

# Beef cattle transportation issues in the United States

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## Abstract

Transportation of cattle is one of the most common practices in the beef industry. This proceedings focuses on some specific opportunities for the beef industry pertaining to transportation. Whether transporting calves for veal production or cull cows for slaughter, fitness for transport must be evaluated by the producer. Cattle haulers need to focus on opportunities to provide a comfortable, safe ride between destinations. Finally, cattlemen and cattlemen must be prepared to help cattle prepare and recover from transportation to improve cattle health and performance.

**Key words:** cattle, beef, transportation

## Résumé

Le transport du bétail est l'une des pratiques les plus courantes dans l'industrie du bœuf. Ce compte-rendu met l'accent sur des opportunités particulières que l'industrie du bœuf pourrait envisager dans le domaine du transport. Que ce soit le transport de veaux dans le secteur de la production de veaux ou le transport de vaches réformées vers l'abattoir, l'aptitude au transport doit être évaluée par le producteur. Les transporteurs de bétail doivent cibler des opportunités pour rendre le transport entre les destinations le plus confortable et le plus sécuritaire possible. Finalement, les éleveurs de bovins doivent participer à la préparation et la récupération des animaux après transport afin d'améliorer la santé et la performance des bovins.

## Bob Veal Transportation to the Packer

Bob veal calves are veal calves that are marketed up to 21 days old or less than 150 lb (68 kg). They make up about 15% of the veal calf market. Recently, there has been a push through the Veal Quality Assurance Program to certify 50% of all domestically produced veal markets as VQA certified.<sup>75</sup> They have also put an emphasis on educating producers on using best practices with bob veal.

In order to avoid non-ambulatory calves at the packing plant, producers and veterinarians should be intimately aware of the Veal Quality Assurance and Dairy Beef Quality Assurance guidelines. Many bob veal condemnations are due to icterus. There is a strong correlation between icterus in bob veal calves and lack of colostrum consumption.<sup>35</sup> For that reason, feeding adequate amounts of colostrum is critical for veal calves.<sup>68</sup> According to the Veal Quality Assurance

manual, 2 to 4 quarts of colostrum within 2 hours of birth and 3 times after, within 18 hours of life, are current best management practices.

Careful handling of calves will prevent stress and reduce the amount of downed calves at the packing plant. Bull calves to be used for bob veal should not be immunized. Calves should not be marketed and/or transported until after 3 days of age and only if they are fit for transport.<sup>75</sup> Stress to the calves occurs when they are taken from a comfortable environment and transported on a trailer to the packing plant. Proper transportation practices for bob veal calves is important to minimize condemnation, as stressful transportation can have an adverse effect on health and meat quality.<sup>37</sup> They should be kept dry and warm during transportation and not overexerted during loading and unloading. When transported at temperatures less than 48° F (8.8° C), calves should have dry bedding for nesting or other means of warmth. Care should be taken to avoid injury, as calves are uncoordinated and usually have not developed herding responses yet.<sup>75</sup>

On May 8<sup>th</sup> 2015, the US Department of Agriculture's Food Safety and Inspection Service published a proposed regulatory rule that would prohibit non-ambulatory veal calves from entering into the food supply. Current FSIS regulations allow downed calves to be slaughtered if they gain their ability to walk after being rested and warmed. The new proposal would require prompt, humane euthanasia of any downed calves without a rest period. According to FSIS, this proposal seeks to improve treatment of bob veal calves and thus, Human Methods of Slaughter Act compliance.<sup>73</sup>

The American Veal Association<sup>1</sup> (AVA) opposes this proposed rule, and believes that the new rule is "misleading and unnecessary" It is the position of the AVA that calves should be given time to rest and recuperate upon arriving at a packing plant, and that it is inhumane to not allow calves to rest upon arrival at the plant. The AVA contends that the proposed rule will cause condemnation of healthy animals and thus, a loss of meat that is safe for consumption.<sup>1</sup> No actual changes will be made until FSIS issues a final rule after reviewing comments from the public.<sup>73</sup>

## Transportation from the Ranch to the Feedlot

Transporting cattle, especially young cattle, can dramatically increase plasma cortisol levels, indicating that cattle have experienced significant stress<sup>16,23</sup> which has profound negative effects on their immune system.<sup>14</sup> Transportation exposes cattle to a variety of physical stressors including



trailer vibrations, noise, exhaust fumes, wind, extreme temperatures, and deprivation of food, water, and rest. In the US, cattle are typically transported a minimum of 2 times in their lives – from the cow-calf/stocker operation to the feedlot and from the feedlot to slaughter. Feeder calves may also be transported from a cow-calf operation to a stocker operation, and yearlings may be transported to auctions or sale barns before arriving at a feedlot. Hence, ensuring that cattle are transported under optimal conditions and careful handling of cattle during loading and unloading will help reduce losses and improve animal welfare.

After unloading at the feedlot, cattle are generally placed in receiving pens and allowed to rest before processing them and moving them to a feeding pen. Cattle should have immediate access to fresh water and good quality hay.<sup>72</sup> At the receiving area in the feedlot, unloading ramps and receiving pens must be in good operating conditions and have non-slippery flooring. Observations in hundreds of facilities indicate that the number 1 facility problem is slippery floors that cause cattle to fall.<sup>34</sup> It is recommended that flooring in processing facilities and sorting pens, if made out of concrete, should be grooved to minimize falls and aid cattle in having a good grip while going through these facilities.

Preconditioning is a management technique developed to reduce economic losses associated with high morbidity and mortality related to acute respiratory disease in highly stressed weaned and transported beef calves.<sup>58</sup> Calves that are properly prepared while on the cow-calf operation prior to transportation to the feedlot tend to experience fewer health-related challenges.<sup>72</sup> Macartney et al<sup>49</sup> indicated that preconditioning calves has positive effects on their health status, which included reduced treatments for bovine respiratory disease (BRD) in the first 28 days after arrival to the feedlot. Bartlett et al<sup>5</sup> report that vaccinating and weaning calves 35 to 45 days prior to transport reduces mortality at the feedlot. Step et al<sup>66</sup> demonstrated that weaning calves 45 d before shipping to the feedlot dramatically reduced BRD morbidity by simply allowing calves to recover from the stress of weaning before transportation.

Mackenzie et al<sup>50</sup> found that both weaning and transport have an effect on calves' immune response, and the combination of early weaning and transport together have the greatest impact on immune responses. Schwartzkopf-Genswein et al<sup>63</sup> reported that preconditioning calves prior to transport resulted in lower cortisol concentrations pre- and post-loading, as well as higher percentages of time feeding and less time standing and milling in their pens immediately after transport compared to non-conditioned calves. The combined effect of conditioning and short-haul transport resulted in lower shrink, higher dry matter intake and average daily gain in the first month after transport. The latter is in accordance with Karren et al<sup>45</sup> and Shipper et al<sup>65</sup> who indicate that preconditioned calves have average daily gains up to 2 times greater than those observed in non-preconditioned calves.

A lack of appropriate water and feed intake prior to and/or during transport leads to dehydration and weight loss in cattle, usually referred to as shrink. Shrink can be defined as the amount of weight that cattle lose from the time they leave their origin to the time they arrive at their destination. Shrink provides a potential measure of transportation stress, and if used as a part of an overall program, it may be a useful tool for veterinarians to help predict the health outcomes in newly arrived calves.<sup>79</sup> Calves that have experienced long hauls have had more time in which to experience fecal, urine, and tissue loss that has been reported to be greatest within the first 5 to 11 hours in transport.<sup>15</sup>

Trips significantly shorter than 24 hours, when made without access to food and water, are capable of producing adverse effects. Warriss et al<sup>77</sup> transported cattle by road for up to 15 hours and demonstrated changes in their blood chemistry that suggested dehydration and disruption of their normal feeding pattern, taking 5 days post-transport for cattle's weight to return to pre-transport levels. Knowles et al<sup>46</sup> indicated that pre-transport body weight was regained by calves within 8 to 16 hours after transport, but their mean weights remained below a non-transported control group for up to 72 hours after transport. Knowles et al<sup>47</sup> also observed a significant weight loss (average of 7% of initial BW) among cattle transported for periods of 14 to 31 hours, even though cattle were allowed a stop for rest and drinking water after 14 hours. An increase in plasma total protein during the journeys was observed, suggesting dehydration. Knowles et al<sup>46,48</sup> also observed dehydration, as evidenced by changes in plasma total protein and albumin, and weight loss among calves transported 19 to 24 hours.

Transport presents several potentially stressful environmental factors for cattle, including extreme temperatures. Extreme heat and extreme cold can both be highly stressful, as can periods with wide swings between daytime and nighttime temperatures.<sup>11</sup> Goldhawk et al<sup>28</sup> reported that cattle loaded in the evening (1700 and 2100 h) during summer experienced more shrink than cattle loaded in the morning (0500 and 0700 h) ( $11.3 \pm 0.5$  vs  $6.73 \pm 0.34\%$  of BW;  $P < 0.01$ ).

The adverse effect of low temperatures during transport is considered an important predisposing factor for BRD.<sup>40</sup> Much greater fluctuations in body temperature have been documented in calves transported during winter than in those transported during summer, indicating that calves were less able to regulate their body temperature when transported during colder weather.<sup>48</sup> Knowles et al<sup>46</sup> also found that weight of calves transported during winter took longer to return to baseline levels after transport than those transported during summer. In addition to a greater and more prolonged reduction in body weight, body temperature was markedly reduced for at least 8 hours after transport, and high levels of plasma total protein and albumin provided evidence of dehydration. This is in accordance with Goldhawk et al<sup>28</sup> who reported that cattle transported during summer experienced more shrink than



cattle transported during winter ( $11.2 \pm 0.5$  vs  $9.0 \pm 0.5\%$  of BW;  $P = 0.03$ ).

### Transportation from Feedyard to Packer

Cattle welfare is a high priority for the beef industry.<sup>76</sup> Recently, abnormalities in the mobility of cattle shortly after transportation to abattoirs has gained considerable media attention, with the greatest focus occurring in the fall of 2013.<sup>74</sup> These mobility issues consist of a series of clinical signs and serum biochemistry abnormalities that has become termed Fatigued Cattle Syndrome (FCS).<sup>71</sup> Cattle exhibiting FCS have various clinical signs including tachypnea with abdominal breathing, muscle tremors, stiff gait, and reluctance to move. Cattle with FCS also had elevated serum lactate and CK.<sup>71</sup> These clinical signs and serum biochemical abnormalities observed in affected cattle are similar to those observed in pigs with Fatigued Pig Syndrome (FPS), which was defined about a decade ago.<sup>59</sup> The FPS syndrome has been documented to be caused by multiple additive stressors, which includes animal handling, transportation, metabolic modifiers, environmental conditions, and pre-transportation sorting and preparation. Briefly, FPS is characterized clinically by vocalization, blotchy skin, reluctance or inability to move, and muscle tremors.<sup>59,61</sup> Swine exhibiting from FPS have greater blood lactate, decreased blood pH, greater CK, and depleted muscle glycogen.<sup>61</sup> Greater serum lactate concentration has been identified as a consistent characteristic of FPS pigs that become reluctant to move or non-ambulatory.<sup>2,59</sup> Research has led to FPS mitigation strategies including management changes, such as improvements in handling, transportation and pre-transportation sorting and exercise.<sup>9,26,59</sup>

The stress of transporting finished cattle is a major consideration in FCS that needs further definition on the potential contribution it has on the incidence of FCS at the abattoir. Transportation and management of cattle to slaughter should take the prevailing environmental conditions into consideration as much as possible. Staging of shipment and arrival times to reduce the time in lairage, maximize efficiency at the plant, and reduce environmental stress on the cattle should be a top priority in managing the transportation, loading, and unloading of cattle. Transportation of cattle during summer months has been shown to increase transportation shrink and needs to be taken into consideration.<sup>70</sup> There is a need for research to be conducted on the management of cattle and design of facilities at the abattoir for further understanding of animal well-being at the packing plant. The beef industry needs to continually improve to ensure that animal well-being is being addressed at every phase of beef production from feedyard to the harvest floor. Investigation into these potential risk factors and mitigation strategies should be pursued to further define the management factors that can increase or decrease the risk for FCS.

Stocking density of cattle transported long distances also needs consideration. Increased stocking density greater

that  $550 \text{ kg/m}^2$  in trailers decreases the animals ability to stand in preferred orientations, most commonly perpendicular to direction of travel, and may increase incidence rates of loss of balance.<sup>69</sup> Additionally dressed weight has been shown to be reduced by high stocking densities. This reduction can only be partially accounted for by the increased rate of bruising in high-density loading.<sup>19</sup>

### Transportation of Cull Cows to the Packer

Cull cows represent 35 to 45% of all cattle slaughtered for beef in the United States.<sup>55</sup> And while the welfare of these animals is generally recognized as “good” during the majority of their lives, it can become severely compromised as they reach their production potential and decline due to disease, anatomical/mechanical disorders, or simply old age.

Cows are considered as “cull” animals when they depart from the herd because of sale, slaughter, or death.<sup>22</sup> In turn, their departure from the farm requires that they be transported in some nature to their next destination, whether that be another farm, an auction barn, or a slaughter facility. Bascom and Young<sup>6</sup> reported that in dairy cows, reproduction, mastitis, decreased yield, udder conformation, and feet/leg problems were the most common reasons that animals were culled from herds. In beef cattle, reproductive failure, feet problems, vaginal and uterine prolapse, cancer eye, lump jaw, and udder conditions were the most common culling reasons reported.<sup>36</sup>

The reasons for culling have a direct effect on the welfare of the animal, and therefore should be considered by producers and veterinarians when culling decisions are made. It must be considered that while the animals are leaving the herd, there may be a long process between their removal from the herd to their final destination, likely a slaughter facility. The transportation process is one in which the welfare of these animals can be severely compromised, especially if they are already suffering from debilitating conditions. The stress of disease, poor conformation, or age, coupled with the stress of being transported for any time/distance, can result in further decline of the animal in to a non-ambulatory state, or even death before or upon arrival to the destination.

Recent research has shown that at slaughter facilities in the United States, up to 8.5% of incoming cull cows are reported to have at least 1 of 10 conditions present, including non-ambulatory state, severe lameness, cancer eye, wound, nervous disorder, malaise, uterine prolapse, pregnancy, udder condition, or poor body condition score.<sup>21</sup> This data indicates that the reasons (problems) for culling cows are not necessarily being dealt with at the farm, but are being passed along to the next facility, whether that be another farm, an auction barn, or a slaughter facility, creating animal welfare problems in multiple areas of the industry.

It is essential that the conditions that determine whether cull cows leave the farm be discussed by the producer and the veterinarian. Animals with conditions such as



those discussed here are not fit for transport to any facility other than a veterinary clinic for evaluation and correction or in cases such as cancer eye and non-ambulatory animals, euthanasia should be performed. If and only if these problems are addressed, corrected, and proper withdrawal times are observed for any drug administered, cull cows can be transported to an auction barn or slaughter facility. Veterinarians must be astute when evaluating these animals, and honest when giving their educated opinions on whether these animals are fit for transport.

With the recent increases in all cattle prices, producers have seen increased income from cull cows as well. It is very easy for one to look the other way, or pass the problem along when culling cows from the herd. As veterinarians, we are not able to police every move our clients make, but with good ethics and sound teaching skills, we can improve this area of the cattle industry and create sound animal welfare practices that consider both the producers' interests and those of the industry as a whole.

### **Carcass Bruising During Cattle Transport to Slaughter**

A carcass bruise is an injury to tissue as a result of an impact from a blunt object and can occur to animals up to the point of exsanguination. Carcass bruising is a source of wastage to a beef carcass, and an indicator of suboptimal animal welfare. Bruising, if severe enough, may deem meat unsatisfactory for its original purpose, devaluing the carcass.

The 2011 National Beef Quality Audit (NBQA)-2011 evaluated 18,000 carcasses and observed 23.0% with bruising; 18.8% with 1 bruise, and 3.4% with 2 bruises, and 0.9% had 3 or more bruises. The location of the bruising occurred down the midline accounting for 50.1%, 21.3% occurred at the rib, 13.8% on the chuck, 7.3% on the round, and 7.5% was located on the flank/plate/brisket.

Bruise location and shape is often associated with the causative agents.<sup>67</sup> Examples of causative agents include handling, use of driving aids, facilities, and cohorts with horns. Barnett et al<sup>4</sup> and Jarvis et al<sup>42</sup> reported use of driving aids was significantly correlated with number of potentially traumatic events during unloading and pre-stunning phases at the abattoir. Driving aids are linked to a parallel red mark that is in a thin line and small mottled bruising. Small mottled bruising can be caused by the use of the end of a driving stick,<sup>78</sup> while bruises thought to be resulting from cohorts with horns are linked to circular shaped bruises.<sup>64</sup> Shaw et al<sup>64</sup> reported bruising trim losses to be almost doubled for horned cattle vs polled cattle (19.4 vs 12.1 lb or 8.8 vs 5.5 kg, respectively). Jarvis et al<sup>43</sup> found that cattle transported farther than 40 miles (64 km) to an abattoir had significantly more bruising than cattle sourced closer. Further research in this area discovered other sources contributing to carcasses bruising; for example, space allowance on trailers. Cattle stocked at the recommended level of 172 ft<sup>2</sup> (1.16 m<sup>2</sup>)/animal, specified by Grandin,<sup>30</sup>

presented significantly less bruising at the abattoir than low and high stocking density groups.<sup>19</sup>

McCausland and Millar<sup>52</sup> suggested handling prior to slaughter has an effect on the prevalence of carcass bruising at time of slaughter. Stressful or inappropriate handling leads to an increase in difficulty of handling.<sup>20</sup> Barnett et al<sup>4</sup> observed cattle subjected to stressful handling procedures were more susceptible to carcass bruising. Grandin<sup>30</sup> observed cattle originating from feedlots with rough handling techniques resulted in increased bruising compared to feedlots with quiet handling techniques (15.5 versus 8.35 % respectively). Another source of bruising has been reported to be from the number of times animals are handled before their final destination, the abattoir. Eldridge et al<sup>18</sup> reported that cattle sold directly to the abattoir had smaller and few bruises than animals sold on a live weight basis. McNally and Warriss<sup>54</sup> observed animals sourced from markets had a bruising prevalence of 7.8%, sourced from a dealer 6.3%, and sourced directly from the farm 4.8%.

Carcass bruising is expensive, because a portion of bruised meat cannot be salvaged for human consumption.<sup>39</sup> McNally and Warriss<sup>54</sup> recorded in a survey that 6.5% of carcasses were bruised severely enough to warrant downgrading or rejection of bruised meat. The results from the NBQA-2011 audit (23.0% bruised) were improved from previous years; 1991, 1995, 2000, and 2005 had bruising rates of 39.2, 48.4, 46.7, and 35.2%, respectively, indicating animal handling and facilities have improved. This type of progress is beneficial for the beef industry, providing evidence that we are continually improving upon our practices and providing a humanly produced animal.

### **Beef Quality Assurance Master Cattle Transporter Certification and Program**

Transportation of cattle in both beef and dairy industries has been demonstrated to play a vital role in the welfare of live animals and the quality of beef produced.<sup>56</sup> In fact, beef cattle typically are transported at least 1 to 5 or more times during their lifetime.<sup>29</sup> Each trip aboard a trailer presents a risk of serious injury or carcass devaluation at the least.<sup>56</sup> Past surveys of loading and unloading at feed yard and abattoir have revealed areas of concern, but have also shown marked improvement as the industry has held itself accountable for the quality of the finished product.<sup>56</sup> However, further improvement is needed.

Beef Quality Assurance, or BQA, is a national program that provides guidelines for beef cattle production with a goal of buttressing/supporting the confidence of consumers across the globe (BQA). Recognizing the important contribution of transportation to the success or failure of each production cycle, BQA has developed a program for transporters to aid the development of excellence among industry partners. Transportation Beef Quality Assurance, or TBQA, thoroughly explores the facets of transporting live animals, and allows



transporters to obtain certification through a 5-module program. The modules are available online and were developed from the checkoff-funded National BQA Guide for Cattle Transporters.<sup>12</sup>

Handling has been declared a major cause of stress in cattle during transport,<sup>13</sup> both on the ground and on the truck. Several factors can affect the level of stress on the cattle during transport and handling, including experience of handler, temperament and condition of cattle, and quality of handling facilities.<sup>31</sup> Therefore, the program begins with a basic description of cattle vision followed by a summary of their flight zone, and how a handler can engage the point of balance to inspire movement.<sup>51</sup> The next guideline addresses moving aids, and discourages the use of electric prods except as last resort. “Persuaders” are the tool encouraged by the checklist, including flags, paddles, and ribbons; however, the handler should understand to combine these with proper movement techniques and avoid using the moving aids as another striking object.

The next portion of the guide is dedicated to the actions of loading and unloading the truck. The checklists encourage planning ahead prior to loading cattle, knowing where and when the cattle are going, and keeping the truck clean between classes and species.<sup>51</sup> Also, the guidelines reaffirm application of good handling techniques to prevent injuries and accidents, because according to American Meat Institute Foundation, guidelines,<sup>32,33</sup> no more than 3% of livestock should slip during unloading. The full guide includes diagrams demonstrating optimal positioning during loading and unloading to encourage quiet, steady animal flow,<sup>51</sup> in order to limit cattle slippage during those situations.

The rest of the manual includes quick reference charts and checklists for traveling during extreme hot or cold weather, and for identifying “unfit” cattle. Loading worksheets and recommended loading distributions are available to help transporters double-check their own figuring and prevent costly animal injuries and even tragic accidents.<sup>51</sup> A section is also dedicated to emergency and/or biosecurity situations, repeating the necessity for a transporter to be prepared for everything. Upon completion of the program, a certified master transporter receives a copy of the manual for reference.

Most industry partners understand the impact that transportation has on the quality of the product, so the encouragement for transporters to participate in the program is widespread. According to the “Beef for foodservice professionals” website, the program encourages transporters to step into their role as proponents of excellent animal husbandry.<sup>7</sup> Further, they write that the National Trucking Association urges its members to comply with the guidelines. Further utilization was described in an article featured by the Beef Cattle Institute, which revealed Cargill’s transport employees have all completed the online training, becoming the first trucking fleet to do so.<sup>38</sup> With over 22,000 certificates presented for BQA training, and 287 Transportation Master Certificates achieved through the first half of 2015 alone, the program

continues to succeed in promoting excellence through the industry as a whole, and shows no signs of slowing down.

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