more welfare-friendly practices.

**Table 2. Overview of surgical castration and alternatives in European countries in 2017<sup>19</sup>**

Country	Entire males	Immunocastrated	Surgical castration	Protocols used for surgical castration		
				With analgesia and anaesthesia	With analgesia only	Without analgesia or anaesthesia
				%total surgical	%total surgical	%total surgical
Austria	5	0	95	1	99	0
Belgium	8	15	80	3	6	91
Denmark	<2	0	>97	0	95	5
France	22	<0.1	78	0	50	50
Germany	20	<1	80	1	90	9
Netherlands	65	0	35	0	0	100
Norway	<1	6	94	99	0	1
Spain	80	5	15	1	1	98
Sweden	1	9	90	100	0	0
UK	98	<1	2	4.5	4.5	91



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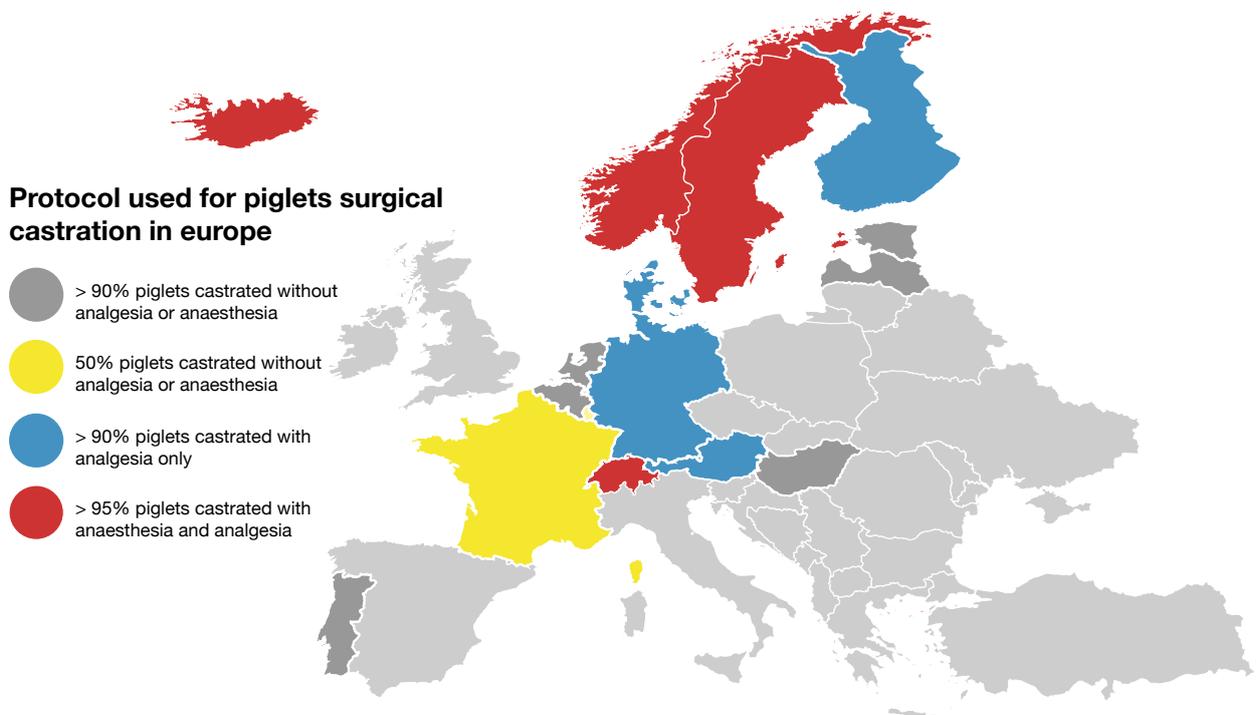
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**Map 1. Overview of piglet surgical castration in Europe<sup>19</sup>**



**Map 2. Protocols used for piglet surgical castration in Europe<sup>19</sup>**



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**Table 3. Local deadlines on pig surgical castration in some European Countries<sup>10</sup>**

Country	Year	Details	Alternatives to piglet castration without anaesthesia and analgesia
Denmark	2011	Ban on surgical pig castration without analgesia	
Germany	2021	Since January 1st 2021: prohibition of piglet surgical castration without anaesthesia. (Animal Welfare Act, adopted in 2013, with a deadline extension, as initially planned for 2019) If farmers wish to perform piglet castration surgically: <ul style="list-style-type: none"> <li>• they must follow a certified training</li> <li>• there must be an anaesthetic and pain management protocol put in place.</li> </ul>	Fattening of male boars with or without immunocastration  - Surgical castration with anaesthetic protocol: <ul style="list-style-type: none"> <li>• Vet performing injection of ketamine + azaperone</li> <li>• Farmer or other qualified person: isoflurane anaesthesia</li> </ul>
Netherlands	N/A	No ban on surgical piglet castration. No specific requirements linked to piglets under 7 days of age. Castration should not entail tissue tearing (2014 legislative measure).	<ul style="list-style-type: none"> <li>• Fattening of entire male boars</li> <li>• Use of CO2 gas anaesthesia (2007 Noordwijk Declaration)</li> </ul>
Norway	2002	Ban on surgical pig castration without analgesia and anaesthesia	
Sweden	2016	Ban on surgical pig castration without analgesia and anaesthesia	
Switzerland	2010	Ban on surgical pig castration without anaesthesia	Piglets are routinely castrated by using isoflurane anaesthesia since 2010 <sup>33</sup>
France	2022	Since January 1st 2022: ban on piglet castration without anaesthesia. If farmers wish to perform piglet castration surgically: <ul style="list-style-type: none"> <li>• they must follow a certified training</li> <li>• there must be an anaesthetic and pain management protocol put in place.</li> </ul>	
Spain	N/A	No ban on surgical piglet castration. No specific requirements linked to piglets under 7 days of age. Castration should not entail tissue tearing.	The vast majority of the male pig population is made of entire males.
United Kingdom	N/A	No ban on surgical piglet castration. Code of practice for the welfare of pigs advise avoiding surgical castration and consider the use of analgesia when performed.	The vast majority of the male pig population is made of entire males.



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Let's now have a closer look at the current situation in some European countries, including Europe's biggest players in the swine industry: Spain, Germany, France and the Netherlands.

**Spain** has a history in **raising and fattening entire male boars**<sup>10,19</sup>. Indeed, the Spanish pig production system **mainly relies on the fattening of male boars**. In 2016, 80% of the male pig population was entire males, 15% were surgically castrated and only 5% immunocastrated<sup>10</sup>. Although there is no specific regulatory framework for surgical piglet castration, the latter remaining an isolated option in pig production, Spain has strict animal welfare regulations. Royal Decree 159/2023<sup>27</sup>, published in 2023 and coming into force in 2025, establishes provisions in terms of animal welfare and more specifically pig welfare, by amending previous royal decrees. These provisions are aiming to establish minimum standards for pig protection, with the ultimate goal to **reduce the need for tail docking**, by decreasing animal density on farms and implementing new housing conditions (feeding, water, enrichment of environment, etc) being the main requirements. According to this new animal welfare act, **castration of piglets should not entail any tearing of tissue**. There is no other specific mention with regards to castration of piglets under the age of seven days. If castration or tail docking is carried out after the seventh day of life, it will only be carried out with prolonged anaesthesia and analgesia provided by veterinary personnel. So, there is no legislative measure in Spain to move away from surgical castration without analgesia or anaesthesia; there is no financial compensation from the government either<sup>19</sup>.

In **Germany**, the German Animal Welfare Act, amended in 2013, **prohibits piglet castration without anaesthesia** since January 1<sup>st</sup> 2021<sup>28,29,30,31</sup>. Therefore, German piglet farmers have two options: fattening boars, with or without immunocastration, or surgically castrate piglets under anaesthesia and analgesia. It is worth noting that isoflurane castration was already performed in some German organic farms prior to 2021<sup>32</sup>.

**Two anaesthesia procedures** fulfil these legal requirements<sup>32</sup>. The first option in terms of piglet anaesthesia is for **vets to inject ketamine and azaperone**. The second option is the use of **isoflurane inhalation anaesthesia**, which can be performed by either a vet or another qualified person, which can be a piglet farmer, provided they attended a training, passed an examination and got a certificate attesting their training<sup>29,30</sup>. German pig farmers received a state subsidy for their anaesthetic devices<sup>32</sup>.

It is worth reminding that **isoflurane** has very good muscle relaxant and good hypnotic effects, although only a **weak analgesic effect**. Therefore, it is mandatory to **combine it with a pain relief protocol**. Research shows that it is recommended to administer an NSAID prior to the surgery, to reduce post-operative pain<sup>33</sup>. In 2021, roughly 40% of German sow farmers were castrating piglets under isoflurane anaesthesia<sup>34</sup>. Surgically castrating piglets under isoflurane is more **time-consuming** than other options, however it seems a well-established practice in Germany. Finally, the large scale of inhalation anaesthesia can lead to ecological concern with gases released in the air.

In **France**, since January 1<sup>st</sup> 2022, **piglet castration without anaesthesia is forbidden**<sup>34,35,36,37</sup>. If farmers wish to perform piglet castration surgically, there must be an anaesthetic and pain management protocol put in place. The government has published technical recommendations for local anaesthetic protocols to use, established in consultation with scientists and professional representatives. These anaesthetic protocols recommend using lidocaine (intratesticular injection) although there is no market authorisation for lidocaine for pigs in Europe. According to French law, only veterinarians may perform piglet castration surgeries. By way of exception, and **provided they attended an e-learning training** on surgical piglet castration provided by the French authorities with their vet or keeping their vet informed (they will get a personal certificate of training completion) **as well as a practical training, pig farmers are allowed to perform castration** with local anaesthesia and pain relief on male piglets aged seven days or less. Pig farmers can apply analgesics or local anaesthetics, provided that the dispensing of these drugs is authorized to the public. Only vets can use general anaesthetics. French law also requires from farm owners to appoint a dedicated member of staff trained on animal welfare whose mission will be to raise awareness on animal welfare across the farm and ensure animals are well kept<sup>34,35,36,37</sup>.

Vets and pig farmers are working hand in hand in the process. Vets are here to support pig farmers by helping them define the right anaesthetic and pain management protocol to use, by giving them technical support and training as needed, and by prescribing the relevant drugs. Inspections can be randomly performed in farms to assess process compliance and ensure the highest standards of animal welfare. There is no financial compensation from the government to support the move towards more welfare-friendly protocols for piglet surgical castration.



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In the **Netherlands**, there is a sense of urgency to further work towards the end of piglet surgical castration<sup>19</sup>. In 2007, the Noordwijk Declaration was adopted by a working group consisting of stakeholders from non-governmental organisations and veterinarians, with the intention to improve animal welfare, and where they agreed to abandon surgical castration without pain relief<sup>38</sup>. Since this declaration, surgical castrations were, and still are, usually performed under general anaesthesia (CO2 inhalation)<sup>38</sup>, although 35% of piglets were still surgically castrated without anaesthesia or analgesia in 2017<sup>19</sup>. In recent years, the proportion of entire male pigs raised has significantly increased, reaching 65% of the entire pig population back in 2017<sup>19</sup>. There is no specific legislative measure to ban surgical castration, nor financial compensation from the government. A legislative measure dating from 2014 clearly states that piglet castration should be performed by means other than tearing tissue. If the animal is older than seven days, the procedure is performed under anaesthesia and with additional long-term analgesia<sup>39</sup>.

In the **UK**, the vast majority of pigs are **entire males**. As such, there is no legislative measure banning surgical

castration, nor any financial compensation for pig farmers. However, mitigating pain in the rare occurrence of surgical castration is acknowledged by the British government. As a matter of fact, the Code of Practice for the welfare of pigs<sup>40</sup> clearly states that pig farmers should demonstrate considerate behaviours towards pigs (loading, unloading, transport, etc) and that pig castration “may only be carried out by a veterinary surgeon or, where the animal is aged not more than 7 days, by a person experienced in performing the techniques involved and who is either a person responsible for the animal or a person employed or engaged by such a person to attend to the animal”. Castration is considered a **mutilation**, and it is recommended to **avoid it wherever possible**. The code of practice also states that “it is also advisable that **analgesia is used where pigs less than 7 days old are castrated**, not just where pigs are 7 days of age or older”. British retailers prescribe the standards for pork production via the Red Tractor label, the UK’s largest food and farm standards scheme. Red Tractor champions high quality food and high standards of animal welfare throughout the food production chain.

## Identifying barriers to implement alternatives to piglet surgical castration

Sometimes deeply rooted in local culture and traditions, piglet castration is a painful and stressful procedure that has been performed for centuries in many European countries. There is not one single alternative to piglet surgical castration: local alternatives in European countries remain strongly dependent on the structure, scale, cost and quality orientation of their own production systems<sup>38</sup>. As a result, piglet castration protocols are not harmonised across Europe, and efforts to ban surgical castration in 2018 have not paid off.

One of the main obstacles<sup>10</sup> to reach the goals of the Brussels declaration are **economic considerations**: with the currently available methods, the cost of combined anaesthesia and analgesia is too high for conventional production systems in most countries<sup>5</sup>, especially in the absence of any governmental financial compensations. Other hurdles to consider<sup>10</sup> are the **additional workload caused by using anaesthesia and analgesia products, the lack of practical and effective anaesthetic and analgesic protocols that can be implemented by farmers, the lack of acceptance of entire male pigs** by the European and global market, the **risk of**

**boar taint in pork meat and welfare considerations** associated with raising entire male pigs. The **duration of the procedure** is also crucial to consider, as it would appear it is an important factor in the strength of the stress response<sup>41</sup>.

While it has so far not been possible to complete end piglet castration, it is clear that as long as piglet castration is still performed in many countries, there is a crucial need for pain management that is safe, efficacious and easy to use by farmers.

Ultimately, the piglet surgical castration situation in Europe results from a **conflict** between **high standards of animal welfare** on one hand and the reality of **farm practice** on the other hand. Depending on local traditions and production systems, various alternatives to piglet castration without anaesthesia and analgesia have been implemented; however, much remains to be done to consistently improve animal welfare, especially in countries where surgical castration is still performed. In such countries, the pork industry is waiting for new, alternative solutions to **efficiently mitigate pain** associated with piglet surgical castration.



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