

Applicability of Commercial Euthanasia Technologies to Alberta's Poultry Industry

Background

Euthanasia is a necessity in food-animal production. It is impractical or impossible for veterinarians to regularly perform on-farm euthanasia so it is important for the producer to be aware of the available humane euthanasia methods and how to perform them. Humane euthanasia is defined as the rapid onset of unconsciousness and insensitivity to pain while minimizing the animals fear and distress. However, there has been inadequate assessment of the suitability and practicality of commercially available tools for on-farm poultry euthanasia. The Institute for Applied Poultry Technologies (IAPT) in collaboration with Poultry Health Services decided to address this gap. The objectives of this study were to evaluate a number of euthanasia devices for their ability to minimize pain and distress in the birds, assess the level of skill required for a successful euthanasia and to determine if operator safety was compromised. The study was completed in two phases and funded through the Growing Forward 2 Livestock Welfare Program.

The study was reviewed by IAPT's Institutional Animal Care and Use Committee and followed the guidelines of the Canadian Council on Animal Care.

At the end of the first phase of the project we identified five poultry euthanasia devices that met our criteria for providing an effective euthanasia, was easy to learn with proper training, and presented minimal risk to the operator. These were the following:

- i. Zephyr (Bock Industries),
- ii. CPK2 (Accles and Shelvoke),
- iii. Top Kip (TopKip USA),
- iv. Tomahawk (Nova Pneumatics), and
- v. Euthanex (VAST).

Zephyr, CPK2, and Tomahawk all employ captive bolt technology. Top Kip is an electrical stunner and Euthanex uses CO₂ inhalation.

The purpose of the second phase of the project were to move the testing of the most promising devices from the lab to the farm. The specific objectives were to train chicken broiler and turkey broiler producers on the technique for each device, evaluate their ability to effectively euthanize a number of birds, and determine if the producers believed the devices were useful and practical for use on their farms.

Methods

Recruitment

Using convenience sampling, six chicken broiler and six turkey broiler producers from Central and Southern Alberta were recruited to participate in this study. We used birds already scheduled for culling and the producers were compensated at fair market value for the loss of these birds. Additionally, flock health checks including environmental samples from each farm and complete post mortems on all birds killed in the study were provided at no cost to the producer. Producers were assured that their identities would be anonymous and they were informed of their rights to refuse to test any or all devices or refuse to answer any or all questions. Each signed an informed consent form.

Producer training and bird euthanasia

The trainer in this study was experienced using each of the euthanasia devices. She and an assistant visited each farm at a time convenient to the producer. The order the devices were to be demonstrated and used was randomly assigned. The trainer demonstrated one device and the producer followed by euthanizing as many birds as necessary to become proficient up to a maximum of 5 birds. In cases where the device was not performing adequately to be considered humane, an alternative euthanasia method was selected.

Table 1. Producer characteristics and birds provided for this study

| Producer ID | Producer age (yrs) | Years experience | Commodity | Age of birds |
|--------------------|---------------------------|-------------------------|------------------|---------------------|
| 1 | 23 | 4 | Chicken broiler | 33 days |
| 2 | 34 | 12 | Chicken broiler | 39 days |
| 3 | 53 | 10 | Chicken broiler | 31 days |
| 4 | 27 | 4 | Chicken broiler | 30 days |
| 5 | 26 | 5 | Chicken broiler | 30 days |
| 6 | 43 | 14 | Chicken broiler | 30 days |
| 7 | 38 | 26 | Turkey broiler | 17 weeks |
| 8 | 39 | 11 | Turkey broiler | 9 weeks |
| 9 | 27 | 4 | Turkey broiler | 11 weeks |
| 10 | 26 | 5 | Turkey broiler | 15 weeks |
| 11 | 41 | 8 | Turkey broiler | 7 weeks |
| 12 | 65 | 39 | Turkey broiler | 7 weeks |

Evaluation of devices

Information about the type of birds (chicken or turkey broiler), age of the birds, the producer's age, and the number of years raising poultry were collected. The trainer assessed the producer's performance with each device. Areas assessed included:

1. Ease of set up
2. Operator Learning Curve
3. Number of birds before proficient
4. Operator Safety
5. Effective Stun/Kill
6. Device suitability for this producer

Assessment was on a scale from zero (very poor) to 3 (very good). Additional comments were also recorded. The producer then completed a questionnaire to gather their opinions about the device using the following:

1. It was easy to learn how to use the euthanasia tool.
2. I felt safe when I was using this euthanasia tool.
3. I believe my staff would be safe using this euthanasia tool.
4. This euthanasia tool was effective for this weight of birds.
5. This euthanasia tool is more effective than the euthanasia method I use now.
6. It would be practical to use this euthanasia tool in my day to day operations.
7. I would be likely to use this euthanasia tool routinely on my farm.
8. I believe that euthanizing birds using this tool would be acceptable to the average consumer.

Assessment was on a scale from 1 (Strongly Disagree) to 5 (Strongly Agree). Additional comments were also recorded. This process was repeated for each device. The final question provided an estimated cost for each device and asked the producer which device they would buy based on their testing and the cost of the device.

Analysis

There was a marked difference in the size of the chickens compared to the size of turkey used in this study. Therefore, the data from chickens was analyzed separately from the turkey data. For each bird type, each device and each question in the evaluation metric, the results were summarized using the mean and standard deviation. To gain an over-all assessment of each device, the averages of the metrics used in the trainer's evaluations were summed. The number of birds required until proficient was scored by the following method:

- Failed to kill, Score 0;
- 4 or 5 until proficient, Score 1;
- 3 until proficient, Score 2;
- 1 or 2 until proficient, Score 3.

The average values from the producers for each device was also summed. The chicken and turkey producers' preferences if they were to purchase one of the tested devices is summarized by the proportion of producers that selected each device.

Table 2. For the chicken broiler producers, the mean and standard deviation (s) of all responses for each question and each device

| | Metric | Top Kip Mean (s) | Zephyr Mean (s) | Tomahawk Mean (s) | CPK2 Mean (s) | Euthanex Mean (s) |
|---|-------------------------|--|---|--|---|--|
| Trainer assessments | Ease of set up | 2.5 (0.5) | 2.8(0.4) | 3 (0) | 3 (0) | 0.2 (0.4) |
| | Learning curve | 2.5 (0.5) | 3 (0) | 3 (0) | 3 (0) | 2.7 (0.5) |
| | # birds to proficiency | 3 (1.1) | 1.7 (0.5) | 2.5 (1.4) | 2.7 (1.2) | 1 (0.9) |
| | Safety | 2.7 (0.5) | 2.8 (0.4) | 3 (0) | 3 (0) | 2.2 (0.8) |
| | Effectiveness | 2.8 (0.6) | 3 (0) | 3 (0) | 3 (0) | 2.7 (0.8) |
| | Suitability | 2 (0.4) | 2.5 (0.8) | 3 (0) | 3 (0) | 0 (0) |
| | Comments | No blood, failed once | Often bloody | Blood occas. | Blood occas. | Multiple birds |
| Chicken producers' assessments | Easy to learn | 3.5 (1.6) | 5 (0) | 5 (0) | 4.8 (0.4) | 4.2 (1.0) |
| | Personal safety | 4.3 (1.2) | 4.8 (0.4) | 5 (0) | 5 (0) | 3.5 (1.4) |
| | Staff safety | 4.3 (1.2) | 4.2 (1.2) | 4.8 (0.4) | 5 (0) | 3.5 (1.6) |
| | Effective | 5 (0) | 5 (0) | 5 (0) | 5 (0) | 4.3 (1.2) |
| | Better than current | 4.5 (0.5) | 4.5 (0.8) | 4.3 (1.2) | 4.7 (0.8) | 2.2 (1.2) |
| | Practical | 3.2 (1.3) | 2.5 (1.5) | 4.3 (0.8) | 4.7 (0.5) | 1.3 (0.5) |
| | Likely to use | 3.2 (1.8) | 2.3 (1.0) | 4.5 (0.8) | 4 (1.5) | 1.3 (0.5) |
| | Acceptable to consumers | 4 (1.5) | 2.7 (1.5) | 4.2 (0.8) | 4.2 (0.8) | 3 (0.9) |
| | Comments | Quick Clean Impractical Needs to charge | Effective Quick Bloody Impractical Needs air compressor | Effective Portable Heavy Need CO ₂ | Effective Easy Portable Need to change cartridge | Multiple birds Not portable Too long Gas risk |

Table 3. For the turkey broiler producers, the mean and standard deviation (s) of all responses for each question and each device. The Top Kip was not assessed in the turkeys.

| | Metric | Zephyr Mean (s) | Tomahawk Mean (s) | CPK2 Mean (s) | Euthanex Mean (s) |
|--|-----------------------------|--|---|---|--|
| Trainer assessments | Ease of set up | 3 (0) | 3 (0) | 3 (0) | 0 (0) |
| | Learning curve | 3 (0) | 3 (0) | 3 (0) | 2.7 (0.5) |
| | # birds to proficiency | 3 (1.5) | 1.5 (1.2) | 2.5 (1.2) | 0.8 (0.4) |
| | Safety | 3 (0) | 3 (0) | 3 (0) | 2 (0) |
| | Effectiveness | 2.7 (0.8) | 0.5 (1.2) | 2.8 (0.4) | 3 (0) |
| | Suitability | 3 (0) | 3 (0) | 2.3 (0.5) | 0.3 (0.5) |
| | Comments | Often bloody | Occas. failed to kill | Occas. bloody | Flapping |
| Turkey producers' assessments | Easy to learn | 5 (0) | 5 (0) | 4.8 (0.4) | 4.5 (0.8) |
| | Personal safety | 4.8 (0.4) | 5 (0) | 5 (0) | 4.2 (0.8) |
| | Staff safety | 5 (0) | 5 (0) | 4.8 (0.4) | 3.7 (1.4) |
| | Effective | 5 (0) | 2.2 (1.6) | 5 (0) | 4.5 (1.2) |
| | More effective than current | 4.5 (0.8) | 1.8 (1.3) | 4.5 (0.8) | 2.7 (1.4) |
| | Practical | 4 (1.7) | 2.7 (1.9) | 4.8 (0.4) | 3.2 (1.7) |
| | Likely to use | 3.7 (1.4) | 2.5 (1.8) | 4.3 (1.2) | 2.8 (1.7) |
| | Acceptable to consumers | 4 (1.5) | 2.3 (1.5) | 4.3 (0.8) | 4 (1.3) |
| | Comments | Effective Quick Bloody Needs air compressor | Quick Portable Too often failed to kill birds | Effective Portable Range of bird sizes Need to load each time Awkward | Multiple birds Clean Too slow Risk of gas |

Results

A summary of the ages of the birds used in this study, the producers' ages and number of years in poultry production is provided in Table 1. Using cross-tabulation there was no evidence of a relationship between the age of the birds, the age of the producer or the number of years experience in poultry production and the producers' responses to the questions or their favored euthanasia device.

The Top Kip was not suitable for the turkeys so was not assessed for these birds. All of the other devices were used by each producer. The mean and standard deviation of the trainer's and the

producers' assessments for each device and each question were calculated (Tables 2 and 3). A representative selection of comments are also provided.

The aggregate of the trainer's marks and the producers' marks was used to gain an over-all assessment of each device (Figures 1 and 2). The devices that the producers preferred are displayed in Figures 3 and 4.

Figure 1. Aggregate of the trainer's and the chicken producers evaluations.

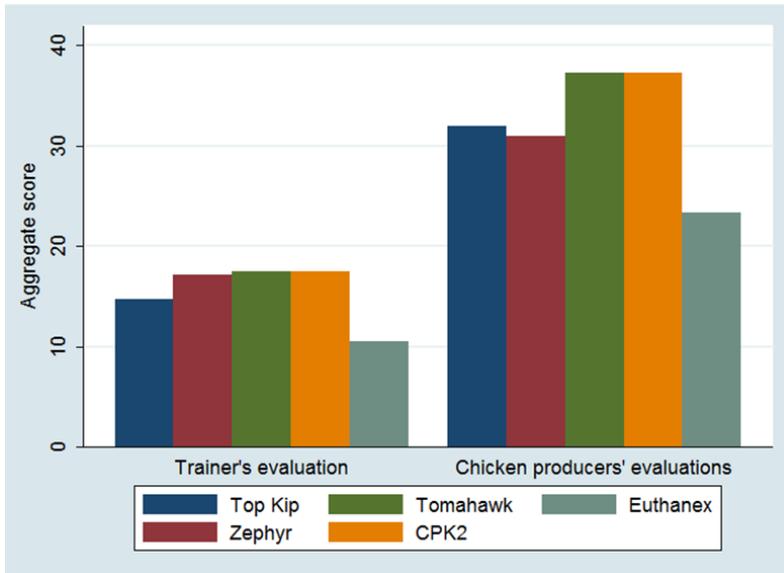


Figure 2. Aggregate of the trainers and turkey producers' evaluations

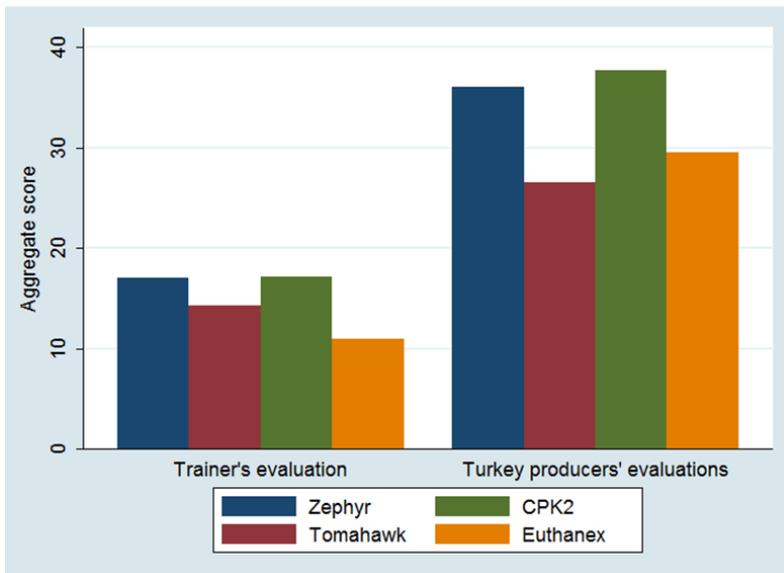


Figure 3. Device preferences by the chicken producers

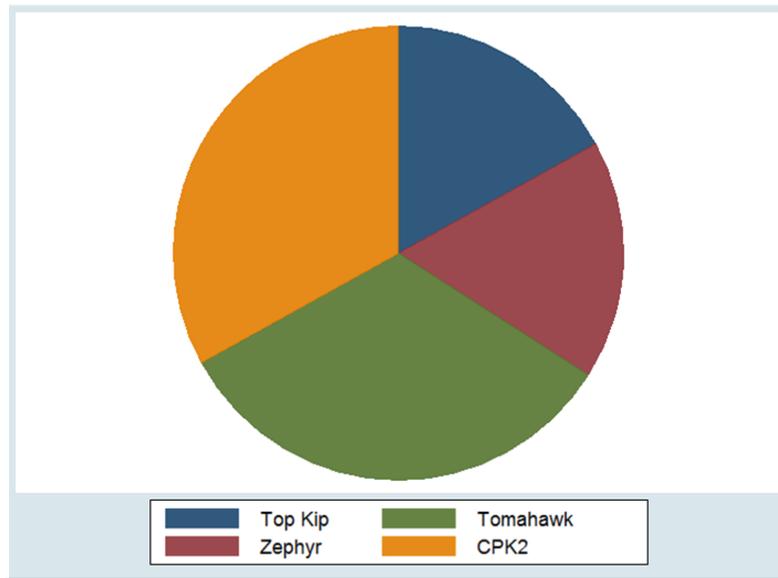
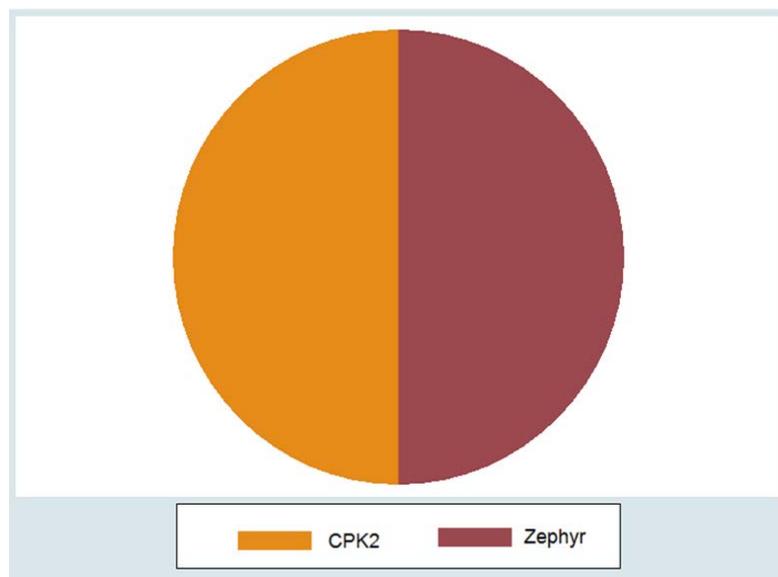


Figure 4. Device preferences by the turkey producers



Discussion

We used a convenience sample of producers but achieved a range of ages and years of experience in the sample of producers from the study area.

The standard deviations, as a measure of variability in the producer's responses, was often small and measuring less than 1.0. There was greatest variability in the producers' assessments of the Top Kip and Euthanex devices, two devices that were less likely to be purchased by the

producers in this study. The questions that resulted in the greatest variability of responses were those asking if the producers considered the device tested to be practical, if they were likely to use this device on their farm, and whether they believed the device would be acceptable to consumers. These questions were very subjective and based on personal experiences and preferences so it is not surprising that the results showed greater variability.

The results did show some clear preferences; the trainer's evaluations, the producers' evaluations and the device they would select if they were to purchase one of those tested were consistent. The chicken producers preferred Tomahawk and CPK2 by a small margin over Top Kip and Zephyr. Euthanex was not assessed favorably. The turkey producers showed a strong preference for Zephyr and CPK2 over the other two devices that were tested in these birds.