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**REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND
THE COUNCIL**

**on the possibility of introducing certain requirements regarding the protection of fish at
the time of killing**

(Text with EEA relevance)

1. Introduction

Farmed fish are covered by Council Regulation (EC) No 1099/2009 on the protection of animals at the time of killing ('the Regulation')¹. However, only the general provision in Article 3(1) is applicable to farmed fish, i.e. "*animals shall be spared any avoidable pain, distress or suffering during their killing and related operations*".

In addition Article 27(1) of the Regulation requires that "*the Commission shall submit to the European Parliament and the Council a report on the possibility of introducing certain requirements regarding the protection of fish at the time of killing taking into account animal welfare aspects as well as the socio-economic and environmental impacts*".

The purpose of this report is to comply with Article 27(1) of the Regulation. The report includes analysis of socio-economic impacts at the time of slaughter. However the potential environmental effects were not considered in this report as their impact was considered negligible at the time of killing².

The report also constitutes one of the actions listed in the EU strategy for the protection and welfare of animals 2012-2015³.

The World Organisation for Animal Health (OIE) has adopted guidelines concerning welfare aspects of stunning and killing of farmed fish for human consumption⁴. These guidelines are also relevant within the EU since all EU Member States are OIE member countries.

For the main fish species farmed in the EU the European Food Safety Authority (EFSA) in 2009 published several opinions on the welfare aspects of the main systems of stunning and killing⁵. These opinions demonstrated that challenges exist in the aquaculture industry with regard to maintaining good fish welfare at the time of killing. Using a risk based approach, the main hazards identified were:

- 1) handling or handling related procedures (e.g. crowding, pumping, time out of water)
- 2) water quality in holding tank/pen

¹ OJ L 303, 18.11.2009, p. 1.

² In more general terms, environmental impacts from aquaculture production are important and consequently have been identified as one of the four priority areas in the Commission strategic guidelines for the sustainable development of EU aquaculture:
http://ec.europa.eu/fisheries/cfp/aquaculture/index_en.htm

³ Communication from the Commission to the European Parliament, the Council and the European Economic and Social Committee on the European Union Strategy for the Protection and Welfare of Animals 2012-2015, COM(2012) 6 final/2.

⁴ Aquatic Animal Health Code, Chapter 7.3 Welfare aspects of stunning and killing of farmed fish for human consumption.
http://www.oie.int/index.php?id=171&L=0&htmfile=chapitre_welfare_stunning_killing.htm

⁵ Scientific Opinions of the Panel on Animal Health and Welfare on a request from the European Commission on Species-specific welfare aspects of the main systems of stunning and killing of farmed fish

Farmed Carp <http://www.efsa.europa.eu/en/efsajournal/pub/1013>

Farmed Rainbow Trout <http://www.efsa.europa.eu/en/efsajournal/pub/1012>

Farmed Sea Bream and Sea Bass <http://www.efsa.europa.eu/en/efsajournal/pub/1010>

Farmed Atlantic Salmon <http://www.efsa.europa.eu/en/efsajournal/pub/1011>

3) stunning and killing methods.

EFSA concluded that many of the methods and much of the equipment in use then resulted in poor fish welfare. For this reason EFSA proposed certain recommendations, both for the pre-slaughter and the stunning and killing operations. It was also emphasised that opportunities for development of new methods for stunning or killing, for all of the fish species assessed, were considerable.

To assist with the preparation of this report an independent study report by a selected external contractor was commissioned in 2016⁶. The aim of the commissioned study was to gather information on current animal welfare practices in European aquaculture in particular as regards the slaughter of farmed fish, and to analyse the extent that fish welfare issues remain unresolved. The costs of adhering to good welfare practices, the economic situation, effects on competitiveness and other factors were taken into account. The study focused on the five main farmed fish species in a number of selected EEA countries in order to provide a general presentation of the current situation in European aquaculture: Atlantic salmon (cold-water marine); common carp and rainbow trout (freshwater), and European sea bass and gilthead sea bream (Mediterranean marine) as outlined in Table 1 below.

The international standards of the OIE on animal welfare during transport and stunning and killing of farmed fish for human consumption were used as a benchmark for assessment of welfare practices. EFSA recommendations on slaughter were also taken into account. The study covered the period 2009 - 2013⁷ so as to enable an assessment of any change or shift towards handling, transport and stunning/killing methods required by the OIE standards or recommended by EFSA. To ensure a broad and reliable collection of data all relevant stakeholders e.g. Member States, industry, scientists, equipment manufacturers and animal welfare organisations were contacted and contributed *via* open and targeted consultations.

This report was based on the following sources of information:

1. The above mentioned study report on the welfare of farmed fish, which included:
 - Desk research: literature review and database searches using data from the Scientific, Technical and Economic Committee for fisheries (STECF)⁸ and Eurostat; data originating from other sources including sector organisations at EU, EEA (European Economic Area) and national levels;
 - Consultation: data collected by on-line survey; targeted stakeholders' interviews, and focus groups, such as representatives of aquaculture associations, national and regional administrations, producer groups and other

⁶ Welfare of farmed fish: Common practices during transport and at slaughter final (2017)
<https://publications.europa.eu/en/publication-detail/-/publication/facddd32-cda6-11e7-a5d5-01aa75ed71a1/language-en/format-PDF/source-49981830>

⁷ These are the most recent years for which Eurostat and STECF (Scientific, Technical, Economic Committee for fisheries) figures on production and economic performance of the sector are available.

⁸ http://ec.europa.eu/fisheries/partners/stecf/index_en.htm

relevant stakeholders, as appropriate in the different countries covered by the study;

2. Commission's overview report on implementation of the rules on finfish aquaculture⁹.

Table 1. EEA States included in the study¹⁰

Fish species**	Country in study	European rank by production	Production (tonnes) in 2014*	Production type
Atlantic salmon 	Norway (NO) United Kingdom (UK) Ireland (IE)	1 2 4	1,290,000 163,347 10,000	Cold-water marine
Common carp 	Poland (PL) Czech Republic (CZ) Germany (DE)	1 2 4	18,000 17,833 5,285	Fresh water
Rainbow trout (Large (L) and Portion (P)) 	Denmark (DK) France (FR) Italy (IT) Poland	(L4 and P3) (L3 and P4) (L9 and P2) (P5)	38,091 34,000 38,800 17,500	Fresh water
European sea bass 	Greece (GR) Spain (ES) Italy	2 3 4	42,000 17,376 6,500	Mediterranean (warm water)
Gilthead sea bream 	Greece Spain Italy	1 3 4	71,000 16,230 8,200	Mediterranean (warm water)

* Source FEAP 2015¹¹; ** Pictures from: https://ec.europa.eu/fisheries/marine_species_en

⁹ Overview report on the implementation of the rules on finfish aquaculture (2015) http://ec.europa.eu/food/audits-analysis/overview_reports/details.cfm?rep_id=95

¹⁰ Tables and figures adapted from published study report “Welfare of farmed fish: common practices during transport and at slaughter” <https://publications.europa.eu/en/publication-detail/-/publication/facddd32-cda6-11e7-a5d5-01aa75ed71a1/language-en/format-PDF/source-49981830>

¹¹ FEAP, 2015, European Aquaculture production report 2005-2014 www.feap.info/shortcut.asp?FILE=1402

2. Main findings

2.1. Welfare practices at slaughter

The slaughter process includes the following stages; handling, restraining, stunning and the final killing stage. Stunning should cause loss of consciousness and sensibility without avoidable stress, discomfort or pain. In some methods, it may also cause death. When the stunning method is reversible or does not cause death, it should be followed by a killing method. Table 2 below provides an overview of the methods used for stunning, stunning/killing and killing, their advantages and disadvantages.

Table 2. Overview of methods used for stunning, stunning/killing and killing, their advantages and disadvantages

Stunning or stunning/killing	Fish species	Advantage	Disadvantage
Electrical stunning	Atlantic salmon Rainbow trout Common Carp	- An immediate stun can be achieved; - Allows pre-rigor filleting.	- Effective killing method is needed; - Carcass damage can occur - Product quality can be affected, mis-stuns* may occur due to varying resistance between fish;
Carbon dioxide (CO ₂) stunning	Rainbow trout		- Very stressful
Percussion	Atlantic salmon	- An immediate stun can be achieved; - When applied correctly, no recovery; - Allows pre-rigor filleting.	- Mis-stuns due to variation in size; - Damage to the head can occur.
	Common carp	- When applied correctly, no recovery.	- Manual application can lead to mis-stuns; - Damage to the head can occur
	Rainbow trout	- When applied correctly, no recovery.	- Manual application can lead to mis-stuns.
Live chilling with CO ₂	Atlantic salmon	- Slow onset of <i>rigor mortis</i> allows pre-rigor filleting.	- Fish are not stunned. - Method is stressful.
Asphyxia in ice or ice water	Sea bass Sea bream Rainbow trout	- Easy to use; - Food quality and safety.	- Stress in fish due to steep drop in temperature.

* A mis-stun occurs when the application of a stunning method is not effective. For electrical and percussive stunning this implies that consciousness is not lost immediately.

The OIE advises the use of electrical or mechanical (e.g. percussive stunning) methods for killing farmed fish. Other methods, including live chilling with CO₂, CO₂ stunning, chilling in ice water followed by electrical stunning, and asphyxia in ice, do not meet OIE standards. The

study report found that the achievement of OIE standards at slaughter was very much dependent on the species and methods used as outlined in the following paragraphs.

In the case of Atlantic salmon OIE standards are met when percussion is used for slaughter, which is the main slaughter method in Norway, the United Kingdom and Ireland. However, less so for electrical stunning where fish are frequently not orientated correctly, resulting in poor stunning. Live chilling with CO₂, which does not meet OIE standards, is still used in Norway and in Ireland though to a very limited extent and was reported that the practice will be phased out in 2018.

OIE standards are only partly achieved for the slaughter of common carp in Poland, Czech Republic and Germany. The most common method is manual percussion (a blow to the head). However, in Poland carp species are exposed to the air for a maximum of 10 minutes, which causes stress. Electrical stunning is also used in Poland, Czech Republic and Germany, but there is a lack of information on the effectiveness of the equipment for this method.

For rainbow trout, OIE standards are partly achieved in Denmark, France and Italy, but they are not achieved in Poland. Electrical stunning is used in Denmark and Italy. However, data on the construction of the equipment is scarce and therefore it is not known whether OIE standards for electrical stunning are met. Manual percussion of rainbow trout meets OIE standards, provided it is carried out correctly. Asphyxia in ice is used in Denmark and Poland, and does not meet OIE standards. In France, chilling in ice water followed by electrical stunning, and CO₂ stunning (to a limited extent) are used, neither of which meet OIE standards.

Asphyxia in ice of sea bass and sea bream is still the main practised slaughter technique in Greece, Spain and Italy, though electrical stunning is being introduced in a limited number of farms on an experimental basis.

Table 3: Summary of current slaughter methods indicating adherence to OIE standards

Fish species	Country in study	Slaughter	
		Outcome	Explanation
Atlantic salmon	NO	+/-	Percussion (standards are met). Dry electrical stunning: only 25-30% oriented, though increasing (standards are met for the 25-30%). Electrically stunned fish killed by gill-cut (standards not met), or by percussion or decapitation (standards met). Live chilling with CO ₂ (standards not met).
	UK	✓	Standards are met
	IE	+/-	Percussion. CO ₂ stunning for 7-8 % (standards not met).
Common carp	PL	+/-	Manual percussion. Electrical stunner not from major producers
	CZ	+/-	Electrical stunner not from major producer and no killing method applied

Fish species	Country in study	Slaughter	
		Outcome	Explanation
	DE	+/-	Manual percussion. Electrical stunner not from major producer
Rainbow trout	DK	+/-	Electrical stunner not from major producer Also asphyxia in ice
	FR	+/-	Manual percussion. However, CO ₂ stunning and chilling in ice water followed by electrical stunning are also used.
	IT	+/-	Electrical stunner not from major producer
	PL	✘	Asphyxia in ice slurry on a truck or at a farm or abattoir
European sea bass	GR	✘	Asphyxia in ice or ice slurry
	ES	✘	Asphyxia in ice or ice slurry
	IT	✘	Asphyxia in ice or ice slurry
Gilthead sea bream	GR	✘	Asphyxia in ice or ice slurry
	ES	✘	Asphyxia in ice or ice slurry
	IT	✘	Asphyxia in ice or ice slurry

- ✓ OIE - likely that the OIE standards are achieved
- ✘ OIE - likely that the OIE standards are not achieved
- +/- OIE - OIE standards may be achieved, depending on the method and the equipment used

With regard to the rules concerning slaughter techniques for certified organic aquaculture production, the findings of the Commission report referred to in footnote nine confirm that the system of controls related to slaughter, as outlined in Article 25(h) 5 of Regulation (EC) 889/2008, are complied with.

2.2. National legislation and guidelines

Article 27(1) second paragraph of the Regulation allows Member States to maintain or adopt national rules regarding the protection of fish at the time of slaughter or killing in the absence of EU rules. The study found that while national legislation and guidelines were developed in the targeted Member States and EEA countries they were not as well developed as those for terrestrial farm animals, although the situation is improving due to growing awareness on fish welfare.

For the five species covered by the study, private standards that include welfare during transport and slaughter are predominately implemented in the salmon sector, to a lesser extent for rainbow trout, and on a limited scale for sea bass and sea bream. A very limited number of common carp farms are covered by private welfare standards. Table 4 below provides a complete overview of national legislation, guidelines and private standards for the countries reviewed.

Table 4: legislation and national guidelines or codes of practices that regulate welfare aspects of slaughter of farmed fish

Country	Legislation	National guidelines or private standards
NO	<ul style="list-style-type: none"> – Regulation (EC) No 1099/2009 and Norwegian Regulation No 1250/2006 sets rules for general fish welfare requirements 	<ul style="list-style-type: none"> – A comprehensive guidance document has been prepared for the industry by the Norwegian Food Safety Authority (NFSA) regarding requirements for good aquaculture animal welfare during slaughter¹²
UK	<ul style="list-style-type: none"> – Regulation (EC) No 1099/2009 – Animal Welfare Act 2006 – The Welfare of Animals at the Time of Killing (Scotland) Regulations 2012. Statutory Instrument 2012 No. 321 – The Welfare of Animals (Transport) (England) Order 2006 (and equivalent legislation in Scotland and Wales) 	<ul style="list-style-type: none"> – Opinion on welfare of farmed fish; Farm Animal Welfare Committee; 2014 – Code of good practices¹³
IE	<ul style="list-style-type: none"> – Regulation 1099/2009 – Animal Health and Welfare Bill 2012 	<ul style="list-style-type: none"> – A Fish Health Code of Practice for Salmonid Aquaculture in Ireland (2014) – The Farmed Salmonid Health Handbook (2011)¹⁴
PL	<ul style="list-style-type: none"> – Regulation (EC) No 1099/2009 Animal Protection Act, (No 111, Item 724; of 1998 No 106, Item 668) 	<ul style="list-style-type: none"> – CODE of Good Practice (Kodeks Dobrej Praktyki); 2014
CZ	<ul style="list-style-type: none"> – Regulation (EC) No 1099/2009 – Act No 246/1992 Coll. and following amendments on the protection of animals against cruelty – Decree No 245/1996 Coll. on stunning/killing methods – Decree No 382/2004 Coll. on stunning/killing methods – Act No 99/2004 on fish pond management, incl for fish farming 	<ul style="list-style-type: none"> – Guideline No. 5/2015 on stall selling fish / sales places
– DE	<ul style="list-style-type: none"> – Regulation (EC) No 1099/2009 – Law for protection of animals related to killing and slaughter (Verordnung zum Schutz von Tieren im Zusammenhang mit der Schlachtung oder Tötung und zur Durchführung der Verordnung (EG) Nr. 1099/2009 des Rates (Tierschutz-Schlachtverordnung -TierSchlV) 	<ul style="list-style-type: none"> – Good Hygienic practice (1994) (Verordnung über die hygienischen Anforderungen an Fischereierzeugnisse) – Good Practice in pond farming (carp) (gute fachliche Praxis der Teichwirtschaft in Brandenburg) –

¹²https://www.mattilsynet.no/om_mattilsynet/gjeldende_regelverk/veiledere/veileder_fiskevelferd_ved_slakteri_for_akkvaturdyr_2014.9471/binary/Veileder%20fiskevelferd%20ved%20slakteri%20for%20akkvaturdyr%202014

¹³<http://thecodeofgoodpractice.co.uk/chapters/>

¹⁴http://www.fishhealth.ie/FHU/sites/default/files/FHU_Files/Documents/FarmedSalmonidHealthHandbookOctober2011.pdf

Country	Legislation	National guidelines or private standards
DK	– Regulation (EC) No 1099/2009 –	– None (Competent Authority survey)
FR	– Regulation (EC) No 1099/2009 – Note de service 2007-8016 de la DGAL du 16 janvier 2007 (DGAL/SDSPA/N2007-8192)	– (<i>no Competent Authority response received</i>)
IT	– Regulation (EC) No 1099/2009	– None (Competent Authority survey)
GR	– Regulation (EC) No 1099/2009	– 2 Circulars on welfare of farmed fish (23/3/2015; 9/6/2015)
ES	– Regulation (EC) No 1099/2009 –)	– Code of practice for killing of fish (Piscicultura; Guia de practica correctas para el sacrificio; 2016; AEONOR)

3. Socio-economic findings

Table 5 below shows the national production from aquaculture of fish, crustaceans, molluscs and other aquatic organisms in the 19 main aquaculture producing EEA States for the years 2009 – 2013, which accounts for 99 % of EEA aquaculture production. Table 6 provides an overview of the average output of total farmed fish for the study target countries.

Table 5. Aquaculture production in 19 EEA States, 2009-2013 (1 000 tonnes live weight)

EEA State	2009	2010	2011	2012	2013	Change 2009-2013	Share of EEA total, 2013
Norway	962	1 020	1 144	1 321	1 248	29.7%	50.5%
Spain	267	252	272	264	224	-16.1%	9.0%
United Kingdom	197	201	199	206	203	3.4%	8.2%
France	234	225	207	205	201	-14.2%	8.1%
Italy	162	153	164	163	163	0.1%	6.6%
Greece	122	121	111	111	114	-6.6%	4.6%
Netherlands	56	67	44	46	60	8.5%	2.4%
Denmark	35	36	36	35	38	7.3%	1.5%
Poland	37	31	29	32	35	-3.6%	1.4%
Ireland	48	46	44	36	34	-28.0%	1.4%
Germany	39	41	39	26	25	-35.0%	1.0%
Czech Republic	20	20	21	21	19	-3.6%	0.8%
Hungary	15	14	16	15	15	0.6%	0.6%
Finland	14	12	11	13	14	-0.1%	0.6%
Sweden	9	11	13	14	13	56.5%	0.5%
Bulgaria	7	8	6	6	12	80.8%	0.5%
Croatia	14	14	13	10	12	-15.5%	0.5%
Romania	13	9	8	10	11	-16.2%	0.4%
Portugal	7	8	9	10	10	49.6%	0.4%
Total 19 States	2 255	2 290	2 386	2 544	2 451	8.7%	99.1%
Total EEA	2 271	2 306	2 403	2 563	2 473	8.9%	100.0%

Source: FAO Global Fishery and Aquaculture Statistics, Version 2016.1.2. Figures in italics are forecasts

Table 6: Average output of fish per enterprise in the selected EU Member States

	National sales volume (tonnes)	Number of enterprises	Average output per enterprise (tonnes)
GR (2014)	118,080	248	476.1
UK (2013)	203,263	548	370.9
DK (2013)	46,297	130	356.1
IT (2013)	153,944	587	262.3
IE (2013)	34,667	283	122.5
ES (2013)	231,738	3,023	76.7
FR (2013)	227,601	2,988	76.2
PL (2013)	31,267	846	37.0
DE (2016)	20,936	5,952	3.5

Source: STECF database, except for Germany (German Federal Statistical Office)

3.1. Economic analysis of slaughter practice

The socio-economic analysis of the study report considered the differences between the five species studied and between environments (cold-water marine, Mediterranean marine, freshwater). The variation in the scale of enterprises and the production methods were also considered in this analysis as they are relevant factors for assessing welfare. Other cost factors, which were not considered in the study report, such as feed, labour and operating costs, are responsible for most of the larger variations between enterprises and countries¹⁵.

For each of the investigated species in the case countries, the additional investments and annual costs of adhering to improved animal welfare practices since 2009 are calculated for the average aquaculture farm for the species under study. These included the additional cost related to improved welfare during stunning, killing and slaughter. In the calculations on additional related costs it is assumed that every aquaculture farm needs to possess its own primary processing and that the average enterprise has not implemented welfare practices.

Atlantic salmon

To meet the OIE standards (see section 2.1 of this report) the study assumed that every fish farm requires investment costs of either an electric stunner or a mechanical stunner, plus a decapitation robot and found that the additional costs for adopting improved welfare practices are relatively small based on the average farm size. According to the study, the cheapest additional cost would amount to 2 € cents/kg or 0.5 % of the sales price in UK, and the most expensive at 9 € cents/kg or less than 1.5 % of the sales price in Ireland. In slaughterhouses with high throughput and high labour costs the investment might even result in cost savings. However, as there is already a high level of implementation of fish welfare practices in the salmon industry in Member States and EEA states, relatively few enterprises will need to invest to meet OIE standards, therefore the impact on competitiveness is likely to be small.

Common carp

Economies of scale in slaughter volume have a substantial effect on the cost of welfare measures. This fact was evident when electrical stunning followed by decapitation were evaluated for improved welfare at slaughter for carp, which has a much lower slaughter volume than typical salmonid enterprises. The extra costs varied considerably between the case-study countries with the lowest being 6 € cents/kg in Poland, and as much as 41 € cents/kg in Romania, and 58 € cents/kg in Germany.

Common carp is mainly consumed in the country of production and was generally not profitable without subsidies between 2009 and 2013 in typical production systems. Small farms are likely to have most difficulty in investing to improve animal welfare and may experience a competitive disadvantage. As export (including re-export) accounts for only a very small proportion of world carp production, the effects of welfare measures on international competitiveness are expected to be limited (although the impacts on cost price can as shown in figure 1 be considerable).

¹⁵ These cost factors were dealt with more extensively and comprehensively in the STECF reports on production and economic performance of the sector.

Rainbow trout

Regarding the investment requirements to meet OIE standards for the slaughter of rainbow trout the study report assumed: 1) electrical stunning before dewatering, and; 2) percussive stunning after dewatering, both followed by manual gill cutting. As with carp the additional costs impact varied significantly depending on the economies of scale with estimated additional costs ranging from just 4 € cents/kg in Denmark up to 24 € cents/kg in France. In Italy, where slaughterhouses have high throughput and high labour cost, savings of 6 € cents/kg were reported. Percussive stunning is a more expensive option and the cost impact will be greater especially for small scale farms, such as in France.

European sea bass and gilthead sea bream

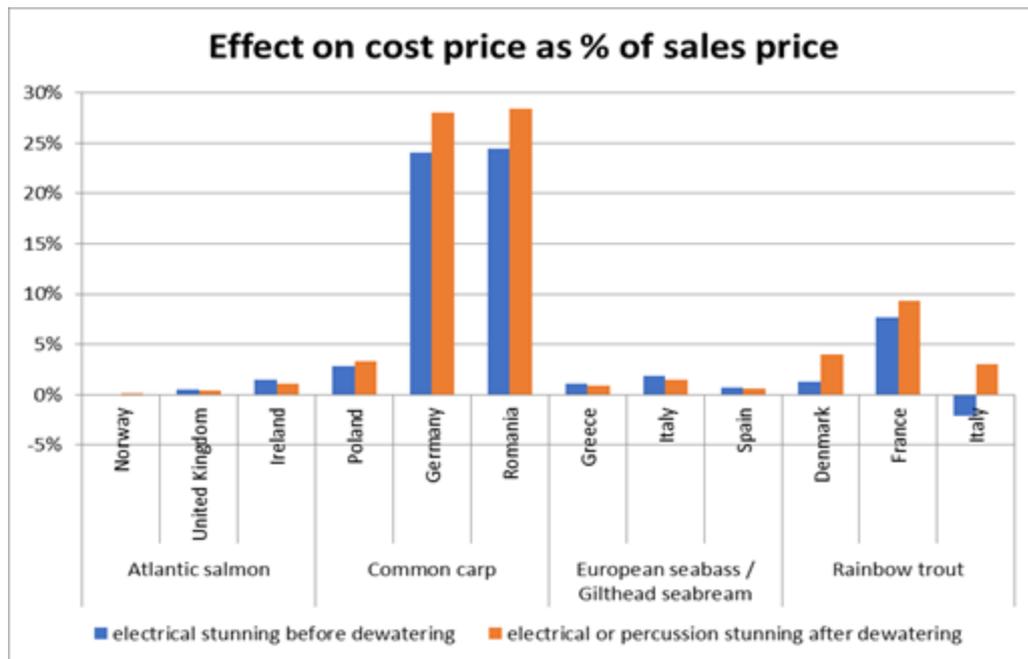
For both sea bass and sea bream the investments considered to improve welfare at slaughter are: 1) electrical stunning before dewatering, and; 2) electrical stunning after dewatering, both followed by chilling in a slurry of ice and sea water.

The additional unit cost varies slightly between the methods, but it varies to a greater extent between countries according to the size of enterprises. In Spain – with the largest enterprises – the additional unit cost was 4 € cents/kg for both methods. In Greece, it was 5-6 € cents/kg depending on the method, and in Italy – with the smallest enterprises – it was 11-13 € cents/kg. Although the cost increase is quite modest, even for relatively small volume producers as in Italy, the profit margins on most of these farms might prevent producers from investing.

Overall the study report found that the production of sea bass and sea bream was also generally not profitable without subsidies during the period 2009 and 2013 in the major producing Member States. It may therefore be difficult for producers to make the necessary investment to improve welfare standards.

Figure 1 provides a summary overview on the impact of achieving improved animal welfare practices on the cost price of farmed fish in the case-study countries (€/kg).

Figure 1: Impact of achieving improved animal welfare practices on the cost price of farmed fish in the case-study countries (€/kg)



4. Limitations of the findings

The economic analysis performed in the commissioned study report used the limited available information for the cost of equipment required for improving welfare at slaughter. The analysis is based on the average enterprise for each species in each of the case-study countries. However, it is assumed that enterprises with high throughput achieve economies of scale. The financial return on the investments will also differ substantially between fish species.

For enterprises with lower annual production volumes, the investment costs are substantially higher than for larger scale operations. The capacity of the identified equipment is such that it might be idle for significant periods of time. It may be that alternative – lower cost – equipment will become available for smaller-scale facilities. However, no information on such alternatives was available at the time of the study.

A further limitation of the findings concerns the quality of data that was obtained during the study for the actual costs for stunning and killing, particularly financial and commercially sensitive information. This was mainly due to a low response rate from industry or the fact that their accounting practices did not break down these costs. Where costs were insufficiently obtained from industry estimates were obtained from equipment manufacturers, which may not reflect true operating costs. It should also be noted that the study focused on a specific reference period, 2009-2013, which may not reflect trends over a longer period, or over the period since.

5. Conclusions

Overall the general requirements contained in Regulation (EC) No 1099/2009 applicable to the welfare of fish at slaughter have contributed to the development of a framework in terms of national legislation and guidance for the welfare of farmed fish in the EU particularly for Atlantic salmon.

The level of achievement of OIE standards at slaughter varies with the species considered. For Atlantic salmon, best practices are mostly achieved, with a few exceptions, in the case-study countries. For common carp and rainbow trout, the level of achievement varies between methods used. For European sea bass and gilthead sea bream, OIE standards are not achieved in the case-study countries.

The economic analysis shows that differences in production cost are mainly caused by the structure of the industry, with particular benefits from economies of scale. Where such scale economies exist, improving welfare practices is likely to have only a small impact on the cost price, whereas for smaller farms the impact is likely to be much greater. Other factors, such as feed, labour and operating costs are responsible for most of the larger variations between enterprises and countries.

In the specific case of larger Atlantic salmon and rainbow trout farms it was found that investment in improving welfare could lead to labour savings, and may outweigh the investment cost.

The commissioned study report findings have also shown that the industry as a whole is gradually but continuously improving fish welfare as evidenced by the increasing use of more humane methods such as electrical stunning, the phasing out of others such as CO₂ stunning¹⁶, and the adoption of private standards. However, improvements are still needed in order to increase welfare of some fish species, such as the European sea bass and Gilthead sea bream. The findings of this study are also supported by the Commission's overview report which was undertaken during 2014-2015¹⁷.

At this stage, the Commission considers that the evidence suggests that it is not appropriate to propose specific requirements on the protection of fish at the time of killing, taking into account that the objectives of the Regulation may equally be achieved by voluntary measures, as evidenced by the improvements introduced by industry in recent years. It is also important to note that this is a comparatively new and very diverse sector compared to other traditional farmed animal production systems, and technology for improved welfare is currently progressing. In view of these ongoing developments the Commission concludes that if further

¹⁶ the Dutch authorities notified the Commission on the 17-10-2017 concerning a new draft national regulation which will ban current traditional slaughter methods for European eels in favour of humane electrical stunning methods (notification 2017/0406/NL)

¹⁷ Overview report on the implementation of the rules on finfish aquaculture http://ec.europa.eu/food/audits-analysis/overview_reports/details.cfm?rep_id=95

guidance is required this would be best achieved at Member State level. In any event the Commission will continue to monitor progress in this area.

However, it has also to be recognized that there is a need for further research aimed to tailor dedicated systems for those fish species where the development of more effective techniques is necessary.

The Commission therefore considers it essential to develop further stakeholder dialogues in order to favour specific initiatives and projects in this field that could be mutually beneficial both from an economic and animal welfare point of view. Against this background the Commission has formulated a more systematic and visible format for this dialogue, through the EU Platform on Animal Welfare¹⁸. The primary objective of this platform is to allow interested parties (animal welfare organisations, scientists, veterinarians, farmers, food processors, food retailers, etc.) an opportunity to express their concerns, share knowledge and resources to build common activities.

¹⁸ Commission Decision of 24 January 2017 establishing the Commission Expert Group ‘Platform on Animal Welfare’ C/2017/0280, OJ C 31, 31.1.2017, p. 61.