Factsheet

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Impact of Pre-Slaughter Handling and Transport on Small Ruminant Carcass Yield and Quality

E. Massender and D. Kennedy

INTRODUCTION

There are many factors that contribute to small ruminant carcass yield and quality, everything from nutrition to genetics. However, handling is one aspect that is often overlooked. From sorting to slaughter, small ruminants are exposed to a range of challenging conditions, including greater handling and human contact, transportation and unfamiliar environments.[1] These conditions may cause stress and bruising, which negatively impact carcass yield and quality. This factsheet reviews management and handling practices associated with greater risk for stress and bruising and provides recommendations to improve small ruminant handling and transportation.

STRESS AND BRUISING REDUCE CARCASS YIELD AND QUALITY

Stress and bruising during pre-slaughter handling and transportation are two common causes of reduced carcass yield and quality of small ruminants.

Stress

Stress represents a range of physical responses as a result of external factors (e.g., novel or unfamiliar environments, human contact, changes in social structure) that disturb an animal's natural physiological state.[1] In livestock, stress can be recognized by increased respiration rate and temperature, greater alertness, immobilization, aggression and escape or avoidance behaviours.[1] All animals experience stress during the pre-slaughter period, but minimizing stress is critical to ensuring high animal welfare and meat quality that is satisfactory for consumers. Stress has well-documented and cumulative negative effects on several meat quality attributes.[1] Meat from small ruminants that experience greater stress may have:

- higher pH
- darker colour
- shorter shelf-life
- greater drip and cooking loss
- reduced tenderness
- lower eating quality

Bruising

A bruise is the site of an injury caused by blunt-force trauma that ruptures small blood vessels without cutting or puncturing the skin.[3] Bruises indicate painful events and reduce yield due to these areas of the carcass being trimmed away during slaughter, so they should be prevented whenever possible.[2],[3] There have been many studies on the prevalence of bruising in lamb carcasses, reporting anywhere from 20%–70% of carcasses inspected containing some degree of bruising.[4],[5],[6],[7],[8] In one study, only 1 in 4 bruises on lamb carcasses were attributable to handling at the slaughterhouse, indicating that on-farm handling, transport and auction systems account for a large proportion of bruises.[4]

Bruises are out of sight until the pelt is removed, but they should not be out of mind. Figure 1 shows the bruising damage that wool-pulling during pre-slaughter handling can have on lamb carcasses. In this image, there is bruising to both the back of the neck and loin. The red colour suggests the bruises were recent and occurred during pre-slaughter handling, as bruises turn a yellow or green colour as they heal.

Figure 1. Image of lamb carcass bruising caused by a handler pulling the lamb's wool.

The economic impact of bruising is dependent on both the location and the severity of the bruise.[2] Bruises that require greater trimming or that are located on more valuable cuts of meat will have the greatest impact. One study found that over half of all bruises in lambs were to the highly valuable loin region.[4] For smaller suckling lambs, another study reported over 80% of bruises were in the leg region.[7] Some bruises may not be easily visible on the whole carcass.[2] In beef cattle studies, it has been reported about a third of bruises were not visible during inspection of the full carcass, but parts were trimmed during processing, resulting in further processing time and yield loss.[2]

RISK FACTORS FOR STRESS AND BRUISING

To improve overall carcass yield and quality, it's important to understand the factors during handling and transportation that cause stress and bruising.

Animal factors – The risk of bruising is greater for younger, heavier and/or leaner animals with less fat cover for protection. Animals will also differ in their ability to recover from handling activity and stress.[7],[8],[9]

Handling facilities – Protrusions in handling systems, pens and trucks all contribute to bruising. Hinges, latches and over-head gates are common causes of bruising.[2]

Stockpersonship – Impatience and rushed handling causes stress and can result in poorer meat quality even if lambs are rested for more than 24 hours before slaughter.[6],[7] Difficult to move livestock are often frightened livestock.[2],[3] Greater use of fear or force causes behaviours such as freezing, fleeing, baulking and riding on top of other animals, which can increase incidences of bruising.[2],[3],[10],[11]

Poor acclimation to handling – Animals that are less familiar with human interaction will experience more stress and risk of injury while trying to flee during handling.[2],[3]

Wool-pulling – Under no circumstances should pulling on the wool or the tail be used to restrain or re-direct small ruminants, as this is among the most common causes of bruising. Handling methods such as pulling the first few animals to start movement through chutes or lifting small lambs by the wool are never acceptable.[2],[9]

Transport stocking density and groups – Overly high stocking densities may increase bruising, stress and the number of non-ambulatory or dead animals on arrival.[2],[10],[14] Mixing unfamiliar animals during transport disrupts their social structure, increasing stress and risk of injury.[2]

Transport duration – Transport durations of longer than 4 hours have been associated with bruising, stress and lower carcass yield, with heavy lambs being most affected by transport duration. [8],[12],[14]

Marketing system – Small ruminants sold through auctions are likely to experience greater stress, bruising, injury and even death than those sold and shipped directly for slaughter because they are handled multiple times by different stockpeople. [4],[9],[12]

STRATEGIES TO IMPROVE CARCASS YIELD AND QUALITY

The following strategies will help reduce stress and incidences of bruising during pre-slaughter handling and transportation.

- Inspect and repair handling facilities that could cause bruising or other injuries.
- Consider the fitness of animals for handling and transport. Be extra careful handling younger, heavier and leaner animals that may be at a greater risk for bruising.
- Train all employees to move small ruminants quietly and calmly, using flight zones to encourage forward movement. Pay attention to both the intensity of the exercise and the duration of handling to minimize stress.
- Refrain from wool-pulling to encourage movement during handling or loading.
- Walk through pens and move animals through handling systems routinely in intensive systems so that they become familiar with these activities.
- Plan to minimize the duration of transport to sale or slaughter and aim to ship animals at appropriate stocking densities with familiar groupmates.
- Market animals directly to slaughter, rather than through auction systems, when possible.

CONCLUSIONS

Pre-slaughter handling and transportation is only a small component of raising sheep and goats for meat, but it can have a big impact. Several factors are associated with stress and bruising in small ruminants. These factors include the animal itself (genetics, age, weight, fatness), handling facilities, stockpersonship, acclimation to handling, transportation duration, stocking density and choice of marketing system. Understanding these risk factors and employing strategies to minimize stress and bruising will improve carcass yield and quality. Careful pre-slaughter handling and transportation will ensure that the efforts of your breeding and management programs are fully realized in the sale barn and on consumers' plates.

ADDITIONAL RESOURCES

This chapter contains excerpts from the following OMAFRA sources:

- *Avoiding Heat and Cold Stress in Transported Sheep*
- *Use Sheep Behaviour to Your Advantage When Designing Handling Facilities*
- *Lowering Stress in Transported Goats*

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This factsheet replaces the factsheet *Lamb Carcass Bruising Caused by Grabbing Fleece* by Craig Richardson, Animal Welfare Specialist, Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA). It was revised by Erin Massender, Small Ruminant Specialist, and Delma Kennedy, Sheep Specialist, OMAFRA.

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Agricultural Information Contact Centre:
1-877-424-1300
1-855-696-2811 (TTY)
E-mail: ag.info.omafra@ontario.ca

ontario.ca/omafra