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PIGCAS
Attitudes, practices and state of the art
regarding piglet castration in Europe

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Report on recommendations for research and policy support

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|--|---|---|
| Dissemination Level | | |
| PU | Public | X |
| PP | Restricted to other programme participants (including the Commission Services) | |
| RE | Restricted to a group specified by the consortium (including the Commission Services) | |
| CO | Confidential, only for members of the consortium (including the Commission Services) | |

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86 **Objectives**

87 To integrate the information collected within objectives 1, 2 and 3 of the PIGCAS project in order
 88 to elaborate elements of support to EU policy:

- 89 • Recommendations for future research with prioritisation of the various topics to be investigated
 90 • Elements of support regarding the relevance of changes in the legislation.
 91

92 **Expected results**

- 93 • Recommendations for research with prioritisation based on an integrated view of the scientific
 94 and socio-economic context;
 95 • Support for EU policy on legislation regulating the practice of castration.
 96

97 **How was this document elaborated?**

- 98 • A first draft of the document was written by the PIGCAS co-ordinator and circulated to the
 99 PIGCAS core group of participants (end of August 2008).
 100 • A second draft was then elaborated and circulated (3 October 2008) to the PIGCAS core group,
 101 to the national contacts, and to a group of members of the international stakeholder platform,
 102 who accepted to participate in a meeting (see below).
 103 • The second draft was discussed during a two day meeting held in Paris on 8-9 October 2008.
 104 • The results of the discussion were used to elaborate a third draft, which was circulated to all
 105 participants in the Paris meeting (16 December 2008).
 106 • The final draft was then prepared.
 107

108 **Summary of the main results obtained in PIGCAS**

109 ***Reminder of the work performed to fulfil PIGCAS specific objectives 1, 2 & 3***

110 Reminder of PIGCAS specific objectives:

- 111 ○ Objective 1: to collect information on the attitudes of relevant stakeholders;
 112 ○ Objective 2: to collect information on the practice of pig castration;
 113 ○ Objective 3: to evaluate research work and other information, in order to examine the various
 114 alternatives to surgical castration without anaesthesia and derive research
 115 priorities;

116 Three working packages were defined, each corresponding to one of the above mentioned
 117 objectives. WP1 (Attitudes) and WP2 (Practice) were conducted in parallel during the year 2007.
 118 Under the supervision of regional co-ordinators, national contact people conducted interviews of
 119 stakeholders they had identified in their respective countries. The collected information was
 120 integrated at the international level to derive common trends and regional variations in attitudes and
 121 practice, as well as potential clashes of interest between the categories of stakeholders.

122 The various stakeholders which were interviewed within WP1 were distributed among the
 123 following 7 categories:

- 124 ✓ ConsRet Consumers, Retailers
 125 ✓ WelfaNGOs NGOs animal welfare
 126 ✓ ProdNiche Pig producers (niche)
 127 ✓ UpChain Upstream pork production chain (Pig Producers mainstream, Feed Companies,
 128 Breeding companies)
 129 ✓ GovAdmin Public, Government, Administration
 130 ✓ DownChain Downstream pork production chain (Slaughterhouses, Meat Industry,
 131 Wholesalers)
 132 ✓ Vets Veterinarians (commercial)

133 The collected information was used as an input for an international stakeholder seminar which took
 134 place in Noordwijk am Zee (Netherlands) in 2007. It was also used, together with other available
 135 resources, in WP3 (Evaluation) which evaluated the available information on alternatives to
 136 surgical castration from various perspectives (attitudes, practice, welfare, pork quality, resource
 137 efficiency and economy). Scientists were invited in a WP3 integration meeting, which took place in
 138 Girona (Spain) in March 2008, to discuss a draft report on evaluation.

139 The results obtained from WPs 1, 2 and 3 are available in the following documents, which can be
 140 downloaded from the PIGCAS website:

141 <http://w3.rennes.inra.fr/pigcas/index.htm> (login: eurocas ; password: pig0708)

| Document: | Click on: |
|-----------|--|
| • A | Deliverables → Final report on "attitudes" |
| • B | Deliverables → Report on the International Stakeholder Seminar |
| • C | Deliverables → Report on the practice of castration |
| • D | Deliverables → Final report "Evaluation" |

142 Another important document is the EFSA report AHAW/04-087 on “welfare aspects of the
 143 castration of piglets”, which will be referred to as Document E. It can be downloaded from the
 144 EFSA website <http://www.efsa.europa.eu>.

145 Elements from the above-mentioned documents have been taken as information support for the
 146 statements of the present report. They are presented in the Appendix and referenced with A, B, C, D
 147 or E, followed by page number in the document.

148 **Limitations to the results**

- 149 • The survey on attitudes was obtained from interviews of stakeholder representatives selected by
 150 the national contacts.
 - 151 ○ stakeholder attitudes were not ascertained directly, only indirectly. Indeed, people were
 152 asked to respond on behalf of their organisations, not as individual persons;
 - 153 ○ the extent to which the selection of stakeholder organisations within each country was really
 154 representative of the country’s situation cannot be ascertained;
 - 155 ○ the distribution of the various stakeholder categories across countries was not balanced;
 - 156 ○ the number of representatives in the ProdNiche category was very low and the
 157 corresponding results should be considered with much care.
 - 158 ○ no distinction was made between solutions which can be readily implemented (possibly after
 159 some feasibility studies) and solutions which require basic R&D before implementation. It
 160 seems likely that most stakeholders answered in a short term perspective.
 - 161 ○ The survey reflects the attitudes of the stakeholders at the moment when it was performed
 162 (2007). These attitudes may have changed since that time.
- 163 • Because of the relatively low number of participants, the opinions expressed during the
 164 International Stakeholder Seminar should not be considered as fully representative of the
 165 European stakeholder views.
- 166 • The results regarding the practice of castration were also obtained from a limited number of
 167 organisations selected by national contacts. The accuracy and representativeness of the figures
 168 they provided cannot be ascertained. It may be argued that some of the interviewees might have
 169 given answers that are socially acceptable and politically/legally correct rather than the truth.

170 **Extent of the practice of castration and interactions with other painful husbandry**
 171 **practices**

172 *Male pigs*

173 The conclusions below are supported by information presented in the appendix, section 1.1.

- 174 • Most of European male pigs are presently castrated.
 175 ○ Castration is rare in UK and Ireland;
 176 ○ A minority proportion of male pigs are castrated in Portugal, Spain, Greece and Cyprus;
 177 ○ A significant minority proportion of male pigs are left entire in Poland;
 178 ○ Entire male production is rare in the remaining countries.
- 179 • From these figures it can be estimated that 99 millions male pigs are castrated each year in the
 180 EU. They represent 79 % of the 125 millions male pigs which are slaughtered annually.
- 181 • In the “mostly castrating” countries, entire male pig production comes predominantly from
 182 animals culled from performance testing stations. However, there are a few instances of
 183 production systems which have built an image on banning castration (e.g. “Milieukeur” in the
 184 Netherlands).
- 185 • Organic pigs are mostly castrated, excepted in UK.
- 186 • Age at castration varies a lot between countries. In a number of them, a significant proportion of
 187 the animals are castrated after 7 days of age.
- 188 • Age at castration can be very variable within country. Particularly there are non-conventional
 189 systems in France, Portugal and Spain where castration is performed at a much higher age than
 190 in conventional systems.
- 191 • Castration is most often performed by the farmers themselves. There are some countries
 192 however, especially in the Eastern part of Europe, where castration is performed by a vet or by a
 193 specialised person. The case of Norway is particular since anaesthesia performed by a vet is now
 194 mandatory.
- 195 • Excepted for Norway, where it is now mandatory, anaesthesia is used seldom (Lithuania,
 196 Slovakia, Hungary, Poland) or very rarely at best (all remaining countries).
- 197 • Iron injection, teeth resection and tail docking are most commonly performed before or at the
 198 same time as castration.
- 199 • Vaccination, ear tagging and tattooing are most commonly performed after or at the same time as
 200 castration.

201 *Female pigs*

202 There were only two reports of female castration, one in Spain and one in Portugal. Because the
 203 procedure is prohibited by EU regulations, it is likely that people are reluctant to deliver any
 204 information on it. It may therefore be speculated that the real extent of female castration in Europe
 205 is higher than suggested by these two reports.

206 ***Convergences and clashes of interest between the different categories of*** 207 ***stakeholders***

208 *Convergences*

209 The conclusions below are supported by information presented in the appendix, sections 1.2 and 2.

- 210 • There is a general agreement that animal welfare is an important issue and **practical**
 211 **alternatives** to surgical castration without anaesthesia **should be developed and enforced as**
 212 **soon as they are viable**. UpChain stakeholders are however not unanimous on that.
- 213 • Except for WelfaNGOs, **stakeholders state they are very concerned about costs and pork**
 214 **quality**, they consider that extra costs associated with alternatives to surgical castration without
 215 anaesthesia should be passed to the consumer rather than paid by the farmers, although they do
 216 not consider improved animal welfare as sufficient ground to raise the price of pork.

- 217 • **Surgical castration with anaesthesia** (currently technically feasible) and sperm selection
 218 (currently not feasible) appear as **the most consensual alternatives** to surgical castration
 219 without anaesthesia. **Vaccination to control boar taint** (Immunocastration) **was poorly rated**.
 220 **Entire male pig production was also rated poorly**, except by WelfaNGOs and the UK.
 221

222 *Clashes of interest*

223 The conclusions below are supported by information presented in the appendix, sections 1.2 and 3.

- 224 • The **major conflict of interests** appears between **WelfaNGOs** and the other stakeholders.
 225 Compared to other stakeholders, WelfaNGOs:
 - 226 ○ put more emphasis on animal welfare, which is, in their eyes, a sufficient criterion to
 227 increase pork price;
 - 228 ○ clearly put castration associated pain before safety risks from possible residues in the meat;
 - 229 ○ do not give so much importance to costs and quality;
 - 230 ○ reject castration without anaesthesia much more unanimously;
 - 231 ○ have a much higher acceptance of entire male production, particularly on the ground of
 232 naturalness;
 - 233 ○ do not mind whether the farmers or the consumers pay for the extra cost associated with
 234 anaesthesia or vaccination to control boar taint;
- 235 • The clash of interests is the most important between **WelfaNGOs** who want to stop castration
 236 without anaesthesia at once and ban castration as soon as possible and **UpChain** stakeholders,
 237 among which a large proportion would like to keep things as they are, at least until better
 238 solutions are available.
 239

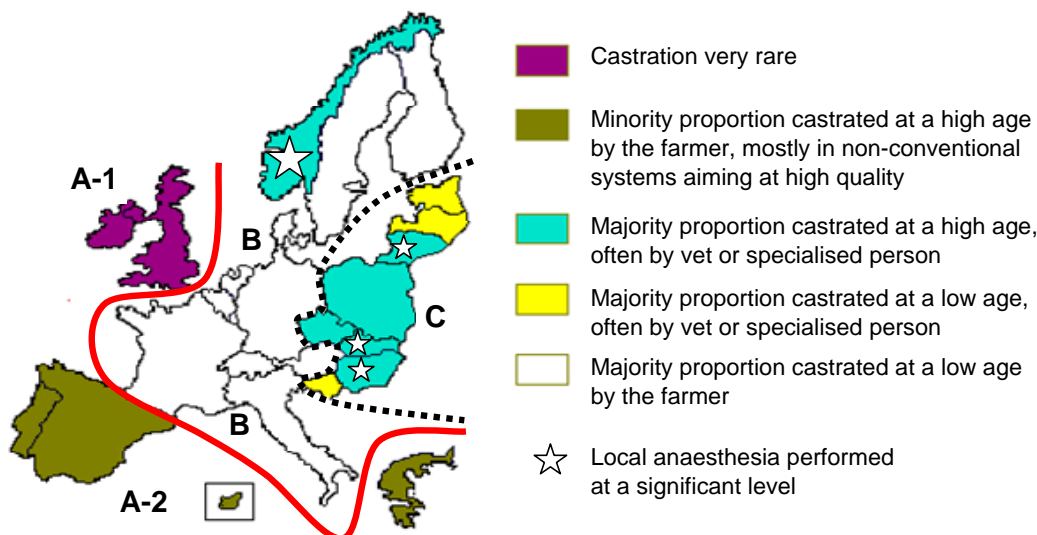
240 *Regional variations in attitudes and practice*

241 *Regional variations in practice*

242 See above, section on Extent of the practice of castration.

- 243 • Both the extent of castration and age at castration:
 - 244 ○ varies widely between countries.
 - 245 ○ can also vary within country, according to production systems.
- 246 • In most countries the castration is performed by the farmer. However, in Norway (where
 247 anaesthesia is now mandatory) and in a number of eastern countries, castration is most often
 248 performed by a vet or a specialised person.

249
 250 Map of the regional variations regarding piglet castration in Europe



- 254 • A tentative synthesis of the regional variations is presented in the map above.
- 255 ○ Region A: West of the solid red line, a minority proportion of male pigs are castrated.
- 256 ✓ A-1: In UK and Ireland, castration is very rare, whatever the production system;
- 257 ✓ A-2: In Spain, Portugal, Greece and Cyprus, a minority proportion of male pigs are
- 258 castrated. Local anaesthesia is very rare. Results obtained in the inventory of pork
- 259 production systems performed within the EU funded project Q-Porkchains show
- 260 that, at least in Spain, the castrated males correspond to the production of Iberian
- 261 pigs (in extensive and intensive conditions) and to some of the males in intensive
- 262 conventional production systems (for the production of high quality fresh meat or
- 263 high quality products).
- 264 ○ Region B: In between the solid red line and the dotted black line, a majority proportion of the
- 265 male piglets are castrated by the farmer at a low age (most under 7 days). Local
- 266 anaesthesia is never or very seldom (< 2%) used.
- 267 ○ Region C: East of the dotted black line, most of the pigs, or at least a significant part of them,
- 268 are castrated by a vet or a specialised person. Age at castration is higher in the
- 269 countries where local anaesthesia is performed at a significant level (12 to 30%).
- 270 ○ Norway is a special case in that castration under anaesthesia by a veterinarian is now
- 271 mandatory. Before 2002, the situation in Norway was similar to that observed in
- 272 region B.
- 273 • Considering EU countries only, the distribution of slaughtered pigs in the various regions can be
- 274 estimated as follows:

| Region | Total slaughtered pigs* | | Castrated male pigs | |
|--------|-------------------------|---------------|---------------------|---------------|
| | % | Millions/year | % | Millions/year |
| A-1 | 5 % | 11.8 | 0.1 % | 0.1 |
| A-2 | 19 % | 46.9 | 7 % | 7.0 |
| B | 58 % | 146.3 | 73 % | 71.8 |
| C | 18 % | 45.3 | 20 % | 20.1 |
| Total | 100 % | 250.4 | 100 % | 99.0 |

275 * On the basis of figures obtained from FAOstat for 2007.

276

277 *Regional variations in attitudes*

278 The conclusions below are supported by information presented in the appendix, section 4.

- 279 • Attitudes differ widely according to countries.
- 280 ○ In those countries **where castration is very rare** (region A-1 as defined above), the various
- 281 stakeholder categories more or less **agree on** being more concerned with welfare than eating
- 282 quality, and therefore on **supporting the banning of castration**. The number of
- 283 representatives per category is however very low and this statement should therefore be
- 284 considered with much care.
- 285 ○ In the remaining countries, there is clearly a **conflict of interest** between WelfaNGOs and the
- 286 other stakeholder categories, particularly with UpChain stakeholders. The Netherlands seems
- 287 to be an exception in supporting a general ban on castration without anaesthesia, which is
- 288 presently by far the most common practice in this country. Conversely, there is no such
- 289 consensus in Spain where more than two thirds of the pigs are left entire.
- 290 • It was commonly expressed during the stakeholder seminar that the **perception of the problem**
- 291 **varies largely** between countries and that solutions to avoid surgical castration without
- 292 anaesthesia may **not necessarily be the same** in the various European countries.

293 ***Attitudes towards surgical castration without anaesthesia and its alternatives***

294 The conclusions below are supported by information presented in the appendix, sections 1.2 and 5.

- 295 • **Surgical castration without anaesthesia** is clearly **rejected by WelfaNGOs**. Other
296 stakeholders acknowledge that it is not ideal but can live with it. Particularly a large proportion
297 of the **UpChain** stakeholders are willing to **stick with it**. They are however **prepared to accept**
298 **alternatives**, provided that there is no extra cost or extra risk for them.
- 299 • A clear consensus was obtained during the stakeholder seminar that, among the possible
300 **solutions** for avoiding surgical castration without anaesthesia, some can be **readily**
301 **implemented** (possibly after feasibility studies) while others **require basic R&D** before
302 implementation.
- 303 • **Surgical castration with anaesthesia** is thought to be a good solution which can be readily
304 implemented. **WelfaNGOs** are **more supportive** than other stakeholders, particularly **UpChain**
305 stakeholders. Still **WelfaNGOs** would **prefer** to leave **male pigs intact**.
- 306 • **Vaccination to control boar taint** is perceived as a possible **solution which could be**
307 **implemented shortly**, even though it was not very highly ranked by stakeholders. **WelfaNGOs**
308 are **more supportive** than other stakeholders. Still they would **prefer** to leave **male pigs intact**.
- 309 • **Entire male** production is by far the best solution for **WelfaNGOs**. There is a **general**
310 **consensus** among stakeholders that this is the solution to be envisaged on the **long run** in
311 countries where entire male pig production is currently not common, **provided that** a solution
312 can be found to **fix the boar taint problem** (this, of course, does not apply to situations where
313 entire male pigs are already common).
- 314 • Stakeholders see **sperm sorting** as a good solution for the **long term**; they acknowledge
315 however that it is **not feasible** at present.
316

317 **Strengths and weaknesses of the alternatives to surgical castration without**
 318 **anaesthesia**

319 **Surgical castration with anaesthesia**

320 The conclusions below are supported by information previously presented in this document (referenced as WP1 or WP2) and in the
 321 appendix, section 6.1.
 322

| SURGICAL CASTRATION WITH ANAESTHESIA | Strengths | Weaknesses |
|--------------------------------------|---|--|
| Attitudes | <ul style="list-style-type: none"> • Somewhat consensual; regarded as a possible solution which can be readily implemented (WP1). | <ul style="list-style-type: none"> • WelfaNGOs quite supportive, but they prefer entire male production. UpChain stakeholders less supportive, ConsRet and DownChain in between (WP1). |
| Practice | <ul style="list-style-type: none"> • Local anaesthesia practised on a large scale in Norway (WP2). • Equipment for general anaesthesia available | <ul style="list-style-type: none"> • Local anaesthesia seldom, very seldom or never used in countries other than Norway (WP2). • More time consuming, particularly general anaesthesia. • Possible risks to people and piglets (general anaesthesia). • May require veterinarian or trained personnel. |
| Animal welfare | <ul style="list-style-type: none"> • Reduce pain at castration. • No increased mounting and aggression. • General anaesthesia allows other painful procedures to be performed while the animal is anaesthetized. | <ul style="list-style-type: none"> • Local anaesthesia: <ul style="list-style-type: none"> - possible increase in pain and inflammation after castration. • General and local anaesthesia: <ul style="list-style-type: none"> - increasing doubts on the efficacy to reduce pain and overall net welfare benefit under large scale commercial applications. |
| Pork quality | <ul style="list-style-type: none"> • Same quality as traditional castrates. • No boar taint. | |
| Resource efficiency and economy | | <ul style="list-style-type: none"> • Additional costs not counterbalanced by improved performance. • Local anaesthesia performed by the farmer: <ul style="list-style-type: none"> - production costs increased by 0.1-0.3%. • General or local anaesthesia performed by a vet: <ul style="list-style-type: none"> - production costs increased by 0.9-1.6%; - additional costs very sensitive to farm size (see figure 14 in appendix, section 1.3); - not economically feasible in small farms. |

323 As shown in figures 15 and 16 in section 1.3 of the appendix, the scientists who participated in the
 324 WP3 integration meeting acknowledge that anaesthesia improves animal welfare comparatively to
 325 surgical castration without anaesthesia. However, they do not see it as easy to put into practice,
 326 have some doubt on the welfare benefits for the animal in real life operations, and perceive it as not
 327 economical. Moreover they do not foresee improvements in the future.

328 *Vaccination to control boar taint*

329 The conclusions below are supported by information previously presented in this document (referenced as WP1 or WP2) and in the
 330 appendix, section 6.2.
 331

| VACCINATION TO CONTROL BOAR TAIN | Strengths | Weaknesses |
|---|--|--|
| Attitudes | <ul style="list-style-type: none"> • Regarded as a possible solution which could be implemented shortly (<i>WP1</i>). | <ul style="list-style-type: none"> • Poorly rated by all stakeholders in the survey. WelfaNGOs more supportive, but they prefer entire male production (<i>WP1</i>). • Acceptability of vaccination by the public poorly known. |
| Practice | <ul style="list-style-type: none"> • Registered in 23 non EU countries, including Switzerland. • Has been performed for up to ten years in a few countries, particularly in Australia and New Zealand. | <ul style="list-style-type: none"> • Registration in the EU submitted but not accepted at time of report (<i>WP2</i>). • Possible concern about safety for the operator. • More handling is required as vaccination has to be performed twice. |
| Animal welfare | <ul style="list-style-type: none"> • Pain and discomfort of castration is avoided. • No or little mounting and aggression once effective. | <ul style="list-style-type: none"> • Up to the second immunisation, the animals behave like entire males (mounting and aggression). |
| Pork quality | <ul style="list-style-type: none"> • Absence of boar taint in most of the animals. • Other quality traits mostly intermediate between castrates and entire males. • Studies performed so far suggest that it is well accepted by consumers. | <ul style="list-style-type: none"> • Some animals may escape vaccination, because they have been improperly injected or have no immune response to the vaccine. • Whether pork from vaccinated pigs should be checked for the absence of boar taint remains to be determined. • Possible concerns of consumers. |
| Resource efficiency and economy | <ul style="list-style-type: none"> • Additional costs counterbalanced by improved performance. • Reduced output of nutrient in the manure. • Production costs are lower than for castrates in some countries. | <ul style="list-style-type: none"> • Production costs higher than for castrates in some countries. • If sorting of tainted meat from non-responding pigs is needed, additional costs will result (detection cost + lower value of sorted out carcasses). |

332 As shown in figures 15 and 16 in section 1.3 of the appendix, the scientific experts who participated
 333 in the WP3 integration meeting perceive vaccination to control boar taint much better than surgical
 334 castration with anaesthesia. They see it as improving animal welfare to a greater extent, easier to put
 335 into practice and more economical. They do not foresee improvements in the future.

336 *Entire male production*

337 The conclusions below are supported by information previously presented in this document (referenced as WP1 or WP2) and in the
 338 appendix, section 6.3.
 339

| ENTIRE MALE | Strengths | Weaknesses |
|---------------------------------|--|--|
| Attitudes | <ul style="list-style-type: none"> • Generally perceived as the best long term solution, provided that, in situations where entire male pigs are currently not common, the boar taint problem is fixed (WP1). • Currently accepted by more or less all stakeholders in UK and Ireland (WP1). | <ul style="list-style-type: none"> • WelfaNGOs very supportive, but other stakeholders reluctant (WP1). • The consensual support in UK and Ireland has to be linked with the fact that all stakeholders seems to be more concerned with animal welfare and costs than with quality. This is different in the other countries where stakeholders other than WelfaNGOs are very keen on pork quality (WP1). |
| Practice | <ul style="list-style-type: none"> • Labour for castration, perceived as unpleasant, avoided. • Has been a common practice in some countries for more than 40 years (WP2). | <ul style="list-style-type: none"> • Is a very rare practice in most of the countries (WP2). • May require different management practices in countries where producers are used to raise castrated males. |
| Animal welfare | <ul style="list-style-type: none"> • Pain and discomfort of castration is avoided • Risk of castration-associated infection avoided. | <ul style="list-style-type: none"> • Increased aggressiveness and mounting behaviour has to be dealt with using management techniques which are not yet fully established. |
| Pork quality | <ul style="list-style-type: none"> • Increased nutritional value due to lower fat content and more unsaturated fatty acids. | <ul style="list-style-type: none"> • Boar taint. • Soft fat. • Increased frequency of lesions on carcasses and DFD (Dark, Firm, Dry) meat has to be dealt with using management techniques which are not yet fully established. |
| Resource efficiency and economy | <ul style="list-style-type: none"> • Reduced production costs from: <ul style="list-style-type: none"> - avoidance of castration labour; - better feed efficiency; - higher growth rate. • Reduced output of nutrient in the manure. • In some countries, leaner carcass results in higher value. | <ul style="list-style-type: none"> • Reduced killing out percentage results in lighter carcasses. • In most countries carcasses from entire males are paid less. • Genetic selection (when feasible) and husbandry practice to reduce boar taint will have a cost. • Sorting out of tainted carcasses (when feasible) will have a cost dependent on cost of detection, percentage of sorted-out tainted carcasses and extent of the depreciation of tainted carcasses. |

340 As shown in figures 15 and 16 in section 1.3 of the appendix, the scientific experts who participated
 341 in the WP3 integration meeting consider that pork quality is by far the dominant problem associated
 342 with the production of entire male pigs. They are quite confident that solutions will be found in the
 343 future to fix the boar taint problem and that the attitudes of the public will improve as a
 344 consequence.

345 **Sperm sorting**

346 The conclusions below are supported by information previously presented in this document (referenced as WP1 or WP2) and in the
 347 appendix, section 6.4.
 348

| SPERM SORTING | Strengths | Weaknesses |
|----------------------|---|---|
| Attitudes | <ul style="list-style-type: none"> • Perceived as a good long term solution, provided that it is feasible (<i>WP1</i>). | <ul style="list-style-type: none"> • Acknowledged as not feasible presently. • Might be perceived as interfering with naturalness (even if not apparent in WP1 results). |
| Practice | | <ul style="list-style-type: none"> • Not feasible presently. • Will probably never be 100% effective • Depending on effectiveness, a system for dealing with male pigs will still be needed. |
| Animal welfare | <ul style="list-style-type: none"> • Pain and discomfort of castration are avoided. Comparatively to entire males, increased aggressiveness and mounting behaviour are also avoided. | <ul style="list-style-type: none"> • Possible pain and health disorders in sows with intrauterine insemination. |
| Pork quality | <ul style="list-style-type: none"> • No boar taint if 100% effective, otherwise reduced incidence of boar taint. • Pork from females is well accepted. | |

349 As shown in figures 15 and 16 in section 1.3 of the appendix, the scientific experts who participated
 350 in the WP3 integration meeting consider that sperm sorting could be a very good solution for the
 351 future, although they acknowledge that there are still many difficulties to be solved.

352

353 ***Most promising alternatives to surgical castration without anaesthesia***

- 354 • Surgical castration with anaesthesia and vaccination to control boar taint appear as solutions
 355 which can be **readily implemented**, possibly after feasibility studies. They have however a
 356 number of drawbacks:
- 357 ○ anaesthesia can be an economic burden, it is not that easy to put into practice and its welfare
 358 benefits are only partial;
 - 359 ○ vaccination to control boar taint can be controversial, there might be some concern about the
 360 operator’s safety and its cost is highly dependent on whether vaccinated animals will have to
 361 be screened for taint or effectiveness of castration.
- 362 • Entire male pig production is already performed in some countries (region A). For the remaining
 363 countries, entire male production is considered as **a very good solution for the long term**.
 364 Production of entire male pigs on a very large scale is hampered by the existence of boar taint,
 365 although niche markets might be developed, building an image on animal welfare. In region A
 366 there is some concern that the current increase in slaughter weight may augment the incidence of
 367 boar taint in entire male pork.
- 368 • Sperm sorting is also considered as **a very good solution for the long term**. It is however not
 369 currently feasible in commercial conditions in the porcine species.

370 **Recommendations for future research**

371 The recommendations below are supported by the previous sections of the present document and information presented in the
372 appendix, section 7, 9 and 10. The recommendations included in the Opinion of the Scientific Panel on Animal Health and Welfare
373 on a request from the Commission related to welfare aspects of the castration of piglets (Question N° EFSA-Q-2004 - 091) have also
374 been considered (appendix section 8).

375

376 ***Gaps and weaknesses in knowledge that hamper the development of the*** 377 ***alternatives***

378 *Practice*

379 Although not perfect, the PIGCAS survey of practice provides a good overview of the reality of
380 male piglet castration in Europe. However, a few countries have not been investigated.

381 The information gathered on the castration of female piglets is too sketchy to be considered as
382 reliable. Because EU regulations prohibit castration of female pigs, it is no surprise that a good
383 appraisal of the reality cannot be obtained from spontaneous declarations. **The extent of female pig**
384 **castration in the EU, and the procedures used to perform it, will have to be investigated in**
385 **some other way.**

386

387

388 *Attitudes*

389 The work performed within the PIGCAS project may be considered as a first approach of the
390 position of stakeholder representatives towards surgical castration without anaesthesia and its
391 possible alternatives. Indeed, people were asked to answer on behalf of their organisation. The
392 PIGCAS results probably give a reasonably accurate view of the main convergences and conflicts
393 of interests between the various stakeholder categories, at the overall European level. Because of
394 the limitations of the work, the appraisal of regional differences in stakeholder attitudes is probably
395 not accurate enough.

396 The main missing information is about:

- 397 • **Attitudes of real stakeholders**, particularly citizens, consumers and farmers;
- 398 • The **existence and extent of the conflicts of interests at national level**. The PIGCAS results
399 suggest that they might be less important in the UK, where castration has been stopped a long
400 time ago, than in the other countries;

401

402 The international stakeholder seminar was a first attempt to have the different stakeholder
403 categories try to figure out and understand their differences in views, and how they could be worked
404 out. Not surprisingly, no overall agreement was reached and the positions of the various stakeholder
405 categories, particularly WelfaNGOs and UpChain, are still far apart from each other and may seem
406 irreconcilable. There was however a general consensus on the following points:

- 407 - More or less **everyone** acknowledged that animal welfare is important and **is prepared for**
408 **changes, provided that these changes do not threaten market positions**, particularly
409 regarding consumer demands and competitiveness.
- 410 - There is also a general consensus on the fact that **some solutions can be readily implemented**,
411 subjected to feasibility studies, whereas **the implementation of other solutions is subjected to**
412 **expected breakthroughs** in knowledge, know-how and technological developments. No
413 consensus was reached on whether or not the solutions that can be readily implemented should
414 be subjected first to **feasibility studies**.

415

416 *Surgical castration with anaesthesia*

417 Surgical castration with anaesthesia (general or local) is generally well accepted and the general
418 view is that anaesthesia reduces pain during castration and therefore could be a good solution which
419 can be readily implemented. However,

- 420 • There are **increasing doubts** on the real **welfare benefits** brought by **anaesthesia** when
421 performed under **commercial conditions**. Is pain alleviation really obtained in all animals?
- 422 • **Long term pain and discomfort** after the few hours when anaesthesia is effective are **not dealt**
423 **with**. Veterinarians and Welfare NGOs insisted on the importance of associating **long term**
424 **analgesia** to anaesthesia, which is short term by definition, to provide longer-term pain relief.
- 425 • The practicality and economic feasibility of castration with anaesthesia is questioned. The
426 additional costs seem to be low when it is performed by the farmers, but they increase
427 considerably if it has to be performed by a veterinarian, particularly so for small scale farms.
428 **Whether or not castration with anaesthesia can be performed by the farmer** is therefore a
429 critical question.

431 *Vaccination to control boar taint*

432 Vaccination to control boar taint was more favourably perceived by the participants in the
433 international stakeholder seminar than by the stakeholders in the survey. During the seminar, there
434 was a general consensus that vaccination might be a good solution, which could be implemented
435 shortly. Of particular interest is the fact that the cost of vaccination can be partially, totally or more
436 than counterbalanced by the economic gains obtained from the improved performance
437 comparatively to surgical castrates. However,

- 438 • There is a general concern about **the acceptability of vaccination to control boar taint by**
439 **consumers and citizens**. The issue could end up as being controversial.
- 440 • There is a real concern regarding the safety of the operators performing the vaccination. Because
441 this is part of the EU registration of the vaccines, it does not need to be further considered in this
442 document.
- 443 • **The proportion of the vaccinated animals** which exhibit boar taint after having **failed to be**
444 **correctly immunised** is still unknown when vaccination is performed under commercial
445 conditions. Any information which could be obtained from Australia, where vaccination to
446 control boar taint has been performed for a number of years, should be considered with caution,
447 given that age and weight at slaughter, hence the incidence of boar taint, are much lower than in
448 most European countries.
- 449 • Whether or not the existence of tainted carcasses in vaccinated pigs justifies that they should all
450 be **checked** in some way **to guarantee** either **efficient castration** or **absence of boar taint**
451 remains to be determined. This is **very critical** for the commercial viability of the technique
452 because fully reliable detection methods do not exist presently and, when they exist, they will
453 have a cost that will impact its economic feasibility. There is a general view that the market will
454 decide whether or not such a check is necessary.
- 455 • Changing the immunisation schedule to obtain **earlier castration** would facilitate screening
456 because the efficacy of vaccination could then be appraised from the sole observation of testis
457 size. This would however **hamper its economic feasibility**, because the cost of vaccination
458 would not be counterbalanced by the economic gains obtained from better feed efficiency and
459 leaner carcass. Moreover a third injection might be needed, which would make the procedure
460 even more costly and less practical.
- 461 • The possibility to **use vaccination to control boar taint in heavy pigs**, typical of some non
462 conventional production systems aiming at very high quality products, is still unknown.

463 *Entire male production*

464 The production of entire male pigs is, by far, the preferred solution for animal welfare NGOs, but it
 465 is overwhelmingly rejected by the other stakeholder categories, with a possible exception in region
 466 A-1, on the ground that the impaired quality of entire male pork may drive consumers away from
 467 buying pork. The international stakeholder seminar resulted however in some consensus that, in
 468 those countries where it is not common, entire male production is a good solution for the long term.
 469 There is indeed an attractive side to entire male production, which is the economical benefit to be
 470 obtained from better feed efficiency and leaner carcasses. Adopting entire male production would
 471 also reduce the output of pollutants in the environment. In most countries however, entire male pig
 472 production cannot be envisaged unless the boar taint problem is fixed, so that the quality of the pork
 473 provided to the consumers can be preserved. There is still a long way to go before this can be
 474 achieved, particularly:

- 475 • There is presently **no satisfactory, internationally accepted, definition of boar taint**, because:
 - 476 ○ There are still some doubts that androstenone and skatole account for all off-odours
 477 associated with entire males. It might be that there are **other compounds responsible for
 478 boar taint**.
 - 479 ○ There is no **internationally recognised model establishing the relationship between
 480 androstenone and skatole levels and consumer dissatisfaction**. This comes from a
 481 number of factors:
 - 482 ✓ **Methods for the measurement of androstenone and skatole levels have not been
 483 harmonised**. As a consequence, measured levels may differ largely according to
 484 methods, particularly for androstenone.
 - 485 ✓ **The sensitivity of consumers to boar taint compounds**, particularly to androstenone,
 486 is known to be **very variable**.
 - 487 ✓ **The procedures for conducting sensory evaluations have not been harmonised**,
 488 although they are known to have a profound impact on the results.
 - 489 ✓ **The perception of boar taint differ to a large extent according to the nature of the
 490 pork product** (fresh vs processed, cold vs hot,) in a not very well known way. The
 491 pattern of pork products is very different between countries.
- 492 • There is presently **no available satisfactory detection method to screen carcasses or pork
 493 joints for taint**.
- 494 • It is known that **tainted pork can be used for processing**. However, the potential of the huge
 495 variety of products and process has not been extensively investigated.
- 496 • There is presently **no available technique enabling the production of boar taint free pigs**.
 - 497 ○ Although a lot of basic knowledge has been accumulated regarding the effect of feeding on
 498 skatole production, **skatole reducing feeds usable in practice remain to be developed**.
 - 499 ○ Although skatole and androstenone are known to be genetically determined, there is still a
 500 **long way to go before selection of boar taint free lines of pigs can be achieved**.
 - 501 ✓ It is known now that the genetic determinism of skatole levels is linked to the capacity
 502 of the animal to degrade it. **More basic knowledge on the key enzymes/genes
 503 governing skatole degradation** in the pig is still necessary to identify reliable **genetic
 504 markers** which could be used for selection.
 - 505 ✓ Whether the genetic determinism of androstenone levels is mostly linked to testicular
 506 production, or peripheral degradation, or both, is presently not known. **More basic
 507 knowledge on the key enzymes/genes governing androstenone levels** in the pig,
 508 without negatively affecting sexual development or performance, is still necessary to
 509 identify reliable **genetic markers** which could be used for selection.
 - 510 ✓ A better knowledge of the **interactions between androstenone and skatole
 511 metabolism** could also lead to most relevant candidate genes.

513 A few countries have been producing entire male pigs on a large scale for the last 30-40 years. The
 514 experience that has been accumulated there regarding the particularities of managing entire male
 515 pigs is certainly useful, but not necessarily sufficient, for defining satisfactory management rules in
 516 situations where slaughter weights are much higher. Lowering slaughter weights is not a realistic
 517 option because this does not prevent boar taint totally and has drastic economic consequences for
 518 the whole chain, as demonstrated by a recent Dutch economic study. The increased level of
 519 aggression and mounting behaviour observed in entire male pigs might represent a greater problem
 520 in the older and more sexually mature boars.

- 521 • How does the **decreased welfare resulting from aggression and mounting** during most of the
 522 fattening period, compare to the decreased welfare resulting from the acute, but relatively short,
 523 pain associated with surgical castration?
- 524 • There is some evidence, which needs to be further demonstrated, suggesting that **aggression and**
 525 **mounting behaviour** can be **minimised via husbandry and management**.

527 *Sperm sorting*

528 Sperm sorting to produce only females would be a very elegant way of solving the problems
 529 associated with entire male pigs, and has been identified as a good solution for the long term. But,

- 530 • **Sperm sorting is currently not feasible at a commercial scale** in the pig species.
- 531 • The **effectiveness** of the method (percentage of female pigs) **is not known** at the moment. If a
 532 sizeable proportion of the piglets will still be males, an alternative for these animals will still be
 533 needed.

535 **Recommendations for future research**

536 The recommendations below are supported by the previous sections of the present document and information presented in the
 537 appendix, section 1.3 (Figures 15 to 19) and sections 9-10.

538 From the discussions held during the PIGCAS international stakeholder seminar, it appeared clearly
 539 that any strategy defined for future research in the field covered by this document should consider
 540 solutions that can be readily implemented and solutions which require R&D developments before
 541 implementation.

- 542 • **Solutions which can be readily implemented**, for which most of the basic knowledge is now
 543 available and which mostly need **feasibility studies**:
 - 544 ○ Surgical castration with anaesthesia and vaccination to control boar taint were identified as
 545 potential solutions. They are not the preferred solutions in the long run because they have a
 546 number of drawbacks (see page 12). If however it turned out that the solutions envisaged for
 547 the long term (see below) could not be implemented for technical or economical reasons,
 548 stakeholders, with the exception of Welfare NGOs, can envisage that surgical castration
 549 with anaesthesia or vaccination to control boar taint might end up as the solutions for the
 550 long term.
 - 551 ○ Entire male production has already been implemented for a number of years in a few
 552 countries. Whether or not the tendency to increased slaughter weights will result in elevated
 553 incidence of boar taint may be a question for the future.
- 554 • **Solutions which need basic R&D before implementation** include sperm sorting and entire
 555 male pig production in countries where it is not currently common.
 - 556 ○ **Sperm sorting** cannot be used presently because it **is not feasible at commercial level**.
 557 Because it is perceived that the technique will not work 100% and that there will be
 558 consequently a sizeable proportion of males that will have to be dealt with, the relevance of

559 investing in such research has been questioned during the Paris meeting (see appendix
560 sections 9.2, 10.2 and 10.3).

- 561 ○ Entire male pig production is the most preferred solution for WelfaNGOs. Yet, in most
562 countries, all other stakeholders are very reluctant to **produce entire males** because they
563 fear that the decreased quality associated with **boar taint** will drive consumers away from
564 buying pork. They are however prepared to abandon castration if a solution is found to
565 ensure that consumers will not be delivered tainted pork. There is **nothing like one single**
566 **solution to boar taint**. Rather an integrated approach is required needing further acquisition
567 of basic knowledge and the development of know-how which represent real industrial
568 challenges.

569

570 It could be tempting to delay research on solutions that cannot be readily implemented until after
571 the feasibility studies for the solutions that can be implemented shortly are completed, hoping that
572 the latter solutions will work fine and so avoid the long term investments. This strategy cannot be
573 recommended because:

- 574 - the readily implementable solutions have their drawbacks (see page 12) and most
575 stakeholders prefer sperm sorting and generalised entire male pig production for the long
576 run;
- 577 - the basic R&D developments required for the solutions which cannot be readily
578 implemented will take a long time and should therefore start as soon as possible.

579

580 The recommendations below are not a comprehensive list of all the research which can be
581 envisaged. Rather it points out the areas that are collectively considered as the most critical. It has
582 to be remembered here that this list has been elaborated by a group of scientists (the PIGCAS core
583 group), taking into account inputs from:

- 584 ○ a larger group of scientists, during a meeting in Girona on March 2008 (Document D). They
585 contributed to document D and were surveyed on their perception of research priorities (last
586 pages of document D + appendix, section 1.3, figures 15 to 19).
- 587 ○ stakeholders on two occasions:
 - 588 ✓ during the international stakeholder seminar held in November 2007.
 - 589 ✓ during a meeting held in Paris on October 2008, of which aim was to discuss a
590 preliminary version of the present document.

591

592 *Overall*

- 593 ● **Investigations on the attitudes** of citizens, consumers and chain actors, particularly farmers, are
594 needed to assess:
 - 595 ○ **the reality of the conflicts of interests** which emerged from the interviews of stakeholder
596 representatives;
 - 597 ○ whether there are **regional variations** in these conflicts.
 - 598 ○ The balance made by consumers between the relative importance they give to welfare
599 considerations (quality of the process) and eating quality of the meat they consume.
- 600 ● Economic studies on the effect of changes in production costs on **competitiveness, market**
601 **flows and international trade**.
- 602 ● The **real extent of female piglet castration** should be investigated with methods other than
603 interviews of stakeholders. It is easy to understand that they are reluctant to say anything about a
604 technique which is officially prohibited in the EU.

605

606

607 *Feasibility studies on solutions which could be implemented shortly*

- 608 • Feasibility studies were given a low degree of priority during the Paris meeting. It is generally
609 felt that such studies should be conducted as pilot field studies rather than experiments in the
610 highly controlled conditions of experimental facilities.
- 611 • The **feasibility of surgical castration with anaesthesia** (general or local) should be studied
612 under commercial conditions. Such studies should include investigations on:
- 613 ○ The **practicality** of performing it in commercial farms, from large scale units with hired
614 personnel to small scale units, from conventional to alternative systems;
 - 615 ○ The possibility that **the farmer can perform it by him(her)self** and the **amount of**
616 **training** that (s)he should receive for being able to do it properly;
 - 617 ○ The **real welfare benefits** obtained from the procedure in such contexts;
 - 618 ○ The **need for analgesia** to deal with long term pain and discomfort following castration;
 - 619 ○ The **economic feasibility** in various situations, from large scale conventional production to
620 small scale alternative systems. In this respect particular attention should be paid to the fact
621 that veterinarian fees can be unbearable for small farms.
- 622 • Although **vaccination to control boar taint** has been used in a few countries for a rather long
623 time, it needs further investigations in the European context:
- 624 ○ Vaccination to control boar taint is a potentially controversial issue. The **acceptability of**
625 **the procedure by consumers and citizens**, including their understanding of it and their
626 possible concerns, should be assessed in studies conducted in total independence from the
627 vaccine manufacturers and the possible differences between countries should be ascertained.
 - 628 ○ The **practicality** and **economic feasibility** of vaccination to control boar taint should be
629 further evaluated, particularly in non-conventional systems.
 - 630 ○ The **proportion of vaccinated animals exhibiting boar taint** after having failed to be
631 correctly immunised should be evaluated. The proportion of non responding animals is only
632 part of the story because the odds for a non castrated animal to exhibit boar taint are very
633 variable according to genetic background of the animal, husbandry and management
634 conditions, including age and weight at slaughter.
 - 635 ○ Depending on the proportion of tainted carcasses, the **need for a systematic screening** of
636 vaccinated animals should be evaluated, on the basis of market demand. Given the absence
637 of at-line or on-line detection method for boar taint, it could be more realistic to screen for
638 the reality of successful castration than for the absence of boar taint.
- 639 • An overall appraisal of the **incidence of boar taint in the various European pig populations**
640 would be very useful. However this cannot be performed seriously unless an agreement on an
641 internationally recognised definition of boar taint has been reached (see below).

642

643

644 *Research priorities on solutions which need basic R&D before implementation*

- 645 • Basic R&D for solutions that cannot be implemented shortly was given a high degree of priority
646 during the Paris meeting, particularly regarding entire male pig production, which was
647 considered as the main goal for the long term in countries where it is not common.
- 648 • Regarding sperm sorting to produce females only, the technology based on specific agglutination
649 of X sperm cells is very promising but there are still a lot of R&D efforts to be invested before it
650 can possibly be used commercially. The expected effectiveness of the method (proportion of
651 males remaining to be dealt with) should be evaluated before large resources are allocated to this
652 research and the relevance of putting a lot of efforts into developing this technique has been
653 questioned during the Paris meeting. New insemination methods will be needed and their
654 possible consequences on health and welfare of the inseminated sows should be evaluated.

- 655 Finally this method cannot be used in systems relying on natural rather than artificial
 656 insemination.
- 657 • In those countries where castration is most commonly used, which account for more than ¾ of
 658 the total EU pig production, entire male pig production cannot be envisaged at a very large scale
 659 unless the **boar taint** problem is solved. There is no unique solution and **an integrated**
 660 **approach** is necessary:
 - 661 ○ Reaching an agreement on an **internationally recognised definition of boar taint**. This
 662 will be obtained via:
 - 663 ✓ **Harmonisation** of the methods for the **measurement** of androstenone and skatole;
 - 664 ✓ **Harmonisation** of the procedures for the **evaluation of the consumer perception** of
 665 boar taint;
 - 666 ✓ Building a **model predicting consumer dissatisfaction** on the basis of androstenone
 667 and skatole levels. Threshold values could be the simplest, but not necessarily the best,
 668 form for this model. Possible differences between countries should be investigated.
 - 669 ○ Developing **on-line detection methods to screen carcasses or pork joints for taint**. To
 670 our knowledge, a number of methods are currently under investigation. The main
 671 prescriptions for the methods are as follows:
 - 672 ✓ High reliability: very low proportion of false negative, low percentage of false positive;
 - 673 ✓ Cost effectiveness: the cost has to be realistic in comparison with the economic benefits
 674 derived from rearing entire males;
 - 675 ✓ Short analysis time in order to deliver the result on time for decision making on the use
 676 of the carcass or joint;
 - 677 ✓ High throughput, able to deal with the flow of carcasses or joints.
 - 678 ○ Screening for taint is useless unless tainted carcasses can be used in some way. The
 679 possibility to use **meat processing** to reduce the residual levels of boar taint compounds and
 680 decrease their perception by the consumer should be extensively investigated.
 - 681 ○ Developing methods and know-how to **reduce the incidence of boar taint** in the animals:
 - 682 ✓ Development of **skatole reducing feeds usable in practice**, on the basis of the
 683 available knowledge.
 - 684 ✓ Definition of strategies for marker-assisted **selection of skatole free and androstenone**
 685 **free lines** of pigs. This includes:
 - 686 ➤ Accumulation of more **basic knowledge on the biological pathways** for the
 687 synthesis of androstenone and for the catabolism of androstenone and skatole;
 - 688 ➤ Identification of the **key enzymes** and of the **corresponding regulatory genes**;
 - 689 ➤ Identification of **QTLs and SNPs** for these genes;
 - 690 ➤ Development of **marker assisted selection programmes**.
 - 691 • Raising older, more sexually mature boars in countries where slaughter weights are higher than
 692 in the current “entire male pig” area may lead to new management problems, particularly in the
 693 case of non-conventional production systems:
 - 694 ○ Investigations should be conducted on how the **animal welfare drawbacks** resulting from
 695 increased aggression and mounting behaviour **compare** with the **animal welfare benefits**
 696 derived from avoiding castration pain.
 - 697 ○ **Management techniques** expected to **reduce aggressive and mounting behaviour** should
 698 be investigated.
 - 699 • Once the above-mentioned scientific and industrial breakthroughs regarding sperm sorting and
 700 entire male pig production have been achieved, **feasibility studies** will have to be conducted and
 701 the accompanying measures to be taken (prescription programmes, training, definition of
 702 marketing labels and strategies, ...).

703

704 **Suggestions for the development of policy initiatives**

705 The recommendations below are supported by the previous sections of the present document and information presented in the
 706 appendix, sections 9-10, particularly section 9.3.

707 ***Current regulation pertaining to piglet castration and entire male pig production***

- 708 • Council Directive 2001/93/EC, amending Council Directive 91/630/EEC laying down minimum
 709 standards for the protection of pigs:

- 710 o Chapter I, General conditions.
 711 In addition to the relevant provisions of the annex to directive 98/58/EC, the following requirements apply:
 712 8. All procedures intended as an intervention carried out for other than therapeutic or diagnostic purposes or for
 713 the identification of the pigs in accordance with relevant legislation and resulting in damage to or the loss of a
 714 sensitive part of the body or the alteration of bone structure shall be prohibited with the following exceptions

715
 716 - castration of male pigs by other means than tearing of tissues.

717
 718 If castration or docking of tails is practised after seventh day of life, it shall only be performed under
 719 anaesthetic and additional prolonged analgesia by a veterinarian.

720 Comment: The regulation regarding the age limit of 7 day has no solid scientific basis and is not
 721 enforced satisfactorily in a number of countries.

- 722 • Regulation n° 854/2004 laying down specific rules for the organisation of official controls on
 723 products of animal origin intended for human consumption:

- 724 o Chapter V: Decisions concerning meat.
 725 1. Meat is to be declared unfit for human consumption if it:
 726 (p) indicates organoleptic anomalies, in particular a pronounced sexual odour;

728 ***Suggestions for development of policy initiatives and relevancy of changes in***
 729 ***regulation***

730 ***Changes in regulation***

731 Council Directive 2001/93/EC, amending Council Directive 91/630/EEC:

732 The overall view is that market forces will drive the agenda forward more effectively than
 733 regulations. The role of changes in regulations should be to remove barriers to market driven
 734 progress while ensuring minimum welfare standard where market will not bring change.

735 A total ban on castration is considered as inappropriate even if most people agree that this should be
 736 the long term goal. It is recognized that there is a need for flexibility in some circumstances, such as
 737 very heavy pigs, extensive systems and very early maturing breeds in some niche schemes.

738 The following changes could be envisaged, once the feasibility studies for the solutions that could
 739 be readily implemented (see above) have been completed:

- 740 • All possible castration methods (surgical castration, chemical castration, vaccination to control
 741 boar taint) should be considered and accounted for separately, according to their specific
 742 consequences on animal welfare. A list of EU-approved methods should be developed by
 743 competent bodies and the producers should be left the choice to select the one which is best
 744 suited to their own situation.
- 745 • Whenever, research has resulted in at least one alternative, which is technically and
 746 economically viable, and brings a real welfare benefit for the animal, regulation should ban
 747 surgical castration without anaesthesia/analgesia for pigs of all ages (the reference to the age of 7
 748 days should be removed).

- 749 • Regulation aiming at making anaesthesia/analgesia mandatory for performing surgical castration
 750 should be considered as soon as possible, whenever:
- 751 ○ a complete appraisal of its feasibility and welfare benefits under commercial conditions has
 752 been performed;
 - 753 ○ a decision has been made on whether the procedure can be performed by the farmer or has to
 754 be performed by a veterinarian (or specially trained person). The decision might depend on
 755 the method used to administer anaesthesia/analgesia.
- 756 • Such regulation on castration with anaesthesia/analgesia should include a list of EU approved
 757 procedures for performing anaesthesia/analgesia, with clear indication of who is agreed to
 758 perform it. If farmers are agreed to perform it, the extent of training they need to receive should
 759 also be defined.
- 760 • Chemical castration should not be authorised unless its safety, efficiency and welfare benefits
 761 have been completely demonstrated.
- 762 • Provided that the vaccine is registered, and that it is found acceptable by citizens and consumers,
 763 vaccination to control boar taint should be considered as one of the possible ways of castrating
 764 male pigs. Description of the conditions under which it can be performed should be included.

765

766 Regulation n° 854/2004 (Chapter V):

767 There is a general perception that the presence of boar taint, even at high levels, does not render
 768 pork meat unfit for human consumption because there is no associated health risk. Therefore:

- 769 • it should be left to the market to decide what the acceptable levels of boar taint are and whether
 770 testing of carcasses for boar taint should be performed;
- 771 • trade barriers on ground of entire males should not be permitted, although price could reflect
 772 taint level if agreed between commercial partners;
- 773 • regulations in the field of meat hygiene should be restricted to laying down the conditions that
 774 are necessary for a fair trade of meat from males left entire or vaccinated to control boar taint.
 775 For that purpose:
- 776 ○ “Sexual odour” should be replaced by “boar taint” which is now a well accepted
 777 denomination.
 - 778 ○ A clear definition of what is boar taint should be given, referring to the compounds
 779 responsible for it.
 - 780 ○ A positive list of agreed methods for the assessment of boar taint should be established.

781 The establishment and enforcement of such regulations cannot be envisaged in the short term. It is
 782 indeed required that an international agreement on the definition of boar taint has been reached and
 783 at least one economically and practically feasible method for measuring boar taint in industrial,
 784 real-life, conditions has been developed (see above section on “Research priorities on solutions
 785 which need basic R&D before implementation”).

786

787 Other regulatory aspects:

- 788 • The regulation should also consider the case of imported pork meat in order to protect against
 789 trade distortion. Ideally, imported meat should be submitted to the same regulations than the
 790 indigenous one, but difficulties with WTO can be expected. A label “produced in accordance
 791 with EU welfare regulations could be considered”.
- 792 • The regulation should also leave the possibility for higher standards in national schemes on
 793 voluntary basis.

- 794 • As a response to WelfaNGOs and ConsRets concerns about the enforcement of regulation,
 795 certification and/or conditions of cross compliance could be envisaged. Other stakeholders
 796 would however like less formality.

797

798 *Development of policy initiatives*

799 A number of ambitious national research projects are currently under way or even already
 800 completed (Norway, Switzerland, Netherlands, Belgium, ...). There is a lot of duplication in the
 801 studies that are performed in the various countries, resulting in a global waste of time and money.
 802 The definition of a research programme funded by the EU would certainly be of great help to
 803 accelerate the whole process. Its aims would be:

- 804 ○ to conduct by itself some of the suggested studies (e.g. international agreement on boar taint
 805 definition, assessment of attitudes, ...) which are international and collective by nature and
 806 could not be performed at national level.
- 807 ○ to have an instigating and co-ordinating role for the remaining studies, encouraging a
 808 rational division of research efforts between countries, hence avoiding unnecessary
 809 duplication.

810 To achieve these goals, the EU programme should be a long one (at least 5 years), with two main
 811 stages.

812 During the first 2-3 years, the programme would work on both short term and long term goals:

- 813 ○ gather and integrate the results of feasibility studies (see above) based on pilot field studies
 814 and instigate new ones where necessary.
- 815 ○ Harmonise the long range studies which are known to need a lot of time (e.g. genetics and
 816 selection) and are presently conducted in a insufficiently coordinated way.

817 At the end of this first stage, an overall evaluation of the results would be made resulting in:

- 818 - proposals for changes in regulation which will encourage the implementable solutions
 819 having the best integrated merit, taking into account the various relevant dimensions,
 820 acceptance, animal welfare, economy and pork quality being the most important ones.
- 821 - re-evaluation of the research strategy for the second half of the research programme, which
 822 will focus more specifically on solutions require a long basic R&D developments.

823

824 Another important initiative would be to encourage further discussion between stakeholders in order
 825 that they can find a way of solving their conflict of interests. This initiative should not be
 826 independent from the research programme. Indeed, as shown during the PIGCAS project,
 827 stakeholders are very helpful in defining research priorities and, conversely, the solutions to their
 828 conflict of interests very often need some progress in knowledge and breakthroughs in techniques.
 829 A good example for that is entire male pig production which currently opposes strongly
 830 WelfaNGOs and actors in the pork production chain, particularly UpChain. This conflict would
 831 totally disappear if the boar taint problem were solved. It is therefore suggested that stakeholders
 832 could be associated in some way to the research programme, at least under the form of participation
 833 in the definition of the project, in mid-term evaluation and in end-evaluation. Ideally they should
 834 form a consortium in charge of organising discussions within them and interacting with the
 835 consortium in charge of the research project. The stakeholder consortium could also have greater
 836 ambitions, for example in agreeing on prescriptions for the development of supply chains building
 837 an image on welfare and relying on entire males, vaccination to control boar taint or anaesthesia. It
 838 could also promote farmer-run professional development schemes with certification of competence
 839 and review curricula for higher education in agricultural and veterinary science. This could come
 840 before the changes in regulation and could nicely complement them. More generally, they could
 841 participate in the implementation of the solutions considered as viable alternatives to surgical
 842 castration without anaesthesia/analgesia.

843

Appendix

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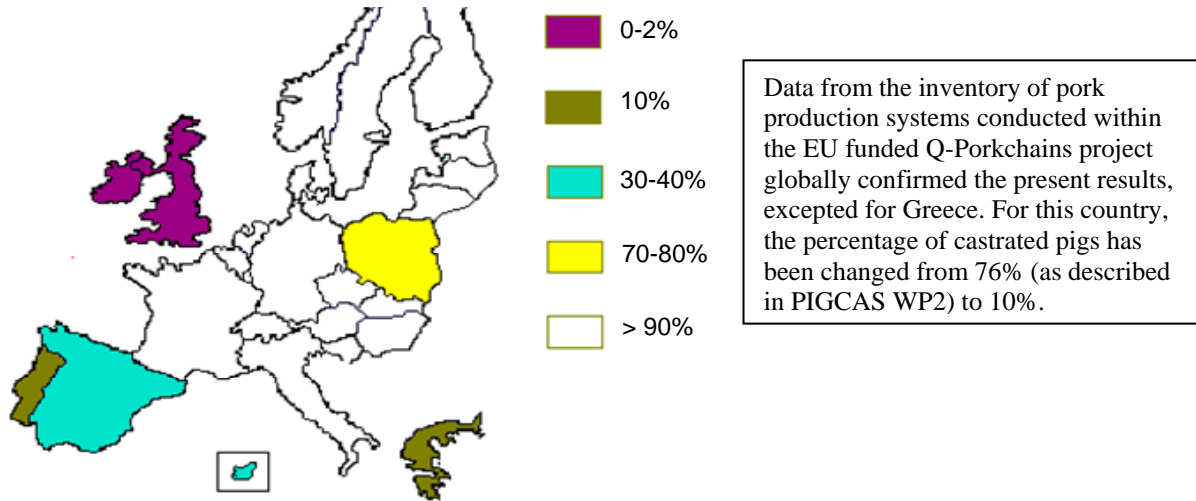
Reference documents

- A PIGCAS final report on attitudes
- B PIGCAS report on the International Stakeholder Seminar
- C PIGCAS report on the practice of castration
- D PIGCAS final report on evaluation
- E EFSA report AHAW/04- 087 on “welfare aspects of the castration of piglets”

51 **1. Figures**

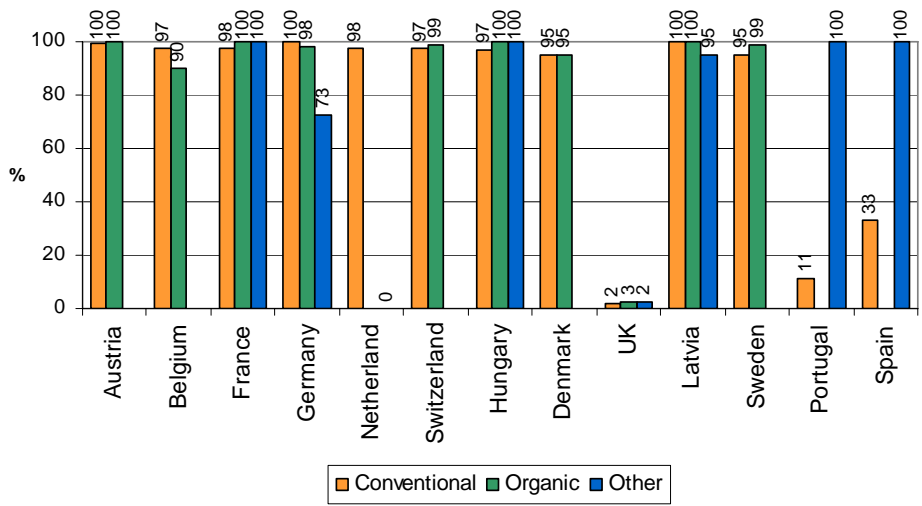
52 **1.1. Figures redrawn from Document C (Final report on practice)**

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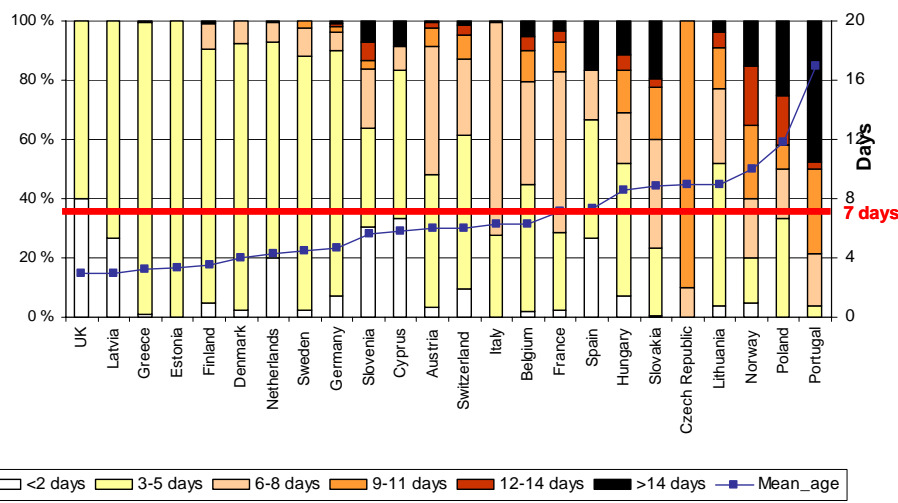
65 Figure 1: Map of the estimated percentage of castrated animals, according to countries

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83 Figure 2: Percentage of castrated animals, according to production system, in various countries

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102 Figure 3: Distribution of the age at castration, according to countries. The blue line is an estimate of the average age in
103 the country. The red line refers to the age limit above which surgical castration is not permitted unless it is
104 performed under anaesthesia.

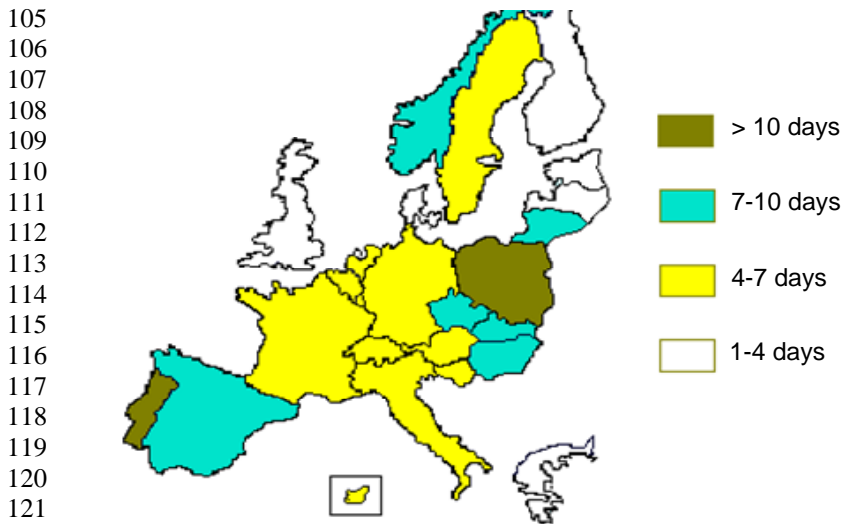


Figure 4: Map of the estimated average age at castration, according to countries

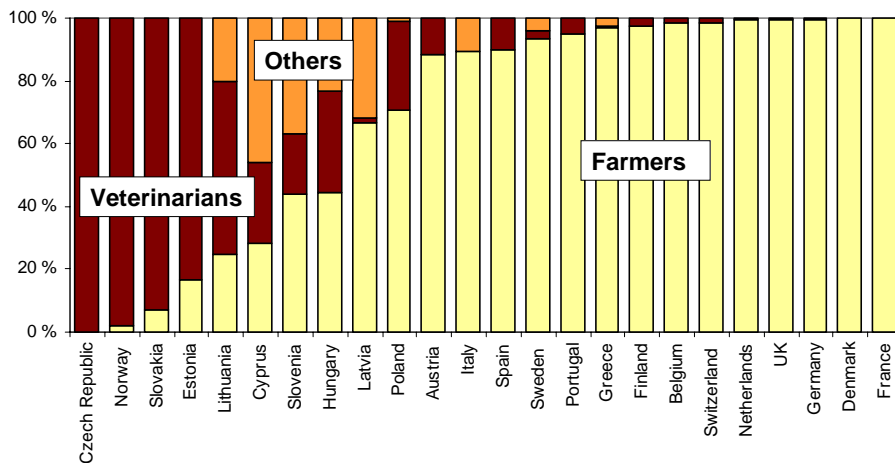


Figure 5: Who performs the castration, according to countries

1.2. Figures redrawn from Document A (Final report on attitudes)

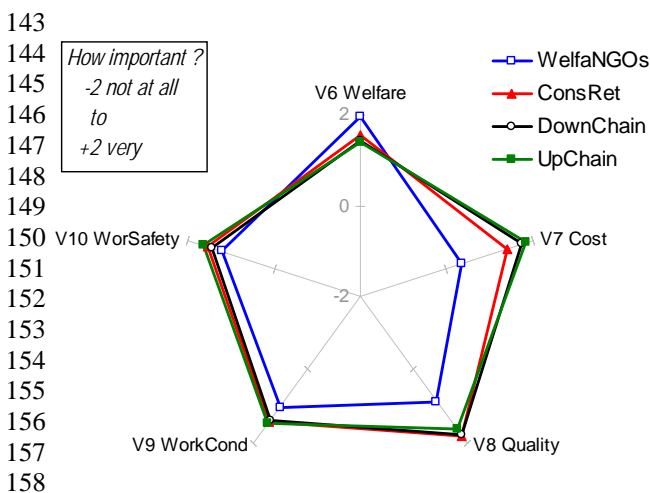


Figure 6: Importance given to different aspects of pig production

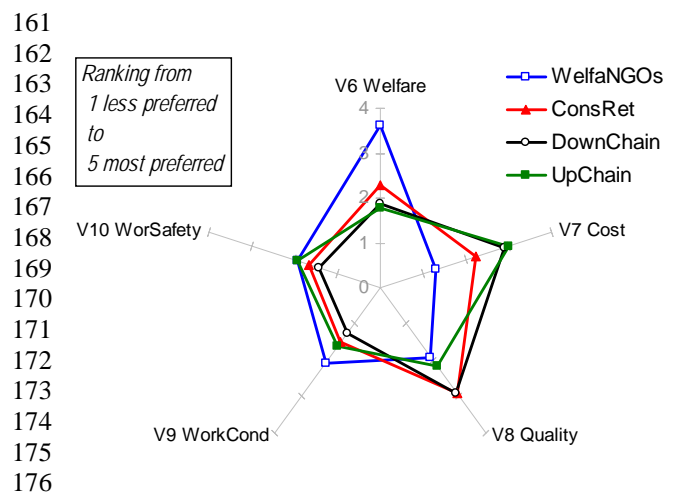
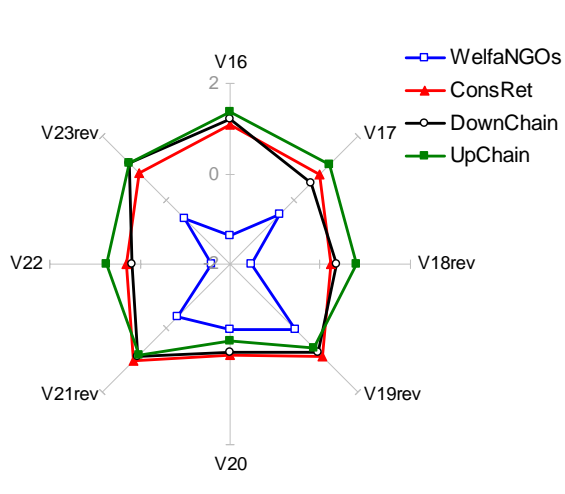
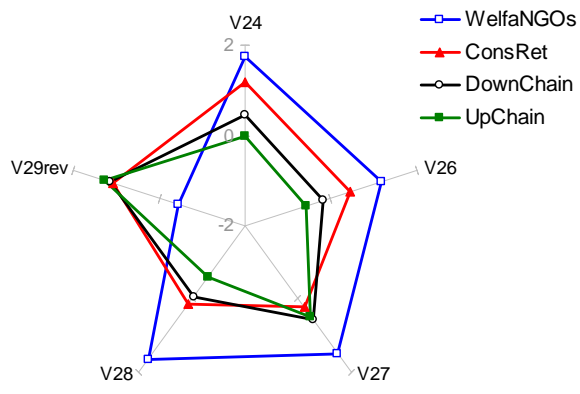


Figure 7: Ranking of the importance given to different aspects of pig production



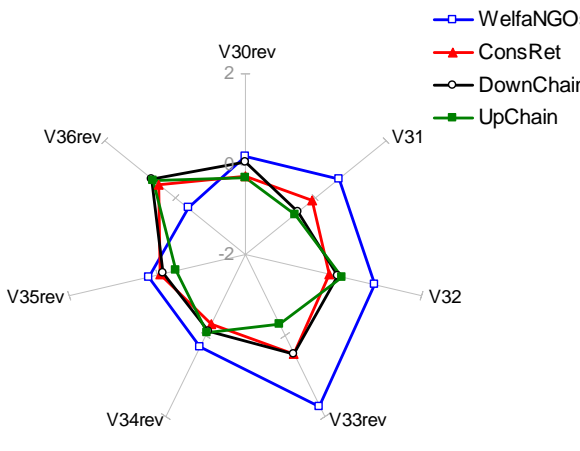
- V16 I would rather have males castrated than have a 10% increase in the incidence of 'off flavour' when eating pork.
- V17 I would rather have males castrated than a high level of aggression and mounting behaviour in pigs.
- V18rev I do not think that castration of male pig is so painful that it should be avoided.
- V19rev I think that male pigs should be castrated although castrates need more resources to be raised and thereby they cost more to be produced.
- V20 It is fair to sell pork from entire males at a lower price than pork from castrates because of the possibility that it is tainted.
- V21rev It is not fair to sell pork from entire males at a higher price than pork from castrates on the ground that avoiding castration is good for the animal's welfare.
- V22 Castration of pigs is a very old practice which is well endured by the animals.
- V23rev I think males should be castrated, even though this changes the natural state of the animal.

Figure 8: Degree of agreement with statements about the alternative “**surgical castration without anaesthesia**” (from -2 “Disagree strongly” to +2 “Agree strongly”. The ratings for some of the statements (V#rev) were multiplied by -1 in order that positive scores always correspond to opinions in favour of the alternative. For easier understanding, the wording of these statements is reversed below compared to the way they appear in document A)



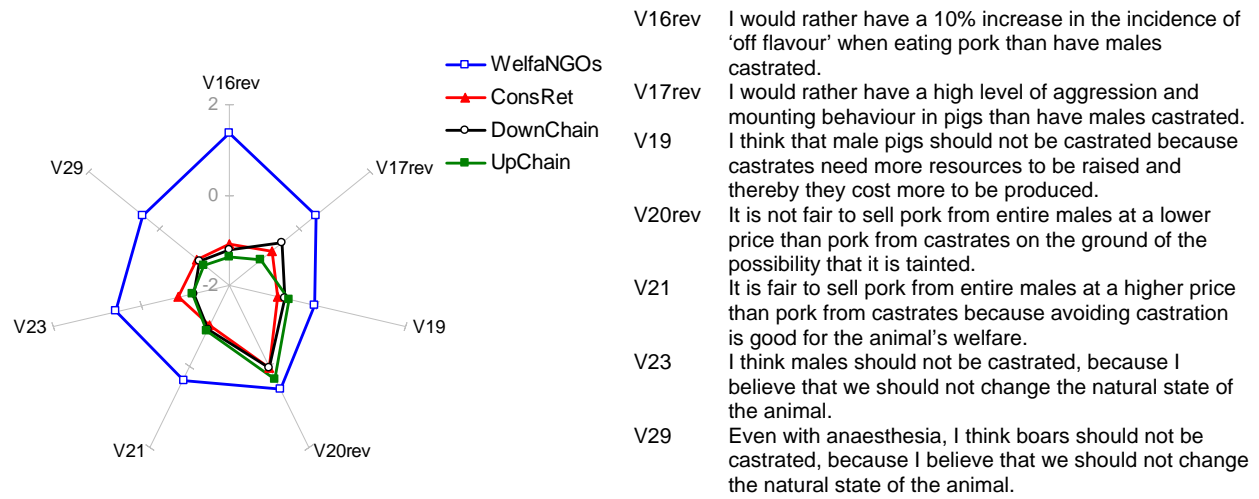
- V24 I think the extra work needed to anaesthetise pigs before castration is worth doing.
- V26 Though pain prevention in castrating the animals entails extra production cost, I think this extra is worth paying by the farmer.
- V27 Pain prevention in castrating the animals will certainly increase the production cost; however, I think the extra cost is worth paying by the consumer.
- V28 I am less concerned with the risk of residues in pig meat when castrated with anaesthesia, than with the idea that the animal has been castrated without anaesthesia.
- V29rev I think boars should be castrated with anaesthesia, even though this changes the natural state of the animal.

Figure 9: Degree of agreement with statements about the alternative “**surgical castration with anaesthesia**” (from -2 “Disagree strongly” to +2 “Agree strongly”. The ratings for some of the statements (V#rev) were multiplied by -1 in order that positive scores always correspond to opinions in favour of the alternative. For easier understanding, the wording of these statements is reversed below compared to the way they appear in document A)

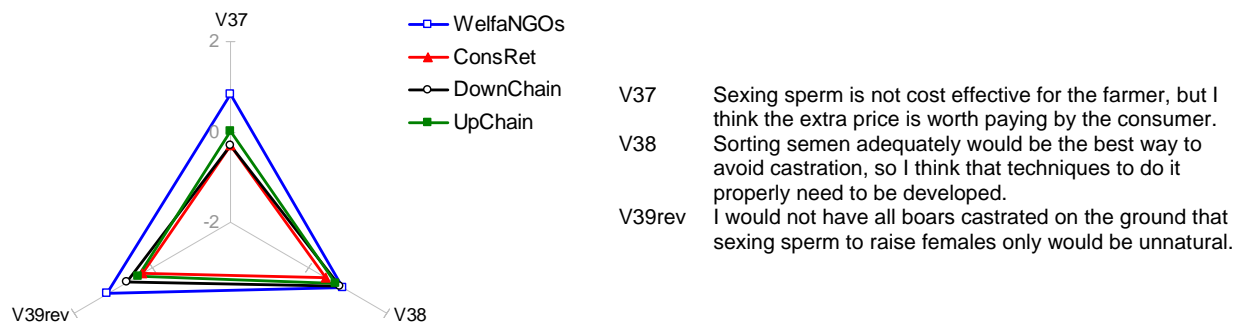


- V30rev I do not think that we should avoid immunocastration as an alternative to surgical castration, on the ground that it could not be done by the farmer without safety risk.
- V31 Immunocastration may entail increase in the production costs; however, I think any extra price is worth paying by the farmer.
- V32 Immunocastration may increase the production costs; however I think any extra is a price worth paying by the consumer.
- V33rev I do not think that we should rather have all boars castrated without anaesthesia, on the ground that immunocastration might affect consumer health.
- V34rev I do not think that we should rather have all boars castrated with anaesthesia, on the ground that immunocastration might affect consumer health.
- V35rev I do not think that we should avoid immunocastration, on the ground that vaccinated males would not all be free of boar taint.
- V36rev I would not prefer farmers to rear entire males, on the ground that immunocastration would be unnatural.

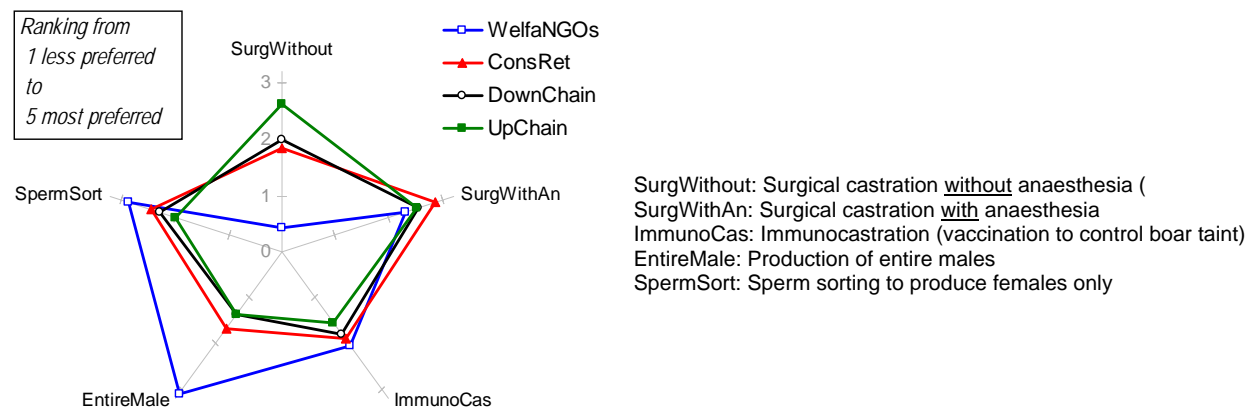
Figure 10: Degree of agreement with statements about the alternative “**Immunocastration (Vaccination to control boar taint)**” (from -2 “Disagree strongly” to +2 “Agree strongly”. The ratings for some of the statements (V#rev) were multiplied by -1 in order that positive scores always correspond to opinions in favour of the alternative. For easier understanding, the wording of these statements is reversed below compared to the way they appear in document A)



277 **Figure 11: Degree of agreement with statements about the alternative “Entire males”**
278 (from -2 “Disagree strongly” to +2 “Agree strongly”. The ratings for some of the statements (V#rev) were multiplied
279 by -1 in order that positive scores always correspond to opinions in favour of the alternative. For easier understanding,
280 the wording of these statements is reversed below compared to the way they appear in document A)
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301 **Figure 12: Degree of agreement with statements about the alternative “Sperm sorting”**
302 (from -2 “Disagree strongly” to +2 “Agree strongly”. The ratings for some of the statements (V#rev) were multiplied
303 by -1 in order that positive scores always correspond to opinions in favour of the alternative. For easier understanding,
304 the wording of these statements is reversed below compared to the way they appear in document A)
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325 **Figure 13: Ranking of alternatives to surgical castration without anaesthesia**

1.3. Figures redrawn from Document D (Final report on evaluation)

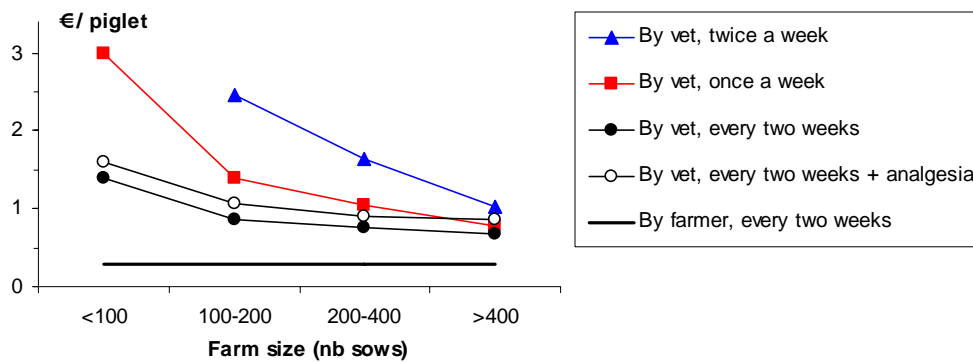


Figure 14: Effect of farm size on the cost of castration with anaesthesia (D 90-91).

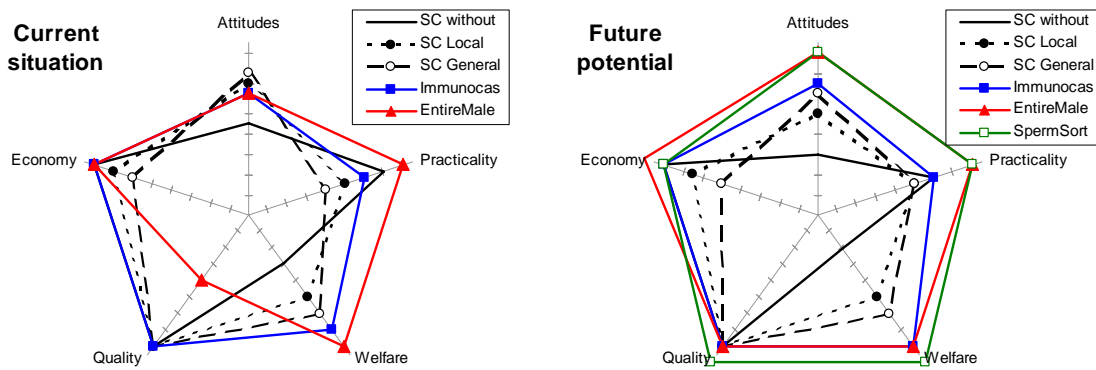


Figure 15: Scoring by scientists of the current situation (left panel) and future potential (right panel) for surgical castration without anaesthesia and its alternatives (D 113-115).

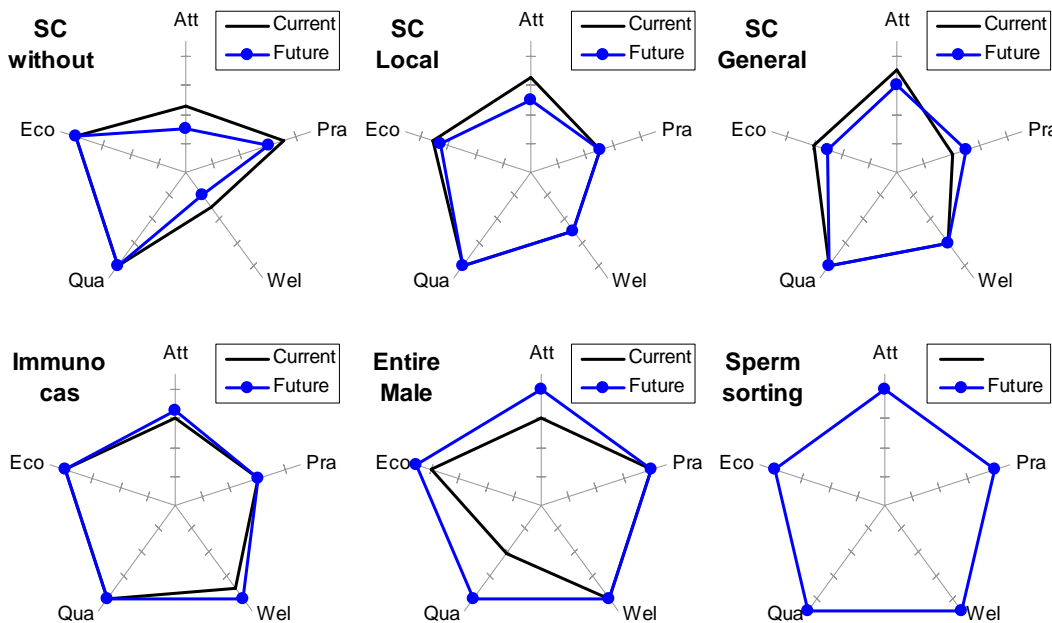


Figure 16: Differences between scorings by scientists of the current situation and future potential for surgical castration without anaesthesia and its alternatives (D 113-115).

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Figure 17:
Distribution of the responses of scientific experts to the question "What is the first limiting factor to current adoption of entire males" (D 117).

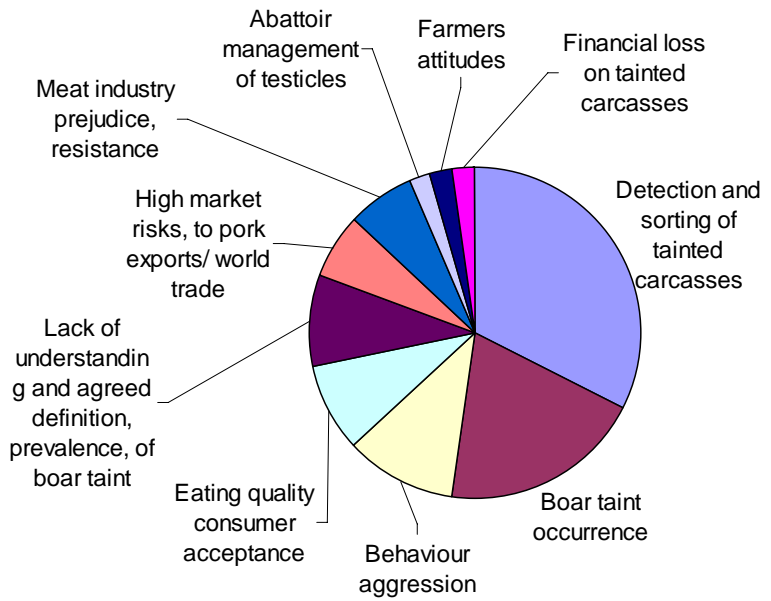


Figure 18:
Distribution of the responses of scientific experts to the question "What is the most important topic for research to allow immediate cessation of surgical castration without anaesthesia/analgesia" (D 118).

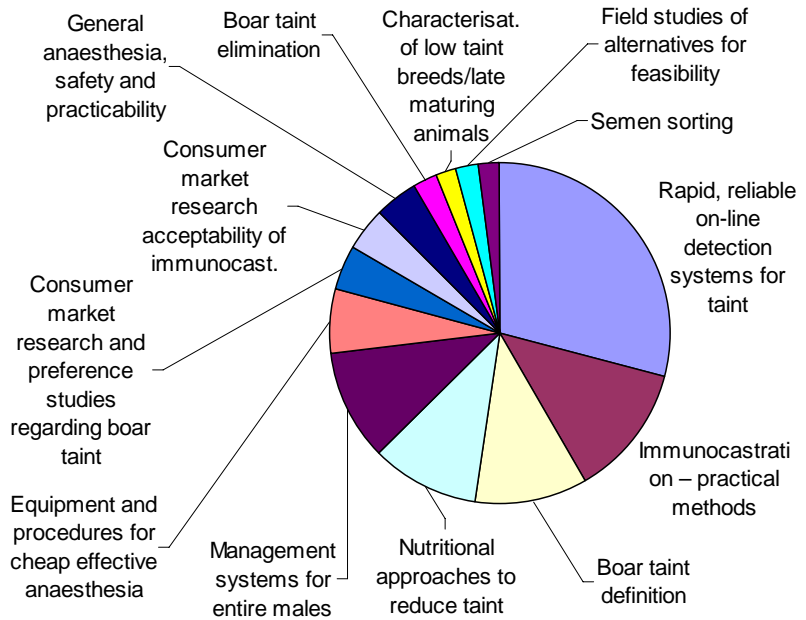
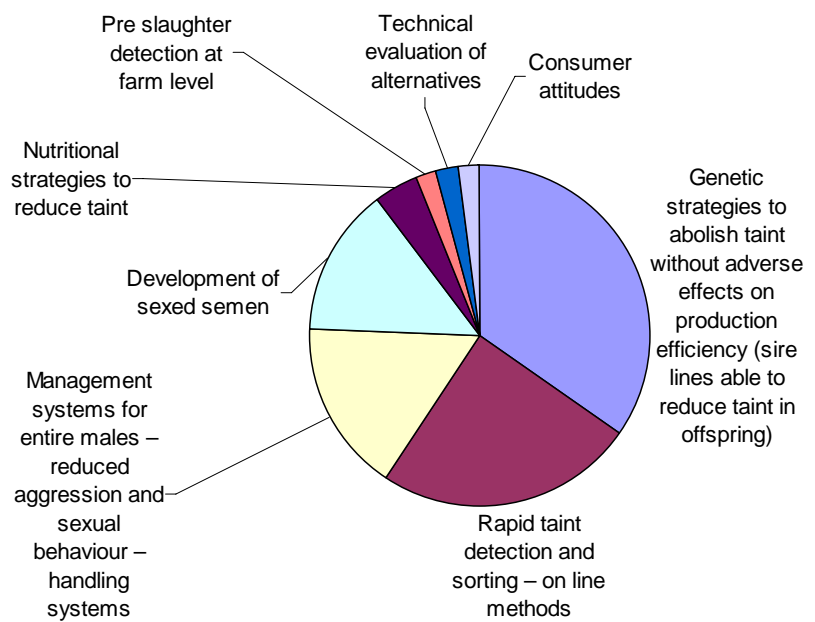


Figure 19:
Distribution of the responses of scientific experts to the question "What is the most important topic for research to give the best long term solution to cessation of surgical castration without anaesthesia/analgesia" (D 118).



448 2. Information on convergences between categories of stakeholders

449 2.1. Excerpts from Document A (Final report on attitudes)

450 *Overall, animal welfare was stated as unimportant in only 3 of the 472 responses. As expected, all stakeholders in*
451 *the animal welfare NGOs category stated animal welfare as important, at the same level as the veterinarians. In the*
452 *other categories, an overwhelming majority of people considered animal welfare as important (A 18).*

453 *A major distinctive feature here is that eating quality of pork and derived products win all the votes, with the*
454 *exception of some of the animal welfare NGOs, showing the predominant importance of pork in national cultures (A*
455 *22).*

456 *One important result here was that stakeholders (with the exception of half of the animal welfare NGOs) do not*
457 *consider animal welfare per se as sufficient criterion for increasing pork meat price. (A 34)*

458 *There is more agreement in that consumers pay the extra cost than in that farmers pay (A 40).*

459 *The major result about sexing spermatozoa to raise females only is that stakeholders altogether agree with the idea*
460 *that it is a technique worth to be developed and do not consider it as unnatural (A 51).*

461 *Taking together the results from all countries, surgical castration with anaesthesia appears to be the most*
462 *consensual procedure. Sperm selection is also ranked quite high by all categories of stakeholders (A 65).*

463 *Immunocastration and entire male pig production are poorly rated, the only exception being entire male pig*
464 *production by animal welfare NGOs (A 65).*

465 2.2. Elements from the vote of delegates during the Stakeholder Seminar 466 (Document B)

467 *A vast majority of delegates agreed with the statement: “Practical alternatives to surgical castration are needed to*
468 *improve animal welfare”. However, delegates from the “veterinarians” and “pig producers” groups were less*
469 *unanimous than other stakeholder groups (B 33).*

470 *A vast majority of delegates agreed with the statement: “Any alternative that includes elimination of boar taint is*
471 *better than surgical castration”. However, delegates from the “veterinarians” and “pig producers” groups were less*
472 *unanimous than other stakeholder groups (B 34).*

473 *A vast majority of delegates agreed with the statement: “The chain has the responsibility to reduce pain”. However,*
474 *close to half of the delegates from the “veterinarians” and “pig producers” groups disagreed (B 35).*

475 *A vast majority of delegates agreed with the statement: “As soon as there are viable alternatives, surgical castration*
476 *without anaesthesia should be banned”. However, close to half of the delegates from the “veterinarians” and*
477 *“farmers” groups disagreed (B 38).*

478

479 3. Information on clashes of interest between categories of 480 stakeholders

481 3.1. Excerpts from Document A (Final report on attitudes)

482 *When asked to state how important the different aspects of pig production are, stakeholders tend to rank these*
483 *aspects according to their own interest, highlighting the factors having priority to them (A 22).*

484 *A major distinctive feature here is that eating quality of pork and derived products win all the votes, with the*
485 *exception of some of the animal welfare NGOs, showing the predominant importance of pork in national cultures (A*
486 *22).*

487 *A conflict of interests appears between animal welfare NGOs and the other categories regarding the lower*
488 *importance they give to the cost of production and also, to a lesser extent, to the eating quality of pork (A 22).*

489 *Once again, there was a conflict of interest between animal welfare NGOs and the other stakeholder categories.*
490 *Animal welfare NGOs may be characterised by their higher emphasis on animal welfare and lower interest in*
491 *productions costs and eating quality (A 26).*

492 *When faced with an inventory of the different aspects of castration without anaesthesia, including advantages and*
493 *disadvantages, benefits and costs, stakeholders exhibit very heterogeneous opinions, which reflect both ethical and*
494 *economical concerns entailed by castration (A 34).*

495 *One important result here was that stakeholders (with the exception of half of the animal welfare NGOs) do not*
496 *consider animal welfare per se as sufficient criterion for increasing pork meat price. (A 34)*

497 *Most of the answers indicate that the stakeholders, (with the exception of animal welfare NGOs) would accept*
498 *castration without anaesthesia even that it could be painful. (A 34)*

499 *Conflicts of interests clearly emerge between animal welfare NGOs (who would not accept castration without*
500 *anaesthesia at any rate) and the other stakeholders (A 34).*

501 *Chain stakeholders back the farmers vs. the consumer when it comes to pay the extra cost entailed by anaesthesia*
502 *(A 40).*

503 *The major conflicts of interest appear between animal welfare NGOs [and other stakeholder categories. The former]*
504 *[...] strongly support the use of anaesthesia, do not mind whether the farmers or the consumers pay for the extra*
505 *cost and are less concerned by risks of residues or consider that the risk does not exist (A 40).*

506 *The major conflicts of interest appear between animal welfare NGOs and the other stakeholders. Similarly to what*
507 *they expressed regarding the use of anaesthesia, NGOs do not mind whether the farmer or the consumer is*
508 *supporting the extra cost of immunocastration, clearly put castration associated pain before meat safety risks and*
509 *prefer raising entire males to immunocastration on the ground of naturalness (A 47).*

510 *Regarding the question of who should pay for the extra cost of immunocastration, animal welfare NGOs do not mind,*
511 *consumers seem undecided while other stakeholders prefer to pass the bill to the consumers. This is very similar to*
512 *what was observed about the extra cost associated with the use of anaesthesia (A 48).*

513 *There is a clear conflict of interests between animal welfare NGOs, who have a much higher acceptance of entire*
514 *male pig production than the other categories of stakeholders and clearly reject surgical castration without*
515 *anaesthesia. The conflict is particularly important with pig producers, notably the main stream one, who are quite*
516 *willing to stick with surgical castration without anaesthesia in a majority of countries representing two thirds of EU pig*
517 *production (A 65).*

518 *Immunocastration and entire male pig production are poorly rated, the only exception being entire male pig*
519 *production by animal welfare NGOs (A 65).*

520 *In general [animal welfare] NGOs, and in a weaker way Government/Administration are against castration and in*
521 *favour of natural state of the animals and veterinarians, producers (main stream) and slaughter plants in favour of*
522 *castration (A 77).*

523 **3.2. Excerpts from Document B (Report on the Stakeholder Seminar)**

524 *The congress did not result in a common desire among delegates to stop castrating. The points of view regarding*
525 *the negative consequences of rearing intact males differed too much, and there is also disagreement on the level of*
526 *impact the castration itself has on animal welfare (and hence the very need to stop castrating) (B 39).*

527 *Excerpts from the conclusions of the group "Farmer representatives" (B 23)*

528 *- Numerous representatives expressed that the best solution was the existing solution (= surgical castration*
529 *without anaesthesia). These producers were convinced that they produce what consumers want: cheap meat*
530 *without boar taint. They also defended the idea that problems come from a minority of people (= welfare*
531 *NGOs) that are far from the great majority of consumers.*

532 **3.3. Elements from the vote of delegates during the Stakeholder Seminar**
 533 **(Document B)**

534 *A vast majority of delegates agreed with the statement: "Practical alternatives to surgical castration are needed to*
 535 *improve animal welfare". However, delegates from the "veterinarians" and "farmers" groups were less unanimous*
 536 *than other stakeholder groups (B 33).*

537 *A vast majority of delegates agreed with the statement: "Any alternative that includes elimination of boar taint is*
 538 *better than surgical castration". However, delegates from the "veterinarians" and "farmers" groups were less*
 539 *unanimous than other stakeholder groups (B 34).*

540 *A vast majority of delegates agreed with the statement: "The chain has the responsibility to reduce pain". However,*
 541 *close to half of the delegates from the "veterinarians" and "farmers" groups disagreed (B 35).*

542 *There was a lot of disagreement between delegates regarding the statement "The long term solution is no castration*
 543 *by January 2013". Delegates from animal welfare NGOs agreed overwhelmingly whereas a clear majority of*
 544 *delegates from the "veterinarians" and "farmers" disagreed (B 36).*

545 *Delegates from Animal welfare NGOs and government bodies mostly disagreed, whereas those from farmers almost*
 546 *unanimously agreed on the statement "At the moment there are no viable alternatives. Under given circumstance*
 547 *there is no need for government to move the farmer to change production practice" (B 38).*

548 *A vast majority of delegates agreed with the statement: "As soon as there are viable alternatives, surgical castration*
 549 *without anaesthesia should be banned". However, close to half of the delegates from the "veterinarians" and*
 550 *"farmers" groups disagreed (B 38).*

551

552 **4. Information on regional variations in attitudes**

553 **4.1. Excerpts from Document A (Final report on attitudes)**

554 *In the countries where castration is a rare practice (UK and Ireland), the slaughterhouses category is more*
 555 *concerned with welfare than with eating quality, in contrast with the other countries (A 26).*

556 *Conflicts of interest are also apparent between countries where castration is rare (UK and Ireland) where the*
 557 *attitudes of producers, slaughterhouses and consumers towards castration without anaesthesia are more driven by*
 558 *cost efficiency and animal welfare issues and less driven by eating quality as compared with the remaining*
 559 *countries, including those where [only] about 30 % of pigs are castrated (Cyprus, Portugal, Spain) (A 34).*

560 *The PCA allows classifying the countries in 4 groups according to their opinion about castration. United Kingdom,*
 561 *Greece and Netherlands are clearly against castration. Portugal, Ireland and Finland are moderately against*
 562 *castration. Spain, France, Austria, Denmark, Sweden, Switzerland, Norway, Estonia, Slovenia, Poland, Germany*
 563 *and Lithuania had an undecided position about castration. Finally Cyprus, Italy, Slovakia, Hungary, Belgium and*
 564 *Latvia can be considered moderately in favour of castration (A 77).*

565 **4.2. Excerpts from Document B (Report on the Stakeholder Seminar)**

566 *Excerpts from the conclusions of the group "Government representatives / policy workers" (B 20)*

- 567 - *Everybody seemed to be quite happy with the situation in which they are right now with the known exception of*
- 568 *The Netherlands to target a ban in 2015.*
- 569 - *Decisions are driven by different regional consumer and citizen perceptions within the EU.*

570 *Excerpts from the conclusions of the group "Meat industry and slaughter house representatives" (B 21)*

- 571 - *The delegates in this session discussed the completely different situations in different countries with regard to*
- 572 *issues related to castration and boar taint: for UK, Ireland and Denmark it was not an issue. But for The*
- 573 *Netherlands, Norway, Switzerland, Sweden it is a big issue.*
- 574 - *There probably is a need for different systems/solutions in different countries.*

575 *Excerpts from the conclusions of the group "Retailer and consumer representatives" (B 24)*

- 576 - *We need to develop long term solutions and in the short term quickly intermediate solution which may differ per*
- 577 *European region.*

578 *Excerpts from the conclusions of the group "Transition paths" (B 28)*
 579 - *Regarding the market situation there is no consensus on understanding/perception of boar taint in Europe. This*
 580 *is very confusing. There are different perceptions of the problem in different countries.*
 581

582 **5. Information on attitudes towards surgical castration without** 583 **anaesthesia and its alternatives**

584 **5.1. Excerpts from Document A (Final report on attitudes)**

585 *Taking together the results from all countries, surgical castration with anaesthesia appears to be the most*
 586 *consensual procedure. Sperm selection is also ranked quite high by all categories of stakeholders (A 65).*

587 *There is a clear conflict of interests between animal welfare NGOs, who have a much higher acceptance of entire*
 588 *male pig production than the other categories of stakeholders and clearly reject surgical castration without*
 589 *anaesthesia. The conflict is particularly important with pig producers, notably the main stream one, who are quite*
 590 *willing to stick with surgical castration without anaesthesia in a majority of countries representing two thirds of EU pig*
 591 *production (A 65).*

592 *Immunocastration and entire male pig production are poorly rated, the only exception being entire male pig*
 593 *production by animal welfare NGOs (A 65).*

594 **5.2. Excerpts from Document B (Report on the Stakeholder Seminar)**

595 *Excerpts from the conclusions of the group "Government representatives / policy workers" (B 20)*
 596 - *There was a consensus on doubts for the effectiveness and added value of local anesthesia.*

597 *Excerpts from the conclusions of the group "Meat industry and slaughter house representatives" (B 21)*

- 598 - *Short term:*
- 599 *surgical castration with anaesthesia*
- 600 - *Long term (5-7 yrs):*
- 601 *- immunocastration – vaccine*
- 602 *- Genetic selection in combination with detection methods*
- 603 *- Sperm sexing*
- 604 *- Processed boar meat.*
- 605 - *For the industry one of the critical questions is: what is the proportion of carcasses that need to be rejected ?*

606 *Excerpts from the conclusions of the group "NGO representatives" (B 22)*

- 607 - *The use of anaesthesia was suggested as a good starting point, but it was considered not ideal for any length*
 608 *of time.*
- 609 - *Anaesthesia and immunocastration should be accepted as short term solutions.*
- 610 - *Sperm selection was not considered feasible.*
- 611 - *Rearing entire male pigs should be the aim, in combination with on-line detection of boar taint.*
- 612 - *Rearing pigs to a low weight still leaves skatole as a problem. At high weights androstenone is.*
- 613 - *Genetic selection would mean we might be able to keep to the preferred weight.*

614 *Excerpts from the conclusions of the group "Farmer representatives" (B 22-23)*

- 615 - *Numerous representatives expressed that the best solution was the existing solution (= surgical castration*
 616 *without anaesthesia).*
- 617 - *..... pig producers seemed very reluctant to change.*
- 618 - *.... the possibility of raising entire males producers from UK and Spain who emphasized the importance of*
 619 *the genotype to avoid boar taint. The effect of the live weight was also discussed but again the*
 620 *necessity to respond to the consumer demand was considered as an obstacle to change. The German and*
 621 *Spanish representatives said that in their countries live weight at slaughtering was gradually increasing. In*
 622 *Spain this tendency might create the necessity to castrate more pigs.....*
- 623 - *..... the use of anaesthesia. Dutch farmers tried to convince others that it is a good solution. Farmers from*
 624 *other countries were reluctant to general anaesthesia*

- 625 - immunocastration and most producers seem to be strongly opposed to it. The biggest problem seems to
 626 be that of the safety for the workers but there is also the fear that consumers will not accept immunocastration,
 627 or that the effectiveness is not sufficient.
- 628 - Producers are ready to accept alternatives to surgical BUT cost of production must not increase, quality of the
 629 meat (in terms of boar taint, size of the meat parts...) must be the same, the technique must be without any
 630 risk in terms of safety (producers and consumers), acceptance by the consumers.

631 Excerpts from the conclusions of the group "Retailer and consumer representatives" (B 24)

- 632 - a medium time solution could be a vaccine, but a long term solution should envisage raising intact males and
 633 detect the boar tainted animals at the slaughter line by means of an electronic nose. Future breeding strategies
 634 on production and genetics will bring new solutions.

635 Excerpts from the conclusions of the group "Veterinarians" (B 24-25)

- 636 - There are two possible alternatives at the moment – local anaesthesia+analgesia, and immunocastration.
 637 - immunocastration at present probably the best alternative to surgical castration.
 638 - Genetic selection not an option now.
 639 - Sperm sexing may be a good option in the future.

640 Excerpts from the conclusions of the group "Transition paths" (B 28)

- 641 - Solutions are short and long term:
 642 Short term solution - castration with anaesthesia
 643 Long term solution - no castration.

644 Excerpts from the conclusions of the group "Market solutions" (B 28-29)

- 645 - One shouldn't focus on just one alternative to surgical castration.
 646 - Short-term solutions should be regarded separately from the long-term solutions.
 647 - Any alternative that includes elimination of boar taint is better than surgical castration

648 Excerpts from the conclusions of the group "Animal welfare" (B 29-30)

- 649 - At present, raising entire males is not an attractive alternative.
 650 - Use of anaesthesia + analgesia : ... it is not practical and difficult to perform on a normal farm. Perhaps it is
 651 good as a temporary solution.
 652 - Immunocastration seems an optimal alternative at the moment but legal approval is needed.
 653 - Selection is not an option now
 654 - Sperm sexing: there are a lot of disadvantages to this method: prevention of natural behaviour, low fertilization
 655 in cattle (not known in pigs), the negative image of "manipulating nature". This is definitely not a solution in the
 656 short run.

657 Excerpts from the conclusions of the group "Research" (B)

- 658 - There was a general consensus that a difference had to be made between long and short term solutions.
 659 - The emphasis for short term solutions should not just be on anaesthesia, but also in the area of analgesia.
 660 - Another short term solution is immunocastration.
 661 - For the long term to stop with castration altogether would be the best solution.

662 Excerpts from the conclusions of the group "Governance solutions" (B 31)

- 663 - anaesthesia decreases the pain very much but it should not be the final solution. The final goal is to stop
 664 castration.

665 Excerpts from the conclusions of the group "Responsibility of Stakeholders" (B 31-32)

- 666 - The alternative of immunocastration was not considered as the best solution by the majority of the
 667 representatives.

668 **5.3. Elements from the vote of delegates during the Stakeholder Seminar** 669 **(Document B)**

670 Half of the delegates agreed, and half disagreed on the statement: "Immunocastration is an optimum alternative but
 671 legal approval is needed". A majority of NGO delegates agreed, a majority of farmer delegates disagreed (B 33).

672 A majority of delegates agreed on the statement "In the near future castration with anaesthesia/analgesia + (
 673 immunocastration are realistic". All NGO delegates agreed, half of the farmer delegates disagreed (B 34).

674 *There was a lot of disagreement between delegates regarding the statement "The long term solution is no castration*
675 *by January 2013". Delegates from animal welfare NGOs agreed overwhelmingly whereas a clear majority of*
676 *delegates from the "veterinarians" and "farmers" disagreed (B 36).*

677 *A clear majority of the delegates agreed on the statement "Long term research should be focused on intact males by*
678 *genetic control and detection of boar taint (on line and live) animals" (B 37).*

679

680

681

682 **6. Information on strengths and weaknesses of alternatives**

683 Unless otherwise stated, the information consists of excerpts from documents D and E.

684 **6.1. Surgical castration with anaesthesia**

685 Attitudes

686 *See previous sections, particularly section 5.*

687 Practice

688 *Castration with anaesthesia is more time consuming it might include assistance by trained personnel (D 16)*

689 *Human safety might be an issue regarding some types of general anaesthesia (D 16).*

690 Animal welfare

691 General anaesthesia

692 - *.... is time consuming, anaesthetics may represent a risk both for people and piglets..... and their availability*
693 *is restricted to veterinarians (E 28).*

694 General anaesthesia by injection

695 - *Ketamine is still the drug of choice and its handling will soon be restricted in many countries of the EU.*
696 *Abuse potential is very high and will not enable the farmer to use this drug by himself (D 25).*

697 General anaesthesia by inhalation

698 - *A specially designed machine [using isoflurane in combination with an analgesic drug] is on the market..., but*
699 *the veterinarian is still the only person allowed to use the drug (D 25).*

700 - *CO2 does little to alleviate stress at castration. CO2 has also been shown to be aversive to pigs.... However,*
701 *the method ... may be easily used at the farm level. (E 29).*

702 - *The optimal mixture for carbon dioxide anaesthesia has been established and showed good results concerning*
703 *the analgesic properties during castration (D 25).*

704 Local anaesthesia and analgesia

705 - *The effects of analgesia and/or local anaesthesia were reviewed by EFSA (2004)..... It was recommended*
706 *that local anaesthesia and analgesia should be used for castration of piglets (D 26).*

707 - *On the basis of these recent additions to the scientific literature, more doubts have arisen about the net welfare*
708 *benefit of using local anaesthesia prior to piglet castration: the additional handling and injection of the local*
709 *anaesthetic has been shown to induce some stress/pain (albeit small relative to castration without*
710 *anaesthesia), a significant reduction in acute castration pain could be demonstrated in 3 of the 6 studies only,*
711 *and isolated studies raised the possibility that local anaesthesia increased pain and inflammatory reactions*
712 *after castration. Moreover, doubts about the welfare improvement caused by the use of local anaesthesia*
713 *...[were] expressed by a considerable proportion of farmers questioned in the Norwegian survey (Fredriksen &*
714 *Nafstad, 2006) (D 29).*

715 *Surgical castration with general and local anaesthesia in combination with long term analgesia has been shown to*
716 *reduce pain but the additional handling and injection of the anaesthetic, the effectiveness and limited safety margins*
717 *along with the long-term impact on the viability of piglets has to be considered against the welfare benefits of these*
718 *methods (D 21).*

719 Resource efficiency and economy

720 The use of anaesthetic and/or analgesic treatments before castration entails additional costs for pig farms
721 which are not counterbalanced by improvement in growth performance (D 87).

722 Differences in costs considerably increase if the anaesthesia cannot be administered by farmers and if the
723 veterinarian has to be called to perform it (D 87).

724 In the case of local anaesthesia, the cost of veterinarian service largely affects the total average costs, making this
725 solution not economically feasible on small-scale pig farms. If the treatment is applied by farmers, the additional cost
726 of local anaesthesia by means of lidocaine would range between 0.30 and 0.40 euro/piglet (D 87).

727 The additional costs of local anaesthesia represent an increase in production costs of:

- 728 - 0.15% (0.13-0.28 depending on country) if performed by the farmer,
- 729 - 1.0% (0.9%-1.3 depending on country) if performed by a veterinarian (calculated from tables in D 92 and D 93).

730 General anaesthesia administered by injections is more expensive, and costs range between 1.00 €/piglet up to
731 1.46 €/piglet. General anaesthesia by inhalation generates even higher costs which may reach 1.67 euro per piglet.
732 These costs depend heavily on farm size as the inhalation equipment has to be depreciated on the largest number of
733 pigs possible. Also general anaesthesia with inhalation does not have a significant impact on total production costs
734 of pig meat, especially in the larger farms (D 87).

735 The additional costs of general anaesthesia by inhalation represent an increase in production costs of:

- 736 - 1.3% (1.1%-1.6 depending on country) (calculated from table in D 98).

737

738 **6.2. Vaccination to control boar taint (Immunocastration)**

739 Attitudes

740 See previous sections, particularly section 5.

741 Perceptions/reactions of (European) consumers to such a practice have not yet been investigated in depth. It cannot
742 be excluded that this kind of treatment could be considered controversial by consumers from a food safety point of
743 view (D 99).

744 Swedish consumers gave a higher value to pork from immunocastrated pigs than to pork from surgically castrated
745 pigs. In contrast, consumers revealed negative valuations of pork from intact boars as compared to pork from
746 surgical castrates (Lagerkvist et al., 2006; D 6).

747 In Switzerland two in three pork consumers considered immunocastration more acceptable than surgical
748 castration (Giffin et al, 2008; D 6-7).

749 Practice

750 At present in Europe, immunological castration is only approved in Switzerland (since January 2007). It is, however,
751 not yet in use in ordinary practice (D 16).

752 There might also be some concerns about the farmers (or veterinarians) safety regarding the risk of self injections
753 (D 17). Vaccine may be active for humans in case of accidental self-injection (D 99).

754 Time consuming (two treatments necessary) (D 19). Difficulties and time-consuming activity of vaccinating pigs twice
755 during the finishing phase (D 99).

756 Conflicts about who can handle the product (D 19).

757 Animal welfare

758 The behaviour of effectively immunised male pigs is similar to that of surgically castrated ones. Both exhibit reduced
759 aggressive and mounting behaviours, and increased feeding behaviour compared with entire males. Up to the
760 second administration of the GnRH vaccine the pigs behave like entire males (D 31).

761 Immunocastration improves the welfare of male pigs compared to surgical castration. However further research on
762 the impact of immunocastration on behaviour and pathological aspects under different housing conditions are
763 required to give a final judgement (D 33).

764 *Raising entire males during the whole fattening period or immunocastration of males towards the end of the fattening*
765 *period are other alternatives with welfare benefits [comparatively to] to current surgical castration with some*
766 *potential welfare draw backs regarding behaviour during fattening, handling stress and health as a result of this*
767 *(D21).*

768 Pork quality

769 *Immunocastration, besides reducing boar taint to levels comparable to surgical castration, improves meat and*
770 *carcass characteristics relative to surgical castrates (D 44).*

771 *Pork from immunocastrated pigs was accepted by the consumers and was comparable to pork from surgically*
772 *castrated pigs or female pigs (D 50).*

773 *Immunocastration is an effective way to reduce boar taint in male pigs, and no studies have reported concentrations*
774 *of androstenone or skatole above recognised taint thresholds in immunocastrated pigs (D 61).*

775 *One concern is the variability of the immune response of the animals, resulting in some pigs not being neutered*
776 *(E 59). If the frequency of those pigs is lower or at the same frequency as inter-sex pigs and cryptorchids in*
777 *conventional pork production, immunocastration should not give any increased problems with taint in comparison*
778 *with the situation today (D 61-62).*

779 Resource efficiency and economy

780 *The overall costs of immunocastration has to be evaluated considering the potential benefits coming from higher*
781 *daily weight gain and feed efficiency. The economic feasibility of this practice will finally depend on the price of the*
782 *vaccine and on consumers' acceptance of immunocastration (D 88).*

783 *As the impact on production costs is concerned, immunocastration presents the advantage that feed efficiency may*
784 *improve significantly which may compensate almost entirely the cost of vaccination (D 88).*

785 *[Assuming] a 7.6% increase in feed efficiency ..., a vaccine costs of € 3.30 per pig, a one percent reduction of killing*
786 *out rate and 50 seconds labour time per pig (D 103), the impact of immunocastration on the production costs [is*
787 *null on an average of 9 EU countries, it ranges from a reduction of 3.5% to an increase of 0.9% of production costs,*
788 *depending on country] (calculated from table in D 104). [Costs for sorting out tainted carcasses are however not*
789 *included in the calculation].*

790 *Costs related to the screening on slaughter-line, for detecting those subjects in which the vaccination may not have*
791 *been effective (D 99).*

792 **6.3. Entire male production**

793 Attitudes

794 *See previous sections, particularly section 5.*

795 Animal welfare

796 *Raising entire males improves their welfare as they are not subjected to pain and discomfort of castration. However,*
797 *their welfare may be impaired because of increased aggressiveness and mounting behaviour as they mature (D 36).*

798 *Raising entire males during the whole fattening period or immunocastration of males towards the end of the fattening*
799 *period are other alternatives with welfare benefits [comparatively to] to current surgical castration with some*
800 *potential welfare draw backs regarding behaviour during fattening, handling stress and health as a result of this*
801 *(D 21).*

802 Pork quality

803 *The lower lipid content and the higher content of unsaturated fatty acids in adipose tissues of entire males may be*
804 *regarded as favourable from the human dietetic point of view (D 49).*

805 *Higher proportion of DFD meat depending on handling (D 49)*

806 *The decreased amount of adipose tissue in entire males may be a disadvantage in some circumstances - in*
807 *particular, in very lean genotypes. Extreme leanness can result in a lack of cohesion between backfat and the*
808 *underlying muscle (D 49)*

809 *The higher degree of unsaturation and higher water content of leaner animals can result in carcasses with*
810 *unacceptably soft fat (D 49).*

811 *The most important limitation to the use of entire males is the existence of boar taint (D 50)"*

812 *Pork odour is to a great extent affected by the presence of malodorous compounds [(boar taint)], mainly*
813 *androstenone and skatole (D 44).*

814 Resource efficiency and economy

815 *The main advantages linked to raising entire males are due to the higher efficiency of feed conversion, to the better*
816 *growth rate and to the higher leanness of meat. A higher risk of boar taint on the slaughter line has to be accounted*
817 *for. A Dutch study, assuming lower slaughter weights to eliminate the risk of boar taint, shows that the gross added*
818 *value for the pig sector will decline by almost 90 million € a year as a result of stopping castration and the separate*
819 *fattening of entire males. A Swiss study concludes that raising entire males should [create less] than 2.5% of boar*
820 *taint among slaughter pigs in order to maintain the considerable economic benefits of a better feed efficiency of*
821 *entire males with respect to castrates (D 88).*

822 **6.4. Sperm sorting**

823 Attitudes

824 *See previous sections, particularly section 5.*

825 Animal welfare

826 *Sperm sexing may provide a long-term welfare friendly solution but depends on further research for new*
827 *insemination techniques (provided that they do not cause additional pain) along with the development of more*
828 *efficient methods for sexing sperm (D 38).*

829

830 **7. Information on gaps and weaknesses in knowledge and further** 831 **research needs**

832 Unless otherwise stated, the information consists of excerpts from documents D.

833 **7.1. Overall**

834 Attitudes

835 *Very few references about attitudes to piglet castration and its alternatives by stakeholders exist in the scientific*
836 *bibliography. Most of the surveys designed to get information from these stakeholders are basically interested in the*
837 *evaluation of the sensory properties of a product, and did not study their opinions, beliefs and behaviour regarding a*
838 *topic (D 10-11).*

839 Practice

840 *The exact numbers of male pigs castrated with and without anaesthesia and the numbers of male pigs left entire are*
841 *still not known. Even if there is considerable uncertainty associated with the estimated numbers, they do give a*
842 *valuable picture of the situation in Europe (D 19).*

843 **7.1. Surgical castration with anaesthesia**

844 Animal welfare

845 *Surgical castration with general anaesthesia (D 39):*

846 *- Safety margins for gas inhalation; effectiveness*

847 *- Mortality rate, Abuse potential of Ketamine, need for veterinary surveillance, feasibility studies*

- 848 *Surgical castration with analgesia and local anaesthesia (D 39):*
849 - *Evaluation of welfare benefit of local and/or analgesia under commercial conditions*
850 - *Stress/pain through additional handling and injection.*

851 *Effectiveness of pain alleviation and feasibility studies on farm (D 40).*

852 *Stress assessment associated with handling and its impact on health and well-being (D 40).*

853

854 **7.2. Vaccination to control boar taint (Immunocastration)**

855 Overall

856 *A robust cost benefit analysis of immunocastration compared with raising entire males has not been carried out.*
857 *This should take account of the labour and materials cost of vaccination, the general lack of difference in*
858 *performance and the cost of tainted pig meat (D 73).*

859 *It would be of interest to investigate other schedules for immunocastration, e.g. if it is possible with earlier*
860 *vaccination than used today (D 73).*

861 Attitudes

862 *The main concern about immunocastration is uncertainty regarding consumer response. It is, however,*
863 *difficult to foresee the response to immunocastration within the EU, when pork from these pigs is on the market*
864 *(D 61).*

865 *Perceptions/reactions of (European) consumers to such a practice have not yet been investigated in depth. It cannot*
866 *be excluded that this kind of treatment could be considered controversial by consumers from a food safety point of*
867 *view (D 99).*

868 Practice

869 *There is a lack of studies focused on the effectiveness and feasibility of immunocastration applied on heavy animals*
870 *of 9 months of age and more (D 99).*

871 Animal welfare

872 *Impact of immunocastration on behaviour and pathological aspects under different housing and management*
873 *conditions (agonistic & sexual behaviour, group size & composition, density, exploration material, prevalence for*
874 *injuries, lameness, feeding behaviour) (D 39).*

875 *Pain caused by inflammatory reaction to subcutaneous injection? (D 39).*

876 *Stress assessment associated with handling and its impact on health and well-being (D 40).*

877 *Management of entire and immunocastrated males and its consequences (scoring) (D 40).*

878 Pork quality

879 *There appears to be limited knowledge on the effect of immunocastration on the processing quality of pork, with only*
880 *a few references to water holding capacity and colour for example (D 73).*

881 *Evaluation of the suitability of pork from immunocastrated pigs for processing (D 75).*

882 **7.3. Chemical castration**

883 Animal welfare

884 *Further research on pain assessment as well as testing of other [substances] than the above described compounds*
885 *are necessary before this strategy could be considered as a sustainable alternative to common practices of*
886 *castration (D 37).*

887 **7.4. Entire male production**

888 Animal welfare

889 Management methods to minimise the level of aggression, sexual behaviour and boar taint in the production of
890 entire males, and thus improve welfare of the animals, require further research. There is a particular need to
891 investigate strategies for dealing with potential problems associated with mixing and split marketing (D 36).

892 Transport and lairage procedures in connection with the slaughter of entire males have not been looked into ...
893 [because mixing of] strange pigs, it is often difficult or expensive to avoid and serious fighting is likely to take place
894 (D 36).

895 More research should be put into studying birth to slaughter systems (D 36).

896 Management of entire and immunocastrated males and its consequences (scoring) (D 40).

897 Pork quality

898 Consumer perception of boar taint

- 899 - Other possible contributors to boar taint have not been well described (D 73).
- 900 - The lack of established threshold level for boar taint compounds, especially androstenone.... The relatively
901 large range in androstenone threshold value is likely due to (D 74):
 - 902 o the differences in individual ability to detect androstenone smell by consumers.....
 - 903 o the method for androstenone analysis.....
 - 904 o differences in how sensory evaluation of taint has been carried out.....
 - 905 o how the amount of taint that is acceptable has been determined.
- 906 - Effective and consistent methods for the sensory evaluation of taint are needed. Ultimately, this needs to
907 reflect consumer preferences for pork products (D 75).

908 Basic knowledge on androstenone and skatole synthesis and degradation

- 909 - Synthesis
 - 910 o Skatole synthesis in the intestine. Little is known about skatole synthesis and absorption from the large
911 intestine, and further identification of bacterial populations involved in skatole synthesis is needed.
912 Other products of bacterial tryptophan degradation should be identified. The role of hormones, genetics
913 and sex on the production and absorption of skatole needs to be examined (D 73).
- 914 - Degradation
 - 915 o Further characterization of Phase I and II biotransformation enzymes for skatole and androstenone
916 should be performed (D 74).
 - 917 o To evaluate the possibility of involvement of other enzymes in skatole metabolism in the liver (D 75)
- 918 - Interactions between androstenone and skatole metabolisms:
 - 919 o The integration of skatole and androstenone metabolism is not well understood (D 74).
 - 920 o To further examine the impact of testicular steroids and other hormones on skatole hepatic metabolism
921 (D 75)
 - 922 o To develop methods for measurement of androstenone and skatole metabolism in extra-hepatic tissues,
923 such as gastrointestinal tract (D 75).
 - 924 o Studies to further understand the integration of the metabolism of boar taint compounds are warranted
925 and will also lead to more useful candidate genes (D 76).

926 Control of androstenone and skatole levels

- 927 - Feeding and management
 - 928 o Skatole reducing feed which is practical to use needs to be developed (D 74).
- 929 - Genetics and selection
 - 930 o Genetic studies have suffered from the lack of reporting of the sexual development of the animals
931 included in the studies (D 74).
 - 932 o Carefully define the genetic potential for boar taint by assessing sexual maturity of animals used in
933 genetic studies (D 76)
 - 934 o QTL and SNP validation studies are needed using the same commercial pig populations (D 74).
 - 935 o Include sufficient numbers of animals from commercially relevant breeds in genetic studies to give
936 sufficient statistical power to identify associations between genetic markers (SNPs) and boar taint
937 (D 76).

- 938 ○ *Rationalize studies to identify QTLs for boar taint so that a clearly established list of QTLs is available*
939 *for comparison with the chromosomal location of candidate genes for boar taint (D 76).*
940 ○ *More candidate genes for the development of genetic markers are needed. These could come from*
941 *comparing gene expression profiles from pigs with low and high boar taint and from a better*
942 *understanding of the biochemical pathways for the metabolism of boar taint compounds (D 74).*
943 ○ *Further studies of gene expression analysis should be conducted using pigs from high and low boar*
944 *taint phenotypes but with similar steroidogenic potentials in order to identify potential candidate genes*
945 *(D 76).*

946 Detection of boar taint

- 947 - *A rapid method for the detection of boar tainted carcasses in the abattoirs is still a challenge. So far, most of*
948 *the methods that exist and the ones that are still in a research and development stage represent advanced and*
949 *sophisticated technology that would require highly qualified staff to operate (D 74-75).*
950 - *So far, there is still no dedicated measurement technology available for on/at-line detection of boar tainted*
951 *carcasses that measures both androstenone and the indoles or boar taint (D 75).*
952 - *Development of one single detection method that measures both androstenone and the indoles or boar taint*
953 *(D 76).*
954 - *Cost effective automated simple technological solutions in order to adapt a proper methodology to*
955 *slaughterhouse conditions for identifying tainted carcasses (D 76).*
956 - *The analysis time should be very short (seconds-minutes) to obtain a fast result. Few methods under*
957 *development have very short analysis times. In most cases it is the sampling that is the time consuming part of*
958 *the analysis (D 75).*
959 - *Development of proper instrumental software, hardware and sampling solutions that meet the industrial*
960 *requirements for on-line/at-line use. In particular, this applies to the sampling, which is a key issue (D 76).*
961 - *Develop a method with a sufficiently high sample throughput, i.e. an analysis capacity of several hundreds of*
962 *carcasses an hour (D 76).*
963 - *Methods are still too costly, since at the end it is the cost efficiency that is the driver for industrial*
964 *implementation of new measurement technology (D 75).*
965 - *The chosen method should have a performance that allows 100 % correct classification of both acceptable and*
966 *not-acceptable samples with regard to boar taint. Eventually, a low percentage of false positives could be*
967 *acceptable; however, false negatives should not occur at all, since this meat would end up at the consumer.*
968 *So far, several of the methods that have been investigated, in particular the fingerprinting based methods show*
969 *that there is still a too high percentage of false positives ranging from 5–20 % (D 75).*

970 Use of tainted carcasses

- 971 - *New processing methods for the use of carcasses with different levels of taint (D 75).*

972

973 **7.5. Sperm sorting**

974 Animal welfare

975 *Sperm sexing depends on further research for new insemination techniques (provided that they do not cause*
976 *additional pain) along with the development of more efficient methods for sexing sperm (D 38).*

977 *More research on potential pain (in sows) due to new insemination techniques (D 40).*

978

979

980 **8. Excerpts from the Opinion of the Scientific Panel on Animal Health** 981 **and Welfare**

982 This document (EFSA-Q-2004 - 091) can be downloaded from the EFSA website
983 <http://www.efsa.europa.eu> (click on Scientific Opinions Publications & Reports, then on
984 Scientific Opinions, then fill in “castration” in the field Search for Term).

985 **8.1. Recommendations**

- 986 1.2. *Because puberty is a gradual process and the development of boar taint variable, puberty should not be used*
987 *as an indicator of the time of slaughter in order to avoid boar taint.*
- 988 2.1.2. *Gaining information on castration rates, etc., may influence any decisions on management being undertaken*
989 *at an EU wide level.*
- 990 2.3.2. *Dir 2001/93/EC requiring training of all operatives likely to castrate pigs should be enforced.*
- 991 2.4.2. *Information on the possible detrimental effects on growth, on the immune system and hence on the health of*
992 *animals should be collected in order to quantify the risk associated with castration*
- 993 *The age limit of 7 days for castration without anaesthesia plus prolonged analgesia may need to be revised,*
994 *including consideration of the neonatal period, as castration at any age is likely to be painful.*
- 995 *Information on the welfare implications of the interactions of combined surgical procedures would be useful*
996 *prior to recommendations being made on the advisability of combining such procedures.*
- 997 2.5.2. *Although it is not possible to recommend a method of general anaesthesia for pigs undergoing castration in*
998 *commercial farms at the present time, local anaesthesia should be used for castration of piglets. Analgesia*
999 *should be used to prevent pain in piglets which are castrated.*
- 1000 2.6.2 *If castration of female pigs is necessary for diagnostic reasons or therapeutic purposes, anaesthesia and*
1001 *analgesia should be used.*
- 1002 3.2. *It is important to avoid mixing of entire males as they are more aggressive and fight more than castrates.*
1003 *Animals from different groups should not be mixed in preparation for or during transport and lairage.*
1004 *Soft fat can be avoided by changing the fatty acid composition of the diet. However, such unsaturated fat*
1005 *may have nutritional advantages for human consumption.*
- 1006 4.2. *There is a need to evaluate and harmonize sensory evaluation and chemical measurements for boar taint.*
1007 *Criteria aimed at avoiding boar taint, for the acceptance or rejection of pig carcasses in slaughterhouses*
1008 *should be revised as knowledge improves.*
- 1009 5.1.2. *Pigs should be mixed as little as possible - ideally litters should be kept intact from birth to slaughter.*
1010 *With present knowledge, slaughtering pigs at a lower weight or age to avoid boar taint can not be*
1011 *recommended.*
- 1012 *Pens floors should be kept clean, especially during the week before slaughter, and in warm periods pigs*
1013 *should have possibility for thermoregulation other than wallowing in excreta*
- 1014 5.3.2. *It is necessary to decrease the frequency of genes causing high levels of boar taint.*
- 1015 5.4.2. *With the present state of knowledge, local destruction of testicular tissue by chemicals cannot be*
1016 *recommended because of the lack of information on possible pain inflicted to the animals and on the*
1017 *achieved reduction of boar taint.*
- 1018 *With the present state of knowledge, immunocastration, cannot presently be recommended, due to a number*
1019 *of concerns, for instance:*
- 1020 ✓ *The effectiveness of immunocastration in EU pig populations for reducing boar taint in commercial EU pig*
1021 *populations is not known.*

- 1022 ✓ *Immunocastrates should be individually checked on the slaughter line for the absence of boar taint. In this*
 1023 *context a possible goal could be to aim at levels of boar taint in immunocastrates which are similar to*
 1024 *those presently observed as a result of surgical castration.*
 1025 ✓ *Operator safety*
 1026 ✓ *Resulting welfare should be at least as good as surgical methods*
- 1027 *However, if such concerns are addressed, immunocastration may prove to be a valuable tool in European pig*
 1028 *farming.*

1029 5.5.2. *No recommendation on the use of sexing of sperm and its insemination methods can be made at present*

1030 6.2.2. *Tests currently applied to fat from carcasses of entire males should continue to be used. Further*
 1031 *development of harmonised on-line tests for use in slaughter houses should be encouraged.*

1032 *The 80 kg carcass weight limit for obligatory detection of taint should be questioned.*

1033 6.3.2 *The current practice of processing carcasses with low level of taint, on the assumption that this will*
 1034 *completely mask boar taint, can not be recommended.*

1035

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1037 **8.2. Future research: high research priorities and other future research**

1038 1. GENERAL

1039 High research priorities

1040 *A survey of the extent of castration of male and especially female pigs in the various EU Member States is required.*
 1041 *The reasons for such a practice should be clarified.*

1042 2. CASTRATION OF PIGLETS

1043 2.1 HISTORY AND EXTENT OF THE CURRENT PRACTICE

1044 High research priorities

1045 *A survey of the procedures (including who does it and how techniques, operators, anaesthesia, age, etc.) used in*
 1046 *the various EU Member States for castrating male and female pigs is needed.*

1047 2.2 PHYSIOLOGY AND IDENTIFICATION OF PAIN

1048 High research priorities

1049 *Research needs to be carried out into the age-related pain perception mechanisms involved in the tissues damaged*
 1050 *during surgical castration, including ways in which to recognise and assess the degree of pain, distress and*
 1051 *discomfort, and of the mechanisms controlling pain in neonatal pigs.*

1052 2.3 SURGICAL METHODS OF CASTRATION

1053 2.4 HEALTH AND WELFARE IMPLICATIONS OF SURGICAL CASTRATION WITHOUT ANAESTHESIA AND

 1054 *ANALGESIA.*

1055 High research priorities

1056 *The influence of age at castration on pain perception, hernia incidence, growth check and the immune system needs*
 1057 *to be determined.*

1058 *Information on morbidity and mortality of uncastrated and castrated piglets in commercial herds needs to be*
 1059 *collected.*

1060 Other future research

1061 *More information is needed on the effects of castration on the immune system of fattening pigs and elucidates the*
 1062 *underlying mechanisms (e.g. are they due to the pain-stress related reactions and/or to the lack of testicular*
 1063 *hormones?).*

1064 *Determine whether it is less painful and stressful for the piglets to be submitted to husbandry practices separately or*
 1065 *simultaneously with castration.*

1066

1067 2.5 HEALTH AND WELFARE IMPLICATIONS OF SURGICAL CASTRATION WITH ANAESTHESIA AND
1068 ANALGESIA

1069 High research priorities

1070 Measure the advantages and drawbacks of local anaesthesia of large numbers of piglets under commercial
1071 conditions including the risk of non-accurate application (frequency, consequences of non- application of the
1072 anaesthetic at the desired site etc). Evaluate the cost (labour, products) of such a procedure.

1073 Develop a protocol of long-lasting analgesics and validate it under experimental conditions. Measure the advantages
1074 and drawbacks of this protocol on large numbers of piglets under commercial conditions. Evaluate the cost
1075 (labour, products) of this protocol.

1076 Other future research

1077 Finalise a protocol of general anaesthesia. Measure the advantages and drawbacks of this protocol on large
1078 numbers of piglets in commercial herds including the safety risk for the staff performing it. Evaluate the cost
1079 (labour, products) of this protocol.

1080

1081 2.6 CASTRATION OF FEMALE PIGS

1082 High research priorities

1083 To develop and validate painless method(s) of castrating female pigs.

1084

1085 3. PRODUCTION OF ENTIRE MALES

1086 High research priorities

1087 More research on the expression and causation of male sexual behaviour is needed, e.g. to determine if and when
1088 mounting behaviour is playfully or sexually motivated, which stimuli from other pigs play a role in eliciting the
1089 behaviour and how much stimulation (sex and aggression) is needed to affect fat androstenone levels.

1090 Other future research

1091 Studies are needed on, if, and at which age the increased aggression and sexual behaviour of males becomes a
1092 welfare problem

1093 Investigations should be made of whether entire males are more susceptible to stress than castrates.

1094 The current minimal requirement for the housing, of pigs should be reevaluated for the production of entire males

1095 Investigate whether current protocols for transport and pre-slaughter handling are adequate for entire males.

1096

1097 4. BOAR TAIN

1098 High research priorities

1099 Chemical analytical methods used for determination of androstenone and skatole require investigation such that
1100 standard methods are agreed upon. A proficiency test/ring trial system needs to be formally developed.

1101 Other future research

1102 The relative contribution of substances to boar taint other than androstenone and skatole needs to be determined
1103 The levels of boar taint compounds that underlie accept/reject criteria used at carcass inspection with respect to
1104 boar taint need further experimental investigation.

1105 Sensory evaluation of boar taint should be standardised. There is a need for more refined sensory descriptors to
1106 characterise the effects of the compounds causal in boar taint.

1107 Factors influencing anosmia to boar taint in human populations and the relative sensitivities of males/females needs
1108 to be investigated for carcasses and processed pork products.

1109 Investigations are necessary to determine if acceptance of meat having boar taint is based on national differences in
1110 slaughter weight, breeds used, culinary traditions etc.

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1115 5. CONTROL OF TAINT: ANTE MORTEM

1116 5.1 MANAGEMENT

1117 High research priorities

1118 *There is a need for further research to clarify stimulating and inhibitive effects on androstenone production e.g.*
1119 *effects of social environment, hierarchy, mixing, relocation and interactions between them, and how such factors*
1120 *can be utilised.*

1121 *Interactions between husbandry conditions and slaughter weight, as well as breed differences in relation to skatole*
1122 *levels in carcasses should be determined.*

1123 5.2 NUTRITION AND DIET

1124 High research priorities

1125 *Diets and feed additives for control of skatole production should be evaluated (time period, feed source,*
1126 *concentration, how the additive should be fed etc.) in order to optimise efficiency and minimise cost.*

1127 5.3 GENETICS

1128 High research priorities

1129 *The genetic relationship between androstenone and skatole metabolism must be established. For example topics*
1130 *may consider if it is a specific inhibiting effect of androstenone on skatole metabolism or if it is a general*
1131 *inhibiting effect of high steroid levels.*

1132 *Strategies for the optimum use of breeds with low propensity for boar taint compounds in breeding programmes*
1133 *need to be develop*

1134 *There is a need to identify genetic markers that are specific for androstenone synthesis or metabolism which do not*
1135 *affect the production of sex steroids*

1136 *There is a need to develop standardized tests for the identification of pigs carrying genes associated with low levels*
1137 *of androstenone and skatole.*

1138 Other future research

1139 *It is necessary to develop genetic markers for boar taint caused by skatole and androstenone and if possible, for*
1140 *other substances contributing to boar taint.*

1141 5.4 ALTERNATIVE METHODS OF CASTRATION

1142 High research priorities

1143 *In addition to all legal requirements necessary for registration of a product used for castration, the following*
1144 *considerations are recommended:*

1145 *Evaluate the welfare impact associated with local chemical destruction of testicular tissue.*

1146 *Investigate the effectiveness of local chemical destruction of testicular tissue in reducing boar taint.*

1147 *Investigation of vaccine residues in meat from immunocastrates.*

1148 *Large scale experimental and on-farm studies should be carried out to investigate the proportion of non-respondents*
1149 *to immunocastration, and the resulting frequency of immunocastrates exhibiting boar taint. The reason for lack*
1150 *of response should be investigated.*

1151 Other future research

1152 *Investigate the possible welfare problems associated with immunocastration and compare it with other castration*
1153 *methods.*

1154 *Survey of the frequency of cryptorchids and intersex pigs in EU slaughter pig populations and on boar taint levels in*
1155 *such animals.*

1156 5.5 SEXING OF SPERM AND INSEMINATION METHODS

1157 Future research

1158 *Develop and evaluate techniques to sort sperm and evaluate delivery techniques taking into account both animal*
1159 *welfare and efficiency of the method.*

1160

1161

1162

1163 6. CONTROL OF TAINT; POST MORTEM

1164 6.1 PUBLIC HEALTH ASPECTS OF THE BOAR TAINT COMPONENTS: SKATOLE AND ANDROSTENONE

1165 Future Research

1166 *More information on the metabolism of skatole in humans and animals is required so that the possible effects of*
1167 *ingestion of high levels can be determined.*

1168 6.2. ONLINE DETECTION OF BOAR TAINT IN PORK CARCASSES

1169 High research priorities

1170 *A reliable on-line analytical method for abattoir use to remove tainted carcasses should be developed.*

1171 Other future research

1172 *Research into electronic-noses and related technologies for on-line detection by providing fingerprints for boar-taint,*
1173 *should be supported.*

1174 *New studies on threshold values for androstenone and skatole using the various sensory and chemical tests in use*
1175 *are needed. Thresholds could be established based on both the concentrations of skatole and androstenone*
1176 *and the sensory responses to them.*

1177 6.3. EFFECTS OF MEAT PROCESSING ON THE PERCEPTION OF BOAR TAINT.

1178 High research priorities

1179 *New processing methods for the use of carcasses with different levels of taint should be developed.*

9. Summary of the discussions within the topic groups (Paris meeting, 8-9 October 2008)

A meeting was organised in Paris on 8-9 October 2008 between PIGCAS scientists and invited stakeholders (see PIGCAS website for more details) in order to discuss an earlier draft of the present document.

Parallel discussions were first organised in four stakeholder groups (Administration, Animal Welfare NGOs, Upstream Chain and Downstream Chain). The aim was to set up, within stakeholder group, a common view on the document, whenever possible.

Representatives from each stakeholder groups were then distributed into 3 topic groups:

- recommendations for short term research;
- recommendations for long term research;
- suggestions for changes in regulations and the development of policy initiatives.

Section 9 provides the summaries of the discussions held within the 3 topic groups.

Section 10 provides statements made by each of the 4 stakeholder groups.

9.1. Summary of discussion on recommendations for short term research

PREPARED BY MARIA-ANGELS OLIVER (IRTA, SPAIN) AND TATJANA SCHMIDT (UNIVERSITY HALLE, GERMANY)

Research priorities:

- 1 a) *Efforts should be made to focus on practical issues (use of CO₂, management techniques for immunocastration, real welfare benefits? reduced pain after anaesthesia?);*
- 1 b) *Efforts should be made to teach/train farmers in the use of anaesthesia and immunocastration (No general agreement);*
- 2) *Concerns about immunocastration from pig producers: How to explain and how to detect the concerns about the application of the vaccine (communication, education);*
- 3) *More research is needed on consumer acceptance of meat from castrated (with anaesthesia) and immunocastrated animals including the different regions of Europe;*
- 4) *Development of on line detection methods to screen tainted carcasses;*
- 4) *Definition of "boar taint" (No general agreement).*

New recommendations:

- Agreement among producers and NGOs on the need that anaesthesia and vaccination can be performed by the farmers in order to reduce cost;*
- New systems need time to be accepted by the producers;*
- Solution envisaged for within a short period of time should be compulsory or not for all the farms including small farms (no agreement; some express concern about the economic consequences for small farms);*
- Production of entire males should be added to the "short-term" implementations including some strategies for screening for boar taint;*
- How to know about the third countries that are exporting to Europe : How they apply animal welfare solutions, How to include it in the new regulations?*

Main points:

- To carry-on research in the next years about anaesthesia & immunocastration (no general agreement; some would prefer to just put the methods into action and "learn by doing");*
- To perform research about the application of surgical castration with anaesthesia and immunocastration in non-conventional systems;*
- There is a need to know the results of implementation of anaesthesia and immunocastration in order to improve them (farmer level);*
- There is a need to know real consumer acceptability and possible differences among countries (including consumers from countries that import meat);*
- There is a need to know how to implement new legal regulations.*

1231 **9.2. Summary of discussion on recommendations for long term research**

1232 PREPARED BY KERSTIN LUNDSTROM (SLU, SWEDEN) AND ARMELLE PRUNIER (INRA, FRANCE)

1233 *Common agreements:*

- 1234 ▪ *Difficult to differentiate between short- and long term solutions;*
- 1235 ▪ *A short term solution in one system could be a long term solution for another system;*
- 1236 ▪ *Set up a network at the EU level to follow developments and share solutions that work at the market.*

1237 *Statements without consensus:*

- 1238 ▪ *There is a market for each type of pigs;*
- 1239 ▪ *Testing carcasses and using tainted carcasses will be too expensive. Useless to develop methods to detect boar taint;*
- 1240 ▪ *Leave the market to define what is boar taint. Useless to make research on boar taint definition.*

1242 *Proposals for research (agreement):*

- 1243 ▪ *Main goal is to raise entire males in the future:*
 - 1244 • *Genetic selection without negative effects on reproduction;*
 - 1245 • *Improve "management" (birth to slaughter), live weight at slaughter, nutrition...*
- 1246 ▪ *Put a very low priority on sperm selection or even skip.*

1247 *Recommendation (agreement):*

- 1248 ▪ *Use knowledge from existing markets (Spain, UK, NL...) already using entire males:*
 - 1249 • *e.g. Spain: meat from entires processed in the north, used as fresh meat in the south;*
 - 1250 • *e.g. UK: understand why some persons do not eat pork but meat from other species;*
 - 1251 • *How to adapt live weight and use of the carcasses to different markets?*

1252 **9.3. Summary of discussion on suggestions for changes in regulations and the**

1253 **development of policy initiatives**

1254 PREPARED BY SANDRA EDWARDS (UNIVERSITY NEWCASTLE, UK) AND KEES DE ROEST (CRPA, ITALY)

1255 *General Principle:*

- 1256 ▪ *Market forces (stimulated by pressure on retailers from NGOs) will drive the agenda forward more effectively than Regulations:*
 - 1257 • *Example of Netherlands, but may not work in all countries;*
 - 1258 • *Some more recent EU member states more concerned about safety and cost than welfare.*

1260 *Role of Changes in Regulations:*

- 1261 ▪ *Remove barriers to market driven progress;*
- 1262 ▪ *Ensure minimum welfare standard where market will not bring change.*

1263 *Surgical castration without anaesthesia:*

- 1264 ▪ *At some point, Regulation should ban this practice for pigs of all ages:*
 - 1265 • *Stakeholders agreed on principle;*
 - 1266 • *Disagreed on timescale:*
 - 1267 - *NGOs, Admin = now;*
 - 1268 - *Farmers = need for more feasibility studies.*
- 1269 ▪ *Analgesia should also be compulsory*

1270 *Permitted alternatives:*

- 1271 ▪ *Regulation should specify that methods must be approved by competent authority (EU approved list):*
 - 1272 • *Anaesthesia should be allowed by farmers:*
 - 1273 - *Important for small farms;*
 - 1274 - *Some countries currently ban CO2 (Austria).*
 - 1275 • *Farmers also wanted simpler methods permitted (topical anaesthesia);*
 - 1276 • *Need to ensure wording allowed immunocastration if product(s) registered.*
- 1277 ▪ *NGOs/consumers concerned about enforcement:*
 - 1278 • *? Through Farm Assurance schemes*

1279 *Longer term Regulations:*

- 1280 ▪ *Total ban on castration not appropriate:*

- 1281 ○ Needs flexibility for local circumstances:
 1282 - Intensive very heavy pigs in Italy (>90% production);
 1283 - Extensive systems in Mediterranean (significant minority of production);
 1284 - Early maturing local breeds in niche schemes.

1285 *Meat Hygiene Regulations:*

- 1286 ▪ Boar taint should not render meat “unfit for human consumption”:
 1287 ○ Need agreed method(s) for taint analysis in Regulations;
 1288 ○ Need agreed methods for defining taint classification;
 1289 ○ Voluntary testing of carcasses according to the market:
 1290 - Price could reflect taint level;
 1291 - Not all markets would need this so reduced cost;
 1292 - Flexibility on immunocastrates.
 1293 ○ Trade barriers on grounds of ‘entire male’ illegal:
 1294 - Could specify not above taint threshold.

1295 *Other Policy Initiatives:*

- 1296 ▪ Need to protect against trade distortion:
 1297 ○ Difficulties with WTO (unless safety reasons);
 1298 ○ Could consider label “produced in accordance with EU (welfare) Regulations
 1299 *Nb: also Welfare Quality Project proposals;*
 1300 ○ National schemes could indicate higher standards on voluntary basis.
 1301 ▪ Better training of farmers in animal welfare;
 1302 ▪ Training/ Certification for anaesthesia:
 1303 ○ NGOs wanted certification (? condition of cross-compliance);
 1304 ○ Other stakeholders wanted less formality.
 1305 ▪ Promotion of Farmer-run professional development schemes with certification of competence (eg UK):
 1306 ○ Ensure animal welfare fully represented;
 1307 ○ ? Support by Pillar 1 or 2 payments.
 1308 ▪ Review curricula for agriculture/veterinary education.

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1311 **10. Summary of the statements made by the stakeholder groups**
 1312 **(Paris meeting, 8-9 October 2008)**

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1314 See above, beginning of section 9 for a description of the programme of the Paris meeting.

1315 **10.1. Statement made by the stakeholder group: “Administration”**

1316 PREPARED BY MARIA-TERESA VILLALBA (MINISTRY OF AGRICULTURE, FISHERIES AND FOOD, SPAIN) AND PETER SPRING (SWISS
 1317 COLLEGE OF AGRICULTURE, SWITZERLAND)

1318

1319 *Definition of meat quality:*

- 1320 ▪ The report should give a definition of meat (pork) quality. Is the report just focused on boar taint or also other
 1321 criteria.

1322 *Terms: Short and long term solutions:*

- 1323 ▪ The terms short and long term solution are unclear, as some short term solutions might stay long term and
 1324 some long term solutions might never come into practice;
 1325 ▪ Terms such as: Solutions which can readily be implemented and solutions which require basic R&D before
 1326 implementation might be more appropriate.

1327 *Entire male fattening (table page 11):*

- 1328 ▪ It is practised today and is therefore a solution which can be implemented in some systems right away;
 1329 ▪ The long term goal should be to develop entire male production with validated check of absence of boar taint.
 1330 This will require the addressed improvements in genetics, management and detection.

1331 *Timing:*

- 1332 ▪ *The developments in Holland, Norway and Switzerland are not factored in sufficiently;*
- 1333 ▪ *What will this mean to the development of the project?*

1334 *Research focus:*

- 1335 ▪ *The report should point out that some countries are starting to implement some of the systems today. This*
- 1336 *should be taken into consideration when defining the research focus;*
- 1337 ▪ *The development of 'short' term solutions should rather be followed in those pilot type field studies and only*
- 1338 *specific open questions addressed through research projects where necessary (e.g. control of immuno*
- 1339 *castrated animals at slaughter line, ...);*
- 1340 ▪ *More funds and focus should be allocated to longer term solutions, which should also increase the chance for*
- 1341 *funding.*

1342 *Genetics:*

- 1343 ▪ *Role of conventional breeding in reducing boar taint.*

1344 *Systems with unique production characteristics:*

- 1345 ▪ *Organic, heavy pigs, outdoor,;*
- 1346 ▪ *Entire male production of heavy pigs will be very difficult, if not impossible, to practice. Therefore this should be*
- 1347 *addressed more clearly in the report. For heavy pigs short term solutions might have to become long term;*
- 1348 ▪ *Extensive systems in Mediterranean countries will also pose unique challenges to the application of several*
- 1349 *solutions.*

1350 *Production and consumption:*

- 1351 ▪ *The report should take into consideration not only the production of pigs but also the consumption of meat; and*
- 1352 *if possible the methods by which imported meat is produced.*

1353 *Economic impact of system change:*

- 1354 ▪ *How will new regulations affect import/export?*
- 1355 ▪ *The effect of different methods on the market flow should be evaluated (go beyond extra production cost and*
- 1356 *address the effect of market volume and price);*
- 1357 ▪ *A study should be carried-out to evaluate the effect of costs on competitiveness and on import and export.*

1358 *Choice:*

- 1359 ▪ *Choice might be important; therefore it should be taken into consideration in the research and legislation*
- 1360 *approach. Different systems might require different methods. So the ideal match should be found for each*
- 1361 *specific system. The market should be in a position that it can choose and develop.*

1362 *Female castration:*

- 1363 ▪ *It is reasonable to mention this practice in the present report. However, as this is not a boar taint problem the*
- 1364 *follow up project might not be the right place to address the issue;*
- 1365 ▪ *It has to be addressed in a specific animal welfare report and sorted out locally.*

1366

1367 **10.2. Statement made by the stakeholder group: "Animal welfare NGOs"**

1368 PREPARED BY PHIL BROOKE (CIWF, UK) AND FRANK TUYTTENS (ILVO, BELGIUM)

1369

1370 *Key Policies 1- short term:*

- 1371 ▪ *Pain relief mandatory when castrating pigs:*
 - 1372 ○ *Anaesthetic and analgesic;*
 - 1373 ○ *Remove 7-day reference:*
 - 1374 - *Pain relief at all ages.*
 - 1375 ○ *Trained stockpeople and vets;*
 - 1376 ○ *Competent body develops list of approved procedures:*
 - 1377 - *Includes methods for all systems (Large scale and small scale);*
 - 1378 - *Includes immunocastration once registered;*
 - 1379 - *Chemical castration unlikely to be an answer;*
 - 1380 - *Ongoing participatory research;*

1381 - Regular updating.

1382 o Set a date.

1383 Key Policies 2- long term:

1384 ■ Castration banned:

1385 o Set a date.

1386 ■ Consider extension for systems with very heavy pigs.

1387 Other policy issues:

1388 ■ Control and cross-compliance:

1389 o Farm assurance;

1390 o Checks by veterinary services at slaughterhouses;

1391 o Cross compliance.

1392 ■ WTO/ bilateral trade agreements;

1393 ■ Tearing of tissues:

1394 o Leave rules alone.

1395 ■ Boar taint regulation:

1396 o Is it necessary?

1397 o Boar taint not harmful;

1398 o Issue for the market;

1399 o Agreed definitions a good idea.

1400 Research - short term:

1401 ■ Regulation does not need to wait:

1402 o Systems in place already;

1403 o Ongoing feasibility studies;

1404 o Development of good practice;

1405 o Participatory research;

1406 o Including training of stockpeople;

1407 o Small and large scale systems;

1408 o Ongoing immunocastration research:

1409 - The market will decide.

1410 Research - long term:

1411 ■ Needs highest priority for funding;

1412 ■ Include research and development of small-scale and niche systems:

1413 o Management practices to reduce aggression and mounting behaviour to be developed.

1414 ■ Sexed semen not a priority.

1415

1416 **10.3. Statement made by the stakeholder group: “Upstream pork chain”**

1417 PREPARED BY HENRI DE THORÉ (COPA-COGECA, FRANCE) AND BENTE FREDRIKSEN (ANIMALIA, NORWAY)

1418 Including of CO₂ anaesthesia:

1419 ■ New information from Netherlands on anaesthesia. (esp CO₂ anaest) – can easily be performed by the farmers
1420 – put video on the internet;

1421 ■ One suggestion: Divide the table on page 9 on local and general anaesthesia (also by different types of
1422 anaesthesia, also split between CO₂ and isoflurane) not so much weaknesses with CO₂, less costs, easily
1423 performed by the farmers, large scale.

1424 Keep the castration as a farmer procedure:

1425 ■ Too expensive to have vets doing the anaesthesia;

1426 ■ The sentence of 7 days cannot be deleted until we have another practical solution (to be performed by the
1427 farmer).

1428 UK comments on entire male pig production/meat quality:

1429 ■ UK do not recognise problems with soft fat (only larger slaughter weights) – old scientific results?

1430 ■ Not more DFD in entire males (UK);

1431 ■ Management in entires can solve the behaviour problems, can prevent skin damages (UK).

1432 *Immunocastration:*

- 1433 ▪ *No agreement about immunocastration being a good short term solution;*
- 1434 ▪ *Independent research has to be carried-out first before it can concluded whether it is a real solution:*
 - 1435 ○ *Immunocastration – not well accepted by consumers (only stated in Pfizer studies) - Belgian study*
 - 1436 ○ *about consumers should be included;*
 - 1437 ○ *What means well accepted by consumers? Some confusion about acceptance of method (attitudes) and*
 - 1438 ○ *acceptance of the meat as good quality;*
 - 1439 ○ *New study from Norway – consumers attitudes to castration and alternatives (including*
 - 1440 ○ *immunocastration) – to be included?*
 - 1441 ○ *Immunocastration cannot be used in the non-conventional pigs (outdoor) – have to be castrated;*
 - 1442 ○ *Immunocastration will be available – leave it to the market if it will be used or not???*

1443

1444 *Sperm sorting*

- 1445 ▪ *Sperm sorting – only if inseminating (not used in all production systems);*
- 1446 ▪ *Questions about fertility + effectiveness have to be included;*
- 1447 ▪ *Chances of different sex ratios to be included and taken into consideration.*

1448 *Future research*

- 1449 ▪ *Attitudes of real stakeholders should be performed – should focus on where is the balance between animal*
- 1450 ▪ *welfare and meat quality?*
- 1451 ▪ *Definition of boar taint is important. – or maybe not a definition but define the characterization of it – what is*
- 1452 ▪ *generally recognised as boar taint? (a definition will take 10 years to reach);*
- 1453 ▪ *Misplacing of definition of boar taint within the legislation????*
- 1454 ▪ *No need for a pan-European regulation – leave it to the market – no agreement on this!*
- 1455 ▪ *Pain research is needed – no consensus on this.*

1456 **10.4. Statement made by the stakeholder group: “Downstream pork chain”**

1457 PREPARED BY KIM MATTHEWS (MLC, BPEX) AND WILLY BALTUSSEN (WUR, NETHERLANDS)

1458 *Be aware of the fast developments:*

- 1459 ▪ *need for feasibility studies???*
- 1460 ▪ *attitude are changing fast; results of PIGCAS are temporary.*

1461 *Strengths and weaknesses:*

- 1462 ▪ *no boar taint → less or more risk on boar taint;*
- 1463 ▪ *Extra costs for controls should be included also for castration with anaesthesia;*
- 1464 ▪ *Safety of application of Improvac: is part of EU registration → no need for further research;*
- 1465 ▪ *Effectiveness of sperm sorting: 100 or 70%?*
- 1466 ▪ *Anaesthesia also includes analgesia? Yes then more emphasis on this combination instead of only*
- 1467 ▪ *anaesthesia (in the recommendations).*

1468 *Further research:*

- 1469 ▪ *Short Term (rapid):*
 - 1470 ○ *No need for short term feasibility studies;*
 - 1471 ○ *Insight in occurrence of boar taint in present population.*
- 1472 ▪ *Long Term:*
 - 1473 ○ *Focus on entire male production (genetics and management);*
 - 1474 ○ *In discussion: does this include immunocastration?*
 - 1475 ○ *Need for definition on boar taint;*
 - 1476 ○ *Need for an uniform testing method for boar taint.*

1477 *Main conclusions Legislation:*

- 1478 ▪ *Does unfit meat exist? Why this differentiation?*
- 1479 ▪ *Framework on EU level with possibility for chain to choose their best solution!*
 - 1480 ○ *to allow free trade of meat and piglets.*