



TURKEY HEN EUTHANASIA REPORT

By Third Party

Talon Poultry Euthanizing System[®] Turkey Hen Euthanasia Report

By Third Party

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Report

Test Information

On December 10, 2019 the Talon Poultry Euthanizing System[®] was evaluated for the efficacy of euthanasia of 2 ages of turkey hens. The test was conducted in the ante room of Glenn Rhodes' brooder house located in Port Republic, Virginia. Mr. Rhodes is a contract turkey hen grower for Cargill. Laura Foltz, Cargill service technician, and Chad Brubaker, President of Innovative Poultry Products, supported the test.



Left to right: Chad Brubaker, Laura Foltz, Glenn Rhodes.

Three 5 gallon buckets were fabricated by Mr. Brubaker to enable viewing and recording each euthanasia event during the test.



Talon Poultry Euthanizing System[®] with clear viewing bucket.

The buckets were manufactured well and 100% visibility was attained. A total of 20 turkey hens from 2 age groups were euthanized. The first group of 10 hens were 33 days old. This group of hens was transported by Laura Foltz in a cardboard box from an external site to the testing site the morning of the test. The second group of 10 hens were 13 days old and were provided by Glenn Rhodes on-site.

Each bird was weighed on a hanging scale and placed into the viewing bucket on the bucket holder of the Talon[®]. Once the handler ensured the bird was facing the direction of the video camera, the Start button was pushed to begin the euthanasia event. The Talon[®] was set to a 20 second CO₂ prefill and a 120 second cycle. The same cycle was used for all euthanasia events. A tutorial video was recorded and uploaded to Youtube by Glenn Rhodes <https://www.youtube.com/watch?v=NL0DS6n0jr0>.

The behavior of the birds was observed and recorded by third party and was used as a cross reference during video recording analysis. At the end of the cycle, each bird was removed from the bucket and confirmed dead using the nictitating membrane reflex, which was performed by opening the eyelid of the bird, touching the eye ball, and observing if the nictitating membrane moved across the eye. No birds exhibited

the nictitating membrane reflex and were confirmed as dead. A new bucket was used for each bird to observe defecation during death.

Video Analysis

Video recordings for each euthanasia event were analyzed for behavioral indicators of distress, insensibility, and death. The behavioral indicators of distress were head shaking and gasping. The behavioral indicator of insensibility was loss of posture. The behavioral indicators of death were cessation of rhythmic breathing, cessation of movement, and defecation. The definitions of each behavioral indicator are in Table 1. The latency is defined as the time elapsed on the stopwatch from the moment the Talon[®] lid closed and CO₂ prefill began to the first or last occurrence of each behavior. The time to the first head shake, first gasp, loss of posture, cessation of rhythmic breathing, cessation of movement, and defecation were all observed and recorded in seconds (Table 2).



GoPro video camera view of a turkey hen poult.

Table 1: Definitions of Observed Behaviors. Observed latency (time in seconds) to each observed behavioral measure exhibited during death.

Behavior	Indicates	Definition
Head shake	Distress	Vigorous side to side movement of head and stretched neck.
Gasp	Distress	Deep breaths with open mouth and out of sync with normal breathing rhythm.
Loss of posture	Insensibility	Inability to remain in initial upright posture combined with a visual loss of neck tension.
Cessation of rhythmic breathing	Death	Cessation of rhythmic up and down movement of the rib cage and keel associated with expansion for inhalation and back down with exhalation.
Cessation of movement	Death	Complete absence of all movement.
Defecation	Death	Voiding bowels after loss of voluntary bodily function control.

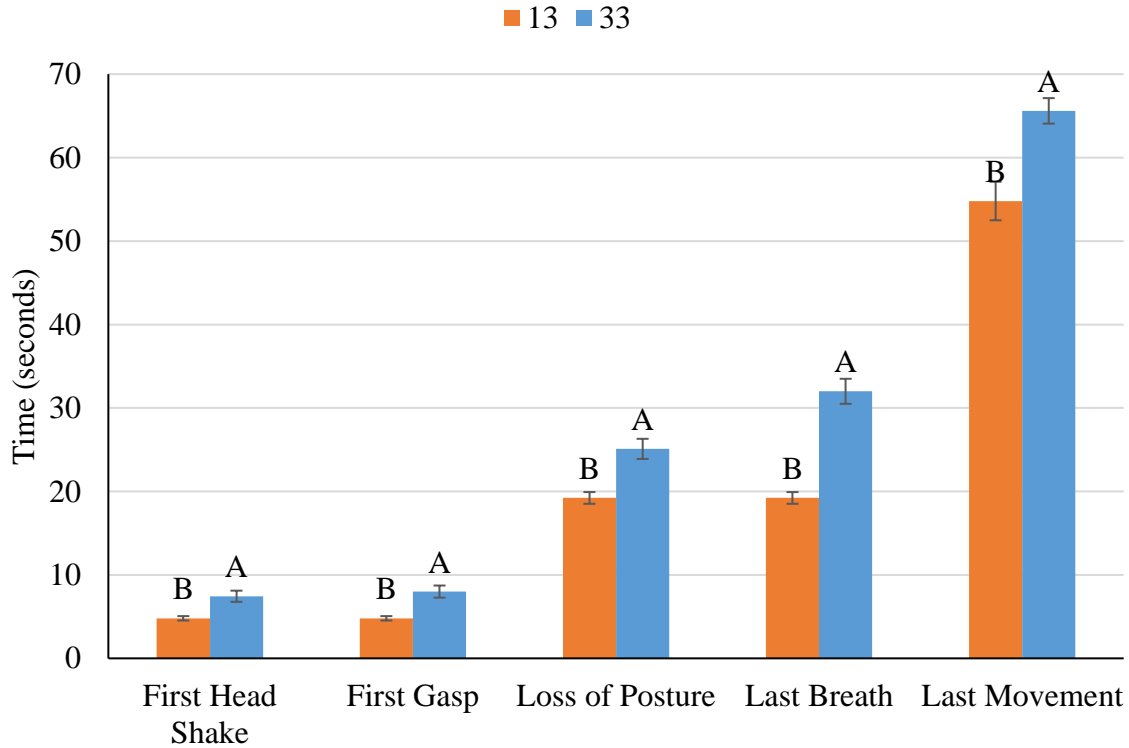
*Adapted from Baker, B. I., S. Torrey, T. M. Widowski, P. V. Turner, T. D. Knezacek, J. Nicholds, T. G. Crowe, and K. Schwean-Lardner. 2019. Evaluation of carbon dioxide induction methods for the euthanasia of day-old cull broiler chicks. *Poultry Science*. 98:2043-2053.

Statistics

The raw data (in Table 2) was analyzed in JMP Pro (v. 14). First, the data was confirmed to have a normal distribution. The statistical model included the main effect of age on the times to head shaking, gasping, loss of posture, cessation of rhythmic breathing, and cessation of movement. A model was run on each age group to determine if body weight had an effect on the behavior time measures and no effect was found.

Results

The results from the statistical model are in the bar chart shown in Graph 1. The orange bars indicate the times of each behavioral event for 13 day old birds and the blue bars indicate these times for 33 day old birds. The letters above each bar indicate the differences in the times to each behavior event for the 2 ages of birds. There were age differences for all of the behaviors, as indicated by the different letters above the bars. The letter “A” above a bar indicates the longer time and “B” above each bar indicates the shorter time. The black lines on each bar represent the standard error, which is the statistical accuracy of the estimated average.



Graph 1: Euthanasia Behavior Results. The observed average latency (time in seconds) to each observed behavioral measure exhibited during death.

The summary statistics are in Tables 3 – 5 on pages 9 - 10.

Below is a summary of the results from statistical model analysis. The P-value is the probability of obtaining the same results of this test in another test, where $P > 0.05$ is not likely, $P < 0.05$ is likely, $P < 0.01$ is very likely, and $P < 0.001$ is extremely likely.

- 100% of the birds were immediately confirmed as dead after the euthanasia cycle ended, as they did not exhibit any signs of the nictitating membrane reflex.
- For birds of the same age, body weight did not affect the efficacy of euthanasia as observed by behavioral indicators.
- The differences in the average latency behaviors of 13 and 33 day old turkey hens during euthanasia are described below (N = number of birds observed).
 - First head shake (N = 18)
 - Time to first head shake was 2.64 seconds shorter for 13 day old hens than 33 day old hens ($P < 0.001$).
 - First gasp (N = 18)
 - Time to first gasp was 3.2 seconds shorter for 13 day old hens than 33 day old hens ($P < 0.001$).
 - Loss of posture (N = 19)
 - Time to loss of posture was 5.88 seconds shorter for 13 day old hens than 33 day old hens ($P < .$).
 - Cessation of rhythmic breathing (N = 13)
 - Time to cessation of rhythmic breathing was 12.78 seconds shorter for 13 day old hens than 33 day old hens ($P < 0.001$).
 - Caution should be used when interpreting this result because this was only observed in the video for 13 out of the 20 birds.
 - Cessation of movement (N = 20)
 - Time to cessation of movement was 10.8 seconds shorter for 13 day old hens than 33 day old hens ($P < 0.0001$).
 - Defecation (N = 19)
 - 78% of the 13 day old birds defecated during death and 50% of 33 day old birds defecated during death.

Conclusions

- The Talon Poultry Euthanizing System[®] efficiently and effectively induced humane euthanasia for 100% of the 13 and 33 day old turkey hens tested with the 20 second CO₂ prefill, 120 second wait cycle.
- Younger turkey hens were euthanized faster than older turkey hens.
- The Talon Poultry Euthanizing System[®] is a valid, humane device for euthanasia of an individual, 13 to 33 day old turkey hen using the 20 second CO₂ prefill, 120 second wait cycle.

Supplements

Table 2. Raw Data

Bird	Age (days)	Body Weight (lbs)	Time In	Latency (s)					Defecate	Notes
				First Head Shake	First Gasp	Loss of Posture	Last Breath	Last Move		
1	33	3.15	10:10	9	8	30	NV	63	no	
2	33	3.60	10:16	7	6	27	NV	64	yes	
3	33	3.00	10:21	6	11	22	NV	75	no	
4	33	3.20	10:24	6	6	19	29	58	yes	
5	33	3.30	10:28	12	8	21	NV	66	no	pooped before gas
6	33	3.80	10:32	7	12	25	NV	70	yes	good video
7	33	3.10	10:36	8	8	27	NV	64	yes	
8	33	3.30	10:40	6	7	25	NV	63	no	
9	33	2.90	10:44	6	6	24	NV	63	yes	
10	33	3.40	10:48	NV	NV	31	35	70	no	sick
11	13	0.25	10:51	3	3	NV	NV	39	yes	
12	13	0.40	10:56	5	5	17	17	48	yes	pooped prior to insensibility
13	13	0.60	10:59	5	5	21	21	60	yes	pooped prior to insensibility
14	13	0.45	11:02	5	5	22	22	53	yes	pooped prior to gas
15	13	0.50	11:05	5	5	17	17	57	yes	poop prior to CO ₂ , vocal @ 0:33
16	13	0.40	11:09	5	5	20	20	55	yes	
17	13	0.35	11:12	5	5	19	19	66	no	
18	13	0.45	11:15	5	5	17	17	57	no	
19	13	0.50	11:18	6	6	18	18	59	NV	camera died, incomplete video
20	13	0.45	11:23	4	4	22	22	54	yes	

*NV indicates the behavior was not visible and was not included in statistical analysis.

Descriptive Statistics

Table 3. Age: 13 days

	Body Weight	Time to First Head Shake	Time to First Gasp	Time to Loss of Posture	Time to Last Breath	Time to Last Movement	Defecation During Death
Count	10	9	9	9	9	10	78%
Mean	0.44	4.80	4.80	19.22	19.22	54.80	
Minimum	0	3	3	17	17	39	
Maximum	1	6	6	22	22	66	
Median	0	5	5	19	19	56	
Standard Deviation	0.09	0.79	0.79	2.11	2.11	7.30	
Coefficient of Variance	21.71	16.43	16.43	10.97	10.97	13.32	
Standard Error	0.03	0.26	0.26	0.70	0.70	2.31	

Table 4. Age: 33 days

	Body Weight	Time to First Head Shake	Time to First Gasp	Time to Loss of Posture	Time to Last Breath	Time to Last Movement	Defecation During Death
Count	10	9	9	10	8	10	50%
Mean	3.28	7.44	8.00	25.10	32.00	65.60	
Minimum	2.90	6	6	19	29	58	
Maximum	3.80	12	12	31	35	75	
Median	3.25	7	8	25	32	64	
Standard Deviation	0.27	2.01	2.18	3.81	4.24	4.84	
Coefficient of Variance	8.31	26.96	27.24	15.19	13.26	7.37	
Standard Error	0.09	0.67	0.73	1.21	1.50	1.53	

Table 5. Age: 33 and 13 days

	Body Weight	Time to First Head Shake	Time to First Gasp	Time to Loss of Posture	Time to Last Breath	Time to Last Movement	Defecation During Death
Count	20	18	18	19	17	20	63%
Mean	1.86	6.05	6.32	22.32	21.55	60.20	
Minimum	0.25	3	3	17	17	39	
Maximum	4	12	12	31	35	75	
Median	1.75	6.0	6.0	22.0	20.0	61.5	
Standard Deviation	1.47	1.99	2.26	4.28	5.66	8.19	
Coefficient of Variance	79.26	32.80	35.82	19.19	26.29	13.60	
Standard Error	0.33	0.47	0.53	0.98	1.37	1.83	