FÉDÉRATION EUROPÉENNE DES FABRICANTS D'ALIMENTS COMPOSÉS
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(19) MEMO 1 final
4 January 2019

Technical & Economic Impact Assessment for the

Reauthorisation of non-ruminant Processed Animal Proteins in monogastric feed

Focus on reuse of pig PAPs in poultry feed

Study performed by FEFAC

Index

1. Background and legal framework

1.1. Origin of the feed ban

Historically, materials derived from animal proteins of different origins were used for animal feeding. Further to the emergence of the BSE outbreak as from 1986, different risk analyses supported the hypothesis that the causal factor of BSE was transmissible via feed use of proteins of ruminant origin. Therefore, a provisional ban on the use of mammalian tissues into ruminant feeds was decided EU-wide in 1994 (Commission Decision 94/381/EC) as a key preventive measure to control the BSE outbreak. The ban was expanded in January 2001 (TSE Regulation (EC) No 999/2001 – Article 7 and Annex IV) with the feeding of all Processed Animal Proteins (PAPs) to all farmed animals being prohibited to avoid risks due to cross-contamination between feed containing PAPs intended for species other than ruminants and feed intended for ruminants, with certain limited exceptions. Only certain animal proteins considered to be safe (such as fish meal) could be used under very strict conditions. This set of prohibitions is commonly known as the "Feed ban".

Processed animal proteins (PAPs) are defined in Annex I of Regulation (EU) No 142/2011 as *"animal proteins derived entirely from Category 3 material which have been treated in accordance with Section I of Chapter II of Annex X (including blood meal[1] and fish meal) so as to render them suitable for direct use as feed material or for any other use in feedingstuffs, including petfood, or for use in organic fertilisers or soil improvers; however, it does not include blood products[2], milk, milk-based products, milk-derived products colostrum, colostrum products, centrifuge or separator sludge, gelatine, hydrolysed proteins[3] and dicalcium phosphate, eggs and egg-products, including eggshells, tricalcium phosphate and collagen".* PAPs shall not be confused with meat and bone meal[4] which are produced from Category 1 and Category 2 materials and may not be fed to any food producing animal.

1.2. Past revisions of the feed ban

Regulation (EC) No 999/2001 provides in its article 23 that the nature of the restrictions and derogations may be reviewed by Comitology. At the time of the adoption of this Regulation, the Commissioner for Health and Consumers, stated that three conditions were required for any revision of the feed ban, i.e. i) a new legal framework for the disposal of animal by-products, ii) clear indications that the BSE outbreak was under control and the number of BSE cases was decreasing and iii) adequate methods of analysis to allow a proper control of the application of the legislation.

In 2009, the EU legislation on Animal By-Products was reviewed with the publication of Regulation (EC) No 1069/2009, followed in 2011 by the publication of the implementing rules (Regulation (EC) No 142/2011).

As regards the number of BSE cases, no typical BSE case and 6 atypical BSE cases were detected in the EU in 2017, against respectively 49 and 11 cases in 2009 and 2,153 total cases in 2001.

[1] 'Blood meal' means processed animal protein derived from the heat treatment of blood or fractions of blood in accordance with Section 1 of Chapter II of Annex X; (Regulation (EU) No 142/2011 – Annex I)
[2] 'Blood products' means derived products from blood or fractions of blood, excluding blood meal; they include dried/frozen/liquid plasma, dried whole blood, dried/frozen/liquid red cells or fractions thereof and mixtures; (Regulation (EU) No 142/2011 – Annex I)
[3] 'Hydrolysed proteins' means polypeptides, peptides and amino acids, and mixtures thereof, obtained by the hydrolysis of animal by-products; (Regulation (EU) No 142/2011 – Annex I)
[4] 'Meat-and-bone meal' means animal protein derived from the processing of Category 1 or Category 2 materials in accordance with one of the processing methods set out in Chapter III of Annex IV; (Regulation (EU) No 142/2011 – Annex I)

In the EU Commission communication TSE Roadmap 2 issued in 2010, the EU Commission envisaged the possibility of re-authorising non-ruminant PAP in non-ruminant feed, subject to maintenance of the ban on cannibalism, the implementation of channelling requirements, and the availability of validated and operational laboratory control methods. The Commission also envisaged the possibility of introducing a tolerance level for PAP in feed for farmed animals.

In 2013, the use of non-ruminant and insect PAPs in fish feed was re-authorised (Regulation (EU) No 56/2013). The reasons for such restriction of the lifting of the feed ban were the high level of specialisation of the aquaculture chain (from fish meal producers down to fish farmers) considerably limiting the cross-contamination risk, the carnivorous nature of a number of fish species and the reduction of the pressure on halieutic resources due to replacement of fish meal with non-ruminant PAPs. This re-authorisation required a strict separation of the production lines for non-ruminant PAPs as well as for their commercialisation and use to avoid the risk of contamination with prohibited ruminant material. Official methods of analyses were developed and validated to enable the detection of ruminant PAPs in non-ruminant PAPs and feed containing them. However, in absence of ruminant PAP specific analytical target, the method officially approved was a qualitative PCR method detecting the presence of ruminant DNA.

Finally, in 2017, the EU authorities authorized the use of Processed Animal Proteins from insects in fish feed (Regulation (EC) No 2017/893). An overview of the current scope of the feed ban for different types of materials of animal origin for the different animal species is provided in Annex 1.

1.3. Ongoing review

The protein supply both for feed and food has become over the recent years a major political issue in the EU. The EU Commission issued recently a report on the development of plant proteins in the EU to reduce the EU dependency in third countries for its supply. Other (underused) protein sources are non-ruminant PAPs, as well as insect PAPs, microbial biomass, algae, etc.

The EU Commission launched several initiatives to pave the way to a possible re-authorisation of the use of pig PAPs in poultry feed and vice versa. This includes the development and validation of PCR methods for the analytical control of the intra-species recycling ban, i.e. the control of presence of pig DNA in pig feed and poultry DNA in poultry feed in resp. 2015 and 2017, and an update of the EFSA Quantitative Risk Assessment of the BSE risk posed by processed animal proteins.

The EU Commission announced its intention to launch discussions with stakeholders and Member States on possible review of the feed ban, starting with the re-authorisation of pig and insect PAPs in poultry feed.

The purpose of the present study is to provide technical and economic analysis regarding the use of poultry PAPs in pig feed and pig PAPs in poultry feed with a mere focus on the latter, taking into consideration different risk management options.

Further information on state of the play on BSE in the EU can be found at https://ec.europa.eu/food/safety/biosafety/food_borne_diseases/tse_bse_en.

2. Overview of the feed market and industrial structure

2.1. Compound feed production in the EU[5]

It is estimated that around 488 mio. t of feed are needed to meet EU-28 livestock animals requirements, thereof 1/2 are forages produced on the farm, 1/6 is feed produced on the farm based on purchased ingredients and 1/3 is compound feed produced by compound feed manufacturers (see chart 1).

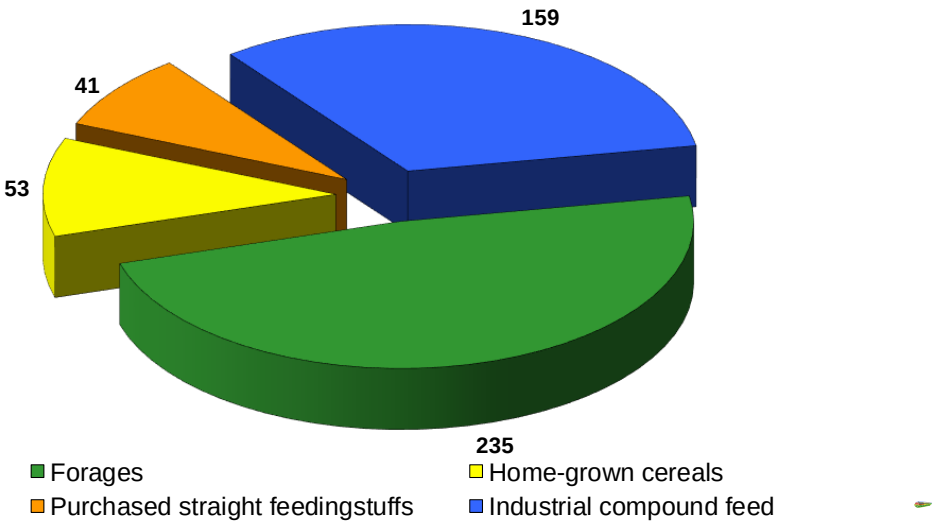


Chart 1: Livestock sourcing in feed in the EU-28 in 2017 in mio. t (source FEFAC – DG AGRI)

In 2017, industrial production of poultry, pig, cattle and fish feed accounted respectively for 55, 51, 45 and 1 mio. t for a total of 159 mio. t. taking feed for other species (rabbit, ovines, horses, etc.) into account but excluding petfood (see chart 2).

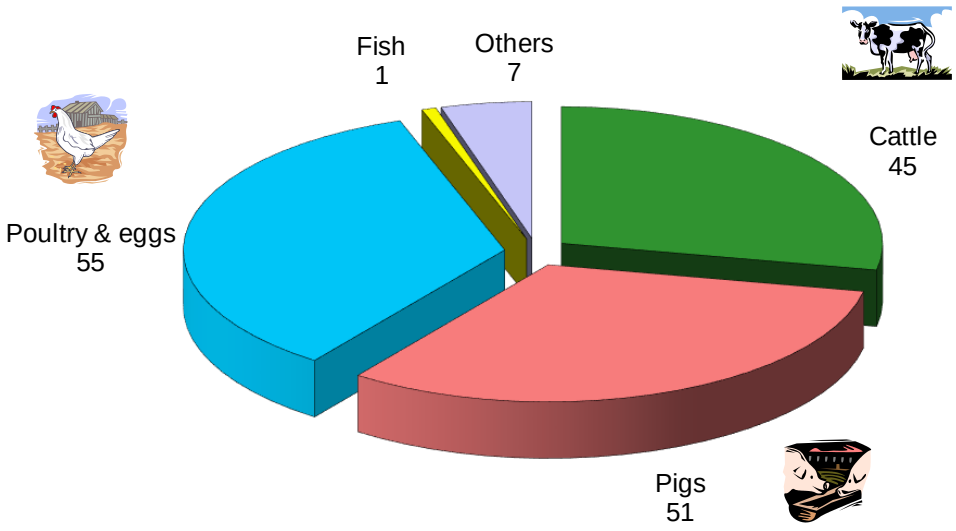


Chart 2: Production of industrial compound feed in the EU-28 in 2017 – breakdown by species in mio. t (source FEFAC)

[5] See also FEFAC statistics 2017 (https://www.fefac.eu/our-publications/statistics/)

2.2. Composition of compound feed (ingredients and protein content)

The nutritional requirements of livestock animals depend on animal species, age, livestock production system, physiological stage, etc. On average, the percentages of protein in pig, poultry and fish feed are respectively 17%, 22% and 40%. In reality, animal requirements are expressed as digestible proteins for ruminants and digestible amino acids for other species.

The animal nutritionist formulates the feed against these specific nutritional requirements, while taking into account the different protein sources, their nutritional value and also their possible negative effects on nutrition (antinutritional factors) or on the environment (nitrogen and phosphates release in manure). The optimisation of allocating the necessary proteins or amino acids is a sophisticated balance between nutritional value of the feed materials available, the nutritional needs of farm animals, the economic efficiency and the protection of the environment. In certain cases, the selection of feed materials also depends on customers specifications, e.g. exclusion of feed materials produced from GMOs or from animal origin.

Compound feed are mostly composed of cereals (50% on average), oilseed meals (for 26%), co-products from food and bioethanol processing (11.5%) and the rest being pulses, oils & fats, minerals, etc. (see chart 3).

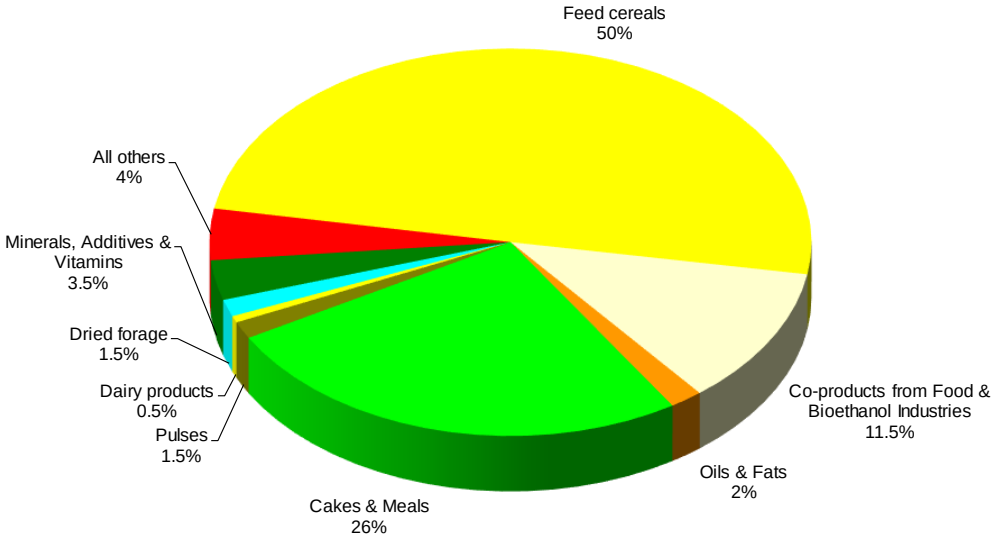


Chart 3: Consumption of feed materials by the EU compound feed industry in 2017

As far as protein content is concerned, we can distinguish three main categories:

- Feed materials with high protein content: fish meal (60%), terrestrial non-ruminant PAPs (average 60%), soya meal (high pro) (48-50%);
- Feed materials with medium protein content: skimmed milk powder (35%), rapeseed meal (32%), sunflower meal (28%), palmist/copra/etc. (23%), peas and beans (23%), corn gluten feed (22%) and dried fodder (15-20%).
- Feed materials with low protein content: cereals (9-12%), tapioca (<2%) and vegetable oils&fats (0%).

The added value of using PAPs in animal feed, especially in monogastric diets, is the high concentration in proteins and the high digestibility of amino acids and phosphorous, which is not only important to meet animal's requirements but also to reduce environment emissions of nitrogen and phosphorous (see nutritional profile of PAPs in Annex 2).

2.3. Feed industry structures

In the EU-28, the 159 mio. t of compound feed are produced by app. 3,500 production units. A large majority of the units are multispecies, although some are dedicated to a single species or have production lines dedicated to one species. In the aquafeed sector, feed production units are fully dedicated to fish feed.

A categorisation of the EU feed mills depending on their degree of specialisation of the plant or existence of dedicated production lines (mono species, monogastrics, etc.) was performed in 2008 among the FEFAC membership (see Table 2).

From the answers received from national associations of compound feed manufacturers, it could be estimated that 12% of the feed mills are (or have production lines) dedicated to pig feed production, while 6% are dedicated to poultry feed and 1.5% dedicated to fish feed. 43% of feed mills manufacture feed for monogastrics only (pig, poultry) (or have dedicated production lines for ruminants) and the remaining feed mills produce for both ruminants and non-ruminants and do not have dedicated production lines for ruminants.

Specialisation of production lines / plants	Number	Percentage
Pig only	357	12
Poultry only	173	6
Fish only	40	1
Ruminant only	246	9
Monogastric only	1,238	43
Mixed ruminant / monogastrics	846	29
TOTAL	2,900	100

Table 2. Degree of specialisation of compound feed production lines/plants in the EU (source FEFAC)

According to the FEFAC experts, the overall number of production units / production lines has decreased by 12% since 2008 but the relative degree of specialisation is considered not to have changed significantly. Therefore, **these data from 2008 are still relevant nowadays** for the evaluation of the potential use of pig and/or poultry PAPs in non-ruminant feed.

It can be assumed that dedicated production lines/plants are larger in production capacity than multispecies lines/plants: in general, smaller feed mills have a single production line and produce for many different species, including ruminants. Therefore, it can be expected that production lines/plants dedicated to poultry feed represent more than 6% of the total poultry feed production in the EU. A figure of 10% would be more realistic.

3. Scenarios for risk management in case of re-authorisation of pig PAPs in poultry feed

3.1. Channelling / Specialisation

EU Regulations (EC) No 1069/2009 and No 142/2011 on Animal By-Products and Regulation (EC) No 183/2005 on feed hygiene establish a set of requirements in terms of traceability and provide that operators implement HACCP-based risk management procedures to control in particular the carry-over risk in plants handling materials of different animal species and/or producing feed for different species. Voluntary Codes of Good Hygiene Practice have been developed at both EU and national level to assist operators in the implementation of such risk management measures.

In addition, it is expected that the re-authorisation of pig PAPs in poultry feed if decided will be accompanied by risk management measures under Regulation (EC) No 999/2001 with a view to control the risk of presence of PAPs in ruminant feed and the risk of presence of poultry PAPs in poultry feed in line with the ban on intra-species recycling.

- Control of risk of presence of ruminant PAPs in ruminant feed
    - Physical separation of pig slaughtering lines from ruminant slaughtering lines and pig ABP processing lines from ruminants processing lines

As regards the upstream part of the chain, it can be expected that the existing strict channelling/specialisation requirements imposed to slaughterhouses and ABP processing plants to prevent contamination of non-ruminant PAPs with ruminant materials in the framework of the re-authorisation of non-ruminant PAPs in fish feed will be maintained (Annex IV, Chapter IV, Section D of Regulation (EC) No 999/2001).

    - Complete physical separation in feed mills of production lines where pig PAPs are used from those producing ruminant feed

As regards compound feed manufacturing, it can also be expected that the obligation laid down in Annex IV Chapter III Section B for feed mills using fish meal, dicalcium and tricalcium phosphate from animal origin and blood products from non-ruminants not to produce ruminant feed on the same production lines as feed for non-ruminant PAPs will also be valid for any establishment using non-ruminant PAPs.

- Control of risk of presence of poultry PAPs in poultry feed
    - Physical separation of pig slaughtering lines from poultry slaughtering lines and pig ABP processing lines from poultry processing lines

It can be expected that the legislator will follow the same logic as for the presence of ruminant material in non-ruminant PAPs for the control of the risk of presence of poultry material in pig PAPs, i.e. that pig slaughtering lines should be physically separated from poultry slaughtering lines and likewise for pig ABP processing.

    - Measures at feed mill

For the purpose of this study, we will consider two options:

- **Option 1**: A strict physical separation of production lines for poultry feed containing pig PAPs from production lines for other feed
- **Option 2**: A separation in time of the production of poultry feed and other feed produced on the same production line, with implementation of Good manufacturing practices for the control of the risk of carry-over of pig PAPs from poultry feed to pig feed

These two options are meant to reflect the fact that dedicated poultry feed production lines are quite uncommon and, therefore, the “dedication” parameter is extremely important to consider in such impact assessment. In addition, the risk of presence of pig PAPs in pig feed is exclusively a non-compliance risk, thus justifying a different approach from the management of the risk of presence of PAP in ruminant feed which is both a safety and non-compliance risk.

3.2. Standard Operating Procedures for the analytical control of the feed ban

The control of the effective implementation of the feed ban is based on documentary checks and analytical controls of feed samples. It is expected that the approach applied today for the control of the feed ban will be maintained, i.e.:

- For feed and feed materials not meant to be used in feed for species for which the use of PAPs from terrestrial origin and/or fish meal is prohibited (e.g. ruminants, rabbits, horses and pigs): light microscopy.
- For compound feed and feed materials meant for use in aquaculture and poultry feed: combination of light microscopy and ruminant PCR.

In addition, for poultry feed, the poultry PCR method is expected to be used to control the presence of poultry PAP in combination with light microscopy. An example of possible Standard Operating Procedures for the control of the feed ban once pig PAPs are re-authorised in poultry feed is provided in Appendix H of EFSA Updated quantitative risk assessment of the BSE risk posed by processed animal protein from 6 June 2018[6].

In the present Impact Assessment, three options will be considered:

Option A: An action limit is established for the presence of ruminant DNA and the presence of poultry DNA in order to address the risk of false positive: this concept of action limit consisting in fixing a number of DNA copies below which no action would be taken by operators/control authorities is explained in the EFSA QRA, based on an assessment by the EURL-Animal Proteins samples of feed containing legally permitted ruminant material as e.g. carrier of feed additives). The level of this action limit considered here is 300 DNA copies for ruminant DNA. A similar action limit is considered for poultry DNA.

Option B: In addition to option A, an action limit is set for the presence of pig PAPs in pig feed: the setting of such an action limit could be envisaged considering that the BSE-risk due to the presence of pig PAPs in pig feed is negligible (and in any case lower than the BSE risk with pig PAPs in poultry feed) and there is no evidence of any other specific risk linked to the presence of pig material in pig feed. Considering that the method used for the control of compliance of pig feed with the feed ban should be based on microscopy, the action limit would, therefore, be expressed in a number of bones spicules corresponding to a percentage of pig PAPs of 0.1% (which would correspond to a carry-over of 2% of poultry feed containing 5% pig PAPs into pig feed). Such action limit would make sense in case no physical separation of production lines between poultry feed and other species would be required (option 2 under par. 3.1. above) and actually meets the minimum required performance level for the validation of the official methods of analysis.

Option C: No action limit.

4. Experience with the re-authorisation of non-ruminant terrestrial PAPs in fish feed

In July 2013, fish feed manufacturers were allowed to reuse non-ruminant terrestrial PAPs. This decision was taken considering in particular that fish farms are physically separated from livestock farms, therefore excluding risks that feed meant for fish would be consumed by land animals. In terms of risk management measures, the EU legislator required a physical separation of production lines at the different levels of the chain, i.e.:

- Physical separation of non-ruminant slaughtering lines from ruminant slaughtering lines and of non-ruminant ABP processing lines from ruminant processing lines;
- Dedication of fish feed production lines.

The latter requirement was not demanding since fish feed is produced in dedicated plants only.

[6] These Standard Operating Procedures were drafted by the EU Commission as possible SOPs when pig PAPs are re-authorised in poultry feed and poultry PAPs in pig feed. In practice, since the review of the feed ban considered at the moment only concerns the reuse of pig PAPs in poultry feed, the control of pig feed would be subject to the same SOP as ruminant or rabbit feed.

4.1. Parameters impacting on the practical reuse of non-ruminant PAPs in fish feed

On the market place, several economic and social arguments were supportive of the reuse of pig or poultry PAPs in fish feed:

- A number of fish species are carnivorous, in particular salmonids;
- Non-ruminant PAPs are safe and produced/used under controlled conditions;
- Non-ruminant PAPs replace fish meal, thus limiting the pressure on halieutic resources;
- Non-ruminant PAPs are (expected to be) less expensive.

In practice, however, operators had to face reluctance from downstream stakeholders and authorities in certain Member States, reported in media with the following *a priori*:

- The PAP that are used in fish feed are the same as the one responsible for the BSE crisis;
- PAP is a cheap waste product unsuitable for animal nutrition;
- The EU does not need PAP in fish nutrition as it was regarded as “non-natural”.

FEFAC, FEAP and EFPRA released a joint statement addressing these assumptions in 2014.

In addition official controls performed by authorities led to a number of results interpreted as showing non-compliance and sometimes leading to notification to the RASFF and triggering withdrawal/recalls of fish feed.

- In certain cases, these results were true positive and investigations performed revealed shortcomings at the level of manufacturers of non-ruminant PAPs, fish meal and blood meal or their transport;
- In other cases, the positive result could be attributed to the presence of legally permitted ruminant material such as milk in the feed materials (e.g. milk in former foodstuffs);
- In other cases, the positive result could not be explained by checks performed on feed materials or by traceability; it could be shown in certain cases that certain constituents of ruminant origin legally permitted in feed such as dairy products are used in preparations of certain feed additives, an information which is not mentioned on any label and, therefore, cannot be anticipated.

Operators implemented corrective actions to avoid cross-contamination with unauthorized ruminant material. SOP for the control of the feed ban have also been updated to address the incomplete fitness for purpose of the ruminant DNA PCR method. However, there are still cases of positive results that cannot be attributed to presence of illegal ruminant material (e.g. dairy products in preparations of feed additives). An analysis of the positive control results is provided by EFSA in their updated QRA.

The EURL-AP performed a statistical analysis of the number of DNA copies detected in a number of feed samples and concluded that an action level set at 300 DNA copies would avoid most of the “false” positive results[7].

4.2. Volume of non-ruminant terrestrial PAPs used in fish feed

Based on internal interviews with major fish feed producers in the EU, it can be concluded that the main driver for the decision whether to use non-ruminant PAPs in fish feed or not is market acceptance.

[7] It must be reminded that there is no method which can specifically identify and quantify the presence of ruminant PAPs in feed: the light microscopy does not discriminate ruminant from non-ruminant PAPs and the ruminant DNA PCR method is an indicator of presence of ruminant DNA whether coming from legally permitted or prohibited ruminant material. Technically speaking, the detection of ruminant DNA from legally permitted ruminant material is not a false positive. However, from a risk management point of view, it is.

In terms of inclusion rates, terrestrial PAPs may be incorporated at levels ranging from 10 to 15% of the diets in salmonids and seabass/seabream feed (average 12%) but only in certain EU Member States representing a volume of feed around 700,000 t. This means a figure of 85,000 t or terrestrial PAPs used in fish feed for the whole of the EU + Norway.

This estimate is consistent with the figures reported by EFPRA for 2017 who considers that 80,000 t of poultry meal, 65,000 t of hydrolysed feather meal and 30,000 t of blood meal that they produce in the EU + Norway are used for fish feeding globally (see Annex 3 chart 1).

5. Parameters to be considered for the effective reuse of pig PAPs in poultry feed

5.1. Potential volumes of pig PAPs available for use in poultry feed

According to the data issued by EFPRA (see annex 3, charts 2 and 3), 3.1 mio. t of Category 3 PAPs were produced in 2017 in the EU-28 + Norway and Switzerland. A significant part of the PAPs (2.05 mio. t) were destined to petfood globally.

Concerning pig meal, the volume produced in 2017 is around 300,000 t, 80% of which is used in petfood (global figure) and the rest being mostly used in feed for fur animals or as fertilizer.

Import of non-ruminant PAPs in the EU is not expected, considering the nature of the EU requirements. On the other hand, export of non-ruminants PAPs is perfectly possible. Therefore, the figure of 300,000 t of pig PAPs available for feed use in the EU must be regarded as a maximum.

5.2. Potential inclusion rates of pig PAPs in poultry feed

The nutritional specifications of some types of pig PAPs can be found in Annex 2. It is difficult to evaluate the potential use of pig PAPs in poultry feed especially because of the relatively modest volumes at stake and the difficulty to figure out the strategy of the individual operators.

Due to the intrinsic higher amino acids content, poultry PAPs and feather meals have a higher nutritional value than pig PAPs and, therefore, have a higher marginal interest price in feed formulation. It is assumed that the non-ruminant PAPs mostly used nowadays in petfood and fish feed are poultry PAPs. Therefore, we can anticipate that poultry feed will not really compete with aquaculture and petfood for the use of pig PAPs, meaning that the price of pig PAPs should at a certain point meet the marginal interest price of pig PAPs in poultry feed. Therefore, it can be expected that poultry feed may use pig PAPs to its full potential, meaning that pig PAP could be incorporated up to the maximum inclusion rate in poultry diets. Such scenario does not take into account the social factors that can further weigh on the decisions of individual operators.

The maximum inclusion for pig PAPs in poultry diets is determined by the intrinsic nutritional value of the feed material and potential adverse effects on zootechnical performances of animals, environmental impact, technological properties of feed and quality of animal products. There is limited knowledge at this stage of such effects. Public research performed on the use of pig PAPs in poultry feed is scarce[8]. Therefore, it can be expected that poultry feed producers should take a margin of security, based on historic records of inclusion rates before the feed ban. A maximum limit of 5% for the incorporation of pig PAPs in poultry feed is considered by FEFAC experts as a realistic figure.

[8] Effect of four processed animal proteins in the diet on digestibility and performance in laying hens – Van Krimpen and al – Poultry Science 2010

5.3. Sustainability considerations of the reuse of pig PAPs in poultry feed

The reuse of pig PAPs in poultry feed may positively affect the environment and sustainability of the food chain:

- The digestible phosphorous content of PAPs is higher than the vegetable protein sources it would replace. This would lower the demand for inorganic phosphorus, which is a scarce natural resource;
- The use of PAPs contributes to closing the bioeconomy cycle that is a key policy objective for the EU;
- The Carbon footprint (CFP) of pig PAPs is estimated at 0.66 kg CO2/kg, vs. 2.58 kg CO2/kg for soybean meal (average value weighted according to the different origins - source GFLI). Expressed per unit of protein, this would mean a value of 1.1 kg CO2/kg protein from pig PAPs, vs. 5.7 kg CO2/kg protein from soybean meal, i.e. 5 times less.

All in all, the benefits of the (re-)use of pig PAPs in poultry feed are somewhat less than for non-ruminant PAPs in fish feed. The "sustainability" argument (i.e. in the present case replacement of soy) is less and poultry are more perceived as insectivorous than carnivorous. The expected economic benefit for the chain is also less as the expected marginal interest price for pig PAPs in poultry feed will be much lower than the marginal interest price of poultry PAPs in fish feed. Therefore, it is expected that the incentives to the poultry feed chain to reuse pig PAPs are less and, therefore, the decision by operators to use pig PAPs will very strongly depend on the risk management measures in place, the legal security they can expect with regard to the risk of non-compliance and market/social acceptance.

6. Impact Assessment of different risk management measures for the reuse of pig PAPs in poultry feed

6.1. Scenarios

Based on the options discussed in part 3, the following scenarios are considered in this document:

- **Scenario 1: physical separation of poultry feed production lines and no action limit for ruminant and poultry DNA (option 1 + option C)**
- **Scenario 2: physical separation of poultry feed production lines and action limit set for ruminant and poultry DNA (option 1 + option A)**
- **Scenario 3: no physical separation and action limits for ruminant and poultry DNA and pig PAPs spicules in pig feed (option 2 + option B)**

Other combinations do not require further attention:

Option 1 + option B is not to be evaluated because there would be no specific need for an action limit linked to light microscopy for pig PAPs in pig feed if physical separation is required. [9]

Option 2 + options A or C would not allow for the practical reuse of pig PAPs in poultry feed on multispecies production lines because of the impossibility to completely avoid carry-over.

[9] It should be noted that, in case poultry PAPs would be re-authorised in pig feed, then the SOP for the control of presence of pig PAPs in pig feed would involve combination of light microscopy and pig PCR and, therefore, the definition of an action limit linked to the pig DNA PCR method would be suitable.

6.2. Results

Generally speaking, it cannot be excluded that some ruminant and/or poultry DNA ends up in a feed mill via legally permitted ingredients of a feed additive preparation or further to "contamination" of a vegetable feed material by legally permitted animal material.

Scenario 1: Under this scenario (which is the one prevailing today for the control of fish feed containing non-ruminant PAPs), official controls performed on final feed may turn positive whereas tests performed on feed materials are negative (light microscopy on feed materials of vegetable origin and feed additives, light microscopy and ruminant and poultry PCR for pig PAPs. It is expected that the proportion of positive results will be higher than what is observed for fish, due to application of both ruminant DNA and poultry DNA PCR and because of the nature of the feed materials of animal origin other than PAPs used in practice in poultry feed (e.g. dicalcium/tricalcium phosphate, lactose as carrier of certain feed additives). This potentially means a significant number of notifications to the RASFF, that could then deeply affect the reputation of the EU poultry chain, both on the EU and the export markets. It is unlikely that the economic benefit for the poultry chain can outweigh the risk for the chain, taking also into account an even higher consumer/media resistance than observed in the case of fish feed. It is, therefore, expected that the number of feed companies willing to reuse pig PAPs in poultry feed will be **extremely limited or null**. Pig PAPs might still be exported to Third Countries as is the case today.

Scenario 2: Under this scenario, the risk of false positive would be reduced. The risk of true positive (i.e. presence of DNA that can be traced to illegal ruminant or poultry material) would remain and it is likely that, as experienced with fish feed, some positive results will reveal effective contamination cases during manufacturing of trading of feed materials used more in poultry feed than in fish feed. This means a number of notifications at the beginning, but lowering over time as corrective actions are implemented. In such case, poultry feed producers and the poultry chain might be more motivated to reuse pig PAPs than under scenario 1. However, due to constraints as regards physical separation of production lines, only the 6% dedicated poultry feed mills/production lines representing 10% of the poultry feed production will be able to reuse pig PAPs. Assuming a max. 5% inclusion rate included in 10% of the 50 mio. t of poultry feed produced in the EU nowadays, this means 250,000 t of pig PAPs per year, i.e. close to the volume produced in the EU. Then, a social resistance to the reuse of pig PAP in poultry feed higher than for the reuse of non-ruminant PAPs in fish feed can be expected, i.e. it could concern a larger number of countries. Therefore, the amount of pig PAPs that could effectively be reused under this scenario would not exceed **125,000 t**, at least in the first 5 years following the re-authorisation.

Scenario 3: Under this last scenario, pig PAPs would be accessible to all feed mills/production lines where poultry feed is produced and no ruminant feed is produced, i.e. 49% of the EU feed mills. This is likely to represent an even larger proportion of the poultry feed produced in EU (a figure of 60% could be a good approximation). In such conditions, the potential usage of pig PAPs would reach 1,500,000 t produced in the EU. The risk of non-compliance due to carry-over of pig PAPs in pig feed would obviously be higher but could be managed via the action limit on the microscopy testing. The social reservation as under scenario 2 would mean that a number of feed business operators would renounce to use pig PAPs for reasons of market opposition but assuming this would concern 50% of the market, the remaining 50% of poultry feed produced, where pig PAPs would be effectively reused, would still be enough to use the total amount of pig PAPs available, **i.e. 300,000 t.** It should be noted here that, in multipurpose feed mills, the decision to reuse pig PAPs in poultry feed may also be conditioned by specifications imposed by customers of other feed, in particular pig feed: indeed, the risk that pig feed produced in mills where pig PAPs are used contain such pig PAPs might be regarded by the pig industry as unacceptable.

7. Conclusions

The present study is an exploratory exercise to gain knowledge about what would initially be the impact of the reintroduction of pig PAPs in poultry feed.

Nutritionally speaking, pig PAPs are regarded by the chain as an excellent feed material, with high concentration of highly digestible nutrients such as amino acids and phosphorous, a high content in vitamins and no antinutritional factor, making this feed material suitable for use in feed for any species and in particular young animals and laying hens. The assessment performed shows that all pig PAPs produced in the EU may be used in poultry feed.

The market perception of pig PAPs is still negative, because of the perceived link with BSE crisis. The experience of the re-authorisation of non-ruminant PAPs in fish feed still shows a high level of resistance in certain countries, supported in certain cases by political statements. The number and strength of the arguments in support of the use of pig PAPs in poultry feed are less than in the case of the reuse of non-ruminant PAPs in fish feed and the economic benefits for the chain are less. Therefore, it can legitimately be expected that the amount of pig PAPs effectively reused would be much lower than the potential.

The non-compliance risk in relation to the use of pig PAPs in poultry feed is perceived as higher than in the case of non-ruminant PAPs in fish feed, with possible damages for the safety image of the poultry chain, both in the EU and on the global market. This non-compliance risk depends on the stage of the chain where official control focus: in its updated Quantitative Risk Assessment EFSA considered that control should be performed at the PAP production level to avoid further contamination and, as far as the risk of “false positive” is concerned, they recommend that “testing/speciating PAP takes place prior to its inclusion in [compound] feedingstuffs”. The non-compliance risk will also be conditioned to a large extent by the introduction of an action limit for the presence of DNA copies of ruminant and poultry at a level that can avoid false positives from a risk management point of view.

The physical separation of production lines along the chain remains a very efficient risk management measure to implement the intra-species recycling ban and control the BSE risk. However, if a complete physical separation is suitable at the level of feed mills between production lines for ruminant and those for other species to control the risk of contamination of ruminant feed by ruminant PAPs, such complete separation between production lines for poultry feed and for other non-ruminant species may not be essential, as no safety risk is associated to the presence of poultry PAPs in poultry feed or pig PAPs in pig feed. In practice, HACCP-based good hygiene practice at feed mill level are meant to reduce the level of carry-over in multipurpose feed mills to a minimum, technically unavoidable level, for which the establishment of an action limit for the presence of pig PAPs into pig feed would be required.

Taking into account socio-economic, nutritional and environmental parameters as well as the possible risk management measures established by the legislator, the present Impact Assessment concludes that, in case of re-authorisation of pig PAPs in poultry feed, the practical use of pig PAPs in poultry feed in the EU would be:

- 0 in case no action limit is set for ruminant and poultry DNA;
- 125,000 t maximum if such action limits are set and if pig PAPs can only be used in dedicated poultry feed production lines/plants;
- All the EU production of pig PAPs (that is not used yet for petfood or aquaculture) in case pig PAPs can be used in multi non-ruminant species feed mills and action limits are set for ruminant and poultry DNA and an action limit is set for pig PAPs in pig feed.

The role of FEAP was decisive in 2013 for the reuse of non-ruminant PAPs in fish feed. In the present case, the proactive support of the poultry industry to the reuse of pig PAPs in poultry feed will be even more crucial.

8. Annexes

<u>Annex 1</u>. State of play with regard to the authorisation of animal proteins per species of animals

Animal products		Ruminant feed	Non ruminant feed (excl. Fish)	Fish feed	Pets and fur animals
Milk, milk-based products and colostrum		✓	✓	✓	✓
Eggs and egg products		✓	✓	✓	✓
Processed animal proteins	From ruminants (including blood meal)	✗	✗	✗	✓
	From non-ruminants (including blood meal)	✗	✗	✓	✓
	From insects	✗	✗	✓	✓
	Feather meal	✗	✗	✓	✓
	Fish meal	✓ (1)	✓	✓	✓
	Blood meal	✗	✗	✓	✓
Hydrolysed proteins	Hydrolysed proteins from ruminant hides and skin	✓	✓	✓	✓
	Hydrolysed proteins from non-ruminants	✓	✓	✓	✓
	Hydrolysed proteins of feathers and fish and marine products	✓	✓	✓	✓
Gelatines	Gelatines from ruminants	✗	✗	✗	✓
	Gelatine from non-ruminants	✓	✓	✓	✓
Dicalciumphosphate and Tricalciumphosphate of animal origin		✗	✓	✓	✓
Blood products	Blood products from ruminants	✗	✗	✗	✓
	Blood products from non-ruminants	✗	✓	✓	✓
Animal fats		✓	✓	✓	✓
Collagen	Collagen from ruminants	✗	✗	✗	✓
	Collagen from non-ruminants	✓	✓	✓	✓

(1) Fish meal used in formulations of unweaned ruminants

Annex 2. Composition of certain pig PAPs

	Unit	PAP 1	PAP 2
Processing method		1 (pressure and sterilisation)	7 (mild method)
Dry matter	g/kg	946	948
Ash	g/kg	121	233
Phosphorus	g/kg	19.3	41.9
Calcium	g/kg	28.3	78.0
Crude fibre	g/kg	40	16
Crude protein	g/kg	609	601
Crude fat	g/kg	144	101
Precaecal digestibility of amino acids	%	63.6	68.1
AME	MJ/kg	9.6	7.4

Nutritional characteristics of two different types of porcine PAPs – Van Krimpen et al. Wageningen University - 2018

Annex 3. Production of PAPs and other ABP derived products in the EU and their destination (EU + Third countries) in 2017 (source EFPRA)

Chart 1: Global use in fish feed of EU-produced PAPs of land animal origin

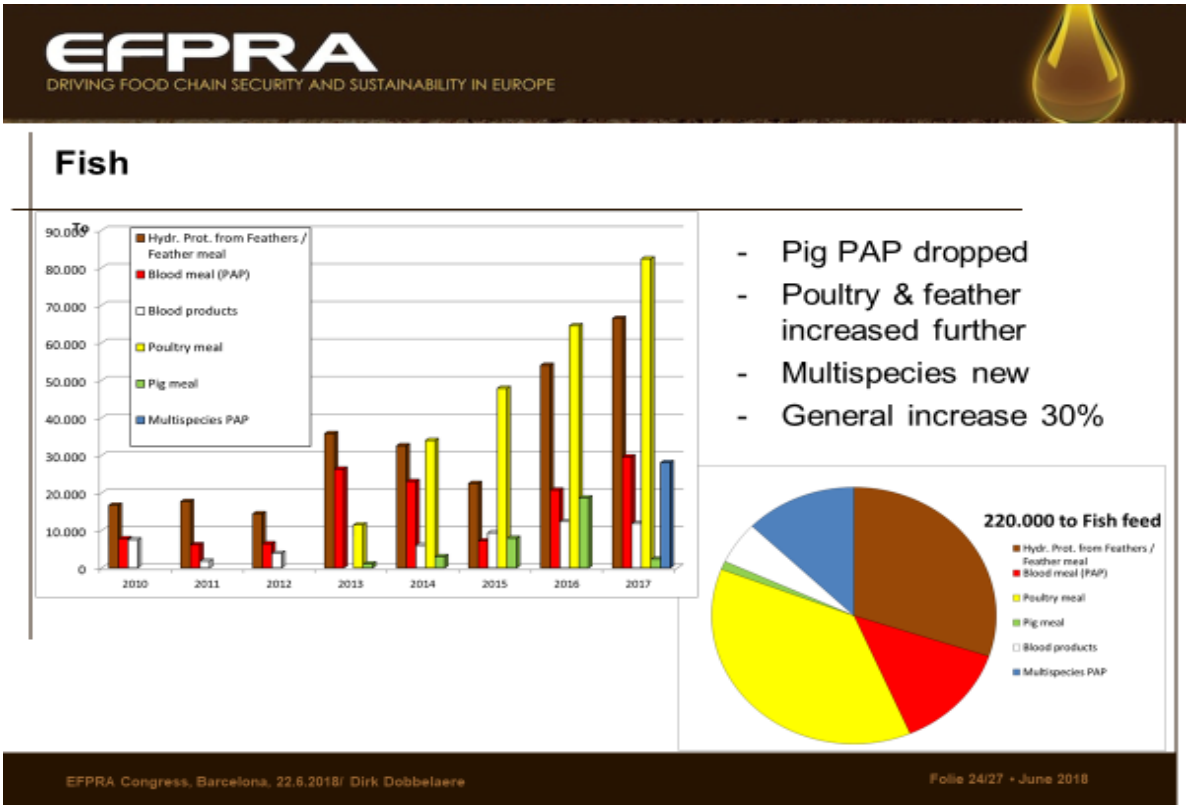


Chart 2: Production of PAPs and food grade protein in the EU

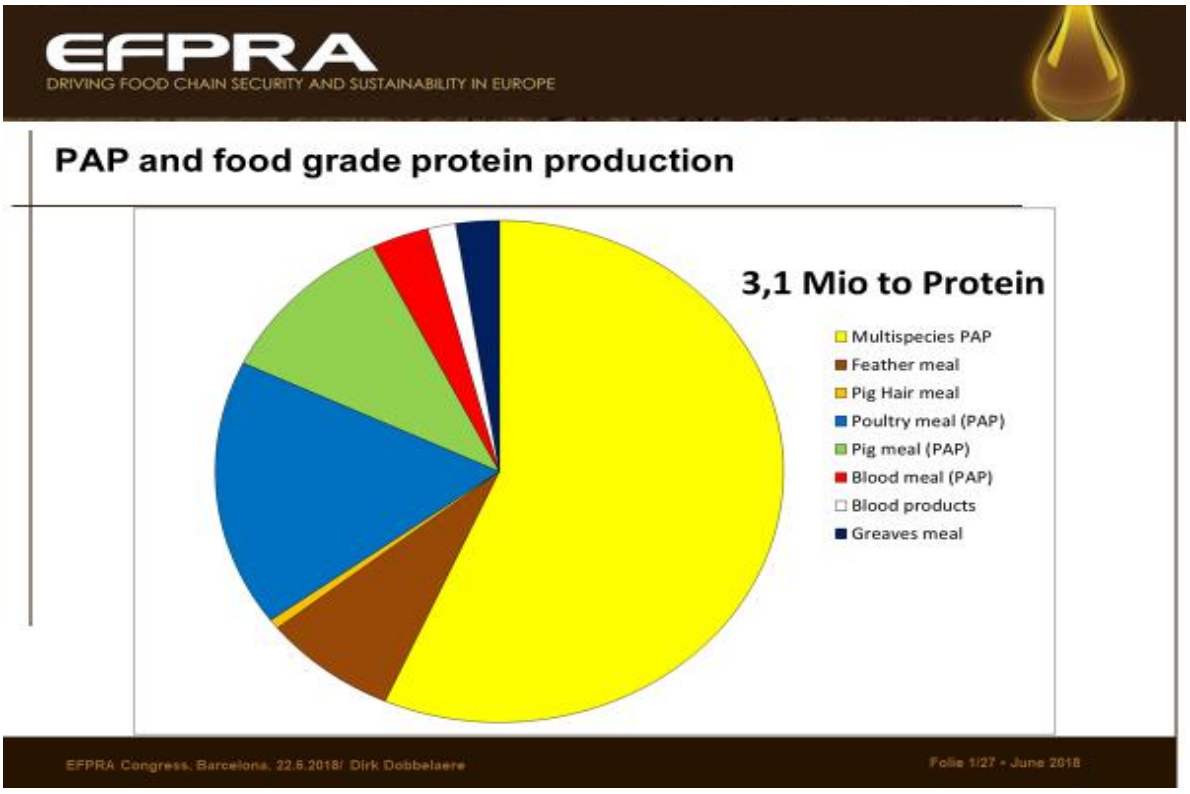
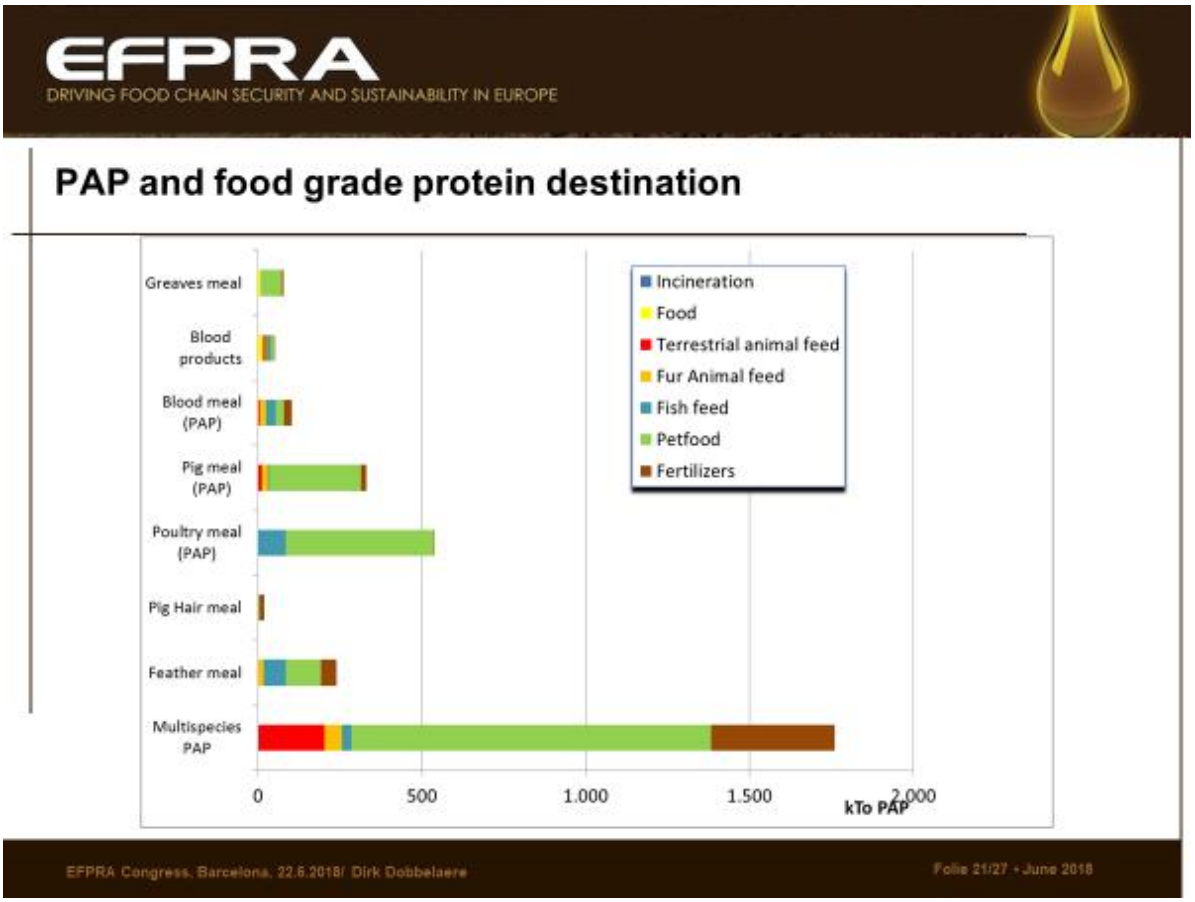


Chart 3: Global destination of EU-produced PAPs and food grade proteins



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Regulation (EC) No 1069/2009 of the European Parliament and of the Council of 21 October 2009 laying down health rules as regards animal by-products and derived products not intended for human consumption and repealing Regulation (EC) No 1774/2002 (Animal by-products Regulation)

Commission Regulation (EU) No 142/2011 of 25 February 2011 implementing Regulation (EC) No 1069/2009 of the European Parliament and of the Council laying down health rules as regards animal by-products and derived products not intended for human consumption and implementing Council Directive 97/78/EC as regards certain samples and items exempt from veterinary checks at the border under that Directive. Text with EEA relevance

Commission Regulation (EU) No 56/2013 of 16 January 2013 amending Annexes I and IV to Regulation (EC) No 999/2001 of the European Parliament and of the Council laying down rules for the prevention, control and eradication of certain transmissible spongiform encephalopathies. Text with EEA relevance

Commission Regulation (EU) No 51/2013 of 16 January 2013 amending Regulation (EC) No 152/2009 as regards the methods of analysis for the determination of constituents of animal origin for the official control of feed. Text with EEA relevance