Welfare requirements and meat quality

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Summary

More than 260 million of cattle, sheep and pigs are killed every year in the European Union, which is about one million every workday, i.e. about 40 animals per second. This number has been in a constant growth due to the more frequent consumption of proteins of animal origin, so it is necessary to conduct welfare measures with quality and carein the entire process of red meat production. The first step in conducting welfare is to identify the stages in slaughterhouse treatment of animals and to carry out the best ways of protection and animal welfare through each stage. It is important to include the loading of animals on the farm with transport to these stages of slaughterhouse treatment because the first signs of stress appear already with the change in the usual daily routine and environment of animals. Animals will react to these stimuli in one of two possible ways –by fighting or escaping. Most of farm animals react by escaping and it is most frequently visible during animal handling in a depot, when we encourage animals to move by entering their flight zone. Our interaction with animals stimulates the activity of hormonal regulation of stress which encourages the organism to protect the life and it directly affects the meat quality and food safety as well.

Keywords: *welfare, stress, food safety*

Introduction

More than 260 million of cattle, sheep and pigs are killed every year in the countries of the European Union, which is about one million every workday, or about 40 animals per second (Humane Slaughter Association, 2004). These numbers indicate to a growing consumption of proteins of animal origin and consequently indicate to the need of conducting welfare in the entire process of red meat production. It is also necessary to differentiate the perception of welfare by science, ethics and legislation. Welfare in science measures the consequences on animals due to different situations and different environment from the animal point of view and tries to make objective conclusions (Webster, 2011). Ethics in welfare deals with the way people should treat the animals, whereas legislation in welfare gives rules of how people must treat the animals. But, even though legislators bind with the fact that they give rules of how people must treat the animals, the laws are most frequently minimum standards that must be fulfilled, so in this case as well.

Implementing welfare in red meat production

Because of the knowledge that meat is softer if the animal was stressed before the slaughter, it was a common practice in history to let the dogs which would attack the animals and cause the appearance of pale, soft and watery (PSW) meat (Gregory, N.G., 2007). Which are then possible ways of implementing welfare in the production of red meat? The first step in conduction of welfare is to identify the stages of slaughterhouse treatment of animals and to carry out the best manner of slaughter and protection of animal welfare through each stage. It is necessary to include the loading of animals on the farm with transport to these stages of slaughterhouse treatment because the first signs of stress appear already with the change in the usual daily routine and environment of animals. Other stages of slaughterhouse treatment important for welfare are:

- Unloading
- Depot
- Handling of animals
- Restraint
- Stunning
- Picking up
- Bleeding

Stress perception

Even though the word "stress" is understandable by itself, it is hard to be defined in a few words or sentences. Maybe the most simple stress definition in English speaking areas is at the same time the best one:

- **S**ituations
- **T**hat
- **R**elease
- **E**mergency
- **S**ignals for
- **S**urvival

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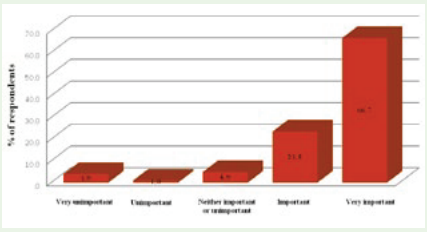

Graph 1 **Importance of animal welfare in meat production (Cerjak et al., 2011)**

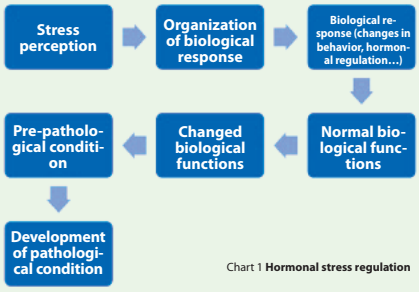

Chart 1 **Hormonal stress regulation**

This definition is clear enough to explain how important stress really is for an animal, for its survival in nature and how hard it is to avoid it. Namely, with each change in daily routine, environment, the people who handle animals, food, etc., the animal reacts in one of two possible ways –by fighting or escaping. Most farm animals react by escaping, and that is visible most frequently while handling animals in a depot, when we encourage animals to move by entering their flight zone.

After the primary stress perception, there appears an organization of a biological response of the organism – changes in behavior, adrenaline activation – which leads to changes in biological functions, then pre - pathological and pathological conditions.

Two consequences of the reaction of hormonal system are differentiated:

ACUTE STRESS

Acute stress is developed as a consequence of a sudden stimulus in the time before the slaughter itself. During acute stress, there appears the release of adrenaline, noradrenaline and corticosteroids. The consequence of the activity of these hormones is a short- term decrease in glycogen level before the slaughter and a very fast glycolysis. By decomposition of glycogen there appears the accumulation of large quantities of lactic acid and the decrease in pH value. The meat of low pH value is pale, it loses its pink color, it has a soft consistency and it is watery - PSW meat.

CRONIC STRESS

As opposed to acute stress, chronic stress appears through a longer period of time and it is most often the consequence of mistakes during the loading and transport. By a long- term influence of corticosteroids to an organism, there appears a complete use of glycogen reserves, so there is a significantly decreased production of lactic acid quantity post mortem.pH value in such meat doesn't decrease to a desirable 5.5° in the stage of maturingand it is known that pH can even increase (Foury et al., 2005). The color of that meat is markedly dark, so such meat is known to be DFD – dry, firm and dark meat.

Conclusion

There are many examples on the connection of stress at slaughter and the quality of meat, but it doesn't mean that all animals subjected to stress produce meat of low quality, nor that low quality is always a consequence of stress. Still, it is considered that better handling of animals reduces the stress and results in a better final product in average. That will become very important in a growing market competition (Petak and Mikuš, 2009). In today's industrial animal production practices it is almost impossible to avoid the appearance of PSW and dry, firm and dark (DFD) meat. Still, some measures of welfare improvement can be taken during the production process in order for stress to be reduced to the lowest possible level, so thereby the appearance of such meats is decreased too. It is necessary to stick to these rules, but one must always know that legislation prescribes minimum standards that need to be satisfied.

The existent "Animal Protection Act" and "Ordinance on the protection of animals at the time of slaughter or killing" in Croatia represent a good basis for ensuring animal welfare. Education of all parts of society is necessary, especially of those people who work with animals, so legislation could be really carried out. Also, product quality, in this case meat, should be very important for our consumers, which has been confirmed by researches (Cerjak et al., 2011; Mijatović 2011).

It is noticeable from both works that most respondents find animal welfare important and that consumers are not informed enough on conditions of keeping animals. Consumers' interest in animal welfare and quality of products of animal origin has been growing in the world in the last years. Therefore, the countries of the EU accepted a new approach in food production which takes consumer needs into account, the so called "fork to farm" approach (Mikuš and Petak, 2010). The interest of meat consumers in Croatia in animal welfare has also increased because those who want to export to the EU market must meet the regulations that apply to EU territory. The most important factor that determines whether animal welfare is ensured in slaughter facility is the attitude of staff. Therefore obligatory education of the employees in slaughterhouses is suggested in order to improve the level of welfare and meat quality (Grandin and Smith, 2004).

Photo 1 **Improper use of stunning equipment**

Photo 2 **Importance of farm animals welfare (Cerjak et al., 2011**

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Forderungen für das Wohlergehen und Fleischqualität

Zusammenfassung

In der Europäischen Union werden jedes Jahr über 260 Millionen Rinder, Schafe und Schweine getötet. Das bedeutet, jeden Arbeitstag sind das über 1 Million Tiere, bzw. – etwa 40 Tiere in jeder Sekunde. Da diese Zahl ständig wächst, weil die Konsumation der Proteine aus animaler Herkunft immer häufiger ist, ist es nötig, vorsichtiger und qualitativ besser für das Wohlergehen während des gesamten Herstellungsprozesses des roten Fleisches zu sorgen. Der erste Schritt beim Durchführen des Wohlergehens ist, die Phasen der Schlachtbearbeitung der Tiere zu identifizieren und in jeder Phase die beste Art des Tierschutzes und - Wohlergehens durchzuführen. Zu diesen Phasen der Schlachtbearbeitung muss auch das Einladen der Tiere auf der Farm und der Transport gerechnet werden, weil es zu den ersten Stresszeichen schon bei Änderung der üblichen Tagesroutine und Umgebung der Tiere kommt. Die Tiere werden auf diese Reize auf zwei mögliche Weisen reagieren – sie werden entweder wegrennen oder kämpfen. Die meisten Tiere auf der Farm werden wegrennen. Das ist auch meistens bei der Manipulation der Tiere im Depot sichtbar, wenn die Tiere beim Eintreten in ihre Wegrennenzone zur Bewegung angeregt werden. Durch unsere Interaktion mit Tieren stimulieren wir die Aktivität der Hormonregulation von Stress, die den Organismus zum Lebensschutz anregen, und somit auf die Fleischqualität und Nahrungssicherheit mittelbar einen Einfluss haben.

Schlüsselwörter: *Wohlergehen der Tiere, Stress, Nahrungssicherheit*

Richieste di benessere e qualità di carne

Somario

Più di 260 milioni di bovini, pecore e maiali vengono macellati ogni anno nell'Unione europea. Questo vuol dire che ogni giorno lavorativo più di 1 milione di animali viene macellato – all'incirca 40 animali ogni secondo. Siccome questo numero cresce continuamente perché il consumo di proteine di origine animale è in aumento, è necessario prestare più attenzione al benessere nell'intero processo della produzione di carne rossa. Il primo passo nel benessere di qualità è identificare le fasi di lavorazione in macelleria, e in ognuna di esse fare il meglio di proteggere gli animali e assisurarne il benessere. In queste fasi di lavorazione in macelleria è incluso il carico nell'allevamento e il loro trasporto, perché gli animali mostrano i primi segni di stress già quando cambiano la loro routine quotidiana e l'ambiente. A questo tipo di stimoli gli animali reagiscono in due maniere: fuggendo o combattendo. La maggior parte di animali in allevamento reagisce fuggendo, e questo è evidente durante la manipolazione con animali nel deposito, quando noi, entrando nella loro zona di fuga, li stimoliamo che si muovino. La nostra interazione con animali stimola in loro la regolazione ormonale di stress alla quale l'organismo reagisce diffendendosi, e indirettamente influisce anche alla qualità della carne e alla sicurezza alimentare.

Parole chiave: *benessere di animali, stress, sicurezza alimentare*