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Review

On-farm conditions that compromise animal welfare that can be monitored at the slaughter plant

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ABSTRACT

Handling and stunning at slaughter plants has greatly improved through the use of numerical scoring. The purpose of this paper is to encourage the use of numerical scoring systems at the slaughter plants to assess conditions that compromise welfare that occurred either during transport or on the farm. Some of the transport problems that can be assessed are bruises, death losses, and injured animals. Welfare issues that occurred on the farm that can be assessed at the abattoir are body condition, lameness, lesions, injuries, animal cleanliness and internal pathology. There are important welfare issues that cannot be assessed at slaughter. They are on-farm euthanasia methods, use of analgesics during surgeries, and the type of animal housing systems. Welfare evaluations at slaughter have the potential to greatly improve welfare.

1. Introduction

Handling and stunning of cattle, pigs, and sheep has improved in many countries. Audits and standards required by major buyers of meat have greatly improved conditions in the United States (Grandin, 2010, 2000a, 2005). The slaughter plants were evaluated with numerical scoring of stunning efficacy, slips and falls, vocalization, electric prod use and insensibility (Grandin, 2010, 1998). Numerical scoring for assessing stunning and handling has also been used by Welfare Quality Network (2009); (Velarde & Dalmau, 2012; Dalmau & Nande, 2016). In many cases, both stunning and handling was improved without major investments in equipment (Grandin, 2000a). In one study, a more highly skilled operator stunned a higher percentage of cattle accurately (Atkinson, Velarde, & Algers, 2013). Poor maintenance was a major cause of ineffective captive bolt stunning (Grandin, 1998). Another method that has been used to improve both stunning and handling is video auditing where a third party auditing firm monitors unloading, handling, and stunning with remotely viewed video cameras. The use of numerical scoring should be expanded to determine the percentages of animals that have welfare issues that occurred on the farm.

The purpose of this paper is to review animal welfare problems that have occurred either on the farm or during transport that can be easily assessed at the slaughter plant. It is much easier to monitor the large numbers of animals that arrive at a slaughter plant than to visit the many farms where they originate. Several research groups have already determined that many conditions that may compromise animal welfare can be easily assessed at the abattoir (Llonch, King, Clarke, Downes, & Green, 2015; Harley, Moore, O'Connell, et al., 2012; Harley, Moore, Boyle, et al., 2012). There are two categories of animal welfare programs that can be assessed at a slaughter plant. They are: 1) Acute or traumatic conditions that recently occurred that are associated with loading on the farm or transport and 2) long-term chronic conditions. Chronic problems were present before animals were loaded for transport. Some examples of recently occurring conditions that occur during transport are bruises, dead animals (DOAs), fresh injuries, and non-ambulatory animals. Some examples of chronic long-term welfare problems that are not usually associated with transport are lameness (difficulty walking), shoulder sores on sows, swollen hocks on dairy cows, breast blisters on chickens, neglected injuries, necrotic prolapses or advanced cancer eye.

2. Principles of assessment tool use

There are many different assessment tools for evaluating lameness, lesions and other problems. For example, different tools for assessing lameness and hock lesions may have three to five categories (Welfare Quality Network, 2009; Grandin, 2015; Angell, Cripps, Grove-White, & Duncan, 2015; Zinpro, 2016; Nalon, Conte, Maes, Tuyltens, & DeVillers, 2013; Gibbons, Vasseur, Rushen, & dePasille, 2012). When assessments are compared between different abattoirs it is important that they both used the same assessment tool. Photos of lesions that evaluators can hold during assessments may improve accuracy (Foddar, Green, Mason, & Kaler, 2012). Training programs also help improve the repeatability of assessments (Gibbons et al., 2012). In the next section of this paper, transport and on-farm welfare problems that can be assessed at the abattoir will be reviewed.

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3. Assessment of acute or traumatic conditions that recently occurred

3.1. Bruises

The first step is to start measuring bruises to determine where the baseline is. When a baseline is determined, it will make it possible to determine if bruise levels are increasing or decreasing. To improve the accuracy of bruise assessment, it is important to have the same person do the scoring. Strappini, Frankena, Metz, and Kemp (2012) found that intra-observer reliability was higher than inter-observer reliability (Strappini, Frankena, Metz, Gallo, & Kemp, 2011; Strappini et al., 2012). Several bruise scoring systems are available for cattle (Strappini, Metz, Gallo, & Kemp, 2009; Anderson & Horder, 1979; Chile, 1992; Chile, 2002; McKeith et al., 2015). In supply chains where loading on the farm and transport to the abattoir occurs within 12 h, it is very difficult to tell the age of a bruise (Strappini et al., 2009). Bruises that are more than 18 h old can be differentiated from fresh bruises, because they will have a yellowish color (Langlois, 2007). Animals that are marketed through a series of markets or dealers may have old bruises where it can be easily determined that the bruises did not occur at the plant. Old bruises often have yellowish mucous (Grandin, 2000b). In cattle, bruises can be separated into two categories: fresh bruises and old bruises that definitely occurred outside the abattoir. In the U.S. and Canada, cattle are held for only a short time in the lairage. In feedlot beef, the total time from loading at the feedlot until stunning is usually under 12 h. In many supply chains; the time between loading on the farm and stunning may be much larger. In systems where cows may be moving through markets or on trucks for many hours, old bruises that occurred outside the abattoir can be easily identified (Strappini et al., 2011). A histological test can also be used to determine if a bruise is over 24 h old (McCausland & Dougherty, 1978). In broiler chickens, bruises can also be separated into old and new categories. Bruises that are over 24 h old will have a green color (Northcutt & Rowland, 2000).

Bruises can occur after captive bolt stunning and prior to bleeding (Meischke & Horder, 1976). They will be a bright red. Horns are another cause of increased bruises (Ramsey, Meischke, & Anderson, 1976; Shaw, Baxter, & Ramsey, 1976). Tipping horns does not reduce bruises (Ramsey et al., 1976). Minka and Ayo (2007) found that in Western Africa, breeds with huge horns had more bruises than cattle with smaller horns. To determine the origin of fresh bruises, differences in the percentages of bruised carcasses between different farms and transporters has to be tabulated. If either a single farm or a single transporter has a significantly higher percentage of bruises, then it is likely that the bruises are not occurring in the abattoir. Bruises that occur in the slaughter plant will usually occur on animals from many different farms or transporters. These bruises are often on the same location of the carcass or they may mainly occur on very tall cattle that hit their backs on equipment.

In a poultry plant with poorly supervised shacklers, chickens from multiple farms had bruised legs (Grandin, 2015). These bruises were definitely occurring in the abattoir and were caused by handlers who squeezed the thighs too hard. Changing how people are paid may also reduce bruises. When producers and transporters have to pay for bruises they will be greatly reduced (Grandin, 1981).

3.2. Injuries inflicted by people

Danish researchers have developed a scoring system for pigs to differentiate scratches and injuries that are likely to be inflicted by humans from scratches caused by pigs fighting (Nielsen et al., 2014). Other injuries inflicted by people that can be easily detected at the plant are shotgun shot, broken tails on cattle, and hide damage due to poking cattle with sticks with nails in them. Hide damage or broken tails that definitively occurred on the farm can be easily differentiated from more recent injuries that may have been inflicted by a transporter. Older injuries will be healed. A healed broken tail will have a permanent bend or kink.

3.3. Dead on arrival or non-ambulatory

Both DOAs and downed non-ambulatory animals can be associated with either poor conditions during transport or conditions on the farm. Overloading of trucks with either cattle or pigs may increase bruises, non-ambulatory and dead on arrival. In an overstocked truck, a downed animal cannot get back up (Tarrant, Kenny, & Harrington, 1988). Genetics is also a factor. Pigs that are either heterozygous or homozygous for the porcine stress halothane gene will have a higher percentage of pigs dead on arrival (Murray & Johnson, 1998; Holtcamp, 2000). A dose of 200 mg/animal/day of the beta-agonist zilpaterol was associated with a higher percentage of feedlot death losses (Longeragen, Thomson, & Scott, 2014). Pigs fed a high dose of ractopamine may have more non-ambulatory animals if they are handled roughly (Peterson et al., 2015). The author has observed that charging producers a fee for handling non-ambulatory pigs greatly reduced them. At one slaughter plant where the pigs were grown under a contract, the authors observed high percentages of non-ambulatory pigs. The percentage of downed non-ambulatory pigs was cut in half by making three changes in farm production practices. These were 1) a change in boar genetics to eliminate lameness caused by poor leg conformation, 2) reduced the dose of ractopamine, and 3) acclimation of the pigs to people walking through their pens during the finishing period.

4. Ease of handling

4.1. The importance of acclimation to handling

Some animals will move more easily through alleys and races than others. People who work in the lairage (yards) have informed the author that pigs or cattle from different producers are either difficult to move or easy to move. An animal's previous experiences with handling at the farm can affect its reaction to being handled in the future (Grandin, 1997; Grandin & Shivley, 2015). Objective numerical scoring can be used to determine which groups of animals can be moved more easily. Animals that are more difficult to move may be more likely to be abused. Some of the handling variables that can be compared between different producers animals are: vocalization due to electric prod use, balking, refusing to move, backing up, or turning back (Grandin, 1998; Welfare Quality Network, 2009; Edwards et al., 2010). Three studies have shown that pigs will move more easily if they have been acclimated to being handled (Abbott, Hunter, Guise, & Penny, 1997; Geverink et al., 1998; Krebs & McGlone, 2009). Producers should walk quietly through the fattening pens throughout the feeding period to improve ease of movement at the abattoir (Grandin, 2015). This will train the pigs to quietly get up and move away from the person. Animals differentiate between a person in the alley and a person in their pen. Pigs may be more difficult to load and unload from a truck if their first experience with people in their pens occurs the day of loading. Another problem area is extensively raised cattle that have been handled exclusively by people on horseback. This is a common problem in the U.S., Canada, Australia, and South America. The author has observed that they can be dangerous to handle by a person on foot (Grandin, 2015). A person on a horse is perceived as safe and familiar. A person on foot is novel and frightening, which greatly enlarges the animal's flight zone. To improve both animal welfare and safety for employees at the abattoir, cattle should become accustomed to being moved in and out of pens by people on foot before they leave the ranch or feedlot of origin.

4.2. Beta-agonists and handling

Another factor that may affect ease of handling is high doses of beta-agonists. In pigs, a high dose of ractopamine made them reluctant to move (Marchant-Forde, Lay, Pajor, Richert, & Schinckel, 2003). A high dose of 7.5 mg/kg increased the incidence of non-ambulatory pigs after they were handled in an aggressive manner (Peterson et al., 2015). Two new studies clearly show that high doses were more likely to cause problems. Peterson et al. (2015) fed pigs ractopamine for 28 days at doses of 0 mg/kg, 5 mg/kg, and 7.5 mg/kg. Pigs fed the highest dose had more non-ambulatory pigs (Peterson et al., 2015). Noel et al. (2016) compared handling of pigs fed 10 mg/kg of ractopamine or 0 mg/kg. The pigs fed 0 mg/kg were able to walk a further distance before they became exhausted. In the Noel et al. (2016) study, ractopamine was fed for 32 days.

In cattle, observations by the author indicated high doses of Zilpaterol was associated with stiff muscles and reluctance to move (Grandin, 2015). This was most likely to occur during hot weather. A dose of 200 mg/animal/day of ractopamine for 28 days had a negligible effect on handling through a squeeze chute (Baszczak et al., 2006). Cattle handling observations were done during a cool day. To help prevent handling or welfare problems associated with beta-agonists, the author has four recommendations: 1) Use lower doses, 2) hot weather over 90 °F is more likely to cause problems, 3) reduce the number of days the beta-agonist is fed, 4) allow cattle to rest after physical exertion. In large feedlots cattle often have to walk over a kilometer from their home pens to the loading ramp. Feedlot managers have observed that bringing them up close to the loading ramp the day before transport will allow them to recover and prevent handling problems. Cattle on beta-agonists may require more time to recover from physical exertion.

5. External lesions and damage associated with housing conditions

5.1. Cattle

The percentage of dairy cows with injured hocks, swollen leg joints, or lame (difficulty walking) can be easily evaluated at the abattoir. Scoring systems for evaluating hock lesions can be found in (Fulwider, Grandin, Garrick, Engle, & Rollin, 2007; Welfare Quality Network, 2009; Gibbons et al., 2012; Von Keyserlingk, Barrientos, Ito, Galo, & Weary, 2012 and Gibbons et al., 2012). An increased percentage of swollen hocks in dairy cows is associated with poor management of the bedding in free stalls (cubicle) housing (Fulwider et al., 2007). Dairies with dirty stalls had more hock injuries than dairies that had freestalls with deep clean bedding (Barrientos, Chapinal, Weary, Gallo, & Vonkeyserlingk, 2013). A Dutch study showed the importance of a soft lying surface to prevent injuries (deVries et al., 2015). Stalls that are too short can also damage the hocks on the concrete curb, Beef cattle housed on concrete slats for 128 days had swollen leg joints (Wagner, 2016). When rubber mats were installed over the concrete, swollen leg joints were reduced. Cattle can also get damage to the top grain of the leather from muddy feedlots.

5.2. Pigs

Shoulder lesions (debutal ulcers) may occur in sows. The presence or absence of shoulder lesions cannot be used to determine if a producer is housing sows in stalls. The author has observed shoulder lesions in group housed sows. Shoulder lesions are genetically correlated with thin back fat (Lundeheim, Lundgren, & Rydhmer, 2014). Sows with thin body condition were also more likely to have shoulder lesions (Lundeheim et al., 2014). One method to help prevent shoulder lesions is to feed sows more to increase their body condition. The author has observed that when farm managers started measuring the prevalence of shoulder lesions they greatly reduced them. People manage the things they measure.

5.3. Poultry

5.3.1. In broilers

In broilers, the three main lesions associated with housing problems that can be evaluated at the abattoir are: breast blisters, hock burn and foot pad lesions. Three point scoring systems are often used. The quality of the litter has an effect on all three of these lesions (Saraiva, Saraiva, & Stillwell, 2016; Mayne, 2005; deJong, Gunnink, & van Harn, 2014). Scoring systems are available for foot pad lesions in (Dawkins, Donelly, & Jones, 2004; Ekstrand, Algers, & Swedberg, 1997), breast blisters (Allain et al., 2009), and hock burn (Allain et al., 2009). Saraiva et al. (2016) has further information on scoring systems. Kjaer, Su, Nielsen, and Sorensen (2016) indicated that slow growing birds had less hockburn. Research shows that footpad lesions cause pain in turkeys (Wyneken, Sinclair, Veldkamp, Vinco, & Hocking, 2015). Wet litter increases footpad lesions in broiler chickens (deJong et al., 2014). There is some evidence that genetic factors may contribute to susceptibility to footpad dermatitis and hock burn (Kjaer et al., 2016). A study done by Jacob, Baracho, Naas, Salgado, and Souza (2016) illustrates the importance of using outcome measures instead of input engineering standards. In this study, broilers on reused sawdust litter had lower levels of footpad lesions compared to new sawdust litter (Jacob et al., 2016). Broilers can also be inspected for eye damage due to high ammonia levels in the building. Ammonia can definitively irritate the eyes and mucous membranes (Kristensen & Wathes, 2000; Miles, Miller, Branton, Maslin, & Lott, 2006). Another condition in broilers that can be assessed in the slaughter plant is twisted legs (tibial dysplasia). Bone abnormalities may be associated with rapid growth (Shim, Karnauah, Mitchell, Anthony, & Aggrey, 2011). Progressive breeders have worked to correct these problems. There are some fast growing broilers that have strong bones (Shim et al., 2011). If leg problems are observed, the use of gait scoring at the farm is strongly recommended. Information on gait scoring and assessment of poultry mobility can be found in Berg and Sanotra (2003), Kestin, Gordon, Su, and Sorensen (2001), Knowles et al. (2008).

Another issue that may need to be addressed is woody breast (muscle myopathies) which can be easily observed at the slaughter plant as white streaks in the breast meat. Research is needed to determine possible welfare issues associated with muscle mypopathy (Thaxton et al., 2016).

5.3.2. Layers

They can be assessed for foot damage and damage from feather pecking. Scoring systems for foot problems in layers can be found in (Welfare Quality Network, 2009; Blanchford, Fulton, & Mench, 2015).

6. Coat/feather condition

Poorly maintained housing, parasites or behavior problems can damage the feathers or coats of livestock and poultry. In dairy goats, animals with rough matted coats were more likely to have nutritional deficiencies and be skinny compared to goats with normal, smooth, shiny hair (Battini et al., 2015). In cattle, bald spots from heavy lice infections can be easily observed. Bald spots from lice should not be confused with normal shedding. The author has observed lice problems in some organic cattle raised according to U.S. standards. The producer did not want to lose his/her U.S. organic status by treating them. Other parasites that can damage the hide are cattle grubs that drill holes in the back of the hide. In confined sheep, wool pulling by other sheep sometimes becomes a problem (Huang & Takeda, 2016). Sheep that have wool pulled out by other sheep can be easily observed. For laying hens, there are good scoring systems available for assessing feather condition (Featherwel, in press; Laywel, 2006). Loss of feathers can be caused by several factors. They are genetic factors that influence feather pecking and housing conditions. Some genetic lines of layers are more prone to feather pecking than others (Morrissey, Brockhurst, Baker, Widowski, & Sandilands, 2016). Providing hens housed in a cage free system with hay bales for foraging will help reduce feather pecking (Daigle, Rodenburg, Bolhuis, Swanson, & Siegford, 2014).

7. Lameness

Lame animals that have difficulty walking can be easily assessed when they are unloaded from the trucks at the abattoir. A major problem is that many different scoring systems are used. Nalon et al. (2013) reviewed ten different systems for assessing lameness and claw lesions in sows. For all species, the most common lameness scoring systems have three to five categories. To facilitate comparison between slaughter plans, both producers and the meat industry should choose a scoring tool that everybody in their country or region will use. Some of the common lameness scoring tools that are readily available for cattle are the Zinpro five point scale (Zinpro, 2016), the Welfare Quality three point scale (Welfare Quality Network, 2009) the four-point scale in Grandin (2015) and a grainfed beef mobility scoring system (NAMI, 2015). Another problem in comparing data from different lameness scoring systems is the numbering scales. Some systems designate a normal animal as 0 and others designate the normal animal as 1. Grandin (2015) has an easy to use four-point scale for cattle, pigs, and sheep. This system can be easily changed to designating the normal animal as zero. The author has observed that training people to accurately score slight lameness score 2 on a five point scale is difficult. This is in agreement with D'Eath (2012). On a four-point scale, Angell et al. (2015) got good intra-observer reliability for sheep, but only fair to moderate inter-observer reliability. Use of the same observer is strongly recommended. The Welfare Quality Network (2009) three-point lameness scoring system loses severity information but it would have better inter–observer reliability. Teaching people to differentiate between lame and normal cows requires less training than determining degrees of lameness (March, Brinkman, & Winkler, 2007). On a five-pint scale, inter-observer reliability is worst at the mild to moderate lameness scores of 2 and 3 (Schlageter-Tlelo et al., 2014). In a three-point scoring system, animals are scored as normal, lame, or non-ambulatory. Below is a scoring system developed by Grandin (2015) that can be easily used at the abattoir when animals are unloaded at a slaughter plant.

1. Normal.
2. Walks with an obvious limp (difficulty walking) but keeps up with the walking group of animals.
3. Walks with an obvious limp, and not able to keep up with the walking group.
4. Almost a downer, can barely walk.

Lameness is associated with many conditions. Dairy cows with swollen hocks are also more likely to be lame (Kester, Holzhauer, & Frankena, 2014). Lameness and painful conditions can also be caused by hoof diseases such as digital dermatitis or hoof rot (Higginson-Cutler, Cramer, Walter, Millman, & Kelton, 2013). The author has observed lameness associated with poor leg conformation in pigs. Leg conformation is influenced by genetics (Le et al., 2015). The animals either had a collapsed pasture or the leg and ankle were too straight (Grandin, 2015). Many people in the dairy industry consider lameness in dairy cows as a major welfare problem (Ventura, von Keyserlingk, & Weary, 2015). Lameness causes pain. When cows are given an analgesic, lameness is reduced (Flower et al., 2008). It is a major welfare concern because it may cause a painful condition for a long period of the animal's life. Producers who use good production practices can greatly reduce lameness. There is a big difference between the best and the worst dairies (Cook, Hess, Foy, Bennett, & Bratzman, 2016; Bennett, Barker, Main, Whay, & Leach, 2014; Von Keyserlingk et al., 2012). The state of Wisconsin has worked hard to reduce lameness and their average dairy cow lameness is 13% (Cook et al., 2016) and the national average is almost double (Von Keyserlingk et al., 2012; Bennett et al., 2014). Cook et al. (2016) found that the best high producing dairies had 2.8% lame cows and the worst one had 36%. Chapinal, Weary, Collings, and von Keyserlingk (2014) report that producers are motivated to reduce lameness when they receive reports which show how they rank compared to other producers. There are many researchers studying automated systems to assess lameness. Many of these systems would require that animals unloading at a slaughter plant would have to walk through in single file. This would be likely to slow down unloading and be difficult to implement.

8. Dirty animals

Manure and dirt on both mammals and birds can be easily assessed. Welfare Quality Network (2009) has an easy to use three point scoring system for poultry. Saraiva et al. (2016) used the following system, 0 = clean, 1 = soiling limited to breast area, 2 = very dirty, dirt caked or adhering to the feathers. In a large survey of fed cattle arriving at eight large abattoirs in the U.S., they were scored with a three point system (McKeith et al., 2015). Forty-nine percent were completely clean, 37% had dirty legs, 24% dirty belly and legs (McKeith et al., 2015). When indoor housing is used, sufficient bedding should be provided to prevent soil from transferring onto the feathers or coats of the animals. The author has observed that in bedded pack indoor barns, one of the biggest problems is not supplying sufficient bedding to soak up the moisture and keep animals clean. Dirty dairy cows may have higher somatic cell counts (Reneau et al., 2005).

9. Body condition score

Animals with a poor body condition score may be due to either a lack of feed or disease. Cattle raised under extensive conditions may become thin and then regain their body condition during the rainy season when the grass returns. At what point is a thin extensively raised cow a welfare problem? That may be subject for debate. For intensively raised animals, such as Holstein dairy cows there are many scoring tools that are available (Wildman et al., 1982; Ferguson, Galligan, & Thomsen, 1994). In any particular country, it is recommended to use the assessment tool that the producers in your area are accustomed to using. Some assessments have too many categories and achieving inter-observer reliability may be more difficult. In the U.S., five point scales are popular (Elanco, 2009).

10. Neglected health problems or injuries

A survey done in the U.S. on cull cows arriving at slaughter showed that a major problem was timely marketing (Roeber, Belk, Field, Scanga, & Smith, 2001). Producers need to bring animals to the abattoir before they become weak and debilitated. Some examples of neglected problems that would cause animals to suffer are necrotic infected prolapses, necrotic advanced cancer eye, advanced hoof disease in livestock and large hernias (ruptures) in pigs. There is an assessment tool for hernias in pigs in Welfare Quality Network (2009). Pigs must be marketed before hernias interfere with walking or become damaged by scraping on the ground.

11. Abnormal behavior

Abnormal repetitive behavior such as tongue rolling may be observed at the abattoir. It is most often seen in Jersey dairy cows. Wool biting and pulling can also be easily detected at the abattoir. Feeding practices at the farm may have an effect on the incidence of wool pulling (Huang & Takeda, 2016). The author has observed that there are also big differences in the percentage of pigs from different genotypes that will fight or mount each other in the lairage pens. Pigs from some farms may have increased percentage of pigs with bitten tails. There are genetic differences in the aggression levels between pigs and tail biting. Genomic testing indicates that selecting pigs for rapid growth and lean backfat unintentionally selected for pigs that are more likely to be active tail biters or receivers of tail biting (Brunberg, Jansen, Isaksson and Keeling, 2013; Brunberg, Jensen, Isakssen and Keeling, 2013). Within a population of the same pig breed, there are "neutral" animals that are less likely to tail bite or receive tail bites (Brunberg, Jansen, et al., 2013; Brunberg, Jensen, et al., 2013).

12. Internal organ inspection

Inspection of the animal's internal organs can detect diseases and conditions that may occur on the farm (Krage-Rasmussen, Rousing, Sorensen, & Houe, 2014; Harley, Moore, O'Connell, et al., 2012; Harley, Moore, Boyle, et al., 2012). Some of the conditions what can be detected in the internal organs are gastric ulcers in pigs (Swaby & Gregory, 2012), parasites, liver abscesses, and pneumonia. Holstein dairy steers fed grain are more prone to liver abscesses than beef breed cattle (Renhardt & Hubbert, 2015). Research will need to be conducted to determine the severity of liver abscesses or gastric ulcers that would be detrimental to welfare. Animals with heavy loads of parasites or signs of severe respiratory illness would also have compromised welfare.

13. Inspection for signs of procedures that are prohibited

Many welfare guidelines prohibit docking of dairy cow's tails or mulesing in sheep. Animals that have had these procedures can be easily observed at the slaughter plant.

14. Welfare conditions on the farm that cannot be assessed at the abattoir

- The use of pain relief for surgeries such as castration or dehorning
- Type of housing used – individual gestation stalls or group housing
- Euthanasia methods used on the farm. This is an area of great public concern due to release of undercover videos on the internet.
- Accommodating behavioral needs on the farm
- Abuse by people that does not cause an injury. Example: Dragging conscious sows or cows.
- The quality of the animal's life on the farm and its ability to experience positive emotions. Did it have a life worth living? David Mellor (2016) and other scientists maintain that good welfare goes beyond avoiding negative emotional states such as fear and pain. Boissey et al. (2007) and colleagues introduced the concept of assessing positive emotions.

15. Other considerations

The public is highly concerned about on-farm euthanasia methods, the lack of pain relief for routine surgeries and restrictive housing systems. Evaluation of on-farm euthanasia methods is impossible at a slaughter plant. The need for surgeries can be eliminated or reduced by finishing (fattening) either intact males, use of immunocastration or use of polled cattle. Determination of the type of on-farm housing system is another area where assessment cannot be done at the abattoir.

16. Conclusions

Even though there are limitations assessment of animal welfare indicators at the slaughter plant would greatly improve animal well-being. It has the potential to reduce chronic painful conditions that are caused by either poor management or damage to the animal from housing. Some of the conditions that could be reduced by assessment at the slaughter plant are: lameness, leg injuries, damage caused by poor bedding/litter materials, bruises, and neglected health problems.

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