P-01-36

Are movements after captive bolt stunning of cattle a sign of regaining consciousness? (#635)

Karen von Holleben, Martin von Wenzlawowicz

bsi schwarzenbek, Training and Consultancy Institute for animal welfare at transport and slaughter, Schwarzenbek, Germany

Introduction

Although there is quite some literature on the indicators to assess unconsciousness after captive bolt stunning, correct interpretation especially of movements directly after stunning, during shackling and hoisting and during bleeding may be difficult in practice. Successful captive bolt stunning leads to immediate collapse and onset of apnoea (absence of breathing), followed by a tonic seizure, which can be recognised from the occurrence of arched back and legs flexed under the body. In the course of the slaughter process cattle are usually shackled and hoisted at this point and subsequent movements will be affected thereby (e.g. arching to the shackled side or kicking of the opposite hind leg during hoisting). After the tonic phase vigorous kicking is possible, especially in black holstein cattle. This may even impede shackling and for working safety reasons cattle in this case have to be stuck on the landing roast before shackling not to exceed the maximum permitted stun to stick interval of 60 seconds. With regard to stunning effectiveness it is important to draw the line between movements caused by the stunning intervention and subsequent process itself and those, indicating that consciousness is not yet lost or may be regained. This difference may not be evident, especially if hoisting happens early. Welfare relevant movements can more easily be distinguished if the seizure is over and loss of muscle tone, e.g. relaxed jaw, protruding tongue and limp tail and legs are predominant in well stunned cattle. Movements described in the case of ineffectively stunned cattle are breathing movements (e.g. at nostrils or lips) but also vigorous kicking, especially of the hind legs, head righting and body arching during bleeding. The aim of this study was to describe movements after shackling and hoisting in relation to signs of consciousness, features of the animals and the slaughter process.

Methods

In total 270 bulls cows and heifers of different breeds, mostly black (63%) and red holstein (14%), brown swiss (8%), limousin (7%) and crossbreeds (8%) were stunned in a German slaughter plant during routine slaughter using a restraining box with head restraint (Allkon, 36396 Steinau an der Straße, D). 36% of the bulls and 79% of the females were black holstein. Average lifeweight was 598,6 (325 – 897) kg. Cattle were stunned by cartridge fired captive bolt guns (Schermer, 76275 Ettlingen, D, KR type for bulls and KS type for female cattle, both red cartridges) at a speed of 55/ hour. Average stun-to-stick interval (chest stick) except for those bled on the landing roast, was 38 seconds (medium 50%-quantile: 33-39s, range: 30 - 66s). We recorded stunning effectiveness (effective / doubtful / not effective) in the stunning pen, on the landing roast and during bleeding, second shots and bleeding effectiveness and also examined the position and angle of the captive bolt hole in the skull by introducing a plastic stick at the end of bleeding. During hoisting and bleeding we recorded the following categories of moments as well as frequency and duration:

1. Tonic seizure: arched back and legs flexed under the body
2. Body arched ventrally
3. Body arched to the side
4. Twitching/struggling: all limbs move uncontrolled and asynchronous
5. Kicking (vigorous & repeated) of one or both front leg(s)
6. Kicking (vigorous & repeated) of the free hind leg
7. Fore leg(s) bending (rolling inwards)
8. Lifting of the free hind leg

Results

More than half of the cattle showed movements during hoisting and bleeding (55%, bulls: 61%, females: 51%, see table 1 and figure 1).

Different types of movements were recorded in bulls and females. 24% of the suspended bulls showed body-arching to the side over 10 to 30 seconds sometimes together with kicking, 8% showed ventral body-arching. Kicking of the free hind leg or bending of the forelegs were seen in 17% of the bulls. Movements recorded for female cattle were mainly tonic seizure (9%) up to 60 s after stunning and also ventral body-arching (12%), 1 to 3 times. All female cattle showing tonic seizure as well as any limb movements except twitching (in total 18%) were black holstein.

None of the cattle was ineffectively stunned. During bleeding for 6 animals (1 bull and 5 females) stunning effectiveness was evaluated "doubtful" due to 1 to 4 breathing movements (nostrils), of which 3 received a second shot for safety reasons. No deviation could be found for these animals regarding positon and angle of the shot. No correlation was found between occurrence or type of movement and stunning effectiveness, evaluated by brainstem reflexes or breathing movements.

Conclusion

After captive bolt stunning leg- and body movements usually occur in sufficiently stunned cattle, especially in black holstein breeds. Some movements are even indicative for the stunning effect, e.g. tonic seizure. Early hoisting in modern plants will enhance movements caused by reflexes. Different types of movements occur in female cattle and in bulls. Stunning effectiveness cannot be evaluated only by looking at movements. Signs of brainstem activity, e.g. breathing, eye reflexes or spontanous eye movements have to be taken into account.

Notes

Type of movement	Bulls			Females		
	n (%)	∅ lifeweight	% black holstein	n (%)	∅ lifeweight	% black holstein
Tonic seizure [1]	2 (2%)	649,0 kg	**100%**	15 **(9%)**	551,9 kg	**100%**
Body arched ventral [2]	8 **(8%)**	598,4 kg	43%	21 **(12%)**	564,8 kg	71%
Body arched to the side [3]	24 **(24%)**	633,6 kg	54%	10 (6%)	541,0 kg	70%
Twitching/ struggling [4]	5 (5%)	637,8 kg	60%	9 (5%)	550,9 kg	33%
Kicking forelegs [5]	1 (1%)	630,0 kg	0%	9 (5%)	579,2 kg	**100%**
Kicking free hind leg [6]	7 (7%)	664,9 kg	43%	13 (8%)	610,9 kg	**100%**
Foreleg(s) bending [7]	10 (10%)	648,5 kg	30%	7 (4%)	609,1 kg	**100%**
Lifting free hind leg [8]	4 (4%)	696,0 kg	25%	2 (1%)	512,0 kg	**100%**

Table 1:
Percentage of cattle showing the movement-type, average lifeweight and percentage of black holstein for the cattle showing this movement-type, bulls and females respectively

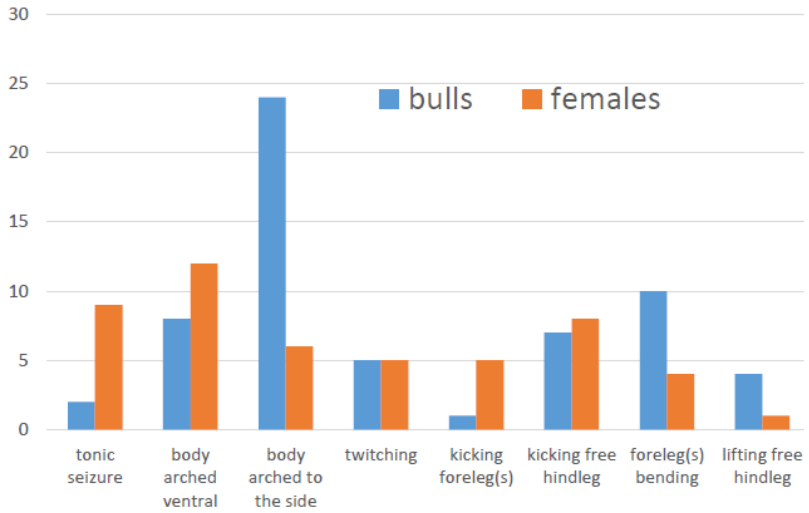

Figure 1:
Frequency of movements during hoisting and bleeding (n= 270)

Notes