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Dr. Janet Donlin
Executive Vice President
American Veterinary Medical Association
1931 North Meacham Road, Suite 100
Schaumburg, IL 60173-4360

Dear Dr. Donlin:

I am writing to express concerns regarding the AVMA's draft guidelines for the depopulation of birds, as well as a study conducted at North Carolina State University on the ventilation shutdown (VSD) method of depopulation that was cited in the guidelines.

As you probably know, the U.S. Department of Agriculture allowed the use of ventilation shutdown during an avian influenza outbreak in 2016, and the AVMA's draft guidelines sanction its use (with heat or carbon dioxide gas) in "constrained circumstances."

The Animal Welfare Institute (AWI) appreciates the distinction between humane euthanasia and depopulation of animals in constrained circumstances. AWI's position on depopulation has been that the method used must be capable of killing animals (or rendering them irreversibly insensible) in less than five minutes with minimal suffering. It is our understanding that containerized gassing and high-expansion gas-filled foam meet these criteria, and although whole-house gassing with CO_2 is slower, proper use also results in minimal distress to birds. AWI has been opposed to the use of ventilation shutdown, with or without heat, and submitted comments on the AVMA guidelines to this effect.

After the comment period on the AVMA guidelines closed, the U.S. poultry industry released a final report regarding a study it funded by Dr. Ken Anderson at North Carolina State University titled "Evaluating hen behavior and physiological stressors during VSD for the development of humane methodologies for mass depopulation during a disease outbreak." AWI reviewed this report and solicited evaluations of the research by several avian welfare experts. Numerous concerns about the study have been identified, the most serious of which are listed below (and further described in an attachment):

- The study has not been peer reviewed. Nonetheless, the AVMA cited it in its depopulation guidelines. During the comment period on the draft guidelines, the report was not public.
- The report is so poorly written and/or edited that it is difficult at times to discern what the author was attempting to communicate. (For example: "Since temperature did not appear to be the primary contributor to hyperthermia in the VSD treatment as the primary component related to the TOD as was the case.")
- Several reporting and mathematical errors call into question the reliability of all of the data. (For example, none of the percentages for the four treatments presented in Table 2 add up to 100; instead, the percentages add up to 109, 119, 90, and 81.)

- The report characterizes certain depopulation methods as “humane” despite the fact that the study does not define “humane.”
- The study’s primary measure of “humaneness” appears to be Heat Shock Protein (HSP), which has not been validated as a welfare indicator in birds.
- The study reports the duration of time to death and the percentage of time unconscious for the different depopulation methods. However, the length of time birds spent in a conscious state, which is a critical measure, is not provided or discussed, and cannot be calculated from the data.

AWI identified serious problems in all aspects of the ventilation shutdown study, including the methodology, the reporting of findings, and the conclusions. In fact, in our opinion, no conclusions can be drawn from this research, with the possible exception that in some situations birds may survive ventilation shutdown conducted without heat and/or carbon dioxide. The research certainly does not demonstrate that ventilation shutdown with heat—the practical equivalent of baking animals alive—is “humane,” and statements making this claim misrepresent the study.

Dr. Dorothy McKeegan, recognized expert in bird depopulation, has said: “VSD is associated with very serious welfare concerns, primarily because death caused by hyperthermia is associated with significant suffering, and the time to death is prolonged.” We feel very strongly that this study does not provide any evidence to justify the use of ventilation shutdown to depopulate birds, even under constrained circumstances.

AWI calls on the AVMA and the poultry industry to present a truthful and unbiased account of the research discussed here, and to support the use of methods demonstrated to have lower animal welfare costs for birds, including containerized gassing with argon and CO_2, whole-house gassing using CO_2 or other gases at appropriate concentrations, and high-expansion gas-filled foam.

Further, we urge the AVMA to call out industrialized farming for raising animals in crowded, filthy conditions that facilitate the spread of disease. By proposing inhumane killing methods, the AVMA is enabling the animal agriculture industry to act irresponsibly. It ensures that the industry will continue to construct massive buildings that confine tens and even hundreds of thousands of birds without consideration of how they will be protected in emergency situations, or humanely killed, if that becomes necessary.

We would welcome the opportunity to discuss this issue with you at your convenience.

Sincerely,

Cathy Liss

Dena Jones

Cathy Liss
President

Dena Jones
Director, Farm Animal Program

cc: Dr. Cia Johnson, Director, Animal Welfare Division, AVMA
Dr. Ken Anderson, Professor, North Carolina State University
Dr. John Glisson, Vice President of Research Programs, U.S. Poultry & Egg Association
Mr. Kevin Shea, Administrator, USDA Animal and Plant Health Inspection Service

Attachment

ATTACHMENT

AWI Concerns Regarding Research Conducted by North Carolina State University on the Response of Egg-Laying Hens to Ventilation Shutdown Method of Depopulation

This document briefly describes some of the Animal Welfare Institute's many concerns regarding the methodology of the North Carolina State University study, the interpretation of its findings, and the conclusions drawn from the research.

General

1. The information that is especially pertinent and relevant to the topic—the length of time birds undergoing each treatment spent in a conscious state—is not provided or discussed.

2. The primary measure of animal welfare in the study appears to be Heat Shock Protein (HSP). However, HSP has not been validated as a welfare indicator in birds. HSP is typically used as a measure of heat stress, not as a measure of an animal's conscious experience. Measuring an animal's conscious experience is essential to any discussion of "humaneness" or "animal suffering."

3. Other validated stress indicators, such as glucocorticoids, were not analyzed. Glucocorticoids are regularly measured in birds as indicators of stress and animal welfare.

4. The HSP data is taken from different birds at different time points, not the same birds at different time points, and only two birds per time point. Furthermore, the time points are based on the time to death of just four birds per treatment (in Phase 1). This methodology assumes that all birds respond the same to the treatments, which the research's own data suggests is not the case.

5. AWI knows of no previously published data suggesting that HSP in chickens can rise a significant amount in the very short duration of some of the treatments. Consequently, there are no scientifically valid conclusions that can be drawn from the reported HSP levels.

6. The duration to time of death (TOD) data suggests that ventilation shutdown (VSD) and ventilation shutdown with heat (VSDH) are inappropriate methods of depopulation. Moreover, any acceptability of ventilation shutdown with CO_2—with or without heat (VSDCO, VSDHCO)—hinges on the use of CO_2 at appropriate concentrations as a euthanasia agent. While AWI suspects the methods that include CO_2 may qualify as meeting minimum animal welfare criteria, the current study does not provide substantiation of this.

7. The VSDHCO method was evaluated in Phase 1, but not in Phase 2 or 3, reportedly because the method did not seem to improve upon the VSDH and VSDCO methods. This decision is inappropriate, especially given the extremely small sample size in Phase 1 (four birds per treatment).

8. Extremely small sample sizes for all Phases, but particularly for Phase 1 (four birds per treatment) and Phase 2 (two birds per time point), qualifies the research as a pre-pilot feasibility study only.

Industry Summary

1. The Summary focuses on duration to TOD for the various treatments; however, from an animal welfare viewpoint, the length of time the birds were conscious is far more important. Moreover, the percentage of time unconscious is of little significance when the time to death is lengthy, as was the case with the VSD method.

2. The Summary reports a hen survivorship of 4 percent for VSD, while the text of the report states 2.8 percent of VSD hens survived.

3. According to the Summary, "The duration to TOD was no different between VSDH and VSDCO." This statement is inaccurate and misleading as the time to death was not reported for Phase 3, and no statistical analysis was conducted (likely due to lack of replication). For Phase 1, time to death was based on only four birds per treatment. If no statistical significance for this Phase was detected, it was likely due to the small sample size and large hen-to-hen variation. This would have been evident if information about variability, such as data ranges, had been provided, but unfortunately it was not.

4. The final statement of the Summary is, "Based upon these field studies, VSDH and VSDCO appear to be the most humane methods of depopulating large numbers of caged he [*sic*]" However, there is no justification for this statement. Given that VSDH hens were conscious four times longer than VSDCO hens, it is inappropriate to suggest that the two methods are equally "humane." From a hen welfare perspective, the difference between 690 seconds and 3202 seconds should be considered important, regardless of statistical significance. The difference must not be disregarded, particularly given the very small sample sizes used in this study.

Phase 1

1. Data for the behavioral observations are not provided.

2. The validity of the different behaviors as measures of loss of consciousness is not established.

3. Because the behaviors studied do not necessarily reflect loss of sensibility or awareness, the amount of time birds were unconscious may have been overstated (or, expressed another way, the amount of time birds were conscious may have been understated).

4. It is not clear how the EEG recordings and the behavioral observations were integrated—did a hen have to display all behaviors listed to be considered unconscious?

5. Maximum carbon dioxide concentrations for Phase 1 are reported as 34% for the VSDCO treatment and 31% for VSDHCO (Table 1 and Figure 3). However, CO^2 concentrations of 40-45% are generally considered necessary to ensure death in chickens. The possibility that lower CO_2 levels may have influenced the duration to TOD for these two treatments is not raised in the report.

6. The percentages of time for each EEG mV range (Table 2) do not add up to 100. For example, the values given for the VSDH treatment add up to 119 percent.

7. Standard error and ranges are not reported for the individual treatments. Therefore, it is not possible to know which treatments had the greatest variation on time to death.

8. Figure 7 reports HSP levels; however, the report does not state that HSP was studied in Phase 1.

Phase 2

1. No explanation is given for why HSP was measured only in the brain and not in the blood of birds. This prevented pre and post measurements in the same animal and prevented measurement while the animal was undergoing treatment. HSP was measured only in dead birds, and all birds at the same time regardless of when the individual birds died.

2. Because brains were used to measure HSP levels, only a subset of the total number of hens could be sampled at each time point (two birds per treatment).

3. Figure 8 is meaningless as the scale masks any difference between the treatments. In addition, Figures 8, 9, and 10 are of very limited usefulness as each value represents different birds, not the same bird over time. Comparing single time points for different animals in different treatments is not a strong method of scientific analysis.

4. The report does not offer an explanation for how HSP levels could be statistically higher in treatments that take significantly less time to unconsciousness or death (Figure 11). The report also does not give an explanation for why the baseline HSP level for the VSD and VSDH treatments in Figure 12 are higher than the sequenced time points (suggesting that heat stress decreased during the ventilation shutdown treatments conducted without CO_2).

5. Conclusions offered for Phase 2 regarding the VSDCO treatment are based on data from just two hens. Since HSP does not respond immediately, it is unlikely that changes in HSP levels would be seen in any birds, except perhaps those in the VSD treatment, where a decrease was actually reported. An adequate explanation of this highly unexpected finding is not offered.

Phase 3

1. The core body temperature data reported in Table 4 is meaningless since the temperature was taken from all birds at the same time, and it is likely that the body temperature would have begun to drop not long after the individual hens died.

2. The text of the report cites a core body temperature of 109.3^{o}F in the VSD survivors, while Table 5 reports a core body temperature of 111.7^{o}F among survivors.

3. Duration to time of death was not reported for Phase 3. It is possible no statistical analysis was conducted because each treatment was applied to all birds at the same time, and therefore there was no replication. In any case, the report should explain the lack of statistical analysis for Phase 3.

4. Conclusions for Phase 3 report that the “speed of the process” for the VSDH and VSDCO methods was similar. This is inaccurate. The time to death was, in fact, very different between VSDH and VSDCO treatments in Phase 3 (if the reported length of environmental monitoring for these treatments can be assumed to represent the total time living birds were being monitored). Whether

the time to death is statistically different cannot be determined as no statistical analysis was conducted (due to lack of replication).

5. If the environmental monitoring times cited for Phase 3 can be interpreted as time to death (see point #4 above), then a large difference was noted between the time to death for Phase 1 and Phase 3. Possible explanations for this difference are not provided.

6. The collection of HSP data in Figure 18 is not described, and this data is not mentioned in the Conclusions for Phase 3.