

a lidocaine (2% with epinephrine) ring block 30 min prior to knife castration in combination with a single dose of subcutaneous meloxicam (Metacam 0.5 mg/kg BW) administered immediately prior to castration. Forty-eight Angus bull calves (301.4 ± 5.8 kg BW) were randomly assigned to a 2 × 2 factorial design assessing administration of meloxicam and lidocaine: no-meloxicam and lactated ringer ring block (NM-NL;  $n = 12$ ), no-meloxicam and lidocaine ring block (NM-L;  $n = 12$ ), meloxicam and lactated ringer ring block (M-NL;  $n = 12$ ), and meloxicam injection and lidocaine ring block (M-L;  $n = 12$ ). Data was collected on d -1; immediately before castration; at 30, 60, 120, and 240 min after castration; and on d 1, 2, 3, 6, 14, 21, and 28 after castration. Physiological parameters consisted of salivary cortisol (SC), haptoglobin (HP), and scrotal temperature (ST). Behavioral parameters included stride length (SL) and visual analog score (VAS). A lidocaine × time effect ( $P < 0.01$ ) was observed for SC, and L calves had lower concentrations than NL calves 30 and 60 min after castration. In addition, M calves had lower SC concentrations ( $P = 0.03$ ) than NM calves during the first 240 min after castration. A meloxicam × time effect ( $P = 0.05$ ) was observed for HP, with M calves having lower concentrations than NM calves on d 1, 2, and 3 after castration. The L calves had lower VAS scores ( $P = 0.01$ ) than NL calves. No treatment differences were seen in SL ( $P > 0.3$ ) or ST ( $P > 0.05$ ). Despite the fact that there was no interaction between lidocaine and meloxicam, lidocaine was more effective at mitigating the indicators of pain at the time of and up to 1 h after castration, whereas meloxicam was more effective at reducing indicators of pain 3 h and 3 d after castration. In this study, the combination of lidocaine and meloxicam was more effective in controlling pain during and up to 3 d after castration than each drug alone.

**Key Words:** beef calves, lidocaine, meloxicam  
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## 012 Meloxicam and temperament effects on growth performance and indicators of pain in knife or band castrated calves housed on pasture.

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The objective of this study was to evaluate the effect of castration method, meloxicam, and temperament on growth performance and indicators of pain in band- or knife-castrated beef calves. Seventy-two crossbred Angus calves (76 ± 2 d of age and 134.5 ± 20.30 kg BW) were randomly assigned to treatments according to a 3 × 2 factorial design assessing castration technique (CAST; knife [K], band [B], or sham castration [S]) and drug administration (DRUG; single subcutaneous injection of meloxicam at the time of castration

[0.5 mg Metacam/kg BW] or single subcutaneous injection of saline solution as control). Calves were managed in 2 groups (GROUP) of 36 to be castrated on 2 separate days, 2 wk apart. Calves were housed on pasture with ad libitum access to water. Temperament was assessed by measuring flight speed (FS; m/s); faster animals indicated more excitable temperament. Growth performance was assessed using ADG (kg/d). Substance P (SP; pg/mL) and stride length (SL; cm) were used as physiological and behavioral indicators of pain, respectively; greater SP and SL values indicated greater and lower pain levels, respectively. Initial BW and FS were collected on d -6, -1 (prior to castration day), and 0 (immediately prior to castration) as baseline measurements and on d 6, 13, 20, 34, 48, and 62 after castration (DAY). Calves were blocked by the average FS and BW obtained on d -6 and -1. Data was analyzed using a mixed-effects model including CAST, DRUG, DAY, and their interactions as fixed effects and GROUP as a random effect. The average baseline measurements of BW, the average of all FS measurements, and the average of SP or SL obtained on d -1 and 0 were used as covariates. Growth performance was greater ( $P < 0.05$ ) in S (1.33 ± 0.03 kg/d) than in K and B (1.21 ± 0.03 and 1.22 ± 0.03 kg/d, respectively). For every 1 m/s increment in FS, SP decreased by 8.7 pg/mL ( $P < 0.05$ ). There was no effect of CAST, DRUG, or FS on SL. As expected, both knife- and band-castrated calves had reduced ADG compared with S calves. Faster FS was associated with lower pain levels, indicating that temperament can affect physiological measures. A single subcutaneous injection of meloxicam had no effect on growth performance or the indicators of pain used in this study.

**Key Words:** animal welfare, pain mitigation, reactivity  
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**013 AWIN mobile apps; animal welfare assessment at your fingertips.** I. Estevez<sup>\*1,2</sup>, M. Battini<sup>3</sup>, E. Canali<sup>3</sup>, R. Ruiz<sup>1</sup>, G. Stilwell<sup>4</sup>, V. Ferrante<sup>3</sup>, M. Minero<sup>3</sup>, J. Marchewka<sup>1,5</sup>, S. Barbieri<sup>3</sup>, S. Mattiello<sup>3</sup>, I. Beltrán de Heredia<sup>1</sup>, C. M. Dwyer<sup>6</sup>, and A. Zanella<sup>7</sup>, <sup>1</sup>Neiker-Tecnalia, Vitoria-Gasteiz, Spain, <sup>2</sup>IKERBASQUE, Basque Foundation for Science, Bilbao, Spain, <sup>3</sup>Department of Veterinary Medicine, University of Milan, Milan, Italy, <sup>4</sup>Faculdade de Medicina Veterinária, Universidade de Lisboa, Lisboa, Portugal, <sup>5</sup>Institute of Genetics and Animal Breeding of the Polish Academy of Sciences, Department of Animal Behaviour, Magdalenka, Poland, <sup>6</sup>SRUC, Scotland's Rural College, Edinburgh, UK, <sup>7</sup>University of São Paulo, Pirassununga, Brazil.

Animal welfare is an increasingly relevant aspect of livestock farming for societal and economic reasons. It should also be a requirement for high-quality and sustainable production, as assuring optimum welfare helps to minimize losses in animal performance and resource loss. In order to implement these

production models, it is critical to the livestock industry to have access to practical yet sophisticated tools and assessment protocols that ascertain the animals' welfare status. The development of easy-to-use but effective protocols and supporting tools were one of the main goals of the Animal Welfare Indicators (AWIN; <http://www.animal-welfare-indicators.net>) project funded within the 7th Framework Programme of the European Union. Animal Welfare Indicators scientists developed assessment protocols for turkeys, sheep, goats, horses, and donkeys that can be effectively applied to commercial conditions with minimal disturbance for the animals. To simplify further the assessment procedures, 4 apps for mobile devices were developed in collaboration with the company Daia. The apps I-WatchTurkey, AWINSheep, AWINGoat, and AWINHorse generated by AWIN scientists are freely available on Google Play Store and allow on-farm data collection of animal-based welfare indicators. The AWIN apps are specifically designed to guide the user step by step during the farm visit. The basic statistical tools included provide an immediate visual output with the results of the assessment, to compare the results with previous evaluations and allow export of the files for further statistical procedures. Potential users of the AWIN apps include farmers for their own self-assessment and to improve competitiveness or veterinary services and technicians in their everyday practice. The real-time output can facilitate dialogue with farmers, suggesting actions to improve the welfare of animals, but can also generate data that can be easily linked to productive performance. The AWIN apps are easy to use; however, basic training on the specific methodologies used, such as the transect approach for turkey welfare assessment, and on how to assess and score the welfare indicators is needed in order to harmonize the assessment and obtain reliable data. Animal Welfare Indicators apps work offline, a feature that contributes to an extensive use of welfare assessment protocols with no geographical limits. These apps increase the efficiency and standardization of on-farm welfare assessment that can promote consumers' acceptance of modern livestock production and social responsibility.

**Key Words:** animal welfare assessment, protocols, tools  
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**014 Benchmarking indicators of compromised and unfit conditions in cattle arriving at auctions and abattoirs in Alberta.** C. E. M. Heuston<sup>\*1,2</sup>, A. Greter<sup>1</sup>, N. Diether<sup>1</sup>, M. Moggy<sup>1</sup>, M. Jelinski<sup>2</sup>, C. Windeyer<sup>3</sup>, D. Moya<sup>4,5,6</sup>, E. A. Pajor<sup>3</sup>, E. D. Janzen<sup>3</sup>, and K. S. Schwartzkopf-Genswein<sup>4</sup>, <sup>1</sup>*Alberta Farm Animal Care Association, High River, AB, Canada*, <sup>2</sup>*University of Saskatchewan, Saskatoon, SK, Canada*, <sup>3</sup>*University of Calgary, Calgary, AB, Canada*, <sup>4</sup>*Agriculture and Agri-Food Canada, Lethbridge, AB, Canada*, <sup>5</sup>*Institute of Biological, Environmental and Rural Sciences, Aberystwyth, UK*, <sup>6</sup>*Aberystwyth University, Aberystwyth, UK*.

The transport and sale of compromised and unfit cattle is a major welfare concern. A compromised animal is defined as having reduced capacity to withstand the stress of transport but where transport with special provisions will not result in undue suffering. Currently, there is a lack of information regarding the occurrence and conditions of compromised cattle arriving at central assembly points. A pilot study was conducted to document the incidence of cattle arriving at auctions and abattoirs in a compromised condition within Alberta (Canada) and to characterize which conditions were most prevalent. A total of 8 out of 22 auction markets and 11 out of 43 provincial abattoirs were selected based on annual sale/slaughter volumes and geographic location. Auction volumes were defined as selling  $\geq 65,000$  cattle/yr (large) and  $< 65,000$  cattle/yr (small). Abattoir volumes were defined as slaughtering  $< 275$  cattle/yr (low), between 276 and 543 cattle/yr (medium), or  $> 543$  cattle/yr (high). Each population was further stratified by age (80% market and 20% cull cattle) based on historical data. Over a 3 mo period, 19 sites were visited once (17 sites were visited by 2 observers and 2 sites were visited by 1 observer) to assess indicators of compromised condition in a representative proportion of cattle ( $n = 936$ ; 847 auction cattle and 89 abattoir cattle). The conditions assessed included mobility (5 point scale), respiratory signs (modified DART 5 point scale), body condition (BCS; 5-point scale), and heavy lactation (yes/no) and assigned an overall score for compromised condition (5 point scale: normal [1], mild [2], moderate [3], severe [4], and unfit for transport [5]). Cattle were defined as compromised if they had a mobility or respiratory score of  $\geq 3$ , BCS of  $\leq 1.5$ , heavy lactation (yes), or an overall compromised condition score of  $> 3$ . Data for a particular animal were removed when disagreement between observers was greater than 1 score. The percentage of cattle defined as compromised based on mobility, respiratory signs, BCS, heavy lactation, and overall compromised condition score were 1.26, 0, 0.80, 0.92, and 1.38%, respectively, for auction cattle and 15.7, 2.25, 2.25, 0, and 22.5%, respectively, at abattoirs. Mobility was the most prevalent compromised condition observed in both populations. Except for heavy lactation, the prevalence of all compromised conditions was greater in abattoirs than