

8TH BOEHRINGER INGELHEIM EXPERT FORUM ON

FARM ANIMAL WELL-BEING

JUNE 5TH AND 6TH 2015, NIAGARA-ON-THE-LAKE (CANADA)



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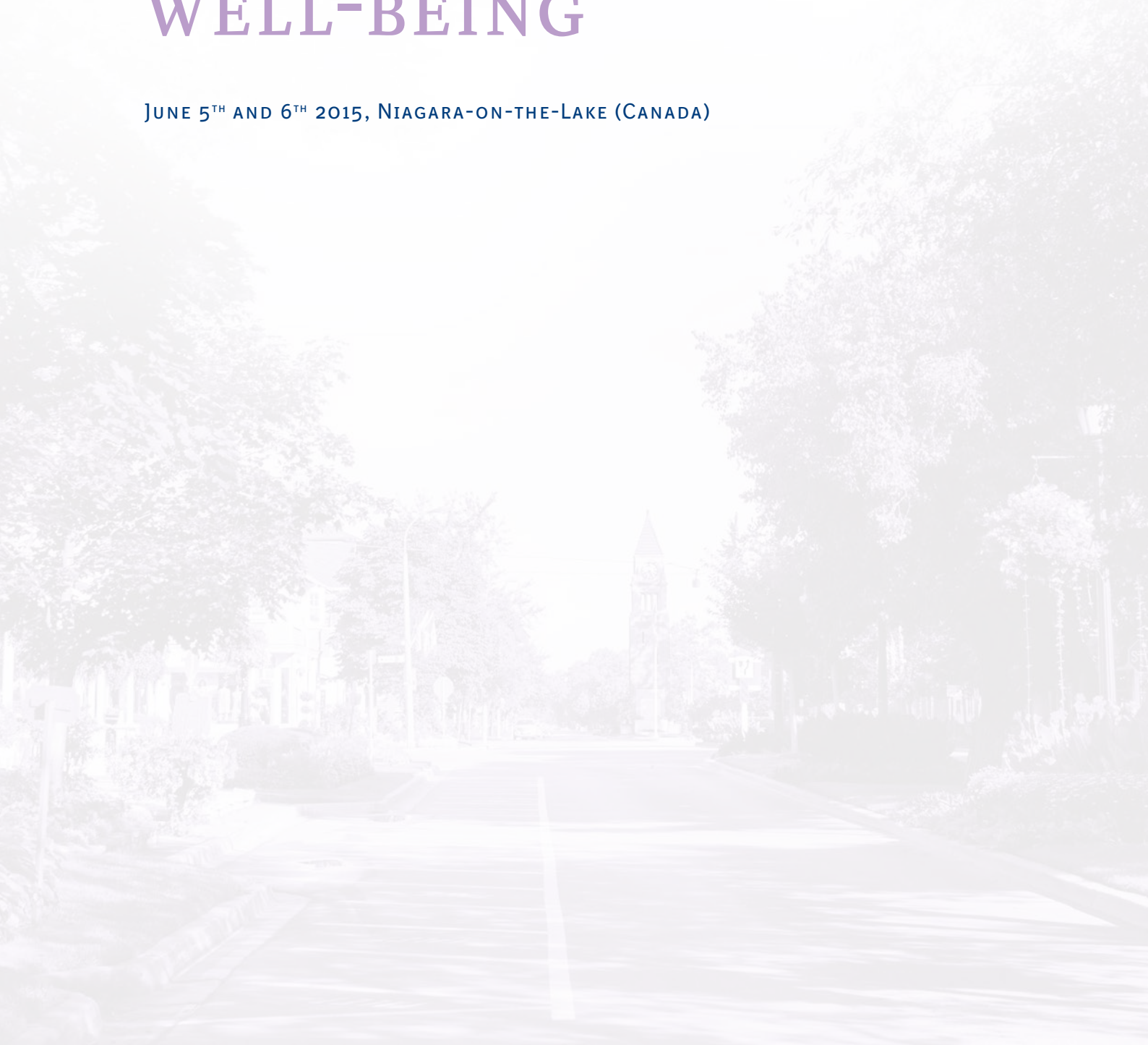
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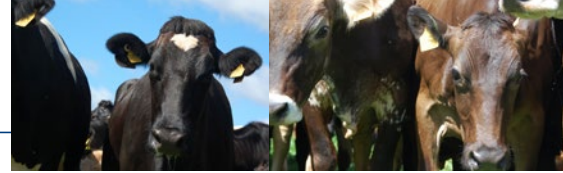
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Dr. Joseph Stookey

Joe grew up in Southern Illinois on a grain and livestock farm. He completed his Ph.D. in applied animal behaviour in 1991 at the University of Illinois. Since then he has been working at the Department of Large Animal Clinical Sciences at the Western College of Veterinary Medicine in Saskatchewan.

As an applied animal behaviourist, Joe aims his research at improving the productivity and welfare in our domestic food animals through the application and investigation of behavioral processes. Specific areas of interest include the investigation of maternal, social and handling behaviour of farm animals and the impact and comparison of routine painful management practices on livestock.



Measurements to assess pain in young calves

Dr. Joseph Stookey
University of Saskatchewan, Canada

The requirements outlined to address pain in young calves laid out by the Canadian Codes of Practice for the Care of Beef Cattle, differ from those found in the recent Code of Practice for Dairy Cattle. It begs the question whether calves from these two production systems and from two diverse populations of animals, one selected for beef and one selected for dairy, display differences in the physiological and behavioural response to pain? Or is the difference in Codes simply different pragmatic approaches by the respective Code Development Committees in addressing the same issue?

I'll discuss and look at the similarities between dairy and beef cattle and the possible extraneous factors that might alter a calf's response to pain. In addition, I will address the common, but perhaps misguided sentiment, that beef calves are too stoic in their response to pain to actually measure or detect it within them. Some of the common signs displayed in calves, that are indicative of pain, will be discussed, with the intent of training farmers and veterinarians to recognize and mitigate pain in all calves, dairy and beef.





Dr. Claire Windeyer

Upon completion of her veterinary degree in Guelph, Dr. Windeyer went into rural mixed practice in Southern Alberta. She returned to the University of Guelph to complete her DVSc in ruminant health management and epidemiology. Her thesis examined vaccination and risk factors for bovine respiratory disease in dairy heifer calves. She won the D.F. Forster medal, University of Guelph's top convocation award for graduate students for academic achievement, motivation, leadership and citizenship. After volunteering for 5 months in Nepal, she joined the University of Calgary in the Department of Production Animal Health.

Claire has a specific interest in pain and animal welfare, specifically on cow-calf operations. She looks into impacts of dystocia on calf vitality and maternal behavior, and pain mitigation at castration and branding.



It's a hard knock life: Impacts of dystocia and the assessment of compromised calves

Dr. Claire Windeyer
University of Calgary, Canada

Dystocia

Dystocia is a stressful and painful event for both cow and calf, negatively impacting calf vigour, health and survival, as well as compromising welfare and performance (Mellor and Stafford, 2004; Arnott, 2012; Murray and Leslie, 2013). Dystocia is defined as an abnormal calving associated with either a protracted unassisted or difficult assisted delivery (Mee, 2008). This may occur because of inadequate heifer growth, under- or over-conditioning of cows, mineral deficiencies, fetal-maternal disproportion, twins, congenital abnormalities or simply malpresentation.

Assisted calving

In the setting of commercial operations, it is often a challenge to consistently standardize what constitutes dystocia, so the term assisted calving is often used to more accurately describe what occurs on farm. In North America, calving is assisted in approximately 12 and 4% of beef heifers and cows, respectively (USDA, 2009), which is in contrast to the 31 and 20% of dairy heifers and cows, respectively (USDA, 2007).

Health and well-being of assisted calves

While growing attention is being placed on the health and well-being of the cow after dystocia, particularly in dairy operations, there remains a need for research to address the vigor of calves assisted at calving. Calves experiencing dystocia may be hypoxic at birth (Murray and Leslie, 2013), be subject to trauma including broken bones and soft tissue damage (Schuijt, 1990), and have less vigor within the first 24 hours of life (Barrier et al., 2012).

Assisted calves are often weak, may be delayed in their attempts to stand and walk, and therefore, may be at increased risk for mismothering (Odde, 1988; Riley et al., 2004; Barrier et al., 2013). Poor vigor is also associated with delayed consumption of colostrum (Barrier et al., 2012) and reduced absorption of IgG (Furman-Fratczak et al., 2011; Barrier et al., 2012). Thus, assisted calving and reduced calf vigor increase a calf's risk of failed transfer of passive immunity (FTPI).

Failed transfer of passive immunity (FTPI)

In dairy calves with FTPI, the risk of calf-hood morbidity may be increased (Furman-Fratczak et al., 2011; Windeyer et al., 2014) and growth may be reduced (Virtala et al., 1996; Windeyer et al., 2014) compared to those with successful transfer of passive immunity. In beef calves, FTPI also increases the odds of pre-weaning morbidity and mortality relative to calves with adequate levels of IgG (Perino et al., 1993; Wittum and Perino, 1995; Dewell et al., 2006). It is well established that passive immunity is a crucial factor for calf health and survival.

To combat FTPI, dairy calves are often hand-fed a prescribed volume of colostrum within a defined time of birth. In contrast, beef calves, who are typically born on pasture in a more natural environment, ideally do not require intervention to assure they receive adequate amounts of colostrum. The calf should stand, find its dam, reach the udder, latch onto the teat, and suck sufficient volume of adequate quality colostrum, all within a short period of time to ensure absorption of immunoglobulin. The cow must also stand, produce sufficient colostrum of adequate quality, and allow the calf to suckle. Therefore, calf vigor and cow-calf bonding are essential within the current cow-calf industry's management framework in North America.

Pain associated with dystocia

Another contributing factor to this issue that is garnering growing attention is the pain associated with dystocia (Laven, 2012; Murray and Leslie, 2013). While a recent survey indicated calf health and survival as predominant concerns of cow-calf producers in Alberta, Canada, fewer

than 15% of respondents indicated administering pain mitigation to either cows or calves after calving (Murray, et al., in progress). However, recent work at the University of Guelph suggests the use of a non-steroidal anti-inflammatory drug in dairy calves after an assisted calving can improve calf vigor and suckle reflex, and may also show benefits in terms of milk consumption, growth, and health (Murray, et al., 2014).



Assessing calf vigor

It is evident that assisted calving and the associated pain are major risk factors for reduced calf vigor, and that these all play a role in poor cow-calf bonding and the occurrence of FTPI. However, in order to make informed decisions regarding intervention strategies to improve calf vigor, ensure cow-calf bonding, and prevent FTPI, an accurate means to assess newborn calves is needed, regardless of the degree of dystocia.

A dairy calf VIGOR score was developed that was associated with the physiological status of the calf as well as degree of calving difficulty (Murray et al., 2014). Efforts to adapt this score to beef calves and use it to predict voluntary colostrum consumption are underway (Homerovsky, et al., in progress). Establishing an on-farm vigor score to identify beef and dairy calves with reduced vigor who are at increased risk of FTPI, morbidity, mortality, or poor performance could serve as a useful tool for producers, veterinarians, and researchers.



Notes

A series of horizontal dotted lines for taking notes, spanning most of the page width.

Dr. Dan Weary



Dan Weary is a Professor at The University of British Columbia. In 1997 he co-founded UBC's Animal Welfare Program and co-directs this active research group.

Dan's research focuses on developing behavioral measures for the objective assessment of animal welfare and developing practical methods of improving the welfare of animals. Dan's work on dairy cattle focuses on the housing and management of dairy calves and cows. His work has helped lead to the changes in feeding practices (including the adoption of higher milk rations) and housing methods (including the adoption of pair and small group rearing for pre-weaned calves). Work on cows has focused on improved comfort (especially in stall design and management), and how these changes can benefit cow health (especially lameness).

Dan's experimental work is based at the UBC's state-of-the-art Dairy Education and Research Centre, located in the heart of the BC dairy industry in Agassiz, BC. Much of Dan's recent work also takes place on commercial farms, helping to ground results in commercial practice, and acting as a direct conduit for knowledge sharing between researchers and innovative dairy producers. Dan has authored 100's of publications and is a frequent and enthusiastic speaker for dairy and professional audiences.



Suffering, isolation and cognition in dairy calves

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Animal Welfare Program, Faculty of Land and Food Systems, University of British Columbia, Vancouver, British Columbia, Canada

Introduction

Cognitive measures are increasingly used in animal welfare research, but until recently have not been applied to dairy calves. Here we review two lines of research with important implications for dairy calf welfare. In the first we show that calves change the way they appraise ambiguous stimuli when in pain, by becoming more likely to interpret these previously neutral stimuli as negative. These changes are consistent with low mood, and we argue that negative experiences resulting in low mood is indicative of suffering and deserves special consideration. Secondly, we show that early separation followed by individual rearing of calves, a pervasive practice in the dairy industry, causes learning deficits in calves. These changes can have important welfare and production consequences, and provide further evidence in support of group housing of calves on dairy farms

Changes in cognitive performance in response to pain - an indication of suffering?

The vast majority of research to date on pain in animals has relied upon acute behavioral and physiological responses to the nociceptive

insult, including measures of HPA axis activation, vocalizations, escape responses, and wound directed behaviors. These responses are often adequate for addressing whether the animal is experiencing pain, and how this experience might be mitigated (for example, with appropriate analgesics). But these measures do not help us address the larger question about how important this pain is to the animal, for example, how the experience may (or may not) affect the animal's quality of life. This distinction is crucial, as our own experience tells us that many everyday experiences of pain (stubbed toes, burnt tongues, and sometimes worse) are dismissed and patients experiencing longer-lasting pain often report that this does not affect their quality of life (e.g. Cassell 1982).

Until recently, there have been no scientific methods of distinguishing pain that is unpleasant, but of relatively trivial consequence to an animal's overall state of wellbeing, versus that which causes animals to suffer. One criterion for suffering, is pain associated with changes in the patient's mood state (Weary, 2014), and new research has begun to explore methods of assessing mood in animals. One robust technique is the use of changes in cognitive appraisals – for example, humans with low mood are likely to rate ambiguous images (e.g.



a neutral face) as negative ('the person is sad'), and these appraisal biases are now being used to assess mood states in animals (see Paul et al. 2005). This methodology is also useful to assess the effects of other types of 'pain' such as emotional or social 'pain' (see Panksepp, 2003). Until now, no work has assessed changes in appraisal bias associated with painful experiences.

Here we briefly review the results of recent work that assessed changes in appraisal following two types of pain related to routine management of dairy calves: the physical pain associated with disbudding early in life (Neave et al. 2013) and the emotional 'pain' associated with separation from the dam a few weeks later (Daros et al. 2014). By providing a small milk reward, calves were trained to touch a video screen when it displayed one colour (either

red or white) and to avoid the screen when the other colour was displayed. All calves quickly learned to perform this discrimination. Once fully trained, calves were then tested with intermediate shades composed of combinations of the two training colours (e.g. light pink, pink and dark pink). Before either painful procedure calves responded to the intermediates as expected; they approached the screen more often if it displayed a colour similar to the rewarded training screen. In the hours after both painful treatments calves showed a negative judgement bias, responding much less often to these intermediate colours. This cognitive bias is evidence of low mood and indicates that both types of pain have more than just transient effects on the calves. We argue that such systemic changes in cognitive responses in the days following a procedure can be a criterion for



distinguishing more trivial experiences of pain from those that cause animals to suffer.

Changes in cognitive performance in relation to early rearing experiences - social housing makes for smarter calves?

Recent research on calves has also demonstrated that commonly accepted housing and management practices can have profound effects of cognitive development. Social isolation early in life is known to impair aspects of cognition. For example, isolation causes deficits in reversal learning and novel object recognition in primates (e.g. Harlow et al., 1965) and in laboratory rodents (Fone and Porkess, 2008). Dairy calves are typically separated from the dam within hours of birth, and then reared individually for the first few months of life. Although not intended as such, these common management practices create the very conditions known to cause the deficits described in other species.

Our work (described above) shows that all calves can be trained to approach the correct stimulus in a visual discrimination task, but we have now found individually reared calves are generally unable to re-learn the task when training stimuli are reversed (Gaillard et al., 2014; Meagher et al., in review). In contrast, socially reared calves perform well in reversal learning tasks, and other tasks requiring behavioral flexibility. These differences may be due in part to higher levels of anxiety in the individually reared calves – these calves respond more fearfully to novel objects (De Pala Vieira et al. 2012) and are reluctant to approach and consume new feeds compared to socially reared calves (Costa et al. 2014).

Take home messages

Measures of cognitive functioning, both as an indicator (in the case of suffering) and as an outcome (in the case of individual housing), show promise in the development of improved rearing methods for dairy calves. The practical implications of this work include 1) that pain in hours after disbudding requires treatment, and 2) that individual rearing of dairy should be avoided.

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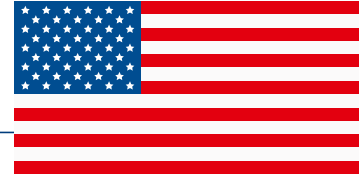
Dr. Cassandra Tucker



Dr. Cassandra Tucker grew up in southern California and studied Animal Science and Management at UC Davis, California. She conducted her Ph.D. work in the Animal Welfare Program at UBC (Vancouver, Canada) and worked for 3 years as a scientist at AgResearch (Hamilton, New Zealand). Ultimately, she returned to UC Davis in 2007.

Research in Cassandra's laboratory focuses on assessment and improvement of animal welfare in dairy cattle. Her research examines what animal behavior tells us about how animals see their world. She is particularly interested in how the behavior of dairy cattle changes in response to controversial procedures (e.g. tail docking, disbudding), management decisions (e.g. stocking density), and housing design (e.g. type and quantity of free-stall bedding, effects of inclement weather).

Much of Cassandra's work involves applying knowledge on pain behavior to create practical improvements in how we care for animals. She wants to understand the best way to care for cows in order to improve their comfort.



Pain sensitivity and healing of hot-iron cattle brands

Dr. Cassandra Tucker
University of California, Davis, California, USA

Concerns about animal welfare are often centered on negative affective states, such as pain. These concerns are increasingly reflected in regulatory changes concerning animal agriculture, evidenced by bans of specific painful husbandry procedures such as tail docking. Consumer assurance programs, the largest driver of animal-welfare change in the US (Mench, 2008), are also increasingly specifying how and when pain relief must be provided to farm animals. For cattle, the common painful procedures addressed by such programs include castration, dehorning or disbudding and branding. There is considerable scientific evidence that all of these procedures cause immediate pain (Coetzee, 2011, Schwartzkopf-Genswein et al., 1997b, Stafford and Mellor, 2011), but less is known about pain experienced through the healing process.

Hot iron branding

Hot iron branding is the most common form of herd identification in the US beef industry (45% of cattle and calves, USDA, 2008). Pain responses during branding include tail flicking, kicking, and falling down (Schwartzkopf-Genswein et al., 1998), escape attempts (Lay et al., 1992), and vocalization (Schwartzkopf-Gens-

wein et al., 1997b, Watts and Stookey, 2000). In addition to the immediate response, healing of hot-iron brands can take longer than 10 weeks in other species, sometimes up to 1 year (Daoust et al., 2006, van den Hoff et al., 2004) and burns can remain painful until the healing process is complete (Hanafiah et al., 2008).

Initially, it was known that brand wounds are inflamed at least 7 days after branding (Schwartzkopf-Genswein and Stookey, 1997) and that there were no effects of the procedure on weight gain and handling ease in the weeks that followed the procedure (Schwartzkopf-Genswein et al., 1997a). More recently, we have found that hot-iron brands take at least 8 weeks to heal or become fully re-pigmented (Tucker et al., 2014a, Tucker et al., 2014b).

When a known and increasing force is used to quantify sensitivity of these wounds (stimulus-evoked pain responses), branded cattle are more sensitive than unbranded controls for at least 10 weeks (Tucker et al., 2014b). In addition, brand wounds are more sensitive at the center of the wound than 5 or 10-cm above it (Tucker et al., 2014b), supporting the idea that the degree of tissue damage increases the response to palpation. The sensitivity of the tissue corresponds to the degree of healing: cattle with hot-iron brand

wounds further along the healing process are less responsive than at earlier stages.

As with other painful procedures, methods of alleviating pain associated with the procedure or those that hasten healing would improve animal welfare. As an initial step towards understanding of how interventions affect healing of hot-iron brands, we have explored two options: administration of a non-steroidal anti-inflammatory (NSAID) or use of a cooling gel at the time of branding.

NSAID administration

Unlike dehorning or castration (Coetzee, 2011, Stafford and Mellor, 2011), little is known about how to alleviate branding pain. In terms of pain in the hours afterwards, the effects of a single injection of NSAID is beneficial for these procedures in cattle. Less is known about how reducing inflammation after these procedures

affect healing in cattle. NSAIDs have either no effect or slow healing in soft tissue wounds in humans and rodents (Chen and Dragoo, 2013, dos Santos and Monte-Alto-Costa, 2013).

The effects of a single injection of an NSAID has been suggested as a practical method of mitigating pain in the hours after branding. However, we found this approach has limited to no biological benefit in terms of wound sensitivity, surface temperature, healing rate or lying behavior (Tucker et al., 2014b). These results are, perhaps, unsurprising, given that the effectiveness of the drug we tested, flunixin meglumine, is short (half life is 3-8 h Anderson et al., 1990). Further work is required with a longer lasting NSAID.

Cooling gel

Effective cooling of a burn using water or a gel (active ingredient, tea tree oil) has been demonstrated to improve the rate of wound healing and decrease tissue damage in pigs (Jandera et al., 2000). In cattle, application of a room temperature gel either once immediately after or twice (immediately after and 1 day later) after hot-iron branding immediately cools the tissue, but this change does not result in improvement of long-term outcomes such as sensitivity or healing rate.

Other factors

Other factors that may influence healing of hot-iron brands remain largely unexplored. Aspects of branding method, such as iron temperature and contact time, do not correlate with healing within the range tested (Tucker et al., 2014b), but further work in this area may be warranted to optimize the process.





The age of the animals is another consideration. Branding younger calves may hasten healing for several reasons. Firstly, the amount of tissue damaged could be smaller in younger calves than in older, bigger animals. Secondly, calves grow more rapidly in the weeks after birth than at the industry-typical age for processing on cow-calf operations (10 to 11 weeks, USDA, 2008) and this faster growth may aid healing.

Finally, anecdotal reports suggest that the shape (e.g. curves vs. straight lines) and concentration of surface area affected may affect healing. For example, the center of the brand may remain more sensitive than the outer edges because the burn is more severe in this area.

Conclusion

The immediate pain associated with hot-iron branding has been well documented and new evidence suggests that these wounds remain painful throughout the healing process (8+ weeks). At least 2 possible practical solutions, a single injection of NSAID or a cooling gel applied at the time of branding, do not hasten healing. Alternatives are needed.

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Dr. John Campbell

Dr. Campbell is a graduate of the Ontario Veterinary College and after graduation spent three years working in mixed practice in Ontario before returning to the University of Guelph to complete a doctor of veterinary science degree. John has been a member of the Western College of Veterinary Medicine faculty since 1991 and teaches beef cattle health management and epidemiology at the veterinary college.



Pain mitigation after castration of young calves and its effect on performance and behavior

Dr. John Campbell
University of Saskatchewan, Canada

Castration of beef cattle

Castration of male cattle is a common livestock procedure practiced throughout the world. (Coetzee, 2010). Despite steers having lower weight gains than intact bulls, castration of calves has several benefits. Castration reduces aggression in animals, making them easier to handle, and also improves the palatability of the meat and avoids unwanted pregnancies (Gonzalez, 2010).

Castrations can be performed by physical, hormonal, or chemical methods, with physical castrations being by far the most common (Coetzee, 2013). Physical methods aim to irreparably damage the spermatic cord and blood supply to the testicles (with burdizzos or rubber rings) or completely remove the testicles from the body (with surgery). Regardless of the method used, all physical modes of castration have been shown to cause pain and distress in calves of any age (Stafford, 2005).

Age of calf and effect of castration

The trauma of castration via physical methods increases with the size of the testicles being

removed. Calves castrated at a younger age demonstrate lower reductions in growth rate post-castration than older calves (Bretschneider, 2005). Younger calves show less evidence of pain and distress during castration in both beef and dairy calves (Bretschneider, 2005; King et al, 1991; Robertson et al, 1994; Boesch et al, 2008; Ting et al, 2005).

It is clearly apparent that the most welfare friendly practice in beef cattle herds is to castrate at as early an age as practically possible which is reflected in the new Canadian beef code of practice. The recently updated Canadian beef code of practice also has specific requirements for pain control in beef calves at castration. These standards are creating a demand for research into practical techniques of pain mitigation following castration. Although the veterinary community has begun to implement pain control as part of their protocol for these procedures, only 21% of veterinarians in the US reported using analgesics at the time of castration (Coetzee, 2010). Unfortunately, a great deal of research into controlling pain in beef cattle during castration has focused on castrating older animals rather than focusing on the young calf.

Pain control for castration

There are several ways that pain alleviation can be administered to young calves for both procedural and post-procedural pain associated with castration. Local anesthetics can be administered prior to castration. However, there is a delay until the anesthetic properties take effect, thus reducing the feasibility of anesthetic use in a production setting (Coetzee, 2011). Epidural administration of lidocaine, though effective, can be difficult to deliver which also makes it less practical for producers. Beef calves are often castrated on a single day of processing and sometimes large numbers of animals are handled in an intensive time period. Dairy bull calves are often castrated in smaller groups and there is less concern about the time required to perform the task of processing these calves. This creates a greater difficulty for providing an effective and practical method of pain control that can be applied to the young beef calf in the production setting.

Non-steroidal anti-inflammatory drugs (NSAIDs) have also been researched as effective pain mitigator for castration. Many NSAIDs such as ketoprofen and flunixin meglumine have been shown as effective mitigators of post-procedural castration pain in calves (often in combination with an anesthetic) (Currah 2009, Early 2002). However, it has been argued that many NSAIDs have a low half-life, and need frequent dosage in order to be properly effective (Coetzee, 2011; Smith 2008).

Meloxicam is an NSAID with a longer elimination phase half-life than other analgesics. For a subcutaneous injection, meloxicam's elimination half-life is 27 hours compared to an 8-12 hour elimination phase half-life of flunixin meglumine. (Coetzee, 2011; Currah, 2009). A

number of studies have demonstrated the effectiveness of injectable or oral meloxicam as a method of pain control in cattle.

Assessment of pain in beef calves

Pain in cattle can be extremely difficult to assess and quantify (Molony, 1995). As a prey species, cattle are adept at hiding pain and distress (Weary, 2006). Techniques to evaluate pain include assessments of physiological, neuro-endocrine, production and behavioral parameters. Physiological cortisol level changes have been used to determine pain and distress in calves following castration (Early, 2010). However, cortisol levels vary considerably between animals and may not reflect the degree of pain experienced (Coetzee, 2011). It has also been argued that cortisol levels are associated with distress and fear in calves and not necessarily pain (Currah, 2009).

Observing behavioral changes in calves following castration can be used to assess pain in calves and avoids the use of invasive handling techniques that are usually used to obtain physiological samples (Weary, 2006). Currah et. al (2009) used pedometers, vocalizations, visual assessments and stride length measurements to determine pain following castration. Currah showed that following castration, calves shortened their stride lengths and this method can be used to indicate pain. Accelerometers, which are small devices that measure acceleration and tilt angles, have also been used on calves to assess pain following castration. Accelerometers indicate the lying and standing behavior in calves and avoid any observer or handling effect while measurements are collected. White et. al (2007) showed that calves spent more time standing following castration than before surgery.



Conclusions

Castration is a necessary procedure that is carried out routinely in bull calves in the North American beef industry. All methods of castration cause pain and distress at any age, however, the trauma caused by castration increases with age and castration at a younger age results in quicker healing and causes less pain and distress overall. Animals castrated at younger age, demonstrate lower declines in growth rates post-castration. The beef industry has specific challenges in terms of logistics and production which makes it more challenging to utilize a practical method of pain control during processing. Local anesthesia may decrease pain responses during and immediately post castration, but does not control longer term pain in castrated calves. Local anesthesia is also more difficult to apply in the beef cattle production setting. Research studies utilizing non-steroidal analgesics such as meloxicam have shown promise in controlling pain; however, much of the research has focused on older animals. Pain mitigation should be more successful and more easily applied when castration is performed on a younger animal. Ongoing research studies demonstrating the benefits of pain control in young beef calves are still needed.

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Dr. Derek Haley

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Derek is currently an Assistant Professor in the Ontario Veterinary College at the University of Guelph where he teaches DVM students about farm animal behavior, and animal welfare, and has a research program working on beef and dairy cattle.



Stress at weaning

Dr. Derek Haley
University of Guelph, Canada

The process of weaning

Weaning involves the independence of offspring from parental care, but the term is most commonly used specifically in reference to the nutritional independence of the young of mammals, characterized by the termination of milk feeding. While in animal agriculture we regard weaning as a particular point in time when we impose it as part of our management of animals, naturally weaning is believed to be an ongoing and gradual process that takes place over an extended period of time.

In truth few if any detailed descriptions exist of natural weaning – for any species, due to the protracted behavior observations that would be required to establish, with certainty, that nursing completely ceased. Still we need to consider that when we impose weaning on our beef cattle, they may to some degree already be experiencing a gradual natural weaning.

Conventional industry weaning practices
Data from the 2007-2008 USDA-NAHMS survey of 4000 beef producers across 24 different States provides us with the most comprehensive picture of typical weaning practices for beef cattle farms in the US. These data may also reasonably reflect the common weaning practices in Canada. Regardless of herd size, weaning is

typically applied when calves are (mean \pm SE) 206.7 \pm 1.1 days of age (USDA-NAHMS, 2007). A majority (53.8%) of the beef farms surveyed under the NAHMS project (2007) weaned their calves based on calf age/weight and almost the same percentage (49.7%) of farms that sold calves for purposes other than breeding sold their calves immediately at the time of weaning. This occurred despite the fact that preconditioning programs frequently recommend producers to hold calves for a period of time to reduce the likelihood of adverse health effects among young calves. Such events occur regularly when the stressors of weaning, mixing, and transportation are combined (USDA-NAHMS, 2007).

Dealing with the stress of weaning

The impact of compounding stressors at weaning on compromising immune status, and the high risk of negative health consequences are the key reasons why it is common to treat all calves (metaphylaxis) upon arrival at feedlots. However such practices are certainly under scrutiny and subject to increasing criticism in the media and public forums. One approach to potentially changing current practices for the health management of newly weaned beef calves, involves improving our understanding

of the factors that contribute to the stress of weaning. Understanding the impact of mixing and transport are important aspects to consider, but the exploration of weaning process itself has been the domain of applied ethologists. Learning more about the natural behavioral biology of cattle as it relates to weaning has proven already helpful in developing strategies to improve weaning practices and ultimately improve the health and well-being of the cattle.

Conventional weaning

Based on the NAHMS survey (2007) the most common method of weaning beef cattle is by what is best described as the “remote physical separation” of cows and calves by a distance which precludes any visual contact or auditory communication. Even in cases where remote separation is practiced on a farm without the

additional stressors of transporting and mixing calves - the overt behavioral responses of cows and calves to this method last for up to 4 days (Haley, 2006). The vocalizing and increased time spent walking are distress responses and they subside if cows and calves are put back together. Because reunion is not practiced, the time spent vocalizing and walking is associated with a significant decrease in the amount of time the calves spend eating. These distress behavior responses to weaning are the same in other social ungulates such as horses (McCall et al., 1985), sheep (Orgeur et al., 1999), and elk (Pollard and Littlejohn, 2000).

Fence-line weaning

Challenging the belief that cows and calves recover from weaning stress faster if they are remotely separated, scientists in New Zealand





investigated as early as 1977 whether, in fact, the exact opposite might be true. Nicol (1977) studied remotely weaned calves and compared them to calves that experienced fence-line weaning, which involved separating the calves into an enclosure that was immediately adjacent to an enclosure that contained their mothers. This study found a short-term advantage for weight gain and noted a seeming improvement in calf behavior, although they did not record behavior as part of their study. Subsequent experiments that did examine behavior have found fence-line weaning to be a significant improvement over remote separation for weaning beef calves (Stookey et al. 1997), horses (McCall et al., 1985) and elk calves (Haigh et al, 1997). Subsequently Price et al. (2003) found that, compared with the remotely separated calves, calves weaned with fence line contact had improved weight gain during the 52 weeks examined, after the cow-calf pairs were separated.

Two-stage weaning

To date, perhaps the most unique method invented for reducing weaning stress involves calves wearing a nose-flap for a period of 5 to 7 days (stage 1), which prevents them from nursing but allowed them to still be able to graze and drink – and, most importantly, have other forms of interaction with their dam. Stage 2 involves removal of the nose-flap and the physical separation of cows and calves. The results of studies on this method have shown that – compared with the traditional method of weaning by total separation, weaning in two stages reduced vocalizing by calves by 95% (Haley, 2006). Further studies have shown that even across the two stages of this process, the behavioral response of calves with this method

is significantly less than the response of calves being weaned by fence-line contact.

Conclusions

Weaning stress is a subject that we know and understand increasingly well and for which research has provided viable solutions to overcome. There are trade-offs for the various methods proposed here, but all have the end goal of reducing the stress experienced by the animal. Benefits to the cows undergoing these methods parallel the behavioral changes seen among the calves, although cows tend to respond even more intensely. This raises very interesting questions about the distress they experience during weaning, compared to what the calves experience.

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Mr. Jeffrey Fitzpatrick-Stilwell

Jeffrey is the Senior Manager, Sustainability for McDonald's Canada, responsible for directing all functional activities in support of the company's goals under the McDonald's Global Sustainability Framework. He develops and leads the implementation of sustainability strategies across the five sustainability pillars (Sourcing, Food, Planet, Community, and People). He represents the company on the global sustainability teams responsible for shaping the sustainability policies and practices across the worldwide McDonald's system. He also manages the company's external relations with key sustainability and CSR stakeholders and influencers.

McDonald's is the leading foodservice company in the world. McDonald's Canada and its franchisees own and operate more than 1,400 restaurants and employ more than 85,000 people across Canada. McDonald's Canada serves millions of Canadians each and every day.



What is the significance of considering the welfare of food-producing animals to the consumer?

Mr. Jeffrey Fitzpatrick-Stilwell

Senior Manager Sustainability, McDonald's Restaurants of Canada Limited

McDonald's Verified Sustainable Beef Pilot Project and Global Vision for Antimicrobial Stewardship

McDonald's is committed to offering Canadians safe, high-quality and sustainably & responsibly-sourced menu options. Beef is core to McDonald's business and we are proud of the fact that 100% of the beef sold to consumers in McDonald's restaurants in Canada is supplied by Canadian beef producers. We want to continue this tradition while working with producers to make continuous improvements in the environmental, social and economic performance of their operations.

It is our aim to work with Canadian beef producers to sell more Canadian beef through increased consumer trust and confidence, as we know that Canadian beef producers will want to be able to supply products that are needed in today's, and tomorrow's, market.

Customers are asking us more and more questions about where our beef comes from and how it is produced. Animal well-being is not only important to producers of farm animals, it is important to organizations like McDonald's that purchase farm products because our customers are asking for products that can be verified as sustainably and responsibly sourced.

In January, 2014, McDonald's made a commitment to begin sourcing a portion of our global beef supply from verified sustainable sources in 2016. We also committed to setting a global verified sustainable beef sourcing target for 2020.

To inform those commitments McDonald's launched a Verified Sustainable Beef Pilot project in Canada in 2014. The Pilot project will serve as a learning opportunity to understand how we can measure, verify, and communicate to consumers the sustainability of beef production.

Through the Pilot we are working with numerous beef experts along the entire value chain to demonstrate and verify the sustainability of the Canadian beef supply. This will be accomplished through transparent collaboration, communication and celebration of the great work done throughout the beef supply chain in Canada.

We are using the principles and criteria developed and approved by the Global and Canadian Roundtables for Sustainable Beef, and are working with stakeholders to develop sustainability indicators that will apply those principles/criteria to Canadian production. We are not creating a McDonald's standard for sustainable beef, and as such, the Pilot will also inform the broader work of the Canadian Roundtable for Sustainable Beef as it works to develop its own indicators and

mechanisms for verification of sustainable beef production.

The Canadian Pilot Project is designed to enable Canadian beef producers to demonstrate their commitment to sustainable beef production through a self-assessment process followed by independent 3rd party ranch, feedlot and processor on-site verifications by the uniquely qualified professionals at **“Where Food Comes From”**. It is important to note that this process is focused on a verification of outcomes, rather than certification to a pre-determined standard. Verification will aim to allow beef producers to demonstrate how they meet the sustainability indicators under varying conditions throughout the value chain.

McDonald’s has also announced an update to its global antimicrobial position with the March release of its **“Global Vision for Antimicrobial Stewardship in Food Animals”**.

As the body of scientific evidence grows, and scientific consensus emerges, we recognize the importance of continuing to evolve our position on antimicrobial use. In 2014, McDonald’s assembled a team of experts from around the world to study, debate and comment on antimicrobial use in food animals. These experts represented veterinarians, physicians, academics, clinical pharmacologists, epidemiologists,

ethicists, animal health and welfare experts and other food animal production experts, and developed recommendations for antimicrobial stewardship in food animals, building on McDonald’s 2003 global policy on antibiotic use in food animals.

Our Vision for antimicrobial stewardship is “Preserving antimicrobial effectiveness in the future through ethical practices today”.

To achieve this vision, the guiding principles for judicious use of antimicrobials should be understood, implemented and verified on all farm operations raising food animals. Second, meaningful veterinary oversight is imperative when antimicrobial use is required to maintain the health and welfare of animals. Third, we support the World Health Organization’s (WHO) characterization of critically, highly and important antimicrobials in human medicine. We acknowledge antimicrobials differ in terms of their importance in both human and animal health care, and those differences were considered.

McDonald’s strongly supports the implementation of all education, training and outreach programs and seeks the development of verification programs for judicious antimicrobial use in all species to achieve our Vision for antimicrobial stewardship.





Notes

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Ms. Melissa Downing

Spring Creek Ranch was started in 2003 as a means of adding value to the cattle the Kotelko-family had been breeding and raising for many years. Through Spring Creek, Kirstin Kotelko, fourth generation on the farm, offers a line of premium beef products that are raised without antibiotics or added hormones to create an exceptional eating experience.

Spring Creek Ranch has a focus on food that is made with care for quality, safety, traceability and the environment.

Melissa Downing has been involved with Spring Creek Ranch since 2007, her current role being Producer Liaison which encompasses everything from cattle procurement to production to public relations. She received her B.Sc. in Agriculture from the University of Alberta with a major in Sustainable Agriculture Systems, and is a Professional Agrolologist in the province of Alberta. Since the time she joined Spring Creek the program has increased ten-fold as they strive to meet consumer demand for their beef, which is raised without antibiotics or added hormones. Melissa and her husband also raise their own cattle to help meet some of this demand.



Challenges of a growing niche market

Ms. Melissa Downing
Quality Control Coordinator, Spring Creek Ranch

Spring Creek Ranch works with ranchers across Western Canada to raise quality beef products without the use of antibiotics or added hormones, marketing their product primarily in Canada but exporting some as well. In the program's inception it was found that although many people liked the concept of organic products, most did not differentiate enough between 'organic' and 'raised without antibiotics or added hormones' to justify the cost difference. Our label claim has been CFIA approved since 2004 to sell beef "Raised without antibiotics or added hormones".

Animal welfare in food production has long been on the agenda for activists, but in recent years it has also become a trendy topic amongst general public. Social media has played a huge role in this trend and has triggered consumers to ask more questions about their food in general. The disconnect between food producers and consumers has become increasingly vast, presenting an opportunity for us to educate the public about the outstanding job ranchers do. However, you have to prove that you are actually doing what you say you are doing, so we researched verification programs for animal care. In the same way that we have CFIA certification and third party audits to ensure our beef is raised without antibiotics or added hor-

mones, consumers also want verification and audits in place to ensure we employ appropriate animal welfare practices.

Humane Farm Animal Care (HFAC) is a certification body based in the United States that has outlined realistic, achievable welfare standards for ranch and feedlot environments, as well as other operations. The board consists of industry experts such as Temple Grandin and sets out guidelines for all aspects of raising cattle including calving, feeding, shelter, medical intervention, etc. Most of the guidelines fit within our existing Spring Creek protocols; however the topic of castration and dehorning presented an opportunity to amend our production requirements for ranchers. According to the HFAC guidelines, cattle under their program should be either (a) castrated within 7 days of birth or (b) administered pain control (Metacam®) at the time of castration, which should be completed prior to 6 months of age. The same guidelines apply to dehorning, should it be necessary.

Some of our ranchers already fit within the HFAC guidelines for castration and dehorning, and those who didn't are adapting in one of two ways - some have simply begun castrating everything before 7 days of age, and others are

FARM ANIMAL WELL-BEING

using Metacam®. If not done at birth, castration and dehorning usually take place at branding, which also typically involves vaccinating with a 7- or 8-way with somnugen as well as a respiratory vaccine.

Several of our largest ranchers were anxious to try using Metacam® at branding and observe the effects of the pain control. What they generally found was that calves appeared more alert in the hours and days following branding and they paired up and trailed better to pasture. One rancher observed that even heifer calves that had not been branded or dehorned appeared to be feeling better than usual in the days following, suggesting that the pain control may also be effective in managing the side effects of vaccination or other stresses related to processing. The observations in one large herd were enough to convince owners to use Metacam® for all

castrations, even on purchased commercial bull calves that they put on feed in the fall (not part of the Spring Creek program).

One of our national retailers is specifically promoting our product as “Certified Humane”, which has been well-received by their customers. The balance of our product is still being marketed primarily as “Raised without antibiotics or added hormones”, however we do have customers who contact us with specific welfare concerns and are relieved to know we are working with a humane certification program. As consumers ask more and more questions about where their food comes from and how it is produced, transparency and accountability are becoming increasingly valuable as marketing tools. Who knows, what may seem like ‘niche’ marketing today may become the standard one day.





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Dr. Ed Pajor

Dr. Ed Pajor is a Professor of Animal Welfare at the University of Calgary Faculty of Veterinary Medicine, Department of Production Animal Health. He is recognized internationally for his research in the areas of swine, dairy and poultry behavior and welfare as well as expertise in animal welfare standards and legislation. Dr. Pajor has served on the Editorial Boards of the Journal of Animal Science as well as Applied Animal Behavior Science and as the US representative to the International Society of Applied Ethology. Dr. Pajor also provides scientific expertise to numerous organizations including the McDonald's Animal Welfare Panel, the National Pork Board's Animal Welfare Committee, and Humane Farm Animal Care.

Dr. Pajor completed his B.Sc. degree in biology from the University of Waterloo and received his M.Sc. and Ph.D. degrees in biology from McGill University, specializing in animal behavior. Prior to joining the faculty of Veterinary Medicine, Dr. Pajor spent 10 years on faculty in the Department of Animal Sciences at Purdue University.



What are the possible drivers for improving farm animal well-being?

Dr. Ed Pajor
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Introduction

Animal welfare deals with the health and functioning, naturalness, and affective states of animals (Fraser et al., 1997). Although animal welfare has been a historical concern for producers and society, its importance to animal agriculture and the scrutiny to which animal agricultural practices are under has never been greater and are only expected to increase in the future. The purpose of this presentation is to identify potential drivers for improving farm animal well-being.

Changing attitudes and perspectives

Societal views on the use of animals have changed substantially over the years. These include increased concern regarding the use of animals in research, keeping animals as pets and using animals for food. Numerous surveys across the globe have concluded that the welfare of animals used for food is important to consumers (Spooner et al., 2014; Eurobarometer, 2007; Lusk et al., 2007). For example, a recent survey in the United States indicated that 65% of US consumers were concerned about the welfare of beef cattle (McKendree and Tonsor,

2014). Concerns tend to be focussed on specific farm practices, including social isolation, confinement and pain inducing practices.

Disagreement between producers and consumers on these issues is not unusual. For example, Canadian consumers stressed the importance of affective states, freedom from pain and fear, and the expectation of pain management if painful procedures occur (Spooner, 2014). Canadian beef producers recognized certain procedures as painful but consider them either necessary, either to be of sufficiently short-term to be unimportant or that pain management presents additional welfare issues which were greater than the pain itself (Spooner, 2012). Such differences in attitudes can lead to significant concern in how food animals are raised. For example, only 39% of US consumers believed that US farmers and ranchers provide appropriate overall care to their cattle. This lack of trust can have significant impact on agriculture's social license, the privilege of operating with minimal formalized restrictions, guidelines, codes and self-regulation rather than external legislation. As the separation between consumers and producers of food increases in the future, concerns over how food animals are raised and the trustworthiness of food producers and retailers will be a major driver for improving animal welfare. One of the

most effective ways to gain consumer's trust is to demonstrate shared values through animal welfare standards and assessments.

Standards and assessments

Animal welfare standards have been developed and range from the international to the local, niche market level. Historically, the European Union has used a legislative approach whereas the US has used private industry to move animal welfare forward. Animal welfare standards are now being moved forward through a combination of these efforts across the globe. Animal welfare standards and outcome assessments will be one of the most important drivers for animal welfare. Future emphasis will likely be on attempts to harmonize standards for commerce or trade purposes as well as encourage development of standards in non-industrialized countries.

Animal welfare standards in Canada, "Codes of Practice" are developed through the National Farm Animal Care Council (NFACC). New codes have been developed for most major commodity organizations in the past 5 years. The Canadian Codes of Practice are scientifically informed, practical, and reflect societal expectations for responsible farm animal care. In addition to the Codes of Practice, Canada has developed an Animal Care Assessment Framework (ACAF). ACAF is a standardized process to follow when on-farm animal care assessments are being developed and implemented.

Science

There is no question that scientific advances and technological innovation have and will continue to be a driver for animal welfare in the future. In

the past 50 years animal welfare has developed to include a broad range of scientific disciplines to the point where general principles for the welfare of animals in production systems have recently been established by the World Organisation for Animal Health (OIE, 2012, Fraser et al., 2013). Animal welfare standards and recommendations are more science informed than anytime previously. Future development of input and output measures of animal welfare will occur and need to be included when standards and assessments are revised. For example, advances in measuring animal emotional states or pain are expected to occur (Boissy et al, 2007; Coetzee 2011; Mendle et al., 2010). The relationship between genetics and animal welfare is sure to emerge as an important area of research in the future (D'Eath et al., 2010). As a desire for cheap affordable animal products increases in the future, geneticists will need to consider animal welfare concerns as part of their selection criteria.

Animal welfare and economics

Agricultural economists that have studied animal welfare have focussed either on 1) the costs associated with changes in management to improve welfare or 2) the conflict between consumers voting or expressed preferences for animal welfare friendly products and their willingness to pay (WTP). Economic research on animal welfare, both theoretical and practical, has started, but more needs to be done. Research that improves our understanding of consumer's willingness to pay for certain issues such as food safety, animal welfare and environmental protection (Viegas et al., 2014) provides future direction as to what aspects of animal welfare or sustainability warrant promotion. Economic research can also help develop incen-



tive frameworks. How should costs and benefits be distributed? Are subsidies for producers the most effective way to promote adoption of animal welfare friendly management approaches? Perhaps as suggested by Harvey and Hubbard (2013), economic policies that subsidise consumption of animal welfare friendly products are more effective.

Animal Welfare and Trade

The development of animal welfare standards may have a significant impact on trade. The OIE is recognized by the WTO as the standard setting organization for animal diseases and has now developed animal welfare standards. These international standards signal an increasing role for animal welfare in trade related issues either formally within the WTO process or through multilateral or bilateral trade agreements (Thiermann and Babcock, 2005). The WTO's recent decision to uphold the EU ban on the importation of seal fur under GATT Article XX(a) is the most direct evidence of an animal welfare issue being involved in a trade dispute. This ruling allows for the restriction of trade in order to protect public morals. The implications of this ruling for new and future trade agreements are still unknown. However, there is no question that the importance of animal welfare on trade issues has been significantly broadened.

Education and Outreach

Consumers

Survey results in many parts of the world indicate that many consumers would like to receive additional information on how their food is produced and place particular interest on the management practices associated with animal

welfare (Olynk, 2012). This is particularly true when it comes to intensive animal agriculture (McKendree and Croney, 2014). Numerous recommendations emphasising the importance of transparency and effective communication are made. However, there are few peer reviewed publications which focus on understanding and developing effective communication approaches for consumers that capture the complexity of animal welfare concerns.

Producers

Ensuring that producers use good animal welfare management practices, are aware of standards such as codes of practice, and are engaged in assessment programs is essential for maintaining a social license to operate. This is particularly true when standards are voluntary or difficult to enforce. The inability of organizations such as commodity groups, niche markets, retailers etc., to effectively engage producers in animal welfare programs/schemes will result in the failure of such initiatives.

Although some research has been done on understanding effective producer outreach programs (Jansen et al., 2010) and specific outreach tools (Vasseur et al., 2012), additional research is necessary. Researching and implementing 1) how producers are influenced to adopt specific animal welfare management practices and 2) how to encourage producers to participate in animal welfare programs is essential.

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Notes

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NEITHER DO WE.

