

How to assess the state of consciousness in turkeys (waterbath stunning)



Introduction

- ✔ Waterbath Stunning (WBS) is intended to induce unconsciousness until death that occurs due to bleeding.
- ✔ It is required to monitor that turkeys are unconscious at the exit of the WBS and do not regain consciousness before death. Hence, turkeys that show indicators of consciousness should be re-stunned using back-up methods to avoid them unnecessary pain, distress and suffering.
- ✔ This factsheet contains:
 1. The method for the assessment of the state of consciousness after WBS
 2. The most relevant Animal-Based Indicators (ABIs).
 3. The method for sample size calculation.



Method for the assessment

- ✔ **Place for the assessment:** At two different stages (Figure 1)
 - **Stage 1:** From the exit of the WBS and before bleeding to assess the effective stunning.
 - **Stage 2:** During bleeding, to assess that unconscious turkeys do not recover consciousness before death.

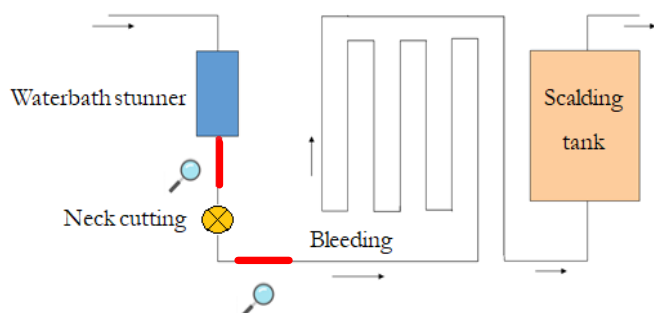


Figure 1. Places for the assessment. The red segments are the observation area.

✔ Sampling procedure and recommended ABIs:

Stage 1:

- Follow visually individual turkeys during 2-3 s (according to the possibilities in the plant).
- Assess the two ABIs of the state of consciousness listed in Table 1 and shown on videos linked to QR codes in Figure 2.
- Record the outcome of the ABIs for every turkey assessed.

Stage 2:

- Place at a distance from neck cutting where you might detect turkeys that begin to show outcomes of consciousness (e.g., approx. 10s after carotids section).
- Then, visually follow animals individually during 6-8 s.
- Assess the ABIs of the state of consciousness listed in Table 1 and shown on videos linked to QR codes in Figure 2.
- Record the outcome of the ABIs for every turkey assessed.

Breathing



Wing flapping

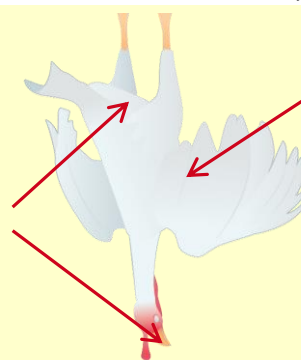


Figure 2. Relevant ABIs of consciousness. Red arrows indicate where to put the attention on the turkey's body. Videos linked to QR codes.



Although less prevalent and less repeatable between observers, presence of vocalizations in stage 1 and presence of head shaking in stage 2 should not be neglected as ABIs of consciousness (see Table 1).

Any bird showing at least one outcome of consciousness should be considered as conscious or recovering consciousness.

- ✔ **Position:** if possible, check the birds in ventral position.

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Table 1. Animal-based indicators (ABIs) assessed and description of the outcomes of unconsciousness and consciousness in turkeys stunned with waterbath in both stages. Adapted from EFSA (2013).

Stage	ABI	Outcome of unconsciousness	Outcome of consciousness
1	Vocalizations	Absence of single or repeated short and loud shrieking (screaming) at high frequencies.	Single or repeated shrieking (screaming).
1 & 2	Breathing	Absence of movements of the beak or abdominal muscles around the cloaca associated to cessation of breathing.	Presence of either a minimum of two movements of the beak or abdominal muscles around the cloaca associated to breathing.
1 & 2	Wing flapping	Absence of flapping with both wings.	Flapping with both wings and should not be confused with rapid trembling of the entire body of the bird.
2	Head shaking	Bird does not shake its head from side to side.	Bird shakes its head from side to side to get rid of blood or water entering the nostrils.

Sample size calculation

Case 1. You want to assess the prevalence of turkeys in a flock with at least one outcome of consciousness. By determining *a priori* the expected prevalence and the relative precision you want to achieve, you can calculate the sample size.

Information needed:

1. Population size: total number of turkeys in the flock
2. Expected prevalence
3. Relative precision: the accuracy you want to achieve.
4. Confidence level: usually used at 95%

Example: you want to assess, in a flock of 5 000 turkeys, an expected prevalence of 1% with 30% relative precision (it means that the result will be something like $1 \pm 0.3\%$) and 95% confidence level.

According to the following table, you need to assess approx. 4 226 animals.

Precision, %	Expected prevalence, %									
	1	2	3	4	5	10	15	20	25	
10	38032	18824	12422	9220	7300	3458	2177	1537	1153	
20	9508	4706	3106	2305	1825	865	545	385	289	
30	4226	2092	1381	1025	812	385	242	171	129	
40	2377	1177	777	577	457	217	137	97	73	
50	1522	753	497	369	292	139	88	62	47	
60	1057	523	346	257	203	97	61	43	33	

Case 2. You want to detect if the prevalence in the flock is above or below a certain 'level'.

Information needed:

1. Population size: total number of turkeys in the flock
2. Prevalence threshold I want to detect
3. Confidence interval: usually used at 95%

Example: the number of birds in the flock is approx. 5 000 and you want to be able to determine if the prevalence in the flock is over 1% or not.

According to the following table, you need to assess 290 animals. If you detect no animals with outcome of consciousness among the 290 animals, it means that the prevalence in the flock is below 1%.

Threshold, %	Total number of birds in the flock					
	200	500	1 000	5 000	10 000	20 000
0.5	190	349	450	564	581	589
1	155	225	258	290	294	296
2	105	129	138	147	148	148
3	78	90	94	98	98	99
4	62	69	71	73	74	74
5	51	56	57	59	59	59
10	27	28	29	29	29	29



These examples assume sensitivity and specificity of indicators of 100%

Online calculation tool for both Case 1 and 2 is provided [here](#).