Further information on slaughter of pigs in disease control situations

Restricting animal movement for disease control

One of the biggest contributors to the spread of African Swine Fever (ASF) comes from the transport of live pigs[1]. For this reason, slaughter for disease control is predominantly carried out on farms and governments kill animals one by one under these conditions.

The Chinese Ministry of Agriculture and Rural Affairs have said:

"Epidemiological investigations show that the main routes of transmission of African swine fever in China are: contaminated vehicles and personnel physically bringing the virus onto the farms, use of swill to feed pigs, infected live pigs and the pork products originated from them."[2]

The FAO recommends zones be put in place around infected areas where pigs cannot be transported:

"There should be a complete ban on the movement of live pigs, pig meat and pig products inside and out of the infected zone."[3]

Currently available culling methods

In large scale abattoirs, electric stunning of pigs is still a widely used method of slaughter in normal circumstances. This is the same process used in disease situations. OIE states that the suggested two stage electric stunning can be completed in 6 seconds (3 seconds to the head, followed by 3 seconds to the heart[4]) and animals can be moved through quite quickly as workers can line the pigs up to move them through.

The two-stage electric stunning method has a biosecurity advantage as no bloods/fluids are involved. With captive bolt, blood/fluids can be involved. Bolt equipment is also known to have a higher mechanical failure rate as the equipment can heat up and burn out and it tends to not be as effective on older, larger animals. Operator fatigue is also an issue, and electric stunning is also considered to be less labour intensive than the bolt method. Overall, the captive bolt method has limitations unless for a small group of smaller animals or where electricity supply is unreliable or not feasible.

Most producers do not have the facilities for undertaking gas stunning or slaughter on farm, and gas is less widely used in Asia than in other parts of the world such as Europe. Gassing can be undertaken on sealed trucks, however there is research suggesting that the use of CO_2 gas has a range of problematic welfare issues and shouldn't be used. This is because there is variability between pigs' responses to CO_2 - pigs are sometimes not rendered unconscious immediately and high concentrations of CO_2 gas can cause significant pain and distress to pigs when inhaled by causing acute respiratory distress.[5]

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[1] https://thepigsite.com/disease-guide/african-swine-fever-asf

[2] http://www.moa.gov.cn/ztzl/fzzwfk/fkzs/201909/t20190910_6327657.htm

[3] http://www.fao.org/3/Y0510E/Y0510E06.htm

[4] https://www.oie.int/index.php?id=169&L=0&htmfile=chapitre_aw_killing.htm Article 7.6.10. Also referred back to our technical document no.3: Electrical stun-kill pigs for disease control.

[5] Velarde, Antonio, and Antoni Dalmau. "Slaughter of pigs." In Advances in Pig Welfare, pp. 295-322. Woodhead Publishing, 2018.

Emerging culling methods

Nitrogen-filled high expansion foam

Earlier suggestion of using firefighting foam for emergency depopulation is allowed in the U.S. Department of Agriculture (USDA) National Animal Health Emergency Management System (NAHEMS) Mass Depopulation and Euthanasia guideline and the American Veterinary Medical Association (AVMA) guideline. However, the technology referred to in these guidelines is using low to medium expansion water-based foam, which has a higher density. The cause of death of using this type of foam is suffocation due to animals' airway being occulated by the foam and therefore creates great welfare concerns.

The latest development in foam depopulation method allows using high-expansion, and nitrogen-filled gas to achieve humane depopulation by anoxia. Normal air consists of 78% of nitrogen and 21% of oxygen, and the nitrogen filled high expansion foam replace the oxygen in the atmosphere to lower than 2%, which is proven to be effective in causing non-aversive anoxia state (lack of oxygen) and rapid death of the animals. For on farm practicality, there has been depopulation operations on poultry farms with 6,000 floor reared broilers which were completed within 6 hours by 5 trained personnel supervised by 2 veterinarians.[6] There was also a successful case study to cull open-house poultry using this method.[7]

Current development in container customisation and foam/nitrogen generating machines enables on-farm use for larger animals. Theoretically, scalable container/enclosure can house pigs in larger groups (40-50) to conduct group culling, but the crucial issue is providing sufficient supply of nitrogen and foam. It can be more efficient by using on-site nitrogen generator instead of purchased cylinders, especially in areas where nitrogen price is higher or more remote. Studies of using high expansion nitrogen filled foam to depopulate poultry have shown high feasibility while studies on pigs are on-going. Pigs show no strong aversive reaction to high-expansion foam and loss of posture can occur within 1 minute. Death occurs on average around 5-10 minutes depending on size of pigs.

Ventilation Shutdown

According to the AVMA and DEFRA in the UK, ventilation shutdown (VSD) is listed as a last resort but accepted method of depopulation. The principle of VSD is by shutting down ventilation system, to increase temperature with or without auxiliary heat source. The animals die of hyperthermia, usually suffering from heat stress. The process is long, distressing and painful, sometimes can take hours for animals to die. Even after long exposure to high temperature, the efficacy of causing death is still not guaranteed. Modelling showed that some chicken can still be alive after 3.5 hours after VSD starts.[8]

World Animal Protection strongly opposes VSD, as it is a completely inhumane depopulation method, and in no circumstances should it be used on pigs or poultry.

The planning of mass depopulation under disease control should be planned in advance of disease outbreaks, and the local and central authorities should take this into consideration in

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[6] http://n2gf.com/category/culling-methods/gas-based-methods/anoxia-methods/

[7] McKeegan, Dorothy. "Mass depopulation." In Advances in Poultry Welfare, pp. 351-372. Woodhead Publishing, 2018.

[8] Zhao, Yang, Hongwei Xin, and Lihua Li. "Modelling and validating the indoor environment and supplemental heat requirement during ventilation shutdown (VSD) for rapid depopulation of hens and turkeys." biosystems engineering 184 (2019): 130-141.

terms of capital investment and subsidies in equipment procurement to ensure depopulation is conducted in a humane and efficient way.

Wildlife culling – wild boars under the threat of ASF

Based on current reports, in general experts agree that simply mass culling wild boars is not effective in containing ASF. One Latvian case published in 2019 showed that regional wild boar populations (to date) reduced after massive culling,[9] however, another modelling study in 2019 showed that culling boars may reduce the number of new cases in the local region but will put the greater region at risk.[10] In 2016 an EU survey of expert opinion showed that wild boar culling did not score highly both in terms of practicality and effectiveness.[11] Currently there's no strong evidence for indiscriminative mass culling of wild boars in the attempt to stop ASF. Fast removal/disposal of dead wild boar carcasses (tested positive for ASF) can be equally important.

World Animal Protection opposes indiscriminate and inhumane culling of wild boar.

[9] Schulz, Katja, Edvīns Oļševskis, Christoph Staubach, Kristīne Lamberga, Mārtiņš Seržants, Svetlana Cvetkova, Franz Josef Conraths, and Carola Sauter-Louis. "Epidemiological evaluation of Latvian control measures for African swine fever in wild boar on the basis of surveillance data." Scientific reports 9, no. 1 (2019): 1-11.
[10] Taylor, Rachel A., Tomasz Podógrski, Robin RL Simons, Sophie Ip, Paul Gale, Louise A. Kelly, and Emma L. Snary. "Predicting spread and effective control measures for African swine fever-should we blame the boars?." bioRxiv (2019): 654160.
[11] Guinat, Claire, T. Vergne, C. Jurado-Diaz, J. M. Sánchez-Vizcaíno, L. Dixon, and D. U. Pfeiffer. "Effectiveness and practicality of control strategies for African swine fever: what do we really know?." The Veterinary Record 180, no. 4 (2017): 97.