Report on religious slaughter practices in Italy

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LXVII Meeting of the Italian Society for Veterinary Sciences (SISVet) - Selected papers

Keywords
Animal welfare,
Halal,
Religious slaughter,
Restraining,
Shekita,
Stunning.

Summary
The term 'religious slaughter' commonly refers to the practice of killing animals without stunning, according to the precepts of Jewish and Muslim religions. The aim of this paper is to assess the situation concerning ritual slaughtering in not-stun bovines, small ruminants, and poultry in Italy in 2012. The study was divided into 2 phases. During the first phase, preliminary data about all slaughterhouses authorized for ritual slaughter in Italy in 2012 are collected through the compilation of a questionnaire sent to each plants. The second step involved a sampling of not-stun animals religiously slaughtered in 5 selected plants. Authors collected and compiled all informations about management, restrain system and rite taking into account in particular animal welfare.

Pratiche di macellazione religiosa in Italia

Parole chiave
Benessere animale,
Halal,
Macellazione religiosa,
Contenimento,
Shechita,
Stordimento.

Riassunto
Il termine «macellazione religiosa» comunemente fa riferimento alla pratica di macellazione senza stordimento, in accordo con i precetti sanciti delle religioni ebraica e musulmana. Scopo della presente ricerca è fornire una panoramica generale della situazione italiana in materia di macellazione religiosa di bovini, ovi-caprini e avicoli non preventivamente storditi nel 2012. Il lavoro è stato suddiviso in due fasi: la prima fase prevede la raccolta di informazioni generali sullo stabilimento mediante la compilazione di un questionario da parte dei mattatoi italiani abilitati alla macellazione rituale. La seconda fase, invece, consiste nel campionamento sul posto di animali macellati ritualmente senza preventivo stordimento in 5 mattatoi selezionati. Tutte le informazioni riguardanti la gestione, le tecniche di contenimento e le informazioni sulle pratiche effettuate sono state raccolte e analizzate tenendo particolarmente in considerazione la tematica del benessere animale.

Introduction

Italy has recently become the destination of a massive immigration by people from less developed areas of the world with different social, religious and cultural backgrounds. These populations have brought with them different ideas and lifestyles that have to be integrated with national customs. Italy is now a multi-ethnic nation: 8% of the population living in our country consists of immigrants, the majority of whom are Muslims (Caritas and Migrantes 2013). Approximately 2.2% of the current Italian population is, in fact, Muslim, whereas there are few people of other faiths: 0.17% of the population are Buddhists, 0.18% Hindus and 0.06% Jews (Caritas and Migrantes 2011). These numbers are rising and the influence of these minorities is, therefore, gradually increasing such as the openings of new commercial markets. The Council Regulation (EC) No. 1099/2009[1], in force since January the 1st, 2013, regulates the protection of animals during slaughter. This Regulation specifies that "*the killing of animals must save animals from avoidable pain, distress or suffering*" and "*animals*

[1] Council Regulation (EC) No.1099/2009 Protezione degli animali durante l'abbattimento.

are slaughtered only after stunning [...], loss of consciousness and sensibility shall be maintained until the death of the animal". Moreover, it adds that during the slaughter of cattle, the *"inversion or any unnatural position of the animal, such as an immobilization system, is forbidden"*. However, the regulation admits derogations during religious slaughter, when it is conducted in approved slaughterhouses. This could increase the risk of animal welfare damaging.

A last point has to be mentioned: even if religious slaughter is commonly performed without pre-cut stun, some kind of stunning system could be accepted by Muslim. According to Koran, animals have to be alive before slaughter, but the use of some stunning method, above all electrical stunning, does not kill the animals. Some Imams could therefore accept prior stunning and declare 'halal' meat resultant from stun animals (Cenci Goga *et al.* 2010).

The aim of this work is to provide an overview of the methods used in Italy during religious slaughtering in 2012, taking particularly into account the restraint methods and the use of stunning system, in order to provide concrete answers to the issues of welfare in not-stun animals.

Materials and methods

During the first part of this work (analysis of the Italian situation about religious slaughtering) a specific request was sent to the Ministry of Health to obtain a complete list of Italian slaughterhouses authorised to perform ritual slaughtering in 2012. Then, a questionnaire was sent to the Veterinary Service of all the 136 abattoirs in order to collect general information regarding the type of slaughter, the number of animals slaughtered annually, the restraint systems used and the stunning method applied, if presents.

During the second part of this work (evaluation of welfare in non-stun animals), authors selected 5 plants among the slaughterhouses which completed the preliminary questionnaire. In these abattoirs no pre-cut stun is performed. The 5 slaughterhouses have been chosen by a simple, random sampling, using the formula:

$$x = Z (c/100) ^2 r (100 - r)$$

where r is the fraction of response and Z (c/100) is the critical level value for the confidence level c, with a 20% margin of error and a 95% confidence level, to obtain a statistically significant sample (Bruce *et al.* 2008).

A general description of the 5 selected abattoirs is showed in Table I. A team consisting of at least 2 auditors visited the 5 slaughterhouses during a period of 6 months. In each plant, a simple, random sampling is performed to obtain information about animal welfare in reasonable number of subjects.

A total of 313 animals were analysed. A two-part questionnaire was completed for each animal. The first part collected general information regarding the abattoir: slaughter line speed and time required to turn animals mechanically restraint. In the second part monitoring of the pain and stress signs is performed. Information about: average time between animals' restraint to neck cutting, average time elapsed between animals' neck cutting to fallowing handlings, average number of cutting performed on animals' neck by slaughterman, percentage of animals showing excitement and stress during neck cutting, average time of animals' struggling between restraining to neck cutting, average time of animals' struggling between neck cutting to the fallowing handling and average time of animals' corneal reflex and rhythmic breathing lost.

Average time of struggling was calculated by summing each single time of coordinated movements shown by each animal and by calculating the mathematical average for the number of observed animals for such parameter.

Results

A preliminary questionnaire concerning general information was sent to all the 136 slaughterhouses

Table I. *General description of the 5 selected abattoirs.*

Species	Rite	Restrain	N° of animal observed	N° of visits to the slaughterhouse
Bovine	Halal	Upright	30	5
Bovine	Halal	Mechanically turned on its side	14	2
Ovine*	Halal	Suspended before neck cutting	79	1
Ovine*	Kosher	Suspended before neck cutting	114	1
Ovine	Halal	Manually turned on its side	6	1
Poultry	Kosher	Suspended before neck cutting	70	1

*in the same slaughterhouse.

Table II. *Methods of stunning and kind of slaughter (normal/halal/kosher) performed in the 29 abattoirs which answered to preliminary questionnaires (percentage).*

Species	Stun animals	Not stun animals	
		Halal slaughter	Kosher slaughter
Bovines	95.30%	4.27%	0.43%
Small ruminants	90.37%	5.47%	4.16%
Poultry	98.69%	1.31%	0.00 %

Table III. *Restraint methods applied in the 29 abattoirs which answered to preliminary questionnaires (percentage).*

Species	Slaughter	Restraint method	Upright	Turned on side	Turned on back
Bovines	Halal	Pen	50.00%	50.00%	0.00%
	Kosher	Pen	100.00%	0.00%	0.00%
Small ruminants	Not stun halal	Pen	0.00%	0.00%	30.30%
		By hand	0.00%	69.07%	0.00%
	Pre-cut stun halal	By hand	0.00%	100.00%	0.00%
	Kosher	Shackled before neck cutting	0.00%	0.00%	0.00%
	Halal	Shackled before neck cutting	0.00%	0.00%	0.00%

Table IV. *Average speed of halal or kosher slaughter line in the 5 checked abattoirs (number of slaughtered bovines per hour).*

	Halal			Kosher	
	Upright and turned bovine	Manually turned sheep/goats	Suspended sheep/goats	Suspended sheep/goats	Suspended poultry
Speed	13	20	162.3	234.4	792

authorised for ritual slaughter in 2012 in order to obtain an overview of the Italian situation. Only 29 questionnaires (18% of the total) were completed and sent back to authors: 25 for halal slaughter, 3 for kosher slaughter and 1 questionnaire was received without data for reasons of privacy. No information is available for 107 slaughterhouses (82% of the total).

For halal slaughtering: 9 questionnaires were complete by abattoirs performing cattle's slaughter, 12 performing small ruminants' slaughter and 4 poultry's slaughter. For kosher slaughtering, 1 questionnaire was completed for each category (cattle, small ruminants and poultry). It must be underline that one abattoir performing halal

slaughter of small ruminants uses pre-cut stunning (head-only electrical stunning). Data obtained from the 29 questionnaires are shown below (Table II and Table III).

Among the 29 abattoirs which answered to preliminary questionnaires, we selected 5 plants to perform on-site visits. A total of 313 animals (44 bovines, 70 chickens and 199 small ruminants) were examined to test animal welfare. A two-part questionnaire was completed for each animal. The first part contains generic data concerning the abattoir (Tables IV and V). The second part contained information about monitoring of parameters usable to assess welfare of each animal slaughtered (Tables VI, VII, VIII, IX, X, XI and XII) (Figures 1 and 2).

Discussion

Results obtained in this study provide only a general picture of the situation concerning ritual slaughter in Italy in 2012. Only few questionnaires

Table V. *Average time (with upper and lower limits) required to turn animals mechanically restraint in the 5 checked abattoirs (seconds).*

	Mechanically turned bovine	Mechanically turned sheep/goats
Time	10.3 ± 1.4	5.5 ± 2.9

Table VI. *Average time with upper and lower limits (seconds) between animals' restraint to neck cutting in the 5 monitored abattoirs.*

Slaughter	Species	Restraining system	Time
Halal	Bovine	Upright	97.5 ± 56.6
	Bovine	Mechanically turned	115.8 ± 86.8
	Small ruminants	Manually turned	21.3 ± 12.1
	Small ruminants*	Suspended	57.2 ± 19.1
Kosher	Small ruminants*	Suspended	228.8 ± 59
	Poultry	Suspended	26.2 ± 11.6

*in the same slaughterhouse.

Table VII. *Average time with upper and lower limits (seconds) elapsed between animals' neck cutting to fallowing handlings in the 5 monitored abattoirs.*

Slaughter	Species	Restraining system	Time
Halal	Bovine	Upright	93.3 ± 23.9
	Bovine	Mechanically turned	114.1 ± 21.6
	Small ruminants	Manually turned	105.8 ± 59.6
	Small ruminants*	Suspended	379.3 ± 47.2
Kosher	Small ruminants*	Suspended	677.3 ± 176.3
	Poultry	Suspended	136.7 ± 13.1

*in the same slaughterhouse.
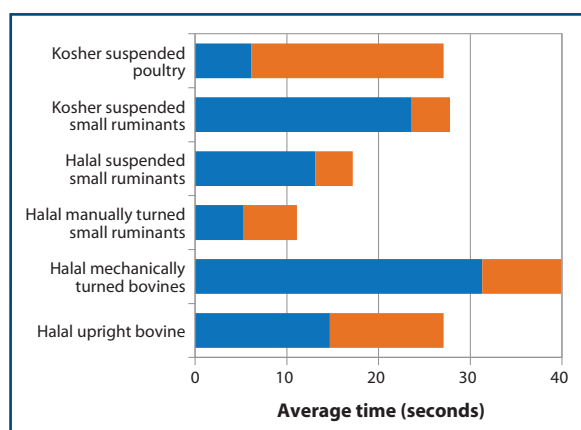
Figure 1. *Graphical representation of the average time (seconds) elapsed from animals' beginning of restraint to neck cutting (blue) and from animals' neck cutting to following handling (orange) in the 5 monitored abattoirs.*

Table IX. *Percentage of animals showing excitement and stress during neck cutting in the 5 monitored abattoirs.*

Slaughter	Species	Restraining system	Percentage
Halal	Bovine	Upright	42.90%
	Bovine	Mechanically turned	42.90%
	Small ruminants	Manually turned	33.30%
	Small ruminants*	Suspended	34.20%
Kosher	Small ruminants*	Suspended	31.60%
	Poultry	Suspended	7.10%

*in the same slaughterhouse.

Table XI. *Average time (seconds) with upper and lower limits of animals' struggling between neck cutting to the fallowing handling in the 5 monitored abattoirs.*

Slaughter	Species	Restraining system	Time
Halal	Bovine	Upright	12.4 ± 14.2
	Bovine	Mechanically turned	8.6 ± 5.5
	Small ruminants	Manually turned	5.8 ± 7.1
	Small ruminants*	Suspended	4.1 ± 4.3
Kosher	Small ruminants*	Suspended	4.2 ± 3.2
	Poultry	Suspended	21 ± 4.3

*in the same slaughterhouse.

Table VIII. *Average number of cutting, with upper and lower limits, performed on animals' neck by slaughterman during religious killing in the 5 monitored abattoirs.*

Slaughter	Species	Restraining system	Number of cuts
Halal	Bovine	Upright	25.2 ± 9.4
	Bovine	Mechanically turned	7.4 ± 2.5
	Small ruminants	Manually turned	3 ± 0.9
	Small ruminants*	Suspended	2.9 ± 1.1
Kosher	Small ruminants*	Suspended	1.25 ± 1.1
	Poultry	Suspended	1 ± 0

*in the same slaughterhouse.

Table X. *Average time (seconds) with upper and lower limits of animals' struggling between beginning of restraint to neck cutting in the 5 monitored abattoirs.*

Slaughter	Species	Restraining system	Time
Halal	Bovine	Upright	14.7 ± 16.5
	Bovine	Mechanically turned	31.3 ± 33.5
	Small ruminants	Manually turned	5.3 ± 2.36
	Small ruminants*	Suspended	13.1 ± 7.6
Kosher	Small ruminants*	Suspended	23.6 ± 11.7
	Poultry	Suspended	6.1 ± 4.3

*in the same slaughterhouse.
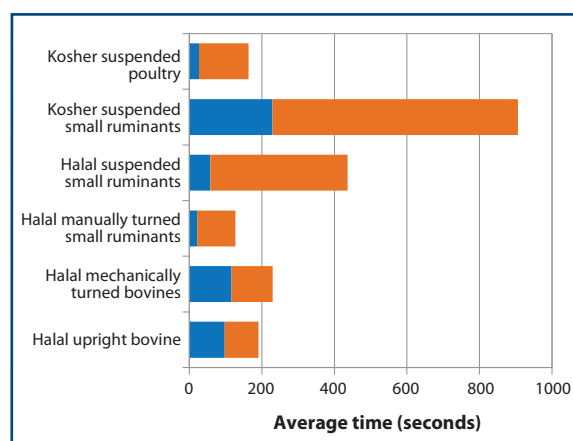
Figure 2. *Average time (seconds) of animals' struggling between beginning of restraint to neck cutting (blue) and between neck cutting to fallowing handling (orange) in the 5 monitored abattoirs.*

were completed and sent back to authors so the situation presented could be not representative of the Italian scenery. Data obtained show that, actually, religious slaughter is a secondary activity in all the 29 abattoirs with a limited number of animals slaughtered annually. Moreover, religious slaughter is commonly performed without pre cut stunning with just one exception for halal small

ruminant. As specify in the introduction, electrical stunning could be accepted by some Imams. (Cenci Goga *et al.* 2010)

To assess animal welfare during religious slaughter, a lot of parameters are analysed during on-site visits to the 5 selected abattoirs.

Speed of the ritual slaughter line is closely related to the farmers' and slaughterers' economic profit.

Table XII. *Average time (seconds) of loss of corneal reflex and rhythmic breathing in some checked animals in the 5 monitored abattoirs.*

Reflex lost	Species	Restrain system	N° of animals sampled	Mean	Median	Extremes
Corneal	Bovine	Upright	0	-	-	-
		Mechanically turned	1	79	79	79
	Small ruminants	Manually turned	2	50	50	38 - 62
Rhythmic breathing	Bovine	Upright	27	85.1	85	37 - 167
		Mechanically turned	13	99.8	96	45 - 166
	Small ruminants	Manually turned	5	29	27	26 - 33

From this point of view, the practice of suspending the animals before neck cutting is much more productive. However, this practice is actually illegal for small ruminants because risky for animal welfare (Reg. 1099/2009). It has to be specify that in 2012, when this work was led, the practice of suspending small ruminants was allow (DL 333/98)[2].

The average time between the restraint of the animal and neck cutting corresponds to the time used by the operators to place the animal in a suitable position to provide a good neck cutting. This time must be as short as possible for animal welfare. This time depends mainly on the restraint system adopted, above all when a rotating system is used, although it can also vary depending on the organization of the slaughter line and on the position of the operator performing the incision. The average time between neck cutting and fallowing handling corresponds to the time of animal's bleeding and lost of consciousness which ends with animal's death for hypovolemic shock. This time depends mainly on cut quality: a complete, deep cut of both the arteries are recommended from an animal welfare point of view (Cenci Goga and Catanese 2009 a, b, Cenci Goga *et al.* 2009, Cenci Goga *et al.* 2010). During slaughter of small ruminants, the average time between the restraint of the animal and neck cutting is 57.2 ± 19.1 seconds; the average time is slaughter and 228.8 ± 59 seconds for the halal and kosher slaughter. This big difference could be explained by the operator's position: during halal slaughter operator is closer to host point of sheep and goats and in a more comfortable position for neck cutting. Probably, the not appropriate operator's position is the cause of a bad neck cutting and of a poor bleeding which retard animal's death and also cause a longer average time between neck cutting and fallowing handling during kosher slaughter. It has to be specify that, even if halal and kosher slaughter are performed in the same slaughterhouse, two different operators carried out animal slaughter. In fact, during religious slaughter, operator performing

neck cut has to be Muslim (for halal rite) or Jewish (for Kosher rite) fact, the average time difference, in the case of small ruminants, is of 172 seconds, is explained by the operator's position (Cenci Goga and Catanese 2009 a, b, Cenci Goga *et al.* 2009, Cenci Goga *et al.* 2010). The average time between the restraint of the animal and neck cutting added with the average time between neck cutting and fallowing handling corresponds to the total time of animal's restraining (Figure 1).

The animal's perception of pain at the time of neck cutting has been the subject of a controversial debate within the scientific community (Levinger 2005, Rosen 2004). However, recent studies using electroencephalography to measure animals perception of pain have shown that animals feel pain during neck cutting (Gibson *et al.* 2007, Gibson *et al.* 2009 a, b, c, d). The number of cuts influences the degree of pain felt by slaughtered animals and it depend on restraint system used, on operator's skill and on rite performed (during kosher slaughter just one, net cut has to be performed by operator) (Velarde *et al.* 2010). The cut determines a sudden nociceptor discharge at central levels which, however, ends in 4 seconds (Gregory 2004).

The average time of struggling is the period used by the animal to perform voluntary coordinated movement. Average time of struggling before neck cut could be using to determine animal stress and fear (Gregory *et al.* 2009, Gregory *et al.* 2010, Velarde *et al.* 2010, von Holleben *et al.* 2010). This time is longer for mechanically rotating bovines and small ruminants. The use of a rotating restraining systems could therefore decrease animal welfare. The average time of struggling after neck cutting is very important in order to assess animal welfare. This parameter can then be used as a clinical indicator of the presence in the animal of consciousness and of its pain caused especially by the presence of blood in the trachea (Gregory *et al.* 2009, Gregory *et al.* 2010, Velarde *et al.* 2010, von Holleben *et al.* 2010). There are no significant difference of struggling time between bovines upright and rotating or between small ruminants manually or mechanically turned: restraint system doesn't influence outcome of

[2] Decreto Legislativo 333/98 Attuazione della direttiva 93/119/CE relativa alla protezione degli animali durante la macellazione o abbattimento.

unconsciousness. The average time of struggling after neck cutting in bovine is longer than in small ruminants. This gap could be attributed to the presence of a pathway for cerebral blood circulation and anastomosis (between branches of the vertebral and carotids arteries), which can be found in bovines, but not in ovines (Gregory 1998). The total time of struggling is shown in Figure 2.

The loss of corneal reflex and rhythmic breathing were used in this work to provide concrete answers about perception of pain in animals after neck cutting and, therefore, their state of consciousness. These reflexes are anatomically sited in the medulla oblongata so their disappearance, consequent to the hypoxia/anoxia of these structures, indicates a loss of sensibility in the cranial encephalic areas linked to conscious perception. In other words, the disappearance of these reflexes indicates with certainty that the animal is unconscious and cannot, therefore, feel pain. Unfortunately, a positive reflex does not indicate consciousness, since it merely indicates the functioning of the structures of the medulla oblongata, which only coordinates involuntary vital reflexes (Velarde *et al.* 2010). Moreover, these reflexes are very difficult to assess during slaughter: only few animals could be monitoring and data obtained are statistically significant only for rhythmic breathing in bovines. The obtained data could suggest that upright animals lost rhythmic breathing early than rotating animals and, therefore, this method could be recommended for animal welfare. However, more studies should be promoted.

Conclusions

Processed and examined data demonstrate that animals feel pain during religious slaughter both during and after neck cutting until unconsciousness outcome. This is problematic when considered from an animal welfare point of view. However, halal and kosher meat represent a new, increasing market, therefore religious practices and animal welfare have to be conciliated. In order to obtain that, alternative methods of stunning have to be investigated. It is also essential to maintain the presence of the competent authority at the slaughterhouse who could ensure animal welfare in all the other phases of slaughtering. At the same time, research needs to identify new parameters to truly and objectively assess the state of animal consciousness during slaughter. Finally, slaughterhouses should be encouraged to modernise their lines, put in place measures to ensure correct handling and neck cutting procedures, which would reduce animal suffering and minimise animal welfare problems. All these elements could improve animal welfare and operator safety, as well as increase the economic profits of slaughterhouses and of all the related industries and, moreover, alleviate the social tensions between the different communities.

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