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**REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND
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1. BACKGROUND

Article 27(3) of Council Regulation (EC) No 1099/2009 on the protection of animals at the time of killing¹ provides that the "*No later than 8 December 2013, the Commission shall submit to the European Parliament and to the Council a report on the various stunning methods for poultry, and in particular multiple bird waterbath stunners, taking into account the animal welfare aspects, as well as the socioeconomic and environmental impacts*".

To prepare this report the Commission had commissioned a "*study on various methods of stunning for poultry*", with the final report submitted to the Commission in 2012 (the "2012 study")².

2. POULTRY STUNNING METHODS

Poultry slaughterhouses mainly use a stunning method called multiple-bird waterbath (or waterbath). It consists in hanging birds upside down on shackles and then in partially immersing them till the wings on a waterbath where they receive an electric current. The current goes through their body and stuns them before being bled.

The main alternative stunning method is Controlled Atmosphere Stunning (CAS), whereby the poultry is stunned in an atmosphere chamber where they are exposed to gas mixtures.

In the EU, **80% of broilers** (chicken for meat) are stunned by **waterbath** and 20% by CAS³.

The proportion varies widely between Member States (like 60 % of CAS in Germany and 5% in France)⁴.

Other alternatives to waterbath are head-only stunning and low atmosphere pressure stunning (LAPS).

¹ OJ L 303, 18.11.2009, p. 1.

² *Study on various methods of stunning poultry* by Food Chain Evaluation Consortium – Project leader Agra CEAS Consulting – 11/12/2012. (http://ec.europa.eu/food/animal/welfare/slaughter/study_stunning_poultry_en.pdf).

³ CAS include various systems according to their design (horizontal/vertical), their integration on the rest of the processing line and gas mixture used (carbon dioxide or inert gases).

⁴ For laying hens the proportion between waterbath and CAS is respectively 83-7%, for parent flocks 61-37% and for turkeys 76-24% in number of animals.

Head-only electrical stunning consists of applying individual electrodes than span the brain. The method is well known for all species but, until recently, was not adapted for poultry slaughterhouses due to the high speed of the slaughterline. In recent years, the method has been developed and commercialised in order to be used in commercial slaughterhouses (up to 9000 birds per hour).

LAPS is a method based on a similar principle as gas stunning but instead of replacing the atmosphere by a gas, LAPS removes progressively the air and creates a lack of oxygen that induces the stunning. LAPS is not yet allowed in the EU, but used in the U.S.

Based on extrapolation of the current trends, the average EU situation in 5 year-time could be a transfer of 15% from waterbath to CAS (i.e. 65% broilers stunned in waterbath and 35% for CAS).

However, this evolution will vary among Member States due to differences in various key factors like consumer demand (for animal welfare but also for the type of meat – whole chickens against filets) and labour costs.

Few Member States are expected to convert to more than 80% of their throughput to CAS (Germany, Austria and Finland) but a substantial number are expected to convert to more than 50% (UK, Italy, Sweden, the Netherlands and Belgium). Other Member States are expected to keep waterbath as the major stunning method.

3. ANIMAL-WELFARE CONSIDERATIONS

Prior to adoption of Regulation (EC) No 1099/2009, the European Food Safety Authority (EFSA) issued, in 2004 and 2006, two opinions regarding the welfare aspects of stunning and killing of animals⁵⁶.

In its opinion of 2004 EFSA identified two main problems:

- **Inversion and shackling of birds is painful**, especially for heavy or fragile birds⁷ and may induce bones dislocations and fractures;
- **The amount of current** delivered to individual bird varies according to the electrical resistance of each bird and cannot be controlled.

In response to these opinions, Regulation (EC) No 1099/2009, which applies from 1 January 2013, sets electrical parameters (150mA for frequencies between 200 and

⁵ The welfare aspects of the main systems of stunning and killing the main commercial species of animals, *The EFSA Journal* (2004), 45, 1-29.

⁶ The welfare aspects of the main systems of stunning and killing applied to commercially farmed deer, goats, rabbits, ostriches, ducks, geese and quail, *The EFSA Journal* (2006) 326, 1-18.

⁷ Turkeys and broiler parent flocks are much heavier than a standard commercial broiler while spent laying hens have fragile bones.

400 Hz) for waterbath stunning.⁸ These parameters are also recommended by the World Organisation of Animal Health⁹.

In 2011, two Member States suggested amending the minimum electrical parameters for waterbath required by Regulation (EC) No 1099/2009. The EFSA examined these data and adopted in 2012 an opinion on the issue¹⁰, whereby **waterbath stunning delivers up to 96% effective stunning** as measured by Electro-Encephalogram (EEG). The opinion also highlighted the need for additional research and enforcement issues, i.e. **slaughterhouse operators tend to lower the current** because of **meat quality concerns**.

The EFSA opinions also point out that CAS addresses the disadvantages of waterbath if the method is used for with parameters that kill the birds:

- Birds are not inverted or shackled conscious;
- It can ensure 100% birds are killed before bleeding.

The 2004 and 2006 EFSA opinion did not assess the head-only stunning method presently developed for commercial slaughterline.

4. ECONOMIC ASPECTS

Key economic data on EU poultry meat production and external trade are available in Annex I.

4.1. Comparison between waterbath and other methods

4.1.1. Production costs and cost model

A cost model was established to compare stunning methods for poultry commercially available¹¹. The following costs were taken into account: installation¹², maintenance, labour for reception and hanging, water consumption, water for cleaning, electricity for stunning, gas for stunning, other labour costs associated with stunning.

The average EU cost per bird was calculated for slaughterhouses of high throughput (12.000 birds per hour) and lower throughputs (6.000 and 3.000 birds per hour) and are summarized in Tables 1 and 2. These figures depend on the local costs of the different resources (capital, energy, water and labour)¹³.

⁸ On electrical parameters see point 6 of Chapter II of Annex I, on equipment see point 5 of Annex II.

⁹ Article 7.5.7 (3) (b) electrical stunning of birds using a waterbath –OIE Terrestrial Animal Health Code.

¹⁰ Scientific Opinion on electrical requirements for waterbath equipment applicable for poultry. EFSA Journal 012; 10(6):2757. 80 pp. doi:10.2903/j.efsa.2012.2757.

¹¹ LAPS is not allowed in the EU but is used in one slaughterhouse in the USA.

¹² Installation costs for a new establishment but not conversion costs.

¹³ More scenarios are discussed in the 2012-study.

Table 1: Basis calculations for the cost of stunning with different methods for a throughput of 12,000 birds per hour

Cost factor	Waterbath	CAS	Head only	Vacuum stunning
Installation cost	€43,000	€08,300	€70,000	€00,000
Maintenance (% of installation cost)	3.45%	6.90%	3.00%	2.40%
Labour for reception and hanging	97 hours per day	90 hours per day	96 hours per day	90 hours per day*
Water for stunning and cleaning	9.0m3 per day	3.5m3 per day	0.96m3 per day	3.5m3 per day*
Electricity	5.2 kwh per day	127.0 kwh per day	9.6 kwh per day	1,136.0 kwh per day
Gas used	-	3.1 tonnes per day	-	-
Other labour	3 hours per day	5 hours per day	0.5 hours per day	5 hours per day*
Cost per bird (EU Average)	2.439 cents	3.495 cents	2.521 cents	2.641 cents
Cost per bird (high labour, water, electricity prices)	4.135 cents	5.105 cents	4.151 cents	4.367 cents
Cost per bird (low labour, water, electricity prices)	0.389 cents	1.562 cents	0.549 cents	0.679 cents
<i>Sources and weightings</i>	<i>Manufacturers: 45%; Slaughterhouse survey for capacity 9,000-13,000 (figures adjusted to capacity of 12,000) 45%; Literature: 10%</i>	<i>Manufacturers: 45%; Slaughterhouse survey for all capacities (figures adjusted to capacity of 12,000) 45%; Literature: 10%</i>	<i>Manufacturers</i>	<i>Manufacturers; labour estimates for CAS.</i>

* Figures taken from CAS estimates given the similarity of the systems and the lack of specific data. Documentation clarified that no water is used in the LAPS stunning process, although water is used in CAS systems for cleaning.

Table 2: Cost model for slaughterhouses with capacities of 6,000 and 3,000 birds per hour

Cost factor	Waterbath	CAS	Head only	Vacuum stunning
Differences at 6,000 birds per hour				
	Installation cost slightly lower; water and labour usage lower; electricity usage approximately the same.	Installation cost, water and electricity usage the same. Labour and gas usage proportionally lower. Maintenance lower due to lower throughput.	Installation cost slightly lower (€50k), labour and electricity cost reduced proportionally.	Installation costs halved through removal of half the vacuum chambers (250k), electricity and labour also reduced proportionally.
Cost per bird (EU Average)	2.541 cents	3.687 cents	2.716 cents	2.667 cents
Cost per bird (high labour, water, electricity prices)	4.294 cents	5.330 cents	4.356 cents	4.412 cents
Cost per bird (low labour, water, electricity prices)	0.422 cents	1.730 cents	0.733 cents	0.682 cents
Differences at 3,000 birds per hour				
	Installation cost slightly lower, water and labour costs lower, electricity approximately the same.	Installation costs, water and electricity costs the same. Labour and gas costs proportionally lower. Maintenance lower.	Installation cost as per 6,000 birds per hour (€50k), labour and electricity costs reduced proportionally.	Installation, electricity as for 6,000 birds per hour ¹⁴ . Labour reduced proportionally.
Cost per bird (EU Average)	2.584 cents	4.053 cents	3.121 cents	3.087 cents
Cost per bird (high labour, water, electricity prices)	4.340 cents	5.761 cents	4.780 cents	5.000 cents
Cost per bird (low labour, water, electricity prices)	0.463 cents	2.046 cents	1.116 cents	1.024 cents

¹⁴ Installation costs are assumed the same as per 6,000 birds per hour as it is unclear if the system is scalable to a throughput lower than 6,000 birds per hour.

On the average, **waterbath is the cheapest stunning method** and CAS the most expensive¹⁵. For high throughput slaughterhouses the difference in costs between the two methods is lower.

Waterbath stunning shows a greater advantage over other methods where input costs are lower. However, where input costs are higher, especially labour, the gap between the costs between waterbath and other methods narrows. This finding is coherent with the empirical observation that CAS is used in regions of the EU where labour costs are relatively high.

The decision of slaughterhouse operators for choosing a stunning system does not seem influenced by the effects on the retail price (average retail price is EUR 5.070 for a 1.5 kg regular chicken) but rather the large differences in upfront investment costs, as well as space required for stunning system (see below).

4.1.2. *Revenues/markets*

Slaughterhouse operators choose their stunning method depending on the market they intend to sell to.

Revenues impacts occur through the following three mechanisms:

- Market access: distributors may ask specific stunning methods for reasons of quality, animal welfare or religious requirements (Halal¹⁶, Kosher).
- Better meat quality: markets may provide a premium if cuts (breast fillets, wings, legs) have consistently the required aspects (colour, no blood splashes).
- Losses through trimming: revenues will be negatively impacted if the stunning methods increase the need for trimming (loss of meat and labour cost of trimming).

In practice the most important **market variable** is whether the **bird is sold as a whole chicken** for further processing (where imperfections are not so critical) or whether it is sold **in fresh cuts at retail level** (where good presentation is essential).

There is no comprehensive study which directly compares the quality of meat from different stunning methods. In addition impacts on quality vary greatly depending on a range of factors other than the stunning method, in particular the parameters used, the origin of the flock, handling and transport of birds before slaughter, etc.

¹⁵ Data on head-only and LAPS rely mainly on manufacturers information which may be more optimistic than commercial practice.

¹⁶ See later section 8.

Provided these reservations, the comparison on meat quality of the various stunning methods can be summarised as follows:

- CAS and head-only¹⁷ system seem to provide better meat quality (higher percentage of breast fillet without blood splashes) than waterbath,
- Leg damage is generally higher in waterbath due to live shackling,
- Wing damage is generally higher in CAS due to more wingflapping during stunning, in particular with inert gases,
- Skin damage may be higher with CAS due to difficulties in defeathering.

In the overall **CAS seems to present an advantage for markets requiring breast fillet** (quality premium) but is not competitive with waterbath for markets requiring whole birds.

4.1.3. *Space required for installing a stunning system*

In addition to the cost model set out previously, it is necessary to take into account the space required in case of conversion from waterbath to another system.

Building and structural modification costs related to a conversion from a waterbath system to CAS (and possibly LAPS) are significant and can reach prohibitive levels. These costs are likely to be higher for a change from waterbath to CAS (and possibly LAPS) than to head-only system which does not require more space than waterbath.

5. **WORKING CONDITIONS FOR SLAUGHTERHOUSE EMPLOYEES**

Systems that avoid handling animals conscious (CAS and LAPS) have a positive impacts on the working environment compared to the others (waterbath and head-only) because of low dust level (no wingflapping), normal light¹⁸, less injuries for workers and less physical efforts. According to one source¹⁹, they have also decrease the employee turnover reducing recruitment costs.

6. **ENVIRONMENTAL ASPECTS**

The 2012-study compared waterbath and CAS against six environmental measures: dust and odour pollution, energy consumption, unusable waste stream, water consumption, cooling and greenhouse gases emissions.

While, on balance there would appear to be little difference in the environmental impacts between the two methods, CAS seems to offer some environmental

¹⁷ Since the commercial system for head-only is still used in few slaughterhouses, information is not subject to independent review.

¹⁸ For the handling of live birds, workers operate in low level of lighting in order to keep birds calm.

¹⁹ PETA (2007) Controlled Atmosphere Killing vs. Electrical Immobilisation. A comparative analysis of poultry slaughter systems from animal welfare, worker safety and economic perspectives. PETA USA, June 2007.

advantages over waterbath in terms of dust/odour, waste and water while waterbath is consumes less electricity and emits less greenhouse gases.

7. ASPECTS OF GLOBAL COMPETITIVENESS

The EU poultry sector has to be assessed also in view of the global competitiveness and competitive pressure from third countries.

Brazil is the leading supplier of whole birds and white meat (breast) to the world market (respectively 80 and 85% of the world trade), while it ranks second for dark meat (legs) (30%).

Global competitiveness in the world poultry market is mainly determined by the **cost of feed which account between 50 to 70% of the total production costs**. Brazil, Argentina and USA tend to benefit from 40% lower production costs than the EU and Asian countries as a result of cheaper feed. Other significant costs advantages in Brazil and Thailand are the **favourable climatic conditions** and lower **labour costs**.

Brazil's dominance of the global poultry market can also be explained by an export focus where demand in export markets is prioritised over domestic demand (in contrast with both the EU and the USA where exports is mainly a by-product of domestic demand).

Exports from the USA to the EU are very limited due to the use of antimicrobial treatments (forbidden in the EU). However, the USA is a relevant player in terms of competition on export markets such as Russia, an important destination for surplus dark meat.

Thailand is an exporter of processed products to the EU but do not tend to compete on global markets with EU exporters.

Waterbath remains the most common stunning method in the world for poultry. CAS is in use in few third countries but is mainly confined to the EU.

Slaughter costs constitute 14 to 22 % of the total production costs and are mainly determined by labour costs which give an advantage in absolute and relative terms to Thailand and Brazil.

Long term economic forecasts foresee a substantial increase in poultry world market. Increasing demand for further processed products may act as a driver in favour of CAS over the long term.

8. OTHER ASPECTS

Compliance with Muslim religious rules also plays a role for some slaughterhouse operators in favour for certain stunning methods or parameters. While there is no commonly agreed position in all Muslim communities on the stunning of animals,

most of them would accept stunning if the animal is able to recover consciousness in absence of bleeding.

Depending on how stunning parameters are set up, waterbath stunning, CAS and head-only stunning can be reversible methods. However, waterbath stunning and CAS being collective methods of stunning, the only way to ensure that all animals can recover without bleeding is to decrease the stunning parameters, hence the percentage of animals being properly stunned.

CAS is usually used to kill animals and therefore Muslim communities rarely accept it for Halal (risk of animals being irreversibly stunned). Electrical parameters required for waterbath by the Regulation may not ensure full recovery of all stunned animals.

Furthermore, the animal welfare benefits or disadvantages of a stunning method have also to be considered beyond slaughterhouses alone. Restricting the use of stunning methods like waterbath, presently the only commercial method widely available for small slaughterhouses will imply that animals raised in regions with extensive farming systems will have to be transported over long journeys.

9. CONCLUSIONS

Among the various stunning methods for poultry, waterbath stunning is the most widely used in the world and in the EU. It is historically the first one, it is cheap, technologically accessible, does not require much space and it immobilises enough birds to be bled through an automatic neck cutter in industrial slaughterhouses.

While CAS is expected to continue to expand in some Member States, because of increased demand for high quality meat and higher labour costs, waterbath stunning is likely to continue to be widely used in the EU.

CAS represents the main commercially available alternative to waterbath. Other alternatives to waterbath are not yet sufficiently developed to represent an immediate option. CAS presents advantages for animal welfare as well as for meat quality and working conditions. However, CAS is expensive, needs more space to be installed and it is designed at present for high throughput slaughterhouses.

The phasing out of waterbath stunning is presently not an economically viable option because in the current context, there is no practical alternative for middle or low throughput slaughterhouses which constitutes a substantial number of establishments in the EU.

It is important that Member States apply new animal welfare requirements in a uniform manner to guarantee a level playing field for slaughterhouse operators and animal welfare.

The Commission continues to follow-up carefully implementation in Member States, as well as assessing, benchmarking and disseminating best practices and innovation in applying the existing EU rules.