**Nordic Workshop on**  
**On-farm killing of Poultry**  

**On 2\(^{nd}\) – 3\(^{rd}\) May 2018**

**VENUE:** Glostrup Park Hotel, Hovedvejen 41, DK-2600 Glostrup, Denmark  
([http://www.parkhotel.dk/](http://www.parkhotel.dk/))

### Summary

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<th>Time</th>
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<td>13:00</td>
<td>Opening session: Welcome address</td>
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| 13:15  | **Session I: Methods for on-farm killing of poultry**  
        | Chair: Anna Huda                                                                     |
| 13:15  | Presentation: Developing of on-farm methods for killing of poultry flocks, containers for gassing  
        | Speaker: Dr. Julian Sparrey, CEng MI AgrE, Engineering Director, Livetec Systems Ltd, UK  
        | Containerized gassing is routinely used for killing of poultry, either for animal welfare reasons, in case of disease outbreaks or for other reasons.  
        | The following gasses/mixtures of gas are applied:  
        | - Min. 80 % Argon + 20 % CO\(_2\)  
        | - 100 % inert gas (Ar, N)  
        | - 100 % CO\(_2\)  
        | The birds are exposed for 3 minutes as a minimum. The killing process runs fast so capacity for catching birds must be adjusted to the killing capacity, or vice versa.  
        | Containers are equipped with a warning device. Three different sizes of containers are available (in the UK): standard 750 kg, mini 250 kg and micro 25 kg.  
        | The gas temperature is important, as cold CO\(_2\) gas may cause animal welfare problems. However, within certain limits the birds will warm up the gas. |
| 13:50  | Presentation: On-farm methods for killing of poultry flocks                          |
|        | Speaker: Dr. Marien Gerritzen, Dr. Ing., Senior Scientist, Wageningen University and Research, NL  
        | Prior to killing of a poultry flock, a plan must be made taking the following into consideration: size of the premises, buildings, distances to nearest neighboring farms, type of production and the owners/the people running the production. |
The following methods are available:
- Mobile electrocution units: easy to perform, however individual live birds must be handled.
- Containerized gassing: good method, not for large flocks, individual live birds must be handled.
- Whole-house gassing: individual live birds not handled, leaks of the building must be covered, method not easy to adjust.
- Gas-filled foam into buildings: individual live birds not handled, may be applied to open buildings (roof damaged).
- Gas-filled foam into containers or “bags”: aggressive movements in the birds may destroy the foam creating turbulence and smaller bubbles with a longer response time as a consequence.

A back-up method must be available in all cases.

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<th>14:25</th>
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| 14:55  | Presentation: Whole-house methods for killing of poultry – nitrogen foam  
Speaker: Dr. Julian Sparrey, UK  
Nitrogen-filled foam has been tested on broilers, hens, turkeys and ducks. Trachea is not blocked so death results from hypoxia – not from choking. After 8-10 sec. the birds lose posture, after 15-20 sec. the birds are unconscious, and after that the birds will die quickly.  
The foam must have an expansion ratio of 250:1 – 350:1. Nitrogen-filled foam is more stable than CO₂-filled foam, and the latter is colder than nitrogen-filled foam; the use of vaporizer equipment (preheating of gas) will prevent ice in the building. It is important that the foam covers the birds (layer of 1 m) before they begin aggressive wing movements.  
Foam must be filled into the building from several inlets (e.g. each corner). One hour after the birds are killed, the foam may be removed. Alternatively, the foam will decompose within 12 hours.  
Benefits: Exposure to virus and dust is minimal, the method may be applied in a building with leaks (damaged roof, etc.). |
| 15:30  | Presentation: Whole-house killing of poultry – monitoring of Animal welfare  
Speaker: Dr. Marien Gerritzen, NL  
For whole-house gassing, minimum 40 % CO₂ must be applied. Consider one or several inlets, and cold, liquid CO₂ or vaporized CO₂.  
One gas inlet will result in a large temperature drop. In case of several inlets, back-up inlets must be planned as some may fail.  
Inlet of CO₂ at 20-25 °C will result in a quick increase in the CO₂ level without decreasing the temperature within the building.  
It must be possible for the birds to move away from the gas inlet. |
In the NL, the following requirements are laid down: 20 % CO₂ must be obtained within 10 min. The CO₂ concentration should then be increased to 60 %.

After 4 minutes, poultry of all species will be unconscious, and the birds will be dead after 15-16 minutes (60 % CO₂).

Inspection of the dead birds will give information on the animal welfare during CO₂ exposure:

- The dead birds will normally be evenly distributed within the building. If they are very close together it indicates fear or panic.
- The dead birds will normally lie on the breast or on the side. If they lie on the back it indicates violent movements before death.

In the NL, whole-house gassing is applied for poultry of all species. For water birds, it is important that the CO₂ concentration is sufficiently high.

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| 16:05 | Presentation: Chickpulp – mobile unit for stunning and killing of poultry, and production of fur animal feed  
Speakers: Mr. Lars Lunding/dr. Jon Buttenschøn |
|       | The Chickpulp mobile unit is applied for stunning and killing of healthy poultry flocks, meaning without any clinical symptoms of disease and without increased mortality rate. The mobile unit is approved according to the ABP Regulation. The finished pulp is used for fur animal feed.  
The procedure is as follows:  
- Stunning and killing of the birds (CO₂ in a chamber)  
- Chopping of the dead animals  
- Addition of acid and potassium sorbate  
- Mixing of the pulp  
The stunning and killing by the application of CO₂ is performed under the provisions of the method “carbon dioxide in two phases”.  
The process may partly be observed from outside through “windows” in the chamber (foggy). The CO₂ concentration is monitored at two stations (< 40 % in upper station, approx. 60 % in lower station).  
The addition of acid ensures a certain zoo-sanitary effect; e.g. avian influenza virus will be inactivated in 10 min.  
Procedures for cleaning and disinfection of the equipment have been established. |
| 16:20 | Questions and discussions related to Session I |
| 17:00 | Closing of Session I |
| 17:10 | Demo of Chickpulp mobile unit (outdoor area behind the hotel) |
| 19:00 | Dinner |

Thursday 3rd May 2018
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<td>09:00</td>
<td>Presentation: Killing of poultry – at hatcheries – and methods suitable for killing of individual birds</td>
<td>Dr. Julian Sparrey, UK</td>
<td><em>Methods for killing at hatcheries:</em>&lt;br&gt;Immediate mechanical destruction (IMD) (in regulation 1099/2009, Annex I, table 1 named maceration, allowed for chickens up to 72 hours and egg embryos). Effective provided the flow of chicks is not too fast.&lt;br&gt;Gas: CO₂ or Argon mixture. Longer exposure time might be necessary for newly hatched birds with immature respiratory system. There might also be inter-species-differences in resistance to hypercapnia/hypoxia, e.g. turkeys need longer exposure time.&lt;br&gt;Eggs with embryos up to 7 days old may be smashed, eggs closer to hatching should be killed by gassing.&lt;br&gt;<em>Methods for killing individual birds:</em>&lt;br&gt;Manual cervical dislocation (max. 70 birds &lt; 3 kg per person per day according to the regulation) The higher the dislocation on the neck, the better effect.&lt;br&gt;Instruments for cervical dislocation are not necessarily effective.&lt;br&gt;Captive bolt – special instruments for birds are marketed making it possible for one person to kill even larger birds like turkeys and geese. Cleaning/maintenance is important.&lt;br&gt;Percussive blow to the head provoking severe damage to the brain.</td>
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<td>09:30</td>
<td>Presentation: Whole-house carbon dioxide killing of laying hens – practical experiences</td>
<td>Dr. Lotta Berg, Prof., Dept. of Animal Environment and Health, Swedish University of Agricultural Sciences, Skara, SE</td>
<td>In Sweden, whole-house on-farm killing of poultry using CO₂ is routinely used. Make sure no birds are close to the inlet of the gas because of the freezing effect. (This might be prevented by preheating the gas). Only one inlet is used for a standard barn. It takes 10-15 minutes to fill a standard barn, reaching 80 % CO₂, and 10 minutes to kill the birds. Alternatively hens in Sweden are slaughtered or killed in a CO₂-flow container. A veterinarian must be present for animal welfare reasons.&lt;br&gt;In Sweden, when using a container for gassing it is compulsory to put the poultry in the container before letting in CO₂ because of the aversive effect of high concentration of CO₂. CO₂ is used for all species including waterfowl.</td>
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<td>09:50</td>
<td>Presentation: Anoxia: A holistic approach of responding to contagious poultry diseases</td>
<td>Dr. Harm Kiezebrink, MBA, Applied Veterinary Technologies Europe AB, Torekov, SE</td>
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**Method:**

Nitrogen foam with (big) bubbles inducing anoxia. The method may be used in barns or in semiopen barns or in containers. The animals lose consciousness/posture within approximately 20 sec. A big bubble size is important to quickly reduce oxygen-level. There is no aversive effect of Nitrogen and the animals seem to worry only little about being covered by foam. The foam can be added a disinfectant (i.e. Virkon) to obtain high biosecurity in a disease control situation. Furthermore, the killing can be done in smaller containers lined with plastic bags to make disposal easy and safe. The method was used in several farms in the Netherlands in 2017 in connection with the Fibronil affair. Further work is carried out at the Wageningen University. The method may be used for different species including pigs.

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| 10:10 | Presentation: Practical experiences from on-farm killing of poultry in the Netherlands  
Speaker: Dr. Marien Gerritzen, NL  
In 2003, the Netherlands had to kill large numbers of poultry because of an HPAI outbreak. Different methods were used and lots of experiences made as the outbreak was in dense poultry areas. Since then contingency plans have been refined, and in 2016, only whole house gassing with pre-heated CO₂ or CO₂ in big bags in smaller containers was used for ducks and laying hens. In the Netherlands, the killing is carried out by a contracted party that is responsible for all parts of the operation and for animal welfare. An Animal Welfare Advisory Committee observes the eradication. CO₂ is so far seen as preferable to foam as it is easier and quicker to handle and leaves no residues. However, in semi-open barns foam may be used to avoid having to catch and handle the poultry. |
| 10:30 | Coffee |
| 10:45 | Open session – group discussions with facilitators (incl. coffee break)  
1. Hatcheries  
2. Whole-house killing of poultry  
3. Killing of poultry in containers |
| 11:30 | Conclusions from group discussions to be presented and discussed |
| 12:00 | Conclusions and recommendations from the workshop  
The sharing of experiences regarding specific killing methods as well as more general subjects relevant for planning procedures for on-farm killing especially in relation to disease outbreaks was very valuable. As well as animal welfare protection of humans in case of a zoonosis was addressed.  
While Denmark has been reluctant to use gassing with CO₂ for waterfowl, several of the other countries reported that they used CO₂ for all species of poultry. On this background Denmark successfully used the method for euthanizing a herd of 20,000 ducks and ducklings reacting for Low Pathogen Avian Influenza the week after the workshop. Thus there has already been a concrete valuable gain from the knowledge shared at the workshop. |
The network of the group was strengthened during the workshop. The presentation and sharing of knowledge about Nitrogen foam killing of poultry was received in a positive manner by the participants.

| 12:15 | Closing of Workshop |