

Meat technology update

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Ecchymosis, Blood Splash and Blood Spotting

Ecchymosis, or blood splash, is an escape of red blood cells from blood vessels into the surrounding muscle. The haemorrhage may result from rupture of blood vessels - usually very small ones (capillaries) - or sometimes from leakage of red blood cells through small holes in imperfect blood vessels. In fresh meat the haemorrhages appear as dark red spots, usually not more than 1 cm in diameter.

These spots are most noticeable on surfaces within the body cavity, and are commonly found in the diaphragm and forequarters, and in the heart, lungs and gall bladder. They can also occur as spots of blood in any muscle, and may be noticed during cutting in the boning room or in cured meat products.

“Speckle” describes the condition similar to ecchymosis, when blood spots are found in subcutaneous fatty tissues and on connective tissue membranes.

Blood spotting or streaking sometimes occurs on the surface of fat. Surface blood spots are called petechial haemorrhages and can vary in diameter from 0.5 to 3.0 mm. These haemorrhages are quite different from ecchymosis, as they exist in and on the surface fat but not in the muscle. Although blood spotting and blood

streaking can occur simultaneously, blood streaking is an aggravated form of blood spotting.

Ecchymosis or blood splash

The exact cause of ecchymosis is not known, but it involves high pressures in the blood vessels, or weak blood vessels, or a combination of the two.

Preslaughter excitement and other psychological or emotional stresses lead to a general increase in blood pressure in the larger blood vessels and an increase in the amount of blood in the smaller vessels. At stunning, the blood pressure and heart rate increase. It is probable that rupture of the distended smaller blood vessels is caused by vigorous muscular contractions during electrical stunning and during struggling which occurs after stunning.

If sticking can be completed, and thus blood pressure released within a few seconds of stunning, blood splash is reduced to a very low incidence. This may be because blood pressure drops quickly, or was prevented from reaching high levels initially.

Ineffective electrical or mechanical stunning (e.g. double stunning) may lead to blood pressure being high for a longer period, resulting in increased blood splash.

Some diseases may weaken the blood vessel walls and result in an increased occurrence of haemorrhages.

Climatic conditions appear to influence the incidence of the disorder. It is most prevalent in hot weather.

Subcutaneous 'speckle' in mutton and lamb - the condition similar to ecchymosis - appears to result from shearing of blood vessels during the stun. Speckle is aggravated by long stunning times when electric stunning is used, and also by tight restraining conveyors. If it looks like a mild wool-pull bruise along the side of the carcass, this is likely to be due to the wool being pulled between the sheep's body and the restrainer as the animal goes into a spasm.

Feed may be a contributory factor to the occurrence of ecchymosis. Anticoagulant (anti-bloodclotting) substances in some types of pasture may predispose animals to blood splash.

Prevention

1. *Stunning cattle*

- (a) Animals should not be excited or stressed before stunning.
- (b) Stunning must be done quickly and effectively. With both penetrating bolt stunners and 'mushroom head' stunners, the placement of the bolt or head at the correct position on the animal's skull is very important and this requires skilled operators and well designed knocking boxes or restrainers. The use of the appropriate cartridge or the correct air pressure (for air-powered stunners) is essential, as is regular maintenance of the stunning equipment. Avoid the need for double stunning.

- (c) Bleeding should be carried out as soon as possible after stunning.

2. *Electrical stunning of smallstock*

The animal must become rigid immediately the stunning electrodes are applied. If it escapes from the electrodes or the initial contact is insufficient to produce rigidity, the animal becomes distressed and struggles which, in turn, makes it more difficult to apply the electrodes. If a particular electrical stunning method persistently leads to interrupted stunning, it can be improved in the following ways. It may be possible to improve the presentation of the animal to the slaughterman, so that the electrodes are then easier to place accurately and firmly. It may also be possible to improve the equipment to reduce the electrical resistance of the animal and the electrodes.

- (a) Minimise stress and excitement.
- (b) Animals should not be allowed to remain in a restraining race for long periods, and should be stunned at an even rate.
- (c) The incidence and severity of ecchymosis can be reduced by using low stunning currents and short stunning times. The lowest voltage found to give satisfactory stunning should be used, particularly for lambs and other young animals. The voltage and the time of application needed for young animals is less than that needed for older animals.

Voltage and time settings are also affected by factors such as the length of the fleece, amount of moisture on the skin or hide

in contact with the electrodes, and the type of machine in use. Correct electrode placement and establishment of the right current flow (amperage) through the brain are the important factors.

- (d) Regular maintenance is necessary. The electrodes should be kept clean and, with probe types, the points sharpened regularly.
- (e) The animals should be bled as soon as possible after stunning. The interval between stunning and commencement of bleeding ideally should not exceed 10 seconds.

If ecchymosis occurs, it is useful to record the number of animals affected in mobs of known history over a period of time. In this way it is sometimes possible to identify reasons and remedy the situation. If ecchymosis occurs more often in animals from certain farms and/or areas, this may indicate a pasture and/or stress problem.

Blood spotting or blood streaking

During dressing on inverted dressing lines, surface blood spots and streaks can occur on the hindquarters of ovine carcasses and financially impact the industry. However, these two blemishes can be reduced by ensuring efficient bleeding and using adequate lead-up work before mechanical pelt pulling commences.

Whilst it is possible to reduce the incidence of blood spotting and streaking, it is unrealistic to expect to avoid it completely on *all* carcasses processed on an inverted dressing line.

Observations in trials established to determine the causes of blood spotting and possible remedial actions indicated that spotting was the most frequent form of the defect when the selvage was left largely or

completely intact throughout the dressing process.

When the selvage is damaged to any significant extent during dressing, instead of some of the superficial blood vessels simply being ruptured beneath the selvage surface, the blood vessels are severed altogether and blood may run from the open ends to form streaks.

As the pelt is pulled from the carcass, a band of pressure bears on the tissues adjacent to the line of separation. In inverted dressing systems, as this pressure band moves over the loins and hindquarters of the carcass, it pushes blood through the veins near the carcass surface. This pressure eventually ruptures some of these vessels (as the pelt is separated from the carcass), and blood invades the surrounding tissue or leaks through broken veins onto the surface of the carcass.

Reducing blood spotting or streaking

Efficient bleeding is not the sole answer to eliminating blood spotting and blood streaking. On the other hand, the severity of blood spotting can be reduced by efficient bleeding. To maximise efficient bleeding:

- The vena cava must be fully severed with a thoracic stick.
- As much time as possible should be allowed for bleeding prior to inverting the carcass.
- Carcasses should be hung vertically for as long as possible before putting them on the spreaders. When on the spreaders, the carcass head and shoulders should be positioned below the back and the hind legs to provide as complete and rapid bleeding as possible, and to minimise pooling of blood in the tissues near the surface of the back.
- The time during which the carcass is in the inverted position prior to pelting should be minimised.

The incidence and severity of blood spotting

can be reduced - but not eliminated - by following slash cut sticking (whether this is done as ritual Halal or conventional slaughter) as rapidly as possible with a full thoracic stick. The thoracic stick should be deep and the vena cava should be severed close to the heart. However, this could require extra labour and therefore the other measures should be adopted first.

The severity of blood spotting is directly related to the quality and extent of pre-pelting work-up.

Accurate clearing and punching of the lateral surfaces of the chump and leg can reduce the problem. In particular, good clearing and positive separation of the pelt from the selvage lessens blood spotting. A good standard of pre-pelting work-up also improves carcass presentation.

Age of lambs and sheep is another factor influencing the incidence of blood spotting and streaking. The strength of adhesion of the pelt to the outer fell appears to rise markedly with animal age, thereby requiring additional force to remove the pelt, and this appears to be closely related to the occurrence of blood spotting in older sheep.

Manning of the chain must be consistent with achieving good dressing. If the work-up is incomplete, excessive pressure will be applied to

the carcass surface when the pelt is pulled and blood spotting will occur. Whilst the mechanical pelt puller can do most of the physically hard work associated with actual pelt removal, adequate pre-pelt-pulling work-up is a prerequisite.

Transporting, animal handling, humidity and temperature also appear to affect blood spotting. It has been suggested that blood diverted to the skin (as in hot weather) leads to greater engorgement of the vascular system over the loin and chump areas during inverted dressing. When blood vessels are engorged, they can burst and cause blood spotting or streaking. In most situations, procedures can be developed and implemented to reduce blood spotting and streaking.

As a repair mechanism only, a large proportion of surface blood spotting can be removed with suitable mechanical carcass washing regimes. Wash jets should be angled about 45° below the horizontal. However, this will directly increase both the quantity of water used and effluent produced by the plant.

Contact us for additional information

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