

Answers to the questions asked prior to and during the webinar organized by IPEMA on 15th September 2020

What are the most important learnings from this IPEMA group on Alternatives Piglet Castration?

Are we ready for the alternatives or is there something missing?

The Cost action IPEMA [1] has made it possible to bring together experts and stakeholders on alternatives to piglet castration. In some countries, but also sometimes only in some production systems within a country, alternatives have been used for years. In other countries, the application of pain control and/or anesthesia in castration, the production of intact boars, or the application of immunocastration is still completely unfamiliar. In addition, knowledge throughout the chain is sometimes limited. A great deal of knowledge can therefore be gained by those who already apply alternatives and by bringing together and translating scientific knowledge into practical solutions. This network made it possible to exchange views and knowledge from all over Europe on nutrition, welfare, genetics, reduction and detection of boar taint, meat quality and the attitude of consumers and stakeholders towards the various alternatives. The results were presented in a webinar held on 15th September 2020 and are published in a special issue of *Animals* [2]

Management strategies can be applied to manage uncastrated male pigs. Housing them in stable groups with sufficient space and natural enrichment helps to reduce behavioral problems, also preferably separate from female pigs to prevent unwanted early pregnancies. Selection, nutrition and management strategies help to reduce the incidence of boar taint at farm level. Sensory detection of boar taint by “the human nose method” is successfully used in a number of slaughter plants across Europe and instrumental detection methods are coming. Meat that is less suitable for fresh meat consumption due to unusual odor can to a certain extent be sustainably used in processed products provided that appropriate measures are taken. Besides boar taint, some other challenges may rise for meat quality for entire male pigs, due to differences in fat quantity and quality. Feeding pigs with adjusted diets will often also solve the fat quality problem. But this will not be enough for systems targeted to dry-cured products, which may have to use fatter pigs. Increasing intramuscular fat content by selective breeding or nutrition is advisable and will contribute to alleviate the toughness issue. If the vaccination is well applied, meat from immunocastrates does not have any major meat quality issue. The delay between 2nd immunization and slaughter is a convenient tool to obtain the desired compromise between performance and meat quality. Despite often raised concerns, the results of the IPEMA consumer survey suggest that informed consumers do well accept immunocastration (71% vs 32% for surgical castration without pain relief). Acceptability of entire male pigs was lower (50%), but a higher acceptability can be anticipated if boar taint free meat can be guaranteed on the market.

IPEMA scientists' preliminary results indicate that selection against unwanted behaviors is possible, but there is still a long way to go. Sensory detection of boar taint has its weaknesses and thus heavily relies on a good selection and training of human assessors. Instrumental methods that measure the key boar taint compounds are under way. What remains open is how to develop effective ways to provide consumers with unbiased, evidence-based, information. But moreover, the question remains why most of the European pork chains are reluctant to use immunocastration.

Do boars have a better growth due to the higher efficiency?

They grow very efficient, but they don't grow faster, because their higher feed efficiency is compensated by a lower daily feed intake.

Are male pigs more susceptible for tail biting?

To our knowledge there is no systematic study done on tail biting and there are no indications based on the observations made that this is more a problem with entire male pigs. This is a general problem, related to space and enrichment. The recommendations for housing entire male pigs are very similar to those that to avoid tail biting.

Is there research done about the difference of boar taint in different genetics?

Several studies have explored differences between breeds, and between lines within breed, on boar taint levels. [3]. In short, sire lines exhibit less boar taint than the dam lines, with particularly low levels observed in the Pietrain. Duroc tend to have higher androstenone levels and Landrace higher skatole levels.

Are breeding efforts made against boar taint and aggression?

Some breeding companies are selecting against boar taint, based on results of the candidate boars, or based on slaughter house results. This is mainly in sire lines, because this is easier. For aggressiveness, there is currently not so much done. More information is available at [3].

What is the influence of slaughter age on boar taint?

Entire male pigs usually do not exhibit boar taint until they start the process of sexual maturation. Therefore, within the usual range of age and weight at slaughter, the older the animals are, the more likely they are to exhibit boar taint. However, there are many other important factors that determine boar taint: breed, lines within breed, feeding, housing conditions, season, etc. Moreover, within a population of animals of the same age, breed, feeding and housing conditions, in the same farm, there is a huge variation between animals. Therefore, the relationship between incidence of boar taint and age is very weak, even if it is clearly positive within the usual range of age and weight at slaughter.

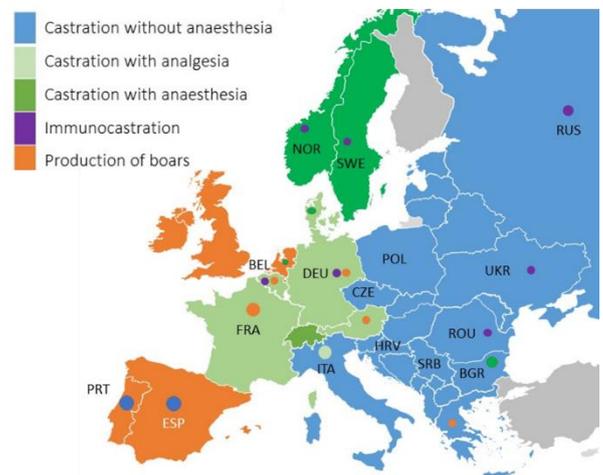
Is it not important for all pig meat (male and female) to have a detection on the slaughter line to avoid unusual smells?

It can be important, because it will help to keep consumers to like pork. For the moment, we are ready for detection of boar taint and it is needed mainly in entire male pigs because it is one of the most important off-odor. We can do it by means of "Human nose", which is a sensory analytical evaluation carried out by panelists trained to detect boar taint. This has been used for several years in some slaughter plants in Western Europe. One can also perform skatole detection as it has been done for a long time in slaughter plants in Denmark. Now it will be possible to chemically analyze androstenone and skatole (system LDTD-MS/MS) automatically (automation developed by DTI, the Danish Technical Institute). But are all off-odors due to boar taint? Probably not. We would need to work more on these other off-odors to know more about them and how important they are.

Regional differences in the application and attitudes of the alternative for surgical castration

The map indicates the current situation in Europe, with the background color indicating the main male pig production method and the dot indicating the additionally applied methods.

Based on the recent IPEMA study [4], which was exploratory (>175 respondents per country), it is not possible to draw strong conclusions. In general, it can be seen that acceptance of a certain practice is higher if it is the current method of male production. E.g the acceptance of the practice of surgical castration without pain relief is higher in the Eastern European countries, while acceptance of surgical castration with anesthesia is higher in Northern European countries.



How much do processing plant's interest in certain type of carcass influence the uptake of alternatives to surgical castration (entire males or immunocastration)? How can we change that?

The processing plant's interest in certain type of carcasses has a large influence on the uptake of alternatives. A few examples. If the main target product(s) are very lean and consumed cold (for instance cooked ham), entire male production is very appealing. If dry-cured products are the main target, entire males cannot be considered for quality products because the amount and unsaturation of fat is not adequate. The delay between second immunization and slaughter in immunocastration, is a convenient tool to adjust the production to the clients' need; 2-3 weeks are enough to get rid of boar taint and could be sufficient for lean products that do not need a long processing time. 5-6 weeks will be better adapted for dry-cured products. Of course, the fact that the various cuts are used for different products is a difficulty and a compromise has to be found. Surgical castration with pain relief is not sustainable in the long range for the main stream production; it can however be a long term solution for some chains where entire males cannot be considered and immunocastration is considered as conflicting with the values of the chain.

What about the acceptability of consumers of Third Countries, which are an important part of our European destinations for export?

IPEMA was not involved in studies about the acceptability of the various alternatives in third countries. It is claimed that Asian markets are very reluctant towards entire males because people there are considered to be more sensitive to boar taint. Immunocastration seems to be well accepted in South America. It seems likely that large exporters have conducted their own studies, but they are kept confidential.

It is not easy to differentiate between entire male pigs and immunocastrates. How can this be done before/around slaughter.

At slaughter, the difference between immunocastrated male pigs and entire male pigs can be observed based on the difference in testes size and the difference in behavior, so less sexual and less aggressive behavior. Due to this difference in behavior, also a lower frequency of skin lesions can be observed at the slaughter line for immunocastrates compared to entire male pigs. On average, testes size is also smaller for immunocastrates than for entire male pigs, but individually, some immunocastrates and entire males can have similar testes size. Differences in the size of accessory sex glands (particularly the seminal vesicles) are more striking and there is much less overlap in the distribution than for testes size, but it is not easy to observe these glands on a slaughter line. These differences in behavior, skin lesions and testes size are especially clear at batch level, less easily at individual level.

There are issues with fat quality and quantity in entire male pigs. Is this also the case for immunocastrates?

This is indeed not really an issue for immunocastrates. The fatty acid composition of adipose tissue can be easily changed by adapting the diet. By adapting the PUFA content of the diet, significant changes in the PUFA content of the adipose tissue can be observed within 2 weeks. Also the transition of metabolism from boar-like to castrate-like is relatively fast, including fat content and fatty acid composition. Therefore, the fat composition of immunocastrates can be altered towards that of barrows after the second vaccination. Some studies evaluating the interval between the second vaccination and slaughter show that the fatty acid composition is intermediate between boars and barrows 4-5 weeks after the second vaccination and similar to that of barrows when this time period is 7 weeks or more. The changes also depend on fat depot and anatomical location (i.e. the fastest in intramuscular fat and the slowest in jowl and withers subcutaneous fat).

Is immunocastration a suitable alternative for organic pork production?

Does IPEMA have some work done or a position regarding the use of immunocastration in organic farming?

There is discussion about immunocastration and its compliance with the organic farming. What is your opinion about it and do you think immunocastration should be allowed in organic farming?

Immunocastration is a vaccination against an endogenous regulatory hormone and therefore does interfere with the natural process of sexual maturation. However, this interference is less drastic than with surgical castration. Surgical removal of the testes is not reversible. Immunocastration is reversible, meaning that sexual maturation is delayed but not prevented. Animals can experience some stress during the vaccination process, but this has to be compared with the pain during surgical castration without pain relief. We are not aware of any study that compared the stress during the vaccination with the stress imposed by surgical castration with pain relief.

The vaccine should not be classified as a hormone-like substance since it has been demonstrated to have no hormonal activity. Studies that have been conducted on the safety of the vaccine did not provide any indication of risk for the consumer. Finally, our results show that 80% of the consumers readily accept immunocastration when informed on the procedure. Based on the currently performed studies, acceptability of immunocastration by consumers of organic pork is comparable to that of consumers of regular pork.

To conclude, there is, in the present state of knowledge, no science-based evidence preventing the use of immunocastration in organic pig farming.

How can you communicate with the consumer?

Lots of butchers do not trust in the method of immunocastration. And the pork supply chain did not force this alternative. How can we improve communication strategies to support sustainable and animal friendly methods in pork production?

In general, we see that the acceptability of immunocastration is high, at around 70% in our study, compared to only 32% for surgical castration without anesthesia. Consumers may have concerns about immunocastration, but this can also be the case for the current practice, in terms of animal welfare.

Regarding immunocastration and food safety, there are no clear indications that giving more information or using different terminology strongly affects consumer perception based on the studies that are currently available.

As seen in the study that was discussed earlier during the presentations, we can see that consumer's acceptability of the methods is strongly based on the impact on animal welfare. Also taste is an important aspect. So it can be relevant to emphasize the positive aspects when communicating about immunocastration. Preferably, this information is given in an easy to understand and graphic format to keep the message clear for the consumers.

Is there a difference in acceptability between consumer and farmers towards the different alternatives, for regular and organic pig production?

The main difference in acceptability that we saw in our study [4] was that for surgical castration without anesthesia. This practice is much more accepted by the farmers (61%) compared to the consumers that are not involved in agriculture (27%). For the alternative methods, the acceptability is very comparable. More information about the acceptability by the different stakeholders can be found in [4].

Concerning the acceptability of the alternatives, do you have more information concerning the link between the age of the consumer and the acceptability?

In general, it is seen that younger consumers are more concerned about animal welfare, but also that they are less aware of the practice of surgical castration.

What are the costs associated with immunocastration versus surgical castration with anesthesia for farmers

For both methods, costs include consumables (analgesic and anesthetic drug or the 2-3 doses of vaccine) and labor to administer the drugs with additional labor to perform the surgery must be added in the case of surgical castration. Total costs will depend on local market situation, local labor costs and local regulations and will therefore vary between countries and regions. Complete prevention of the pain associated with surgical castration needs both anesthesia during surgery and analgesia for a few days after surgery which is costly both in terms of consumables and labor. Anesthesia with CO₂ is cheap but does not prevent pain in a satisfying manner. If anesthesia has to be performed by a vet, it will be much more costly than immunocastration done by the farmer. Immunocastration. The cost of performing immunocastration or surgical castration with anesthesia+analgesia is not enough for a complete economic evaluation of the two methods. Comparatively to surgical castration without pain relief, surgical castration with anesthesia+analgesia only add costs, whereas immunocastration adds cost but also economic advantages in terms of savings on feed cost and added value in carcass composition. The economic advantage of immunocastration is less and less with increasing delay between 2nd immunization and slaughter.

Will the results from the 100.000 Eber Program be published?

The 100 000 immunocastrated male pigs program is a private initiative independent from the Cost action IPEMA.

Improvac was launched in the EU in 2009. Why is uptake so slow, while consumer acceptance isn't a problem?

Most, although not all, retailers and pork chains in Western Europe consider that immunocastration cannot be considered, under the assumption that consumers do not find it acceptable. Our survey shows that informed consumers readily accept immunocastration. The issues are 1) What kind of information should be provided to the consumers and 2) how should this information be relayed to the consumers. Regarding item 1 on the kind of information, it has to be objective, science-based and evidence-based and not try to conceal the fact that immunocastration is interfering with the sexual maturation process, although to a lesser extent than surgical castration which is not reversible. Item 2 on how to relay the information is a very difficult issue that has not received a satisfactory answer so far. More work is needed in this respect.

In Switzerland, Improvac was approved by the authorities 2 years before it was approved in the EU. Despite showing/proving that consumers, if well informed, would accept the new technology as a suitable alternative to surgical castration, retailers did not want to take any risks and said "no" to immunocastration. So, the Swiss compromise was to keep surgical castration, now with anesthesia and pain relief (performed by the farmers after getting a 1 day course). The advantage for the industry was that no changes in the slaughter line was necessary.

Is it not important from an animal welfare point of view that the animals stay intact? And can a third vaccination help to deal better with the problems in meat quality?

One has to distinguish between the issues of naturalness and welfare. Regarding naturalness, intact males are better than immunocastration because there is no interference with the natural process of sexual maturation. On this respect, immunocastration, which is reversible, is better than surgical castration which is not reversible.

Regarding welfare, immunocastrates, after the 2nd vaccination, are much quieter than intact males, less aggressive and do not exhibit mounting behavior. There is also no penis biting anymore. Therefore immunocastration is an easy way of avoiding welfare issues related to sexual maturation. However, intact males can enjoy good welfare provided that husbandry conditions are adapted to their specific behavior and behavioral needs [5].

A third vaccination is needed when the animals are reared to higher weight, resulting in a very long delay between second vaccination and slaughter. There are indeed indications that immunocastration effects are reversible. Also a third vaccination is recommended for individual animals that continue to exhibit sexual and aggressive behavior after the 2nd immunization, showing that they failed to answer properly to the vaccination.

Are there perspectives about a EU real law-enforced regulation towards the ban of surgical castration without pain relief?

Some countries outside the EU (e.g. Norway, Switzerland) have enforced laws banning it, and some EU countries (e.g. Germany) are considering to do the same. The EU usually provides declarations/recommendations that will or will not be implemented into national legislation. Until now, the position of the EU has been to encourage voluntary actions from the stakeholders to abandon surgical castration without pain relief [6].

What are the arguments against surgical castration with anaesthesia as long term solution?

This method is less interesting regarding both economy and resource efficiency. Production of surgically castrated male pigs is less efficient compared to the production of uncastrated male pigs. Besides, the application of anesthesia brings extra costs. It is also not easy to effectively prevent pain during the procedure as well as during the days after castration. Also stress during this procedure should be avoided, as well as side effects afterwards (in case of general anesthesia). There are also practical and legal issues. Not all drugs are yet allowed for application during surgical castration or can be applied by the farmer. This situation currently varies between countries. To conclude, castration with anesthesia is complex and each of the possible methods has pros and cons. Some good review papers can be consulted to learn more about this alternative [7-9].

Have your experts considered and explored the possibility of using opioids during surgery + relay by other molecules for post-operative management (see castration of horses and other domestic animals). This is because, according to the bibliography and research into available molecules, apart from these opioids, no other injectable active ingredient has the capacity to alleviate type III pain. The bibliography also mentions these products in animal experiments (surgery on pigs in particular) and for interventions on wildlife. Given the regulatory obstacles to be overcome (MRL – maximum residue limit- and others), this avenue should be explored for the cases of “some quality products”... and other “small” productions.

The use of opioids is regulated and might not be licensed for this indication in some countries. In terms of effectiveness, opioids have been tested for pain relief in piglets. Butorphanol, an opioid with sedative and analgesic properties has been considered as unsuitable because of its side effects. The application of Butorphanol alone or in combination with Meloxicam seems to be inefficient for pain relief. See relevant papers [10-14] for more information.

Did you identify if certain alternatives are better suited for smaller/bigger farms? How do you assess the influence of the farm structure in the different Member States and regions thereof? What are the challenges with respect to coordinate actions along the food chain (because none of the actors can decide completely independent of the others)?

Complete prevention of the pain associated with surgical castration needs both anesthesia during surgery and analgesia for a few days after surgery. Surgical castration with anesthesia+analgesia can be quite sensitive to farm size if sizeable investment has to be done (e.g. gas anesthesia) and/or if the anesthesia has to be performed by a vet. In both cases, the cost per pig will be less in bigger farms. The same holds for immunocastration if it is not performed by the farmers themselves. In other cases where no large investment is needed and farmers can do everything by themselves, surgical castration with anesthesia+analgesia and immunocastration should not be very sensitive to farm size. The cost of restructuring pens (more space, escape zones) and separating males from females for a good management/welfare of entire males is likely lower in bigger farms.

It can be assumed that the comparative interest of the various alternatives depends on the farm structure in the different Member States and regions. IPEMA is not aware of any published study devoted to this issue.

Processing industry and retailers have the final say in determining which alternative should be chosen. Still, a concerted action of all actors along the supply chains is critical to implement alternatives. Surgical castration with anesthesia+analgesia results in extra costs at farm level. Depending on the delay between 2nd immunization and slaughter, immunocastration results in more or less benefits (down to zero in case of long delays) at the levels of farm and slaughter house. Entire males bring a benefit at farm level (reduction of feeding costs, higher selling price of carcasses) and for processors of lean products. But they result in higher costs in slaughter house (on line control of boar taint, lower value of tainted carcasses, trimming and disposal of genital tracts) and for the processors of dry-cured products. It is critical that the extra cost and/or benefits associated with any alternative are distributed in a fair way among the various actors of the pork chains. In the case of entire males, on line assessment of boar taint is meaningless if no effort is done at farm level to reduce the incidence of boar taint.

What about pig production in third world countries or poorer countries? Will they castrate in future or not? Is boar taint a huge issue there?

Very little is known on third world countries or poorer countries. In most of those countries, animal welfare is not an issue and surgical castration without anesthesia will likely go on for a long time where boar taint is an issue. The better efficiency of entire males may entice the abandonment of castration where boar taint is not an issue.

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