Observation of Certain Parameters with Animal Welfare Consequences During the Implementation of Shechita

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ABSTRACT

In Israel around 330,000 ruminants are yearly slaughtered without stunning and according to Jewish and Islamic religious requirements. The slaughters of animals may implicate a lack of standardization of some parameters which categorically have animal welfare relevance. In this survey, some parameters linked with animal welfare aspects have been monitored during the slaughtering of 125 bovines in a slaughter plant in Israel, in which only shechita, without prior stunning, was performed. Despite parameters like bellowing, struggling of animal, use of prod, time restrain to cut, quality of cut were found in line with animal welfare best practices. Notwithstanding the authors still found room for improvement relative to the number of cutting motions, severing of both carotids, unconsciousness evaluation, readiness of back-up measures in case of failures or complications. Therefore we propose that appropriate corrective/back-up measures should be introduced in current Israeli regulations and routinely implemented at the slaughter point.

Keywords: Bovine; Slaughter; Shechita, Welfare; Unconsciousness; Regulations.

INTRODUCTION

In Israel, on yearly basis, around 520,000 animals are slaughtered for food production, of which 141,000 bovines, 186,000 small ruminants and 190,000 pigs. Considering 74.8% Jewish and 20.8% Muslim populations (1), the demand by 95.6% of population is for (poultry and) ruminant meat, only slaughtered without stunning and according to Jewish and Islamic religious requirements (2). This kind of slaughter is regulated by the EU legislation under the definition of "*religious slaughter*" (3), on the basis of freedom of religion, according to Article 10 of the Charter of Fundamental Rights of the European Union (4). Also the USA regulations, in the framework of freedom of religion as granted by the Constitution, specifically allow *"slaughtering in accordance with the ritual requirements of the Jewish faith……."* (5) all over the country. The main difference between EU and USA legislation is that EU leaves *"…however, a certain level of subsidiarity to each Member State…"* (3-*whereas* 18); which concept is in practice translated into prohibition of religious slaughter (without stunning) in some EU and EFTA (European Free Trade Area) countries (6). The above mentioned pigs, mainly raised for consumption by Israeli Christian and other minorities are not included in Jewish and Muslim diet, therefore they are slaughtered following prior (electrical) stunning.

Recently, data from a survey (BoRest Report) (6) performed in 6 European countries relative to the evaluation of certain parameters during the implementation of shechita of 331 bovines, has been released to the public (6). Following the publication of these data, we decided to replicate the study performed in Europe in one of the largest slaughterhouse in Israel, in which approximately 40,000 bovines are slaughtered per year (7), 28% of total bovine slaughtered in Israel. In order to facilitate the appraisal of this paper, we thrived to use the same definitions as in the BoRest report mentioned above (6).

MATERIAL AND METHODS

Plant

A ruminant only slaughterhouse, located in the North Region of Israel with a daily capacity of 270 bovines (30/hour) or 700 sheep and goats day (90/hour). The yearly capacity is around 40,000 bovines and 15,000 sheep and goats. In the plant, only Jewish slaughter (shechita) is performed, with both bovines and small ruminants held in a rotating restraint inverted position. The plant is nevertheless equipped with a captive bold pistol, to be used in particular situations according to the judgement of the Chief Veterinary Inspector of the plant (e.g. downed animal).

Restraining pen

The device used for restraint is from Norman (ZI R.de Pommiers, 61120 Vimoutiers – France), installed in the year 2005, provided with rear pusher, lateral pusher, neck/head yoke and chin-lift/restraint device (Figure 1).

Animals

The shechita of 125 animals was studies, during 4 non-consecutive working days (March 1st; March 7th, April 3rd, August 16th 2016) and operated by five different slaughterers not previously informed about the observations.

Slaughterers

The slaughtering by five different slaughterers was observed; number of animals slaughtered per each "*shochet*" (religious slaughterer) ranged from 7 to 42, (average 25). All the shochatim (slaughters) used standard shechita knives for adult bovines, 42 cm length (at least *twice the width* of the neck) (8). Knives were compulsory (9) and routinely checked and wet-stone sharpened after each slaughter, before the next slaughter (9).

Observed parameters

The parameters considered included:

Weight: Live weight of animals at entrance to restraint pen.

Use of a prod: Number of times and animals urged with electric prod from lairage to the pen.

Bellowing: Number of bellows and number of animals bellowing in total.

Struggling: As considered in the BoRest report (6), we followed movements involving the whole body; kicking; mounting the front opening in order to attempt to escape the pen; movements finalized as an intention to escape (6); walking backwards attempting to escape the pen. The number of struggling animals was enumerated.

Time from head restraint to cut: Time between start of head restrain (from when the chin-lifter starts lifting the jaw and pushing the head towards the neck-hold) to the cut operated by the shochet. This time limit includes the rotation time of the pen, due to the fact that head restraint starts together with the rotation of the pen.

Number of cut moves: Number of moves back and forth carried out by the shochet during the cutting. A single move back and/or move forth was counted separately.

Severing of Carotid arteries: Number of Carotid arteries cut for each animal.

Time from cut to tongue prolapse: Time from end of the cut carried out by the shochet and tongue prolapse.

Carotids occlusion: Number of Carotid arteries which occluded after the cut (so called false aneurism) (10) and number of animals in which occlusion occurred. During the trial, after the dressing of the animal, we noted some carotids occluded in a stage later than slaughtering point: observations of these findings are separately recorded.

Blood in trachea: Indication of blood inspiration (11); presence of blood lines, blood clots and blood foam in the trachea. In a few cases the trachea had been cut to ascertain or exclude presence.

Cut position, from Cricoid cartilage, in centimeters: Measured in cm from the caudal edge of Cricoid cartilage, to the point of the cut. The purpose of this observation was to establish if a connection existed between the position of the cut (so called "*high cut*" or "*low cut*") and insurgence of Carotids occlusion (10, 12).

Statistical analysis

Data was collected into Excel data file. Measured variables are presented as means and standard deviations, minimum and maximum values. Nonparametric tests (Mann-Whitney, Kruskal-Wallis) were used to evaluate and compare categorical variables. Pearson Correlation was used to evaluate correlation between continuous variables. All analyses were performed with Excel and SPSS-IBM Company Statistics for Windows, 22.0 software (Armonk, NY, USA; IBM Corp. USA).

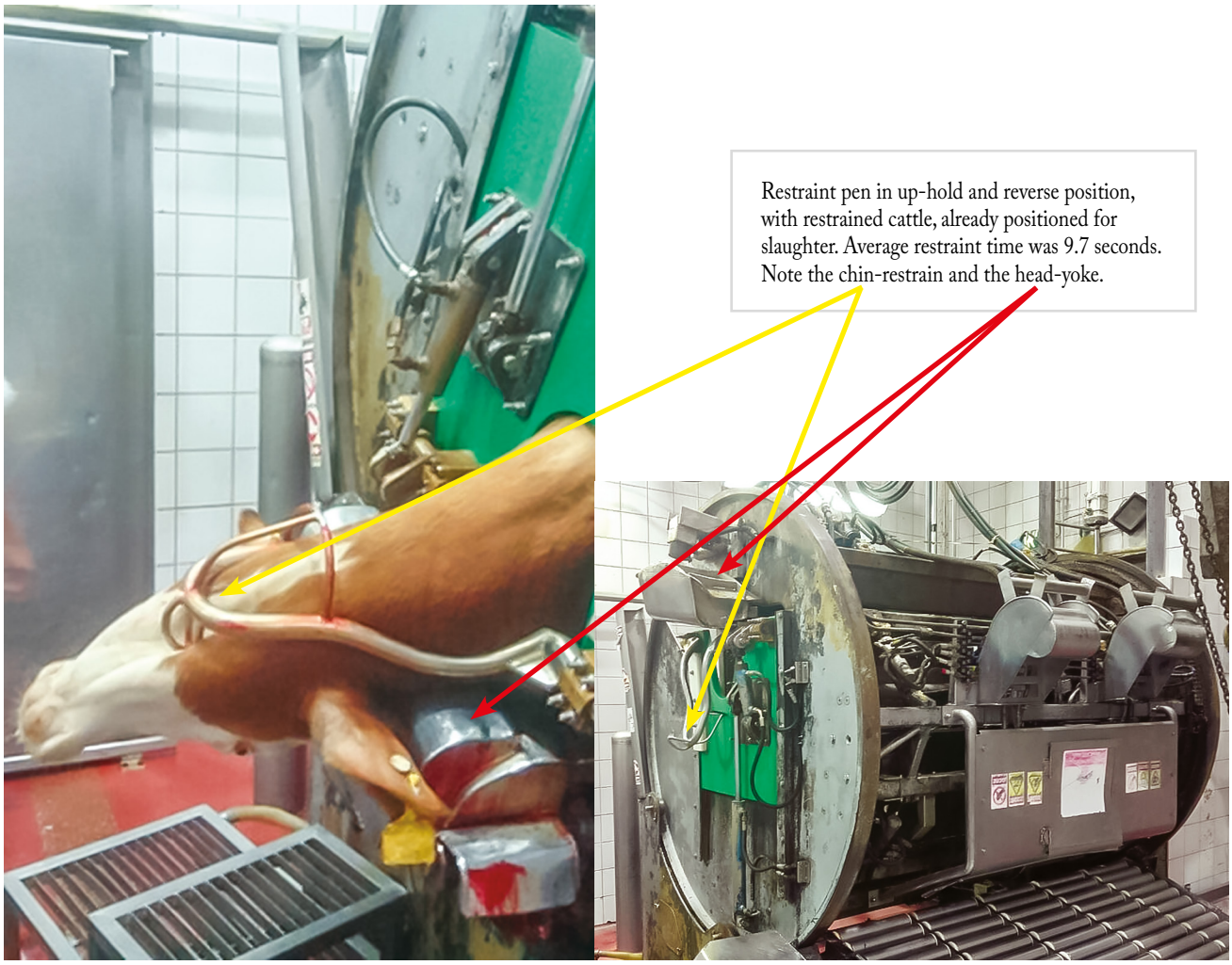

Figure 1: restrain pen; it is a reverse restraint pen, provided with neck-yoke and chin-lift and restraint

RESULTS AND DISCUSSION

The original observation group consisted of 126 animals; one had to be excluded due to the fact it was necessary to stun it, with a captive bold pistol, due to the fact it got stuck in the pen. Therefore the survey was carried on 125 animals.

The results of the survey are summarized in Table 1 below.

The weight of bovines ranged 360 to 760 kg, (average 548 kg); cattle breeds included in the survey were mixed-Brama (import from Australia); mixed-Charolais (local, cow-calf line); mixed-Charolais-Brava and mixed-Brava (import from Portugal); 105 males; 20 females.

Use of a prod

There was no use whatsoever of prodding. In the facility, electric prods are not available to workers; prods are under the custody of the Chief Veterinary Inspector and used only under his direct control and authorization. Animals were channeled to the slaughter point through the use of "cattle talker". It should be emphasized that in all the slaughter-houses in Israel, close-circuit cameras have been installed, according to Israeli Veterinary Services Procedures (13), for which all the operations linked with livestock such as un-loading from trucks, lairage activities, moving animals to the slaughter point are monitored, registered, randomly inspected by the Veterinary Inspector of the slaughterhouse and by the Animal Welfare Inspectors of the Veterinary services (13). A retrospective check of close-video cameras also confirmed that no use of prods was carried out. Results were therefore in agreement, and even below, the acceptable level recom-mended to maintain an adequate level of animal welfare (14).

Table 1: Summary of results obtained during the observation of 125 ritual slaughters

Measured Parameters	Results	Min	Max	Notes
Average weight, kg	546.1± 12.3	360	760	
Prod use	0			number of animals prodded
Bellow	7 (5.6%)			number of animals bellowing
Struggle	6 (4.8%)			number of animals struggling
Time from head restraint to cut, seconds	9.7 ± 4	3	35	
Number of cut moves	2.9 ± 0.8	1.5	5	
Severing of both Carotid arteries	246 Carotids in 122 animals			98.4% Carotid arteries were cut in 97.6% of animals
Time from cut to tongue prolapse, seconds	31.4 ± 7.2	13	58	prolapse in 115 animals; 92% late prolapse in 9 animals; 7.2% no prolapse in 1 animal; 0.8%
Time head restraint to release, seconds	41	18	76	
Carotid arteries occlusion	34 Carotids in 28 animals			13.6% of Carotids occluded in 22.4% of animals
Late Carotid arteries occlusion	11 Carotids in 10 animals			8% of Carotids occluded late in 8% of animals;
Blood in trachea	14 cases			in 11.2% of animals
Cut position, from Cricoid cartilage, cm	9.4	3	15	

Table 2: Restraint-to-cut time interval distribution between shochatim, in seconds.

Shochet	Observations	Min. seconds	Max. seconds	Mean	Std. Dev
A	31	3.5	21.0	8.929	2.85
B	42	7.5	23.0	10.78	3.30
C	24	3.0	15.0	7.27	2.73
D	21	4.9	35.0	11.46	6.37
H	7	6.0	15.8	8.87	3.39

A significant difference was observed between shochatim (Kruskal-Wallis, p<0.001).

Bellowing and struggling

Seven (5.6%) of animals bellowed once, when columned to the slaughter point. Six (4.8%) of animals "struggled" or clearly behaved violently entering the pen. These were four mixed-Brama males, one Charrolais male and one mixed-Charolais female. For the struggling animals, procedures applied in the plant were to wait until the animals calmed down and/or got out with the head from front opening of the pen. At that time, rear and lateral restrains started operating: chin lift started pushing and restraining the head against the back-head bracket. The number of bellowing and/or struggling animals was in agreement with the acceptable level recommended to maintain an adequate rank of animal welfare (14).

Time interval between head restraint and cut

The time interval between head restraint-to-cut was 9.7 seconds (Min. 3 seconds; Max. 35 seconds). Differences could be observed in head restraint-to-cut time between slaughters (Table 2).

Veterinary Services Procedures (13) requires that animals be introduced into the pen and restrained, only once the shochet is fully ready to cut, in order to avoid a longer than necessary restraint which could induce unnecessary stress to the animal (15,16). Minimizing the time the animal is held tightly by the head holder and implementing shechita within 10 seconds after the head is restrained is considered an adequate level of animal welfare (17).

Cutting within 10 seconds from head restraint was achieved in 96 out of 125 animals (76.8%). The average time from head restrain to cutting in struggling and/or bellowing animals was not statistically significantly different, i.e. 11.7±4.5 seconds, versus 9.4±0.3 seconds among the non-distressed group (Mann-Whitney test, p=0.74).

Number of cutting moves

The average number of moves back and forth carried out by the shochet during the cut was 2.9 (Std. Dev 0.8; min 1.5; Max 5.0), every movement back and/or forward was counted separately. There were no statistical differences in cutting-moves between the distressed and non-distressed (bellowing, struggling) animals. Differences in number of cut moves could be observed between shochatim, and these are illustrated in Figure 2 below and for each shochet.

There was a significant difference between shochatim (slaughterers) relative to number of cut moves (Kruskal-Wallis, p< 0.001)

Severing of both Carotid arteries

97.6% of animals had both Carotid arteries severed, and 98.4% of all Carotid vessels were severed. In 3 animals (2.4%) only one Carotid artery was severed.

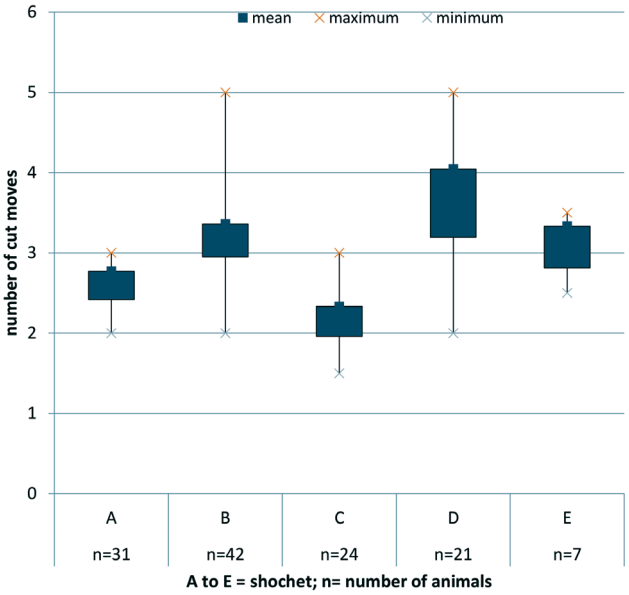

Figure 2: Average cutting moves for each shochet

Time from cut to tongue prolapse

Tongue prolapse was observed in 124 animals (97.6%) occurring on average 31.4±1.4 seconds after the cut (Min. 13 seconds; Max. 58 seconds). There were no significant differences between shochatim (Kruskal-Wallis, p=0.143); and between breeds of animals (Kruskal-Wallis, p=0.06) nor relative to the weight of the animals (Pearson Correlation = -0.03; p = 0.715). In 9 animals (7.2%) a late tongue prolapse was observed: these animals released the tongue only after the release of the head from chin lift. Average time to late tongue prolapse in these last animals was 55 seconds (Min. 34 seconds; Max. 107 seconds). One animal did not show tongue prolapse at all. Among the others, relaxed jaws with a protruding tongue may be considered a sign of loss of consciousness (18) both in stunned and non-stunned animals, while the opposite (retraction of tongue into the mouth) is considered conscious or at least ineffective stunning (18). The inverted position restraining pen does not allow in general to check loss of muscle tone (18) apart from jaw muscles tone with a protruding tongue. Cessation of breathing and absence of corneal reflex were considered after release from restraint and before shackling.

Time from head restraint to release

The total time of restraint of the animals, from head restraint to release from the pen was 41 seconds (Min. 18 seconds; Max 76 seconds). The slaughterhouse plant considers two possibilities: animal released around 30 seconds after cutting, or animals released after tongue prolapse. This may explain the exceptionally short release time in some animals (18 seconds) due to early tongue prolapse. Taking into account an average "time cut to tongue prolapse" of 30.74 seconds (± 7.20 seconds), it appears that an automatic release from restraint around 30 seconds from cut (13) is definitely too early and this release should be delayed of further 10 seconds at least. As alternative, regardless of any pre-fixed time limit, release should be operated after actual "tongue prolapse" only. An extended observation time before releasing the animals from restraint, after slaughter without prior stunning, is also recommended by European Food Safety Agency (EFSA) (18). In this scenario, a release from restraint only after cessation of rhythmic breathing, or breathing in general, should be considered (18).

Late prolapse was considered when animals released the tongue only after the release of the head from chin lift, and it was observed in 9 animals (7.2%). A possible explanation is that pressure exerted by chin-lift on the jaw in these animals did not allow the mouth to open enough to allow tongue release. When shechita is performed in the rotating restraint, with the full body still inside the pen and head restrained by the chin-lift, tongue prolapse represents almost the single visible sign of loss of consciousness. Other signs, like loss of posture, cannot be determined in animals that are severely restrained and/or rotated (18), while the corneal reflex in reverted position is difficult or often impossible to evaluate, due to blood-splash. It is to be underlined that in this plant eye blinking/corneal reflex are routinely examined after the release from the restraint pen on the bleeding chute, before shackling the animals (13).

Thirty four out of 250 (13.6%) Carotid arteries were occluded (Figure 3) after cutting in 28 animals (22.4%). These occlusions were observed before the release of the animals from the restraint pen.

Carotid arteries occlusion occurs after slaughter when the severed carotid artery retracts within its surrounding connective tissue sheath and occludes (10, 19). It has been already described (10), in extremely variable percentages (1% to 30%) at slaughter without previous stunning, and apparently in connection with:

a) Cut position (high cut or low cut, with respect to jaw-bone) (12, 20) or

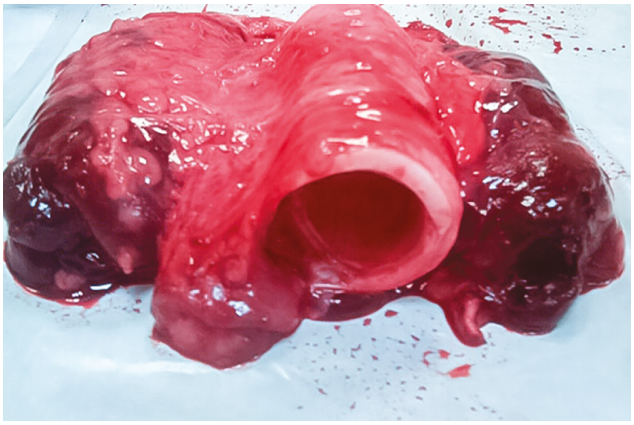

Figure 3: (Bilateral) Carotid arteries occlusion alongside the trachea.

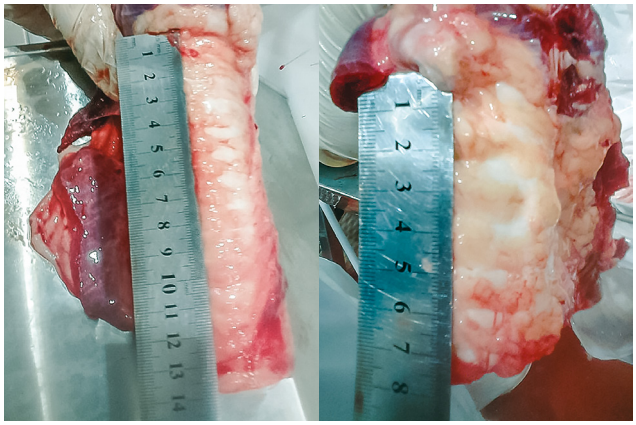

Figure 4: Measuring of cutting position, starting from Cricoid cartilage

b) Quicker or slower cut-stroke (19) operated by the shochet during the cut.

Relative to "high" or "low" cut with respect to jawbone, in this survey we considered by measuring the height of the cut in the trachea, in centimeters, starting from the ventral edge of Cricoid cartilage (Figure 4). Only cuts below the Cricoid cartilage are considered valid in shechita (21). Just before performing the cut, the shochet identifies the Cricoid cartilage through palpation, and then he slaughters below it. For operational constraints due to speed of the dressing line, we were able to follow and analyze the characteristics of 21 cases of Carotid arteries occlusion (out of 34) in 92 animals only (out of 125), with respect to cut position along the trachea.

Results are summarized in Table 3 below.

There was no statistical difference in cut position with respect to occurrence of Carotid arteries occlusion (Mann-Whitney, p=0.36),

Relative to "quick" or "slow" stroke we analyzed the number of cut moves necessary to complete the shechita, rather than the speed of the cut itself which is almost impossible to measure. The authors' assumption was that a quicker cut requires less cut moves forward and back in order to complete the cut. This most probably implicates an extremely sharper knife than in cuts with high number of cut moves. A quick stroke is also likely to induce less movements forward and backwards of tissues involved in the cut, and therefore allows less stretch to the arteries' elastic tunic, where stretch to arteries is considered inducing retraction, collapse of elastic tunic and then occlusion (19).

As a final result, there was no statistical difference between number of cut-moves with respect to occurrence of Carotid occlusions (χ^2, p=0.497). Despite no statistical difference, we observed a positive correlation in the occurrence of Carotid occlusion with increasing number of cut-moves. The lack of statistical significance may be explained by the relatively low number of Carotid occlusions for each category of cut-moves. Results are represented in Figure 5.

Implications for Carotid occlusion or *ballooning* are controversial:

1: It is considered a potential risk for prolonged consciousness (18, 22, 23), so that if signs of carotid ballooning are seen, or if bleed-out is slow, then appropriate intervention should be applied (18);

2: It is disputed that the residual cerebral blood flow (via the Vertebral arteries), after the cut of both Carotids, may be enough to keep cortical grey matter active (24, 25, 26).

Table 3: Occurrence of 21 Carotid arteries occlusion cases, with respect of cut position from Cricoid cartilage, in centimeters; 92 observations.

Occlusion	Observations	Cut Position, cm	Std. Dev.
No	71	9.320	2.64
Yes	21	9.762	2.60

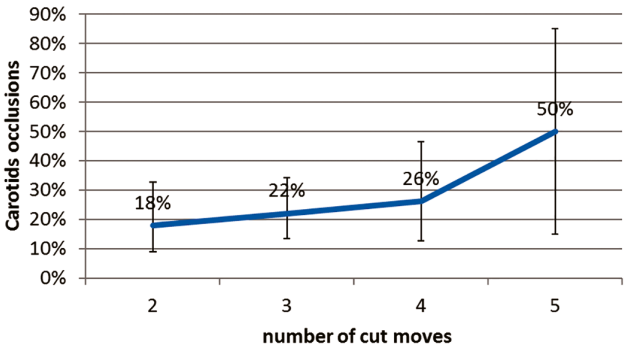

Figure 5: Percentage distribution of Carotid arteries occlusions with respect to number of cut moves: 125 observations; 34 occlusions.

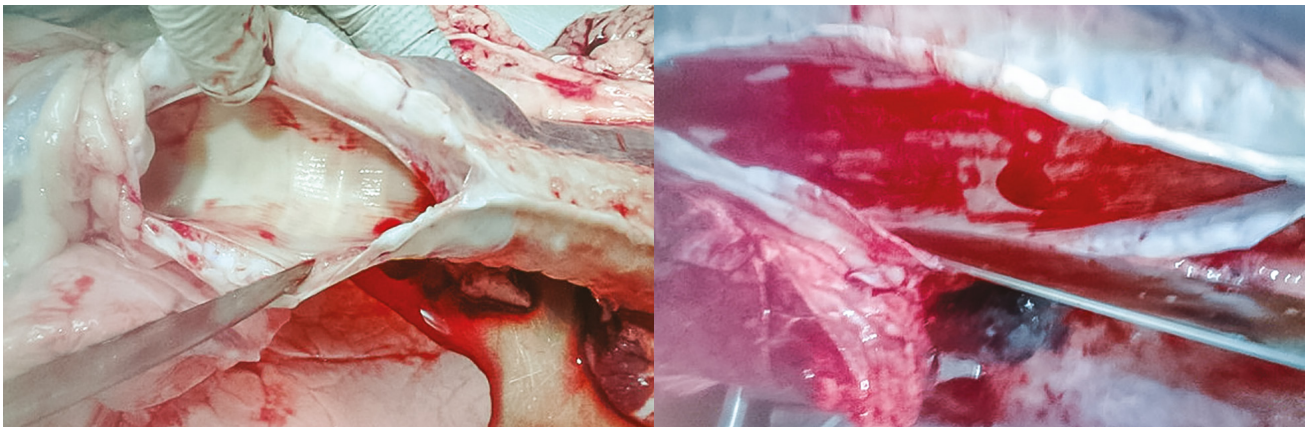

Figure 6: Blood in trachea

Accidents during routine husbandry procedures in cattle, with pressure on the Carotid arteries (which can be considered equivalent to clamping\occlusion), can kill cattle within 30 seconds (19).

Carotid arteries late occlusion

When checking the animals along the dressing line, a further 10 animals (8%) revealed Carotid arteries occlusions, which were not noted at the slaughter point. Considering that two veterinarians were constantly present at the slaughter point, with the purpose of collecting data for this work, a relatively high number of missed observations at the slaughter point should be excluded and late insurgence of occlusion should be considered, probably after hanging the animals and due to mechanical obstruction resulting in blood clotting.

Blood in trachea

Blood in the trachea was observed in 14 (11.2%) of the animals (Figure 6).

Blood inspiration in the respiratory tract has been demonstrated, with different frequencies, both in stunned-then sticked animals and not stunned animals (shechita/halal) animals (11) when slaughtered in an up-right position. Other authors do not consider the possibility of blood inspiration in up-right position slaughter (19). Blood inspiration into the respiratory tract when animals are slaughtered without previous stunning is considered an animal welfare concern, in the case of prolonged sensibility, due to irritation (11, 19). Therefore, considering the upper respiratory tract innervation by the Vagus nerve and its ramifications, and considering their course and position along the neck, some authors (22, 23) suggested that a high cut will likely severe both the Laryngeal nerves (sensory signals from the upper respiratory tract) and the Vagus nerves (signals from the lungs and lower trachea) when the neck is cut in this position, with diminution or elimination of painful stimuli from the respiratory tract, in case of blood inspiration (22, 23). On the other hand, considering a drastic fall in blood pressure to the central nervous system (CNS) reached between 0.3 to 2.4 seconds (24, 25), when both carotids are severed, with a redistribution of residual cerebral blood-flow away from cortical grey matter, aimed to preserve vital functions at lower levels of CNS (26), with a consequent quick unconsciousness state, the sensation of pain induced by blood inspiration is disputed.

CONCLUSIONS

Observing 50 to 100 animals is considered adequate to evaluate the standard performances of a plant in which slaughter without stunning is performed (27).

No use of electric prod is considered a high standard level (14, 16). Bellowing around 5% may be considered a good standard level (14, 16); rotation itself does is not considered a cause of bellowing (16), rather of struggling if persistence for a long time (more than 90 seconds) (15,16).

Performing slaughter within 10 seconds after restraint is considered as a high standard (14, 17, 18); it is opinion of the authors that this time limit should be intended for every single animal, much more than as an "average" result. In this observation, 29 animals out of 125 (23.2%) had a higher restrain-to-cut interval; this percentage should be drastically reduced by investigating the reasons of such longer restrain-to-cut time and, where technically possible, implement the changes to reduce this time interval.

A "minimal sawing motions" (cut moves forward and back) is among the recommendations for minimizing the interval between cut and loss of consciousness (17). Number of cutting moves registered in this trial is similar to data from shechita (1.8 – 4.7 cutting moves) collected in SANCO Study BoRest (6).

Cutting of both Carotid arteries: from an animal welfare perspective the best cutting method is a cut that severs both Carotid arteries (18). This study registered 2.4% failures with respect to number of animals, with 1.2% uncut Carotid arteries. A previous study (10) indicated a 6% failure in Carotid cut during shechita or halal slaughter; SANCO Study BoRest (6) reports a 5% failures (% of animals with either only one, or no Carotid cut) in inverted restraint.

In a shechita-like experiment (28), even if conduced with an already controverted design-study (16), ventral-neck tissues incision induced noxious sensory inputs when Carotid arteries were *not yet* severed. Neck-tissue transection without interruption of blood supply to the brain evoked a cerebrocortical response distinct from that of blood-vessel transection alone.

The collapse in the arterial blood pressure after the cut of both Carotid arteries causes a dramatic fall in cerebral perfusion. The cerebral cortex is particularly sensitive to this drastic fall and consciousness is lost rapidly (within approximately two seconds) and irreversibly (25). A reduced number of cuts and\or quicker strokes, with a quick cut of both Carotid arteries, would therefore represent the best practice when performing shechita.

Failure of both Carotid arteries to be severed will lead to poor welfare due to prolonged sensibility of the animal to the cut; therefore monitoring of Carotids cut in all of animals slaughtered without stunning is required (18). In the plant considered in this study, corrective measures are in place, in case of failure to cut both Carotids, consisting in an immediate quick cut of the uncut artery. It should be considered that in most of the cases the cut would not be performed by the shochet himself (17), due to halachic implications in "stop – then – cut again", so called "delay", in shechita (see reference 2 for a summary-explanation of shechita rules), but should be performed by a skilled operator in charge, among others, of this specific task.

Slaughter of animals may implicate lack of uniformity of some parameters which definitely have Animal Welfare relevance. In all cases animals shall be spared any avoidable pain, distress or suffering during their killing and related operations (3-*art.3,1*), for which corrective systems or back-up measures should be routinely kept in place.

The European Food Safety Agency (EFSA), considering the results of a Panel on Animal Health and Welfare relative to bovine slaughter (with and without previous stunning) recommends the implementation of back-up systems or "appropriate interventions" to minimize the chances of poor welfare following slaughter without stunning" (18).

Table 4 below indicates parameters with animal welfare implications, as observed in this study; thresholds for high standard level; their relevance in Israel current Regulations; appropriate intervention/corrective systems or corrective measures which should be put in place on routine basis.

Some findings in this survey clearly indicate the need of corrective systems or back-up measures and including an update of regulations. According to the authors, these findings may be summarily enlisted into two main groups:

1. Potentially stressful events before the slaughter/cut: prodding; restraining time (16, 3-*Whereas 32*); accidents during restraining with the impossibility to proceed with slaughter/cut:

For these events, regulations should indicate clear thresholds of good practice; but also thresholds of unacceptable malpractice with a temporary stop of operation.

2. Potentially painful events during/after slaughter/cut (3-*art 6,2c)*: slow cuts; high number of cuts; failure to cut both of Carotids. Slow cuts or high number of cuts may be caused by hesitating slaughter man or use of inadequately sharp knives. Observations in slaughter plants indicate that some slaughter men are more efficient than others (29). A skilled slaughter man can be successful in over 95% of slaughters; replacing the shochet (29) with a record of low performances could be considered.

But defects in chin-lift design, too, may induce the shochet not to perform decisive and quick strokes. All these possible situations should be investigated and solved.

The cut of both Carotid arteries is fundamental for inducing a quick stop of cerebral blood circulation. Both Carotids should be systematically severed (3, *Annex III:3,2*). According to authors' experience, shochatim are aware that time to time both Carotids (*"masrekim"* – "squirts" in halacha language) are not cut during shechita. In almost all the cases, this is caused by the slope of the cut operated by the shochet. The understanding of physiological implications may be missed,

Table 4: Parameters with animal welfare relevance when performing shechita; thresholds for high standard levels; parameters' relevance as in Israel Regulations (13); appropriate intervention/corrective systems (3, *art.9,2*) to be introduced in the Regulations and routinely implemented

Parameter	Threshold for high standard levels	Israel Regulations	Corrective systems
Prodding	≤ 5%	"*reasonable*" use; 1-2 times/animal	Total count per group of animals.
Bellowing	≤ 5%	No relevance	Total count per group of animals.
Time restrain to slaughter	≤ 10 sec	≤ 10 sec	
Cut moves	*"minimal"*	No relevance	Introduce count. Agree with shochet for reduction. Verify knives' sharpness.
Carotids cut	Cut of both	No relevance	Introduce check. Agree with shochet and/or staff for cut of uncut Carotids.
Cut to release	At unconsciousness	At 30 sec.	Increase to 40 sec. at least. Or, only at unconsciousness.
Carotids occlusion	"high cut" or "decisive stroke"	No relevance	Agree with shochet for decisive strokes. Verify knives' sharpness.
Failures/ sudden complications	Back-up stunning	No relevance	Introduce back-up stunning. Skilled staff and stunning equipment ready at slaughter point (3, *art.9,2*).

but once this is highlighted by the veterinarian-in-charge and once explaining the link between uncut carotid and animal welfare, shochatim reaction proved to be positive: slope corrected and success in cutting of both Carotids increased. Anyway, regulations should consider corrective measures or back-up systems in place to ensure the severing of both Carotids.

Some findings like occurrence of Carotid occlusion with respect to cut position did not reflect the assumptions of the literature and therefore this may be worth of further investigations. On the other hand, dedicated literature provides excellent examples for goals to be achieved when performing a religiously correct shechita and corrective or back-up measures (30) which could easily be adopted to improve current regulations.

When killing animals, best practices in the field should be implemented (3, *Whereas, 2;)* use of practices not reflecting the state of the art and reflecting animal distress and sufferance, may definitely reflect professional negligence (3, *Whereas,2)* and should be censored.

ACKNOWLEDGMENTS

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