Proceedings of the

9th ISAE North-American Regional Meeting

July 17-18, 2009

McGill University, Montréal (Québec) Canada

Organizing and scientific committee:
Stephanie TORREY, Nicolas DEVILLERS
and
Candace CRONEY, Derek HALEY, Camie HELESKI, Terry JOBSIS,
Janice SIEGFORD, Janice SWANSON

McGill

The Campbell Centre for the
Study of Animal Welfare

Program

Friday, July 17 – Leacock Building, McGill Downtown Campus

12:30 – 14:00	Registration opens & Poster set-up
14:00 – 15:30	Meeting opening and Keynote Lecture Pr. Donald L. KRAMER (McGill University): Fear in domestic and captive animals: the perspective of a behavioural ecologist
15:30 – 16:30	Coffee break and Poster session
16:30 – 18:15	Oral Presentations: Management
19:00 – 21:00	Barbecue dinner
21:30	Beer at Brasserie Benelux (245 Sherbrooke West)

Saturday, July 18 – Leacock Building, McGill Downtown Campus

08:00 – 09:00	Walk to Mont Royal (Meet at Leacock Hall)
09:00 – 09:30	ISAE Business Meeting
09:30 – 10:30	Oral Presentations: Lying Behaviour
10:30 – 11:00	Coffee break and Poster session
11:00 – 12:15	Oral Presentations: Tools & Assessment
12:15 – 13:30	Lunch
13:30 – 14:30	Oral Presentations: Health
14:30 – 15:15	Coffee break and Poster session
15:15 – 16:30	Oral Presentations: Housing
16:30 – 17:00	Closing discussion and meeting adjournment

General Information

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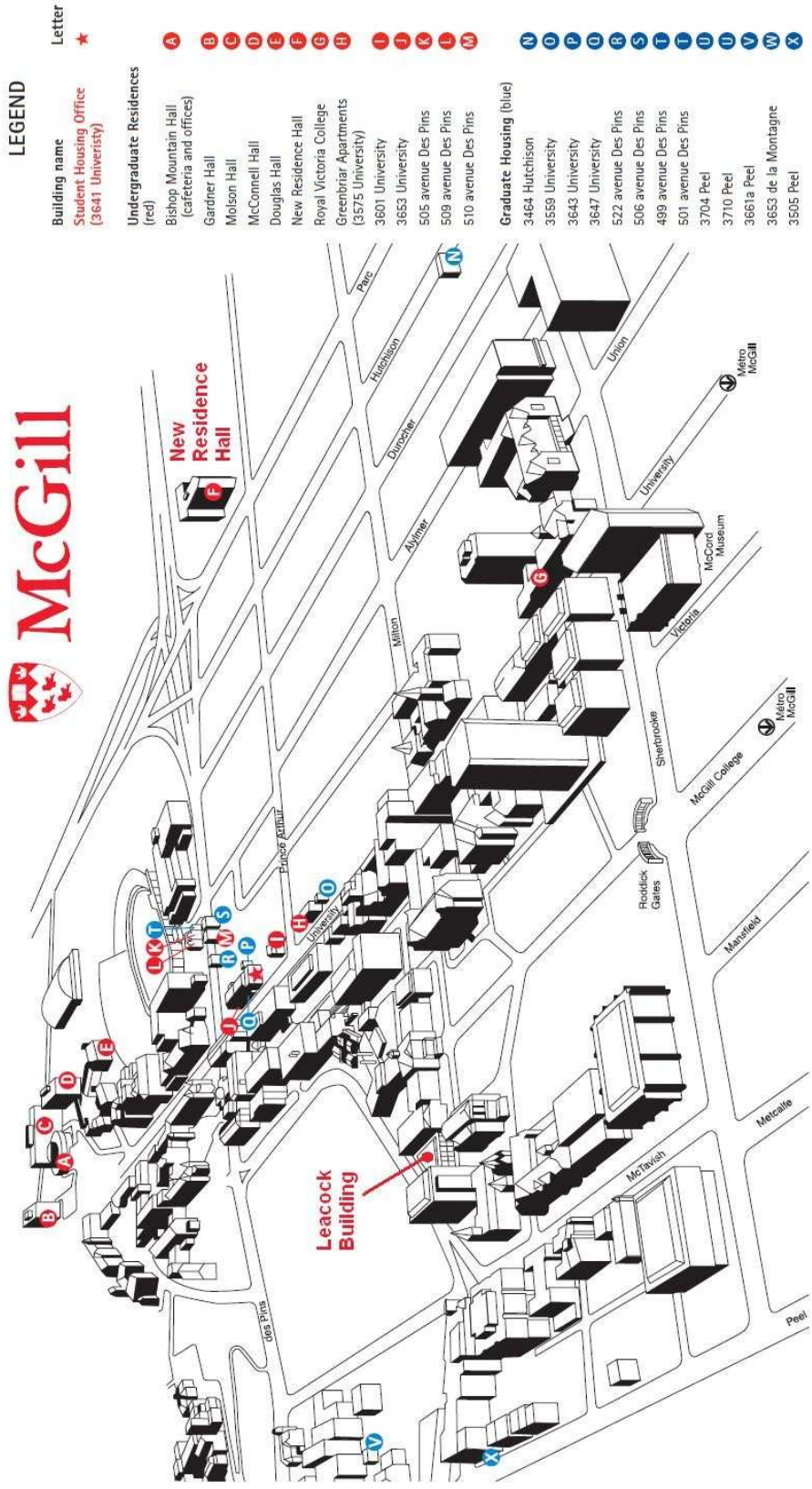
Music & Festivals in Montréal

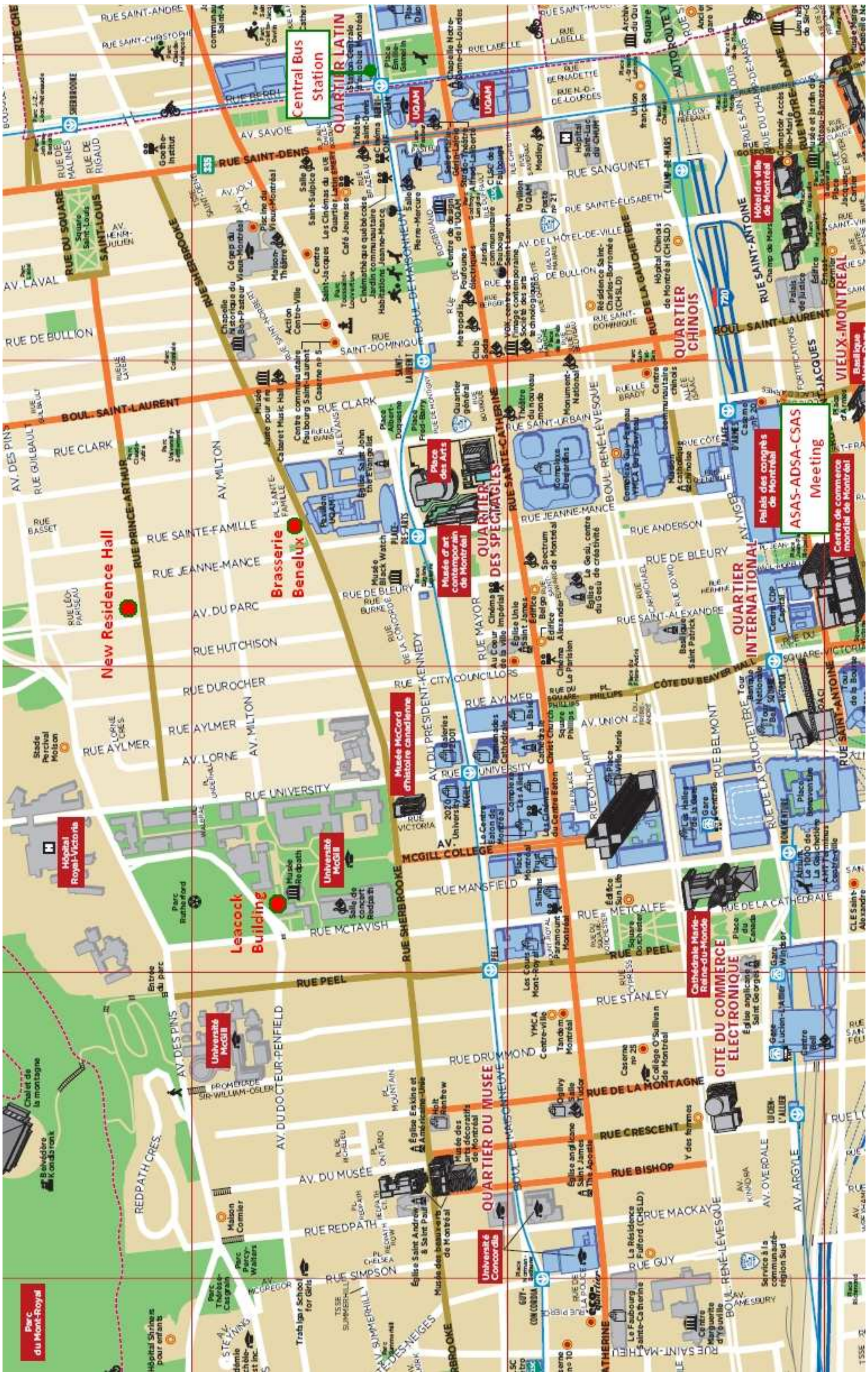
Event	Date	Location	Website	Description
Just For Laughs Festival	July 3 to 26, 2009	Quartier latin	www.hahaha.com	
Montréal International Tango Festival	July 10 to 19, 2009	Several locations	www.festivaldetangodemontreal.qc.ca	Concerts, shows, dance evenings…
Sainte-Catherine Street Celebrates Sidewalk Sale	July 18 and 19, 2009	Sainte-Catherine Street West	www.destinationcentreville.com	
Festival International Nuits d'Afrique	July 16 to 26, 2009	Corner of Berri and Sainte-Catherine Streets	www.festivalnuitsdafrique.com	Best music from Africa, the Caribbean, and Latin America.
Fantasia International Film Festival	July 16 to August 3, 2009	Concordia University, 1455 de Maisonneuve Blvd. West	www.fantasiafest.com	Fantasy, action, and horror, other original and eclectic works.
Festival International du Merengue et de la Musique Latine	July 17 to 19, 2009	Île Notre-Dame	www.festivalmerenguedemontreal.com	
TRAQUEN'ART, SÉRIE ESTIVALE MUSIQUES ET TRADITIONS DU MONDE				
Ragleela	Friday 17 July at 8:30 p.m.	Théâtre de Verdure (Parc Lafontaine)	http://www.traquenart.ca/	World music, Free show
Papagroove !	Saturday 18 July at 8:30 p.m.	Théâtre de Verdure (Parc Lafontaine)	http://www.traquenart.ca/	World music, Free show

McGill Downtown Campus Map



Montréal Downtown Map

http://ville.montreal.qc.ca/pls/portal/docs/page/arr_vm_fr/media/documents/CarteZoomVille_Marie.pdf



Oral Presentations

Presenting author underlined

Friday, July 17: 16:30 – 18:15 Management

16:30 Effects of playful handling on attitude of laboratory rats towards caretakers
Sylvie Cloutier, Jaak Panksepp and Ruth C. Newberry
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16:45 Can an unpredictable shaking feeder act as a stimulus to attract turkey poults to feed?
Stacey Enneking, Edmond A. Pajor, Mickey A. Latour and Joseph P. Garner
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17:00 Transportation of culled dairy cows in Denmark
Katrine Fogsgaard Jensen and Mette S. Herskin
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17:15 Humane euthanasia for laboratory mice?
I. Joanna Makowska, Lori Vickers, Jane Mancell and Daniel M. Weary
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17:30 Does water stimulate cows to defecate?
Marianne Villettaz Robichaud, Anne Marie de Passillé, Jeffrey Rushen and Doris Pellerin
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17:45 The behavioural response of horses to two-stage weaning
Derek Haley, Katrina Merkies and Justine Danel
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18:00 Combining pasture-based and automatic milking systems: a marriage of opposites or a match made in heaven?
Jacquelyn A. Jacobs and Janice M. Siegford
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Saturday, July 18: 09:30 – 10:30 Lying behaviour

Saturday, July 18: 11:00 – 12:15 Tools & Assessment

Saturday, July 18: 13:30 – 14:30 Health

13:30 Self-harm in non-human primates: prevalence and persistence
Jonathan Balcombe, Hope Ferdowsian and Debra Durham
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13:45 Effects of acute influenza virus infection on swine behaviour associated with collection of oral fluid specimens for disease surveillance
Suzanne. T. Millman, Ray M. Brooks Jr., Jeffrey Zimmerman and Christa Irwin
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14:00 Metritic cows eat less, spend less time at the feeder and engage in fewer competitive interactions than healthy cows
Kathryn L. Proudfoot, Daniel M. Weary and Marina A. G. von Keyserlingk
Page 29 *Student Competition*

14:15 An assessment of the behavioural changes in young swine infected with *Salmonella*
Janet H. Higginson, Jeffrey T. Gray and Suzanne T. Millman
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Saturday, July 18: 15:15 – 16:30 Housing

15:15 Sow social status alters enrichment use, but not motivation for a group pen
Monica R.P. Elmore, Anna K. Johnson, Joseph P. Garner, Brian T. Richert and Edmond A. Pajor
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15:30 Behaviour of cage – Free laying hens under different lighting conditions
Courtney L. Daigle, Elizabeth A. Kenyon, Emma Distel, Aislin A. Hardee and Janice M. Siegford
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15:45 Impact of an extended photoperiod in farrowing houses on sow and litter behaviour.
Marie-Pier Lachance, Nicolas Devillers, Jean-Paul Laforest, André Laperrière and Chantal Farmer
Page 33 *Student Competition*

16:00 Heat or insulation: Behavioural titration of mouse preference for warmth or access to a nest
Brianna N. Gaskill, Edmond A. Pajor and Joseph P. Garner
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16:15 Sows demonstrate increased heart rate in anticipation of free stall environments
Lyndsey M.W. Jones, Joseph P. Garner, Jeremy N. Marchant-Forde and Edmond A. Pajor
Page 35 *Student Competition*

Posters

Presenting author underlined

ABSTRACTS FOR ORAL PRESENTATIONS

Oral Session: Management

Effects of playful handling on attitude of laboratory rats towards caretakers

Sylvie Cloutier*, Jaak Panksepp and Ruth C. Newberry

Washington State University, Department of Veterinary and Comparative Anatomy, Pharmacology and Physiology, Center for the Study of Animal Well-being, Pullman, WA, USA

We hypothesised that playful handling by caretakers, that mimics playful social contact between rats, increases positive attitude towards humans. Effects of handling were assessed using 25 days old male Sprague-Dawley rats (N = 72) exposed to one of two handling treatments: (1) Standard (control) handling during weekly cage cleaning only; (2) Tickling 2 min daily for 3 weeks. Rats in both conditions were housed individually, in pairs, or in triplets. In week 4, all rats were individually housed with minimal handling for the next 3 weeks. The effectiveness of tickling as social enrichment was evaluated by measuring the emission of 50-kHz ultrasonic vocalizations (USVs), interpreted as evidence of a positive affective state. Ease of handling was assessed during cage cleaning using a handling score. Tickled rats emitted more 50-kHz USVs in anticipation of handling (Median (IQR), Control: 2 (0-16), Tickled: 38 (2-89); Mixed Model Anova on ranked data, $F_{1,38} = 50.1$; $P < 0.0001$), and struggled less when handled during cage cleaning (Control: 1 (0-2), Tickled: 0 (0-0), Mixed Model Anova on ranked data, $F_{1,66} = 41.2$; $P < 0.0001$) than control rats. These effects of tickling applied to all rats, whether housed individually, in pairs or in triplets, and persisted after discontinuation of tickling. Our results indicate that daily tickling for 2 minutes over a 3-week period improved the relationship between rats and their caretakers. Taken in combination with previous findings indicating benefits of tickling over exposure to a passive hand, we conclude that daily tickling is a good source of social enrichment for individually-housed rats that is also beneficial for socially-housed rats.

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Oral Session: Management

Can an unpredictable shaking feeder act as a stimulus to attract turkey poults to feed?

Stacey Enneking*, Edmond A. Pajor, Mickey A. Latour and Joseph P. Garner

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A key cause of early turkey poult mortality is "starve-out," which involves a failure to eat. Young gallinaceous birds are attracted to movement in their environment. We hypothesized that starve-out is partly due to a lack of stimuli attracting poults to feed, and therefore predicted that a moving stimulus directed towards the feeder would attract poults to feed, thereby increasing feed intake. We performed four replicates, each testing four pens of ten poults. The treatments applied were 1) Male Feeder pen, 2) Female Feeder pen, 3) Male Control pen, and 4) Female Control pen. Feeder pens were exposed to a moving feeder stimulus. The feeder stimulus turned on at unpredictable times within ten minute intervals for a period of 5-10 seconds, 24 hours/day. When 'on' the feeder gently rocked up and down. Control pens contained a similar feeder that did not move. Video observations were recorded for ten days, and the number of poults at the feeder 60 seconds pre- and post-stimulus presentation was recorded. On day ten, poults were euthanized via CO2 anoxia as approved by Purdue's IACUC. Body, crop content, heart, spleen, and bursa of Farbricius were weighed. Data analysis employed the General Linear Model (Minitab 15). Organ weights were corrected for end body weight of the poult. Total weight gain and bursa weights were lower for Male and Female Feeder than Control ($P < 0.05$). Spleen weights for Female Feeder were less than Male Control ($P < 0.05$) and Male Feeder ($P < 0.01$). Heart weights, feed intake, and ADG were not significantly different between treatments. Male and Female Feeder displayed more variation in bursa weights than Controls ($P < 0.01$). Preliminary analysis of behavioural data indicated a decrease in Feeder poults' feeding behaviour post-feeder presentation ($P < 0.05$). The data suggests that poults found the unpredictable moving feeder stimulus aversive, and that this aversion was stressful.

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Student Competition

Oral Session: Management

Transportation of culled dairy cows in Denmark

Katrine Fogsgaard Jensen[1]* and Mette S. Herskin[2]

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In Denmark, approximately 200,000 dairy cows are culled and transported to slaughter each year. There are no data on the exact travel times in Denmark, but typically cows spend at least 3 hours on the truck. In recent years, there have been reports of dairy cows arriving at slaughter in unacceptable conditions (Caspersen, Danish Vet. J. 18:22-23, 2002). EU-legislation regarding animal suitability for transportation is general and not specified for single groups of animals (Annex I, Chapter I of the Council Regulation (EC) No 1/2005 of 22 December 2004). In short, the animals must be able to stand without help, have no open wounds, not be within the last 10% of gestation or two weeks after calving, and be milked every 12 h in order to be transported. However, these limitations might not be enough to avoid unacceptable conditions during and after transport of dairy cows to slaughter (Caspersen, Danish Vet. J. 17:12-14, 2003). The objective of this review was to examine existing knowledge about consequences of transport of culled dairy cows in terms of animal welfare. Transportation is a complex stressor involving several elements. Cows are exposed to handling and regrouping, loading and unloading as well as novel surroundings in the truck (Knowles & Warriss, in *Livestock handling and transport* (Grandin *Ed.*), CABI Publishing, 2000). During the drive the animals are kept close together, with limited possibility to rest and risk of falling down. Due to the high prevalence of poor body condition and disease among culled dairy cows (Beaudeau et al., Livest. Prod. Sci. 35:213-236, 1993; Seegers et al., Prev. Vet. Med. 36:257-271, 1998), there are reasons to believe that transportation of this particular livestock group poses greater risk and potential threats to animal welfare than transportation of heifers. In order to improve the on-farm evaluation of suitability for transportation and avoid animal welfare problems, there is a need for a research-based evaluation tool, the acquisition of which would require combined physiological, behavioural and veterinary registrations.

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Review
Student Competition

Oral Session: Management

Humane euthanasia for laboratory mice?

I. Joanna Makowska*, Lori Vickers, Jane Mancell and Daniel M. Weary

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Laboratory mice are most commonly euthanized with carbon dioxide (CO2), but recent evidence suggests that they find this gas aversive. Inhalant anaesthetics are commonly used in veterinary anaesthesia and may be a humane alternative. The aim of this study was to use approach-avoidance testing to evaluate mouse (n = 7) responses to CO2 introduced at a range of flow rates (Experiment 1) and to the inhalant anaesthetics isoflurane and halothane introduced at two concentrations (Experiment 2). In preliminary testing using 12 additional mice, we measured the time to recumbency with the low and the high concentrations of anaesthetics; these were 95 s and 62 s, respectively. This study complied with ISAE ethical guidelines. For approach-avoidance testing, mice were trained to access the bottom cage of a two-cage apparatus to gain access to shredded coconut. The experimental or control (air) gas was turned on as soon as mice started eating. We scored the latency to leave the test cage, and the CO2 concentration in the cage when mice left in Experiment 1. Variables were analyzed using mixed models in SAS. When tested with CO2, mice always left the cage before losing consciousness. The average tolerated CO2 concentration (± S.E.M.) was 14.0 ± 1.7% regardless of flow rate ($F_{1,19}$ = 3.65, P < 0.07). When tested with isoflurane, two mice remained in the test cage until recumbency. Mice remained in the test cage longer ($F_{1,15}$ = 4.90, P = 0.04) and closer to the time of expected recumbency ($F_{1,33}$ = 4.29, P < 0.05) with isoflurane than with halothane, and they remained closer to the time of expected recumbency with higher concentrations of both anaesthetics ($F_{1,33}$ = 10.13, P = 0.003). We conclude that CO2 euthanasia is aversive to mice and that isoflurane is a more humane alternative.

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Student Competition

Oral Session: Management

Does water stimulate cows to defecate?

Marianne Villettaz Robichaud[1]*, Anne Marie de Passillé[2], Jeffrey Rushen[2] and Doris Pellerin[1]

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Manure is a source of disease and uncleanliness for cows and the milking area. It affects cow and human health. We tested ways to stimulate 12 lactating Holstein cows (Day in milk = 137.5 ± 17.5 d, parity = 3.3 ± 1.5) to defecate. In Test 1, cows walked through an empty footbath or through one filled with water (20°C) following a balanced order, one treatment/d, over 6 d. Cows were more likely to defecate with the water footbath (Sign test: $P = 0.04$). Test 2, the cows stood 2 minutes in an empty footbath, a footbath with still water or with running water, one treatment/d, over 9 d. Test 3, the cows stood for 2 minutes in an empty footbath with nothing, air or water sprayed on their feet, one treatment/d, over 9 d. No treatment differences were found for Tests 2 and 3 (Sign test: $P > 0.10$). After Test 3, we repeated Test 1 but no treatment differences were found (Sign test: $P > 0.10$). None of our tests reliably stimulated defecation, which occurred most when cows were exposed to novelty. In a second experiment, we observed elimination behaviours of 48 cows (DIM = 144.7 ± 38.0 d, BW = 667.1 ± 72.0 kg) for 48 hours in a free-stall barn. There were large differences between cows in frequency of defecation (mean ± SD, range; 10.0 ± 4.17/d, 3–20/d) and urination (7.58 ± 3.21/d, 2–18/d). We observed 27.8% of defecation and 19.1% of urination in the area behind the stalls, 33.4% and 28.3% in the feeding area and 20.7% and 38.4% when cows were standing with two feet in the stall and two in the alley. Large differences between cows in elimination behaviours suggest that some could be disproportionately responsible for spreading manure throughout the barn.

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Student Competition

Oral Session: Management

The behavioural response of horses to two-stage weaning

Derek Haley[1]*, Katrina Merkies[2] and Justine Danel[2,3]

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[2] University of Guelph, Kemptville, ON, Canada
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The purpose of this study was to examine the behavioural response of horses to a two-stage weaning procedure. Ten mare-foal pairs were weaned (all foals 6 months of age), half by physical separation (control), and half by two-stage weaning (nursing prevented for 4 days [stage 1] prior to the physical separation [stage 2]). In stage 1, two-stage pairs were prevented from nursing by an udder cover (commercial name "Udderwear"), worn by the mare. Physical separation for both groups was at a distance of approximately 100 m; within auditory range, but with limited (obstructed) visual contact. Behaviour was recorded over 10 consecutive days: 2 days of baseline (all pairs were free to nurse), 4 days of stage 1 (control pairs still free to nurse), and 4 days following physical separation. Observations were carried out from 0800 to 1800h, with instantaneous sampling of general activity at 5-min intervals, while nursing was recorded at 1-min intervals. Data were analyzed by the GLM and MIXED procedures in SAS, using Tukey's HSD test to compare treatments within stages. Preventing nursing by the udder cover did not increase the vocalizing by the two-stage mares and foals. Control mares and foals vocalized significantly more following separation than two-stage pairs (MARES: 248 vs. 188 vocalizations, $P = 0.018$; FOALS: 596 vs. 364 vocalizations $P < 0.0001$). Foals in the control group showed more aggression toward other foals following physical separation than the two-stage foals (48 vs. 5 total acts $P = 0.0002$). Two-stage foals also spent more time eating than controls during both stage1 (587 vs. 492 observations, $P = 0.0005$) and stage 2 (555 vs. 469 observations $P = 0.016$). Based on the results from this preliminary study it appears that weaning horses in two stages reduces the signs of behavioural distress compared with the traditional method of abruptly separating mares and foals to terminate nursing.

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Oral Session: Management

Combining pasture-based and automatic milking systems: a marriage of opposites or a match made in heaven?

Jacquelyn A. Jacobs and Janice M. Siegford*

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Over the last 100 years, the dairy industry has been continuously evolving to maximize yield and profit. Recent pressure to maximize efficiency and lower inputs require novel approaches to managing, milking and feeding dairy herds, including combinations of pasture-based and automatic milking systems (AMS). While AMS have been used for nearly 20 years in Europe, they are only recently becoming more popular in North America. AMS have the potential to increase milk production by up to 20%, decrease labor by as much as 18%, and simultaneously improve dairy cow welfare by allowing cows to choose when to be milked. However, certain difficulties can be associated with AMS, including a high initial investment, a need for special technical expertise to handle repairs and maintenance, and less reduction in labor than anticipated because some cows must be brought in to be milked.(Bach et al., J. Dairy Sci. 90:5049-5055, 2007). Concurrently, many farmers are looking to break away from the increasing cost of confinement systems and are turning to pasture-based systems. Pasture-based systems, after being nearly replaced by confinement systems feeding total mixed rations, have once again become attractive; as they offer improved time budgets for farmers, less expensive feed, and improved herd health for cows (Roche et al., J. Dairy Sci. 90:3802-3815, 2007). However, milk production generally decreases on pasture (Pedernear et al., J. Dairy Sci. 91:3896-3907, 2008), leaving some farmers hesitant to change their systems. A marriage of two seemingly opposite systems may overcome the disadvantages associated with each system individually. Combining pasture-based and automatic milking systems has the potential to maintain current milk production levels, improve herd health, and simultaneously offer increased economic and social benefits for the dairy farmer (Sporndly & Wredle J. Dairy Sci. 88:1711-1722, 2005). While it may seem like a marriage of opposites, combining pasture-based systems with AMS could result in a system that is both low-input and low-labor. With future research directed at merged AMS and pasture-based systems, this marriage of opposites may offer the dairy industry a more efficient and successful way to manage a dairy farm.

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Review
Student Competition

Oral Session: Lying behaviour

Extreme lying times predict lameness

Kiyomi Ito[1], Marina von Keyserlingk[1], Stephen LeBlanc[2] and Dan Weary[1]

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Cow comfort influences lameness dynamics in dairy cows, but the precise relationship between lying behaviour and lameness of individual cows is not known. The objectives of our study were to evaluate the role of lying behaviour as a predictor for lameness. Using electronic data loggers, lying time was recorded at 1-min intervals for 5d for 2033 cows from 43 farms. These cows were gait scored according to a 5-point Numerical Rating System (NRS), and were classified as having swollen or healthy hocks. Differences in the mean lying time (h/d) between severely lame (NRS≥4) and non-lame (NRS≤2) cows, and between cows having swollen and healthy hocks were tested using a mixed model with farm as a random effect. In addition, extreme lying times were defined as < 9 or > 14 h/d by graphically comparing the distributions of daily lying times for severely lame vs. non-lame cows and cows having swollen vs. healthy hocks. Odds ratios for severe lameness and swollen hocks, as predicted by extreme lying times, were estimated using logistic regression including parity (1 to 4+) as a fixed effect and farm as a random effect. The overall prevalence of severe lameness was 7.1% and of swollen hocks was 3.3%. Severely lame cows spent more time lying down compared to sound cows (11.5 ± 0.2 vs. 10.9 ± 0.1 h/d, $P < 0.01$). Cows with swollen hocks had similar lying times to cows with healthy hocks (10.7 ± 0.3 vs. 10.9 ± 0.1 h/d, $P = 0.60$). However, cows having extreme lying times were 2.5 times (CI = 1.7-3.7) more likely to be severely lame, and 2.2 times (CI = 1.3-3.6) more likely to have swollen hocks. The odds ratio (OR) for severe lameness and swollen hocks increased with increasing parity (OR = 1.9, CI = 1.6-2.2; and OR = 1.5, CI = 1.2-1.9, respectively). These results show that extreme lying times are associated with lameness and swollen hocks.

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Student Competition

Oral Session: Lying behaviour

Effects of bedding quality on lying behaviour of dairy cows: a dose dependent response

Lindsey J. Reich[1], Douglas M. Veira[2], Daniel M. Weary[1] and Marina A. G. von Keyserlingk[1]*

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The objective of this study was to determine the effects of various moisture levels of bedding on lying behaviour of Holstein cows. Moisture was varied systematically over 5 treatment levels during two seasons to test if cows were more likely to avoid damp bedding during cooler temperatures. For summer, samples averaged (± SD) 90.4 ± 4.3, 75.4 ± 5.0, 64.5 ± 6.3, and 44.6 ± 4.4, and 34.9 ± 4.1% dry matter (DM). For winter, samples averaged (± SD) 89.1 ± 2.9, 72.5 ± 6.8, 60.6 ± 5.2, and 42.9 ± 2.8, and 34.5 ± 3.5% DM. Over the course of the trial, minimum and maximum temperatures averaged 13.3 ± 2.5º C and 22.6 ± 4.1º C in the summer and 2.6 ± 2.0ºC and 6.8 ± 2.2ºC in the winter. In both seasons, five groups of three non-lactating cows were housed in freestalls bedded with sawdust. Following a 5-d acclimation period on dry bedding, each group was tested on each of 5 moisture treatments in a 5 × 5 Latin square. Each treatment lasted 4 d, followed by 1-d when the cows were returned to dry bedding. Stall usage was assessed by 24-h video scanned at 5-min intervals. Responses were analyzed with group (n = 5) as the observational unit. There was no effect of treatment on any measure of stall usage during the summer, but when cows were tested during winter conditions lying time declined from 12.3 ± 0.44 h/d to 11.3 ± 0.44 h/d on driest to wettest treatments, respectively. Both linear and quadratic effects of bedding DM were significant, reflecting an accelerating reduction in lying times with increasingly damp bedding during cooler weather.

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Student Competition

Oral Session: Lying behaviour

Associations between lying time and weight gain in post-weaned dairy calves

Amy L. Stanton[1]*, Dave Kelton[1], Ken E. Leslie[1], Stephen J. LeBlanc[1] and Suzanne T. Millman[2]

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The objectives were to investigate associations between post-weaning weight gain and the behaviour of dairy heifers. Holstein heifers (n = 44) were group-housed in a naturally ventilated heifer barn in groups of 4-6 and were 57.5 (+/-8) days old at weaning. Pens measured 356 cm by 699 cm. Prior to weaning, calves were housed individually in either outdoor hutches or stalls in a nursery. Lying behaviour was observed from video-recordings on post-weaning Day 0 from 12pm-7pm and on Days 1, 2, 4 and 6 from 7am to 7pm, using instantaneous scan sampling at 5 minute intervals. Calves were recorded as lying close (< one calf length from another calf), average (1-3 calf lengths from another calf), or distant (> 3 calf lengths from another calf). Data was analyzed using mixed models in SAS 9.1. In the first week post-weaning calves gained 3.55 ± 3.4 kg and lay 49 ± 10.3% of the time. Calves spent 33.8 ± 11.2%, 64.2 ± 10.3 and 1.9 ± 4.6% of the lying time close, average and distant from other calves, respectively. A 1% increase in time spent lying close to other calves was associated with a body weight gain of 0.20 ± 0.08 kg ($P < 0.05$). A 1% increase in time spent distant lying was associated with a decrease in body weight gain of 0.43 ± 0.20 kg ($P < 0.05$). Calves housed in groups of 6 were 1.84 (1.37-2.50) times more likely to be close lying than calves in groups of 4. On day 0, nursery calves were 1.82 (1.04-3.17) times more likely than hutch calves to be lying close. By day 6, there was no significant difference between hutch and nursery calves. Hutch calves were 1.9 (1.4-2.7) times more likely to be lying distant than nursery calves. These findings suggest that pre-weaning management affects post-weaning lying behaviour, and lying apart from the group may be an indicator of poor weight gain.

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Student Competition

Oral Session: Lying Behaviour

Short-term overcrowding affects the lying and ruminating behaviour of lactating Holstein dairy cows, regardless of experimental method.

Peter D. Krawczel[1,2]*, Charles S. Mooney[1], Rachel E. Butzler[1], Heather M. Dann[1], Catherine S. Ballard[1] and Richard J. Grant[1]

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Previous research on the effects of overcrowding dairy cows has eliminated access to resting or feeding space without accounting for the reduction of alley space inherent in on-farm conditions. The objective of this study was to determine differences in lying and rumination by Holstein dairy cows housed at stocking densities of 100% (1 cow per stall and feeding space) or 142%, achieved by: 1) preventing access to freestalls and feeding space, 2) preventing access to freestalls, feeding space, and 26.6 m2 of alley space, or 3) addition of 14 cows. Cows (n = 136) were assigned to 1 of 4 pens and treatments imposed using a 4 × 4 Latin square for 14 d. Data were collected from focal cows (n = 12) within each pen. Lying time and bouts were determined at 1-min intervals from d 10 to d 14 using dataloggers. Feeding and rumination time was determined by direct observation at 10-min intervals for 24 h on d 11. Data were analyzed using MIXED procedure of SAS. No differences among 142% methods were evident. Lying time was greater ($P < 0.002$) at 100% (13.0 ± 0.1 h/d) than at 142% (11.8 h/d ± 0.1). Overcrowding tended to reduce time spent ruminating in stalls (7.6 ± 0.2 h/d at 100% vs. 6.8 ± 0.2 h/d at 142%; $P = 0.08$) and the percentage of the total rumination time occurring in stalls was reduced (92.2 ± 2.4% at 100% vs. 85.2 ± 2.4% at 142%; $P = 0.01$). Lying bouts (12.3 per d; $P > 0.1$) or feeding time (4.2 ± 0.2 h/d; $P = 0.25$) were not affected. Each overcrowding method resulted in decreased lying time and altered rumination. This suggests any of the tested methods are appropriate for further evaluation of the effects of short-term overcrowding on welfare.

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Student Competition

Oral Session: Tools & Assessment

Can commercial pigs demonstrate the 'when' aspect of episodic-like memory?

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Demonstrating higher level cognitive functions in animals could have implications for their welfare. One such higher function is episodic-like memory, which can be demonstrated by showing that animals know 'what', 'where' and 'when' about an event. Little research on this exists in farmed animals, therefore, this study aimed to identify whether it is present in commercial pigs. Two groups of nine female Large White × Landrace pigs aged 10-12 wk were initially trained, individually, that food was present in one of two hoppers, either to the left or right of a test pen, teaching them 'what' and 'where'. After the training, the 'when' aspect of episodic-like memory was examined using 4 and 8 hr intervals. After 4 hr the feed would remain in the same hopper; however, after 8 hr it would be in the other hopper. This was alternated, with all pigs being fed (and tested) both 4 and 8 hr after the first feeding, on different days. Pigs had no access to food between tests. The ability of pigs to immediately choose their correct hopper when 4 hr had elapsed since feeding, but select the other hopper after 8 hr, would suggest pigs can distinguish 'when'. In the first part of the study, pigs learned to immediately choose the correct hopper at a level which was highly significantly different from chance ('t'-test; $P < 0.001$), demonstrating that they could easily distinguish 'what' and 'where'. For the second part, demonstrating 'when', results were more equivocal. Group 1 made choices that were significantly ($P < 0.01$) different from chance after both 4 and 8 hr, while group 2's choices were significant after 4 ($P < 0.001$) but not 8 hr. Results of this study suggest that commercial pigs may be capable of the 'when' aspect of episodic-like memory, although further research is required.

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Oral Session: Tools & Assessment

Murid stress odours: a review and a "low tech" method of collection

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Stress cues can affect the welfare of nearby animals, and could also be useful non-invasive indicators of the emitters' welfare. To facilitate their study in murids, we tested whether rats' stress odours could be collected and stored using an enfleurage-type technique. 'Donor' rats were exposed to a compound stressor (carried individually approximately 75 metres inside a novel container, then euthanized with rising carbon dioxide) while on blotting paper dotted with melted vegetable lard. These sheets were sealed, left at room temperature for 2-5 hours, and then 'bioassayed' by a blind observer for their effects on conspecifics. Data was analyzed using a generalized linear models and Tukey tests. Compared with control sheets (exposed to unstressed rats, to CO2 alone, or to nothing), stress-exposed sheets significantly affected the unconditioned behaviour of 16 pairs of detector rats trained to enter an arena from their home cage to obtain sucrose. When used to line this arena, the stress-exposed sheets significantly increased i) rats' latencies to eat ($F_{3,43}$ = 9.28, P < 0.0001), to place front feet into ($F_{3,43}$ = 26.87, P < 0.0001), and to completely step into the arena ($F_{3,43}$ = 34.12, P < 0.0001); and ii) shuttling movements between arena and home cage ($F_{3,40}$ = 32.90, P < 0.0001). Though some possible confounds were identified, these pilot data thus suggest that odours produced by stressed rats can successfully and simply be collected and stored for several hours.

Ethical note: the stressed donors were surplus rats from another experiment, already scheduled to be euthanized, and were treated no differently than they would have been had no data been collected from them. Test rats were pair-housed in enriched environments. Our work was approved by Oxford University's ethical review process.

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Review
Student Competition

Oral Session: Tools & Assessment

Domestic pig responses to playback of barks

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Pigs emit barks when they are alarmed. Juvenile pigs also emit barks while engaged in playful behaviour, suggesting that juvenile barks may sometimes induce a positive affective state. In the present study, we investigated behavioural responses of weaned juvenile pigs to playbacks of barks. We predicted that pigs would play more in the first 10 minutes after hearing juvenile barks than adult barks. We also predicted that fewer pigs would be feeding, lying or located near the speaker after hearing adult barks than juvenile barks. Same sex groups of crossbred pigs (n = 12, with 14-15 pigs per group) were presented with three playback treatments: adult bark, juvenile bark and control sounds. Control sounds were sounds of background noise from rooms in which the animals were housed. Half the groups received playbacks set at natural volumes (control 74 ± 1dB, juvenile 83 ± 1dB, adult 90 ± 1dB). The other half received all playbacks at adult bark volumes (90 ± 1dB). Data were analyzed using a repeated measures analysis of variance, with playback volume as a between subjects factor. Time and playback treatment were the within subjects factors. There was a smaller proportion of pigs feeding after adult bark playbacks (0.094 ± 0.013) than before playbacks (0.152 ± 0.026; $F_{1,5} = 10.2$, $P < 0.05$) or after the control playbacks (0.163 ± 0.012). Fewer pigs were lying immediately after juvenile bark playbacks (0.279 ± 0.040) than before playback (0.392 ± 0.039; $F_{1,5} = 16.4$, $P < 0.05$). A smaller proportion of pigs were located near the speaker immediately after playback of the adult bark (0.371 ± 0.067) than before playback (0.509 ± 0.072; $F_{1,5} = 7.9$, $P < 0.05$). Play behaviour was unaffected by the playbacks ($P > 0.05$). Playback volume did not alter these responses ($P > 0.05$). The results suggest that the control sound was perceived as less alarming than the adult bark, with the juvenile barks having an intermediate effect. Nevertheless, contrary to our prediction, playback of the juvenile barks did not stimulate play.

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Student Competition

Oral Session: Tools & Assessment

An evaluation tool to assess and enhance calf welfare and management on-farm

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Unweaned calf morbidity and mortality remain high; a costly animal welfare concern. A survey of 115 Quebec dairy farmers found mean calf mortality of 8.8 %, which was underestimated by 20 -50 % by producers: 94 % did not consider that they were experiencing a calf mortality problem. Tools to assess calf health and welfare on-farm are needed. From this survey, we identified 10 areas of concern: calving management and newborn care, painful procedures, colostrum management, calf-dam separation, weaning, calf feeding, calf housing, heifer feeding, heifer housing, and health monitoring. We developed an evaluation tool to review each area of concern. An expert committee validated the scoring system and recommendations. The tool was then tested on 28 dairy farms for feasibility, producer satisfaction and repeatability. The on-farm tool included an interview on management practices and in-barn measurements related to calf welfare. Farmers were asked to take colostrum and blood samples, and record health data. The visit required 3:38 ± 1:07 h (Mean ± SD). We found that 100 % of producers were convinced of the effectiveness of our diagnostic tool for identifying areas in need of improvement, and that our tool was useful as an advisory tool for technical advisors and veterinarians. Involving producers in the collection of data (e.g. checking colostrum quality by using a colostrodoser) and providing realistic targets, helped in putting emphasis on problem areas and in discussing ways of improvement. Seventy-five percent of producers would continue using the colostrodoser and keeping stock of colostrum. Although 65 % found it useful to keep health records, only 32 % continued to do so over a 6-month period. Voluntary improvements in animal welfare can be facilitated by using appropriate tools to educate producers and help them change their attitudes towards management and animal welfare.

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Student Competition

Oral Session: Tools & Assessment

Validation of a test for detecting aggression towards humans in dogs

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Dog bites present a serious public health concern making it desirable to find ways to identify aggressive dogs before they bite. We aimed to validate a potentially more precise test for detecting dogs aggressive to humans. This test is adapted from one used by the San Francisco SPCA. We predicted that this test would have a 5-10% error rate in identifying aggressive dogs. Based on owner report, dogs (n = 42) were assigned to one of four experimental groups: Non-aggressive (no bites, barks, growls, snarls, snaps, or lunges), Mildly Aggressive (has barked, growled, snarled, snapped or lunged), Moderately Aggressive (has bitten without skin puncture), and Highly Aggressive (has bitten with skin puncture). We hypothesized that aggressive dogs would show higher frequencies of bites, barks, growls, snarls, snaps, and lunges on the test compared to Non-aggressive controls. Behaviour in the test was recorded by a trained observer. Dogs were presented in a random order, and the handler was blind to each dog's status. Data were analysed using analysis of variance. Bonferroni post-hoc analysis revealed that the frequency of lunging during the test was higher in Moderately Aggressive dogs (0.44 ± 0.18) and Highly Aggressive dogs (0.33 ± 0.16) compared to Non-aggressive controls (0 ± 0; $P < 0.05$). Non-aggressive dogs showed more looking away than all other groups ($P < 0.05$), and more orienting to the handler than Highly Aggressive dogs ($P < 0.05$). One control and one Mildly Aggressive dog tested positively for aggression. Two Moderately Aggressive, and four Highly Aggressive, dogs did not test positive. The test gave a 19% error rate in classifying biting dogs as non-aggressive, a lower rate of error relative to those reported in previous temperament test studies but nevertheless highlighting the absence of a failsafe method for predicting which dogs present a danger of biting people.

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Student Competition

Oral Session: Health

Self-harm in non-human primates: prevalence and persistence

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We reviewed the literature to determine the prevalence of self-harming behaviours (SHB) in nonhuman primates used in laboratory research. Specifically, we tested the hypothesis that rates of SHB have not declined significantly since enactment of the 1985 amendment to the United States Animal Welfare Act (which became regulation in 1991) to promote the psychological wellbeing of laboratory primates. We defined SHB as self-biting, self-inflicted head trauma, hair pulling, and other forms of self-directed aggression. We examined 126 published studies reporting primate SHB behaviour, published in journals in the fields of psychology, primatology, ethology, welfare and others. Sixteen studies, all involving macaques (four species), met our inclusion criterion that animal subjects comprise either a random or whole sample, and not self-injuring animals only. SHB was reported in thirty-six (30%) of the 121 monkeys involved in the five studies done before the AWA amendment came into effect in 1991; from the remaining eleven studies, all published since 1998, 407 of 1,415 monkeys (29%) exhibited SHB. Well-recognized risk factors for the development of SHB include single housing, mother-infant separation, enforced weaning, and proportion of time spent indoors. For several reasons related to sampling and observation methods, reported rates of self-harming behaviours are likely to be underestimates. Despite current guidelines that strongly recommend against the use of chronic isolation, more than half of all primates currently living in US laboratories are believed caged alone (Baker, J. Appl. Anim. Welf. Sci. 10: 49-54, 2007). Limitations in our study include small sample sizes, particularly for the pre-1991 studies, exacerbated by a lack of organized record-keeping on laboratory-housed primates. Nevertheless, we find no clear evidence that primate SHB has been ameliorated by legislation aimed at improving their psychological wellbeing. Our review has implications for current policy and practice, and for the ethics of laboratory primate use.

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Oral Session: Health

Effects of acute influenza virus infection on swine behaviour associated with collection of oral fluid specimens for disease surveillance

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Oral fluid sampling has been proposed as a non-invasive method for swine disease surveillance or prognostication. Samples are collected by suspending ropes within a pen and pigs deposit oral fluids during interactions with the rope. However, behaviour during clinical disease (e.g. lethargy, changes in motivational state) may reduce the incidence of interactions with the ropes and preclude sample collection. The objective of this study was to quantify the effects of acute swine influenza virus (SIV) infection on interactions with ropes hung within the four pens of 10 pigs (n = 40). For 8 consecutive days, a single rope was placed in the same location at the same time in each pen, and behaviour was video-taped while the ropes were in place (15-20 minutes). For each pig, latency of contact with the rope was recorded. On Day 4, all pigs were inoculated with SIV. Latency data was log-transformed to improve normality and analyzed using a failure time regression model. One minute after ropes were placed in the pens, 88% of all rope contact occurred, and 99% occurred within 10 minutes. Latency differed significantly across observation days ($P < 0.05$); mean latency was highest on Day 5. Logistic regression model analysis showed that odds of contacting the rope decreased significantly after influenza challenge ($P < 0.0001$), with only 53% of pigs contacting ropes on Day 5. However, 100% of pigs contacted ropes on Days 6, 7 and 8. In conclusion, acute clinical disease had an immediate and transient effect on swine motivation to chew ropes, but in this experiment, a sufficient number of pigs interacted with the rope so as to provide a sample sufficient for detection of SIV. The cotton rope remains a viable option for collecting oral fluids, and it is feasible to lower exposure time to 10 minutes to increase the quality of samples.

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Oral Session: Health

Metritic cows eat less, spend less time at the feeder and engage in fewer competitive interactions than healthy cows

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Dairy cows often become ill after calving. One of the most common ailments is metritis, an infection of the uterus. The aim of this study was to determine if behaviour can serve as early indicators of metritis in dairy cows. Within 2 pens, 76 cows were paired and the pair was assigned to a feedbin. Cows were examined every 3 d after calving for signs of metritis (putrid vaginal discharge and fever), and behaviour was recorded in the 1 wk after calving. Six cows developed severe metritis (and no other condition; diagnosed 9 ± 2 d post-calving, mean ± SD), and these were matched with 6 cows that remained healthy; only one cow of a pair was included in the analysis. Displacements at the feedbunk were recorded for 3 h after each of 2 feedings during 4 consecutive days in the week post-calving. Feed intake, feeding time, rate and visits to the feedbins were recorded 24/d during the same 4 days. The Proc Mixed procedure in SAS was used to determine differences in behaviour between metritic and healthy cows; health was included as a fixed effect and pen as a random effect. Metritic cows tended to be involved in fewer displacements at the feedbins compared to healthy cows (7 ± 3 vs. 17 ± 3 no./d, $P = 0.07$); metritic cows instigated fewer displacements and were displaced less often (4 ± 2 vs. 9 ± 2 no./d, $P = 0.06$; 3 ± 2 vs. 8 ± 2 no./d, $P = 0.09$). Metritic cows visited the feedbins less often (11 ± 3 vs. 21 ± 3 no./d, $P = 0.02$), ate less (8.3 ± 0.9 vs. 11.0 ± 0.8 kg/d, $P = 0.05$), spent less time feeding (67 ± 10 vs. 109 ± 9 min/d, $P < 0.01$) and tended to eat at a faster rate (148 ± 13 vs. 119 ± 11 g/min, $P = 0.10$). These results suggest that cows that become metritic after calving behave differently than healthy cows in the week post-calving, days before the onset of clinical signs of metritis.

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Student Competition

Oral Session: Health

An assessment of the behavioural changes in young swine infected with *Salmonella*

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Animals exhibit behavioural changes during illness, including lethargy, anorexia, adipsia, and anhedonia, which are a part of a strategy to assist in convalescence. The objectives of this study were to determine if resting behaviour, feeding, aggression, and abnormal oral behaviour (belly nosing, tail biting, and ear biting) would be altered by *Salmonella* infection in group-housed swine. Twelve groups of five Landrace/Yorkshire weaned pigs were housed in separate biosecure rooms. On the day of weaning and transport pigs were 18 ± 2.3 days of age, which corresponded to Day -5 of the trial. One animal was randomly selected from each group as the seeder animal and given 10^7-10^8 CFU of *Salmonella* Typhimurium orally on Day 0. Observers were able to identify pigs by individual markings and were blind to treatment. Pens were video-recorded from 0800 to 1700 on Day -1 to Day +6 relative to inoculation, and 5-minute scan samples were used to measure behaviour. Behaviour was analyzed using mixed models with a logit transform in SAS. The mean daily time spent lying was 63.6%, however this decreased throughout the trial ($P < 0.0001$), and did not differ between seeder animals and their penmates. Similarly, feeding did not differ between seeders and penmates ($P = 0.95$), although the amount of time spent feeding increased throughout the trial ($P < 0.0001$). Aggression did not differ between seeder animals and their penmates or over time ($P > 0.05$). However, abnormal behaviour increased on Day +6 ($P = 0.004$) for both seeder animals and penmates. *Salmonella* transmission was associated with pens in which pigs performed more abnormal behaviour ($P = 0.007$). This level of *Salmonella* infection did not appear to alter the resting, feeding, or aggressive behaviour of these newly weaned, group-housed swine in stable social hierarchies, however the performance of abnormal oral behaviour was associated with pen-level transmission of *Salmonella*.

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Student Competition

Oral Session: Housing

Sow social status alters enrichment use, but not motivation for a group pen

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Sow social status may affect enrichment use in group pens, but little data on this relationship is available. In an experiment designed to assess gestating sow motivation for an enriched pen, the effect of social status (D = dominant, M = middle, S = subordinate) on enrichment use was studied. Following operant response, 15 groups of 3 (Landrace x Yorkshire) sows gained 23 h daily access to an enriched pen containing 3 feeding stalls, a rubber mat (1.8 m x 2.4 m), and enrichments (cotton ropes, compost, and straw). The order in which sows entered the pen was varied (first; S: n = 7, D: n = 8). Behaviour was recorded during two sessions: continuously upon pen entrance (30 min) and at 10 min intervals for time budget information (23 h). Data were analyzed using GLM and post-hoc Tukey tests. Social status did not affect motivation for the pen (D: 54.2 ± 45.7 presses vs. S: 85.1 ± 56.2, P = 0.72). During the first 30 min, S sows used enrichments less (26.9 ± 5.3% observations) compared to M (46.5 ± 4.9%; P = 0.03) and D sows (52.5 ± 5.0%; P = 0.005) and spent more time inactive (S: 61.7 ± 5.4% vs. M: 39.7 ± 5.0% and D: 39.2 ± 5.1%; both P = 0.02). Status did not affect latency to first enrichment use or bout length (both P > 0.05), though S sows were pushed from their first chosen enrichment more than D sows (increased force score; 1.4 ± 0.1 vs. 1.0 ± 0.1; P = 0.04), M sows did not differ (P = 0.52). Status did not affect the overall 23 h time budget (P = 0.57), but S sows showed increased enrichment use the next day prior to feeding. In conclusion, S sows used enrichments less than companions during the first 30 min, but compensated during non-peak times. This may explain why D and S sows showed similar motivation for the enriched pen.

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Student Competition

Oral Session: Housing

Behaviour of cage – Free laying hens under different lighting conditions

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Observing the behaviour of animals at night or when they are housed in low-light conditions has traditionally involved altering lighting regimes or using non-white lights, both that could alter behaviours of interest or circadian behaviour patterns. Laying hens, which have multiple cone types, can potentially perceive light beyond the visible spectrum and possibly into the infrared range. To determine whether circadian behaviour patterns of laying hens were affected by lighting regimes typically used to enable low-light recording, 50 week-old Bovan Brown laying hens (n = 25/room x 3 rooms) were randomly exposed to each of three different treatments: regular lighting (CON; 16 L: 8 D; single incandescent 60W bulb on a dimmer/timer), additional continuous red lighting (RED; 20W bulb), or additional continuous infrared lighting (INF). Hens were exposed to each treatment for 5 d prior to video recording on d 6 and d 7. Instantaneous scan samples of behaviour and resource use were performed every 5 min using video and analyzed using one-way ANOVAs (daytime) and T-tests (nighttime). Daytime resource use (floor, nestbox, food, and water) and behaviour (preen, dustbathe, and other active) were not affected by the additional RED or INF light. Nighttime activity did not differ between RED and INF (t = -1.75, P = 0.16). However, overall perch use at night was higher under RED than INF (5.11 ± 1.47 and 1.20 ± 3.67 respectively, t = -2.75; P = 0.05), with bottom perches being used more under RED (1.47 ± 0.36 and 0.30 ± 0.16 respectively, t = -3.01, P = 0.04). Use of red lighting could increase nighttime perch use of hens in an aviary system, suggesting that lighting used to enable night and low-light video recording may alter behaviour and must first be tested with the species of interest to avoid confounding effects.

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Oral Session: Housing

Impact of an extended photoperiod in farrowing houses on sow and litter behaviour.

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The effect of an extended photoperiod throughout lactation on the behaviour of piglets and their dams was studied. Fifty-four sows were assigned to two light regimens: 1) standard (CTL, n = 28) consisting of 8h of light daily from d112 of gestation until d23 of lactation; 2) extended (TRT, n = 26) consisting of 23h of light from d112 of gestation to d4 of lactation and 16h thereafter. Litter size was standardized to 10 ± 1 pigs. Behaviour of sows and piglets was recorded for a continuous 24h period on d3 and d19 of lactation. Suckling and eating behaviours of sows were determined by continuous sampling whereas activities of piglets were investigated every 5 min using instantaneous scan sampling. Data were analyzed according to a one-way factorial design, with PROC MIXED of SAS, using the factor day as a repeated measure. TRT piglets tended to spend more total time suckling on d3 of lactation than CTL piglets (263 vs. 233 min., SEM = 11, P = 0.05) and suckling interval tended to be shorter for TRT sows on d3 (29.0 vs. 31.8 min., SEM = 1.2, P = 0.1) and d19 of lactation (28.8 min. vs. 31.8 min., SEM = 1.1, P = 0.06). The number of sucklings, average suckling length and number of productive sucklings were not affected by a longer photoperiod (P > 0.1). On d3 of lactation, CTL sows tended to have more eating episodes (4.0 vs. 2.5, SEM = 0.6, P = 0.06) and also tended to spend more total time eating (21.4 vs. 12.1 min., SEM = 3.4, P = 0.06) than TRT sows. Over the 24h period on d3, TRT piglets were more active than CTL piglets (34.5 vs. 32.2%, SEM = 0.8, P = 0.04). In conclusion, extending the photoperiod in farrowing houses affects mostly the activity of piglets, by increasing the daily period (i.e. when the lights are on) during which they are more active.

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Student Competition

Oral Session: Housing

Heat or insulation: Behavioural titration of mouse preference for warmth or access to a nest

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In laboratories, mice are housed at 20-24˚C, which is below their thermoneutral zone (26-34˚C). Generally mice prefer temperatures warmer than 20˚C. However, optimal temperature varies by behaviour, sex, and other factors. Nesting material should allow mice to control their thermal environment. Therefore, nesting behaviour should change with temperature and material, and the choice between nesting or thermotaxis should also depend on the balance of these factors, such that mice titrate nesting material against temperature. We housed naïve CD-1, Balb/c, and C57BL/6 mice (36 male and 36 female/strain in groups of 3) in a set of 2 connected cages, each maintained at a different temperature using a water bath. One cage in each set was 20˚C (Nesting cage; NC) while the other was one of 6 temperatures (Temperature cage; TC: 20, 23, 26, 29, 32, or 35˚C). The NC contained one of 6 nesting provisions (0, 2, 4, 6, 8, or 10 grams), changed daily in a balanced design. Food intake and nest scores (5 point scale) were measured. Analysis used GLMs with post-hoc contrasts and logistic regression. As the difference in temperature between paired cages increased, feed consumption in NC increased (Contrast: $F_{1,71} = 7.73$;$P = 0.007$). Nesting provision altered differences in nest scores between the 2 paired temperatures ($F_{5,352} = 514.95$;$P < 0.001$). With increasing provision nest scores in NC increased (Contrast:$F_{1,352} = 260.13$;$P < 0.001$). Temperature pairings altered difference in nest scores ($F_{5,352} = 12.82$;$P < 0.001$) with the smallest difference at 26˚C and 29˚C. Mice transferred material from NC to TC but females were more likely to transfer than males (Chi-sq = 64.4;$P < 0.001$). The likelihood of females to transfer peaked at ≈29˚C and males at ≈25˚C. With increasing provision, the likelihood of transfer occurring decreased (Chi-sq = 6.60;$P = 0.01$). Not only were mice titrating nest building vs. thermotaxis on the basis of temperature and material, but unexpectedly their decision to carry material (i.e. to combine the two responses) depends on these variables.

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Student Competition

Oral Session: Housing

Sows demonstrate increased heart rate in anticipation of free stall environments

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Heart rate (HR) is often used as a measure of animal welfare but increases in response to positive/negative stimuli. Two experiments were designed to determine if sows from different housing prefer locked (L) or unlocked free access (FA) stalls and if HR was related to the choice made. A total of 16 group housed sows and 16 sows from standard gestation stalls were given 16 free choices in a T-Maze. Sows were allowed 5 minutes to make a choice and spent 15 minutes in the selected stall. HR was collected using Polar S810 monitors and analyzed using paired and two-sample t-tests. Sows from both systems showed a significant preference for FA stalls. The max HR (bpm) was higher for stalled sows during the choice when the subsequent choice was FA (FA 168.9 ± 5.3, L 159.1 ± 5.4, $P = 0.02$). Sows from groups showed a similar trend (FA 135.4 ± 6.3, L 126.2 ± 4.3, $P = 0.08$). Stalled sows, with high preference for FA, showed a greater increase in HR (bpm) during the choice for FA compared to stalled sows with low preference for FA (High 19.8 ± 4.5, Low 0.8 ± 4.8, $P = 0.02$). For stalled sows with high preference for FA, HR (bpm) during the 1st min in the L stall dropped significantly less than the stalled sows that showed a low preference for FA (High 27.7 ± 5.8, Low 47.3 ± 5.7, $P = 0.04$). This was not true for group housed sows. Increased HR prior to choosing FA, could be due to anticipation of entering the free space, especially for stalled sows. Sows with a strong preference for FA maintained a higher HR during the 1st min in the L stall may indicate that they find the L stall aversive and are stressed.

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Student Competition

ABSTRACTS FOR POSTERS

Poster 1

Shelter choice by Syrian hamsters (*Mesocricetus auratus*) in the laboratory.

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We tested hamster preference for different types of shelter. First, 15 males and 15 females were offered a choice between a cage without shelter and a cage with one of four shelters, presented successively: an ABS (Acrylonitrile Butadiene Styrene) pipe open at both ends, 7.6 cm diameter, either short (10 cm) or medium (15 cm) and acrylic boxes open at one end, 7.6 x 7.6 cm, either short or medium. Both genders used the cage with the medium pipe more than the cages with the other shelter types ($P < 0.05$). More hamsters of both sexes chose the medium pipe for nesting than the short pipe (22/30 versus 2/30 individuals, presence of the nest in the shelters on more than 50% of observations). The second experiment gave access to pairs of shelters (one shelter per cage in a linked pair of cages) for 10 males and 10 females during 10 sessions (a different pair each session but the same for all hamsters). The different shelters were: open ABS pipes (medium, 15 cm; and long, 20cm), ABS pipe (15cm) closed at one end, box (medium, 15 x 7.6 x 7.6) open at one end, wheel (35 cm), aluminium cover (15 x 24 cm) and deep litter (10cm). Both genders preferred nesting in the closed pipe to nesting under the wheel ($P < 0.05$). There were tendencies for both to choose a closed pipe over a medium open pipe (adjusted $P = 0.06$) and females tended to nest in the closed pipe rather than under an aluminium cover (adjusted $P = 0.06$). No other combinations were significant. Overall, the closed pipe, as an environmental enrichment, was preferred over the other options. A recommendation for its use could be made, noting that this type is relatively easy to clean and fairly inexpensive.

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Student Competition

Poster 2

The effects of tail docking method on piglets' behavioural responses to a formalin pain test

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Routine piglet production procedures, for example teeth clipping, tail docking and castration, most likely cause pain and are under increasing scrutiny from the animal rights lobby. The objectives of this study were to assess the impact of 2 alternative methods of tail-docking on subsequent responses during a standard pain test – the formalin test. At three days of age, a total of 12 male and 12 female piglets from 4 litters were assigned to one of three treatments: Cold clipping (COLD) – tails docked using side-cutter pliers, Hot clipping (HOT) – tails docked using gas-heated cautery clippers, and Control (CON) – tails left undocked. For docking, approximately 5 cm of tail was removed. At 6 and 12 days of age, the piglets were subject to a formalin test, during which they were placed individually into a 1m × 1m × 1m solid-sided arena and a 100µL dose of 1% formalin was injected subcutaneously into the tip of the tail. Behaviour was measured continuously for 15 min following injection. Data were analyzed using repeated measures ANOVA in SAS. CON piglets carried out more tail wags than both docked treatments (19.6 vs. 0.8 – COLD, 2.2 – HOT, $F = 10.2$, $P < 0.01$). COLD piglets spent more time standing abnormally (13.3s vs. 0.3s – CON, 1.8s – HOT, $F = 5.6$, $P < 0.05$) and on day 12 tended to carry out more bouts of shaking (18.1 vs. 7.2 – CON, 1.8 – HOT, $F = 3.2$, $P < 0.07$) than other treatments. Across treatments, male piglets appeared to show greater pain responses than female piglets, with more bouts of abnormal standing (8.2 vs. 2.1, $F = 5.8$, $P < 0.05$) and shaking (11.6 vs. 4.3, $F = 4.7$, $P < 0.05$) and less time spent walking (122s vs. 198s, $F = 10.5$, $P < 0.01$). The results indicate that pain sensitivity appeared to be greatest in cold docked piglets and in male piglets. Docking using heated clippers may reduce pain during the time period measured, but long-term implications should be further investigated.

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Poster 3

Effects of farm management, gender and temperament on behavioural and physiological responses of pigs at slaughter

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While genetic, management and temperament factors are all known to influence the responses of pigs at slaughter, our understanding of these effects and their interactions is poor. In this study, the effects of management, gender and temperament were studied in 498 pigs (253 barrows and 245 gilts) reared on 18 commercial farms and on a research farm. All pigs were slaughtered at a commercial abattoir in cohorts of 24 animals per day. Farm classifications were 1) commercial farms with short loading-slaughter interval (CS; n = 188); 2) commercial farms with long loading–slaughter interval (CL; n = 189); and 3) research farm (R; n = 121). Before transport, temperament was assessed on-farm using an open door test; pigs were identified as 'bold', 'intermediate', or 'shy' based on their willingness to exit the home pen. At the abattoir, responses in the crowd pen and chute area were videotaped to determine the frequency of handler interactions (taps or prods/min) and pig behaviours (sum of balking, falling, turning back or piling events/min). Blood was collected at exsanguination for determination of stress parameters. Effects were assessed by mixed model ANOVA in SAS. Temperament had a significant effect on handling at the abattoir; in the crowd pen, shy pigs received more handler interactions than bold or intermediate pigs (P = 0.007), whereas in the chute area intermediate pigs received more handler interactions (P = 0.004). Also in the chute, gilts received more handler interactions/min (P = 0.022) and performed more behaviours/min (P < 0.001) than did barrows. Cortisol levels in R pigs were lower than CS or CL pigs (P = 0.040), and glucose levels were higher in barrows than in gilts (P = 0.020). We conclude that the effects of temperament, gender and management factors on behavioural and physiological responses at slaughter are both complex and important.

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Student Competition

Poster 4

The effect of social rank on feed intake patterns in growing pigs

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To determine the effect of social rank on individual feeding patterns, 108 barrows (BW = 49.5 ± 4.7 kg) were housed in groups of 12 and distributed into 3 replicates of 3 pens each. Starting 10 d after mixing, pigs in each pen were submitted to two food competition tests, performed following a 16 h fast. The first test was a 30-min group test in the home pen, in which pigs competed for access to a single space feeder providing food ad libitum. The second one was a 5-min dyadic test, in which each pair of pigs competed for 100 g of food. During group tests, all aggressive acts delivered and received per pig were summed for each group. Thereafter, a dominance value (DV) was used to determine social rank of each pig within its group. During dyadic tests, all encounters won by each pig during tests were summed within each group. Pigs that had a higher number of winning encounters were given a higher dominance rank. In addition to the two social hierarchy tests, the «total time at the trough» (TTT) was measured as a complementary variable during the group test for each pig. Computerized IVOGÒ feeding stations registered individual feeding data over a 10-day period. Spearman's rank correlation tests revealed inconsistencies in social rank determination from one test to another. Out of 27 test combinations, only three were significant. Three clusters were established based on feeding data. Daily feed intake, feed consumption rate, and most significantly, daily eating time, were three discriminative variables that explained differences between groups. For each food competition test, the number of dominant and subordinate pigs established was not significantly different from one cluster to another. Therefore, no clear relationship could be demonstrated between social ranks and individual feeding patterns.

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Poster 5

Influence of season and location within truck on the behaviour of market weight pigs after being transported 8 hours prior to slaughter

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There is evidence that season plays an important role in pre-slaughter mortality, although little is known about the seasonal effects on pig behaviour after transportation and whether location within truck interacts with these effects. The objective of this experiment was to determine if season and location within truck influenced pig behaviour during unloading and lairage. Over 11 weeks (6 summer, 5 winter), 195 pigs per week were transported for 8h on a three-level pot-belly truck with 10 compartments. Pigs were loaded onto the truck in groups of 4-5, unloaded by compartment and mixed at lairage where they remained for 1.5h before slaughter. Behaviour during unloading (slips/falls), time to unload each compartment, and latency to rest (75 % of pen lying) during the first hour of lairage were observed. Data were analyzed using the mixed model procedure in SAS, with season and truck level as fixed effects and week within season as a random effect. Tukey-Kramer adjustment was used to compare treatment means. Data were weighted for the number of pigs in each compartment. There were no interactions between location and season. Pigs tended to unload slower in winter (summer: 128 ± 7s; winter: 146 ± 8s; $P = 0.09$), although pigs slipped and fell more (summer: 3.0 ± 0.4 times; winter: 2.0 ± 0.4 times; $P = 0.01$) and had a shorter ($P < 0.001$) latency to rest after transport in summer (summer: 15.6 ± 2.1 min; winter: 29.9 ± 2.3 min). Pigs coming from the lowest truck level took twice as long to unload as other pigs ($P < 0.001$; upper: 106 ± 8 s; middle: 107 ± 9 s; lower: 199 ± 10 s), although pigs slipped and fell more if they came from the upper level ($P < 0.001$; upper: 3.3 ± 0.4 times; middle: 1.6 ± 0.5 times; lower: 2.3 ± 0.5 times). There was no effect of location in truck on the latency to rest ($P = 0.86$). In conclusion, both season and location in truck independently influence pig behaviour during unloading and lairage.

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Poster 6

Validation of scoring scales to assess standing up behaviour and foot lesions in gestating sows

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Locomotion disorders are a major welfare problem in sows. They represent the second major cause of culling and the main reason for euthanasia. This study is part of a larger project which aims to analyse lameness for on-farm evaluation of gestating sow welfare. The objectives of this study were to validate two scoring systems for standing up behaviour and foot lesions which are potential indicators of lameness. Standing up behaviour was analysed using a four-point scale ranging from 1 (standing up without hesitation) to 4 (refuse to stand up or stay in a sitting position). The scoring system was developed after video-observation of spontaneous standing up movement of 10 sows during a 6-hour period. The standing up scoring scale was assessed by three observers for reliability (index of concordance within or between observers) using 20 gestating sows housed in individual pens. Sows were stimulated to stand up by opening the door of the pen. Observers were trained by observing two standing up sequences. Inter-observer reliability ranged between 71 and 90%. Intra-observer reliability, calculated from two video-observations of the same sequences, was 86%. Foot lesions were evaluated using a grid adapted from the FeetFirst™ lesion scoring guide and following the analysis of post-mortem pictures from eight sows. It consisted of nine categories of lesions; each evaluated using a three-point scale (ranging from no lesions to severe lesions). Three observers were trained with photo examples and rated one sow collectively before rating each of the four feet of five sows. The index of concordance between observers ranged from 58 to 64%, while it averaged 76% within observer. In conclusion, these scoring systems could be useful tools to evaluate standing up behaviour and foot lesions at the farm level. However, further tests are required to establish whether more training would improve inter-observer reliability.

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Student Competition

Poster 7

Can fear be effectively assessed in swine? A study measuring fear levels during a Human Approach Test

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The objectives of this study were to examine the influence of experience and companionship on fearfulness in pigs. Forty PIC Camborough 22 crossbred Duroc swine were tested using a Human Approach Test at 9-11 weeks of age. Pigs entered an unfamiliar testing arena (4.6 m X 2.7 m) where an unfamiliar human stood passively. ***Test 1***; Behaviour was observed for 10 minutes and included latency to enter within 1 m, 0.5 m of the human, latency to touch human, and number of contact bouts, grid crossings, vocalizations, and defecations. All pigs completed Test 1 individually over four days. ***Test 2***; A week later, the test was repeated with 20 pigs tested paired with a penmate (P) and 20 tested individually (I). Data were analyzed using Minitab version 15.1.10 for Windows XP and tested for normality. Paired T-tests were used to determine changes in behaviour between Test 1 and Test 2. More vocalizations (156 (I) vs. 54 (P), $P < 0.05$) and a trend for more defecations (5.6 (I) vs. 4.7 (P), $P = 0.07$) from individually tested pigs suggested that pig responses reflected fear rather than exploratory motivation. Increased latency to approach within 0.5m (133 (I) vs. 70 (P) sec, $P < 0.05$) suggests that fear was associated with the human stimulus rather than novel environment. Latency to touch did not differ between the first and second test, suggesting contact with a human is an extremely fearful action regardless of companionship. Once contact was made, paired individuals made more contact bouts with the human ($P < 0.05$). Companionship did decrease fear levels of pigs but Experience did not. This suggests a significant amount of positive human interactions is needed for handlers to overcome innate fearfulness of pigs, and that handling pigs in groups is less likely to induce stress.

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Student Competition

Poster 8

Validation of tests for on-farm assessment of gestating sows' reactivity to humans – Inter- and intra-observer reliability

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The human-animal relationship is an important factor to consider when assessing farm animal welfare. The aim of the study was to validate reliable and easy to use tests for on-farm assessment of sows' reactivity to humans. Sixty-eight gestating sows were successively subjected to two tests in their home stall. In the approach test, an unfamiliar experimenter slowly approached the sow from the front and tried to touch it on forehead. An observer recorded the outcome of the test (contact or withdrawal), vocalisations and sow's behaviours before and after the contact attempt. In the handling test, the experimenter tried to make the sow leave its stall in a standardised manner while the observer recorded the time (max. 2 min) and the number of interventions (slaps with a paddle) needed to perform the test and sow's behaviour. All tests were video-recorded. Concordance between direct and video-recording observations was assessed on 18 videos and Kappa's coefficient (k) indicated high to very high concordance ($k > 0.77$) for all variables. Inter- and intra-observer reliabilities were evaluated by video-observations of 10 video-clips selected for their variability of the response of sows. Inter-observer reliability between 3 observers was very high (correlation coefficient $r > 0.9$) for the time needed to succeed in the handling test, to relatively high ($k > 0.62$) for postures, vocalisations and interventions in both tests. Intra-observer reliability was high for all the variables (index of concordance > 76%) except for the behaviour during the handling test. Comparison of the response of sows when the tests were carried out one hour or seven hours after feeding was also done on 20 sows, but no mean difference was observed. These tests are promising tools and should be further developed for on-farm welfare assessment. However, better definitions of the behavioural responses may increase the intra-observer reliability.

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Poster 9

Can environmental enrichment during lactation reduce the effects of prenatal stress on piglet behaviour?

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Acute stress during gestation in sows can alter the development of the foetal hypothalamic-pituitary-adrenal (HPA) axis in utero. Physiological evidence of an altered HPA axis, such as increased corticotropin-releasing hormone expression, is most evident when stress occurs during mid-gestation in pigs. Scientific findings on the effects of prenatal stress on piglets vary but generally seem to agree that it negatively impacts welfare. Prenatally stressed piglets adapt less well to the stressful situations of weaning and mixing than controls by having more aggressive encounters (+82%), decreased frequencies of play behaviours (-46%) and greater increases in salivary cortisol concentrations (+2.5ng/mL vs. +1.2ng/mL). The impacts of gestational stress on maternal behaviour have not been extensively studied in pigs. However in rodents, gestational stress depresses maternal behaviour by causing a condition similar to post-partum depression in humans. Thus it is argued that stress during gestation potentially decreases the welfare of the sow and her progeny. On the other hand, environmental enrichment during lactation (free movement of the sow, substrate availability and large surface area) improves pig welfare. Piglets in enriched environments show increased frequencies of feeding behaviours pre- and post-weaning, decreased frequencies of aggressive interactions (-56% pre-weaning and -32% post-weaning) and spend more time in play behaviours (+66%) pre-weaning compared to controls in standard farrowing crates. Additionally, environmental enrichment improves maternal behaviour in terms of the sow performing fewer postural changes, more frequent suckling grunts and spending more time in lateral recumbency than sows in standard crates. It may therefore be possible to counteract the impacts of prenatal stress by providing sows and piglets with enrichment during lactation. In rats, environmental enrichment can reverse prenatal stress effects on pups. A scientific experiment will follow this review to determine whether this is also the case for piglets.

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Review
Student Competition

Poster 10

The health and welfare of cull cows in Ontario

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Beef and dairy cows are culled for reasons including lameness and decreased productivity, and sold at auction. A survey was carried out in Ontario, Canada between May and August 2008 to assess the health and welfare of cull cows. Data were collected from three sale barns on days with the expected highest volume of culls. Data collection at ringside allowed for the longest evaluation of the largest number of cows. Each cow spent approximately 30 seconds in the ring. A scoring system assessed cull cows on the following parameters: purpose (1 = beef, 2 = dairy); body condition score (BCS) (1 = clinically emaciated, 2 = thin, 3 = average, 4 = heavy, 5 = fat); gait (1 = normal, 2 = uneven gait, 3 = mildly lame, 4 = lame, 5 = severely lame); and udder (large/pendulous, impedes locomotion = 1, or not = 0). A total of 1390 cows were assessed, of which 72.7% were dairy. The average BCS for all culls was 2.80 ± 0.02, with beef cows having a slightly higher average than dairy ($P < 0.0001$, Mann-Whitney test). BCS 1, indicative of clinical emaciation, was present with 6 times greater frequency in dairy culls than beef ($P < 0.0001$, $\chi 2$-test). Gait scores for all culls averaged 2.26 ± 0.03, with frequencies of gait scores 1 through 5 being 69.9, 11.6, 6.2, 10.8 and 0.8%, respectively, for beef and 24.0, 27.9, 21.7, 24.6 and 1.8% for dairy. An udder score of 1 was assigned to 18% of all animals, with dairy cows representing 98% of that number. The most compromised culls were held for veterinary inspection and are not included in this data. The results of this study show that cull dairy cows are more likely than beef culls to suffer reduced welfare due to increased incidence of lameness and decreased health at sale barns. It confirms census data of lameness prevalence and reaffirms that on-farm decisions to cull or euthanize dairy or beef cows need to be made more promptly.

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Student Competition

Poster 11

Effect of feeding level on the feeding and sorting behaviour of lactating dairy cows fed a total mixed ration.

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The objective of this study was to determine how feeding level affects feeding behaviour and feed sorting of lactating dairy cows. Six lactating Holstein cows, individually fed a total mixed ration (TMR) twice daily, were exposed in a crossover design with 7-d periods to 2 treatments: 1) lower-feeding level (LFL; 14.3% orts), and 2) higher-feeding level (HFL; 18.2% orts). Feeding behaviour, dry matter intake (DMI), and feed sorting were monitored during d 4-7 of each period. Feed samples were taken prior to each feed delivery (at 0930 and 1530 h) to determine DMI and sorting. Sorting was determined from particle size analysis of orts and fresh feed samples. The particle size separator separated feed into 4 fractions (long, medium, short, fine). Sorting of each fraction was calculated as actual intake expressed as a percentage of predicted intake. To determine if sorting occurred, each fraction was tested for a difference from 100%. Treatment effects were tested using a general linear mixed model. Cows tended to consume more on the HFL across the entire day (29.1 vs. 27.5 kg/d; SE = 2.7, P = 0.09). There was no difference in feeding time between treatments (270.9 min/d). Feeding rate was higher on the LFL following AM feeding (0.29 vs. 0.19 kg/min; SE = 0.04, P = 0.06), but was similar for the rest of the day (0.10 kg/min). There were no differences in sorting between treatments. In the period following AM feeding, cows sorted against long particles (75.2%; P = 0.04). During the rest of the day, cows sorted against long particles (67.1%; P = 0.02) and tended to sort for both short (104.4%; P = 0.07) and fine (108.4%; P = 0.08) particles. Feeding dairy cattle at a higher level would, therefore, be recommended as this practice does not affect sorting, but does reduce feeding rate during the period following the AM feeding, and promotes higher DMI.

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Student Competition

Poster 12

A comparison of commonly used and novel techniques for evaluating beef cattle temperament

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The temperament of twenty-eight steers was assessed using four different quantitative techniques including: flight time, flight distance, strain-gauge and accelerometer tests, and three separate visual scores made on entry, during restraint and exit from a squeeze chute. The objective of this study was to develop a temperament index based on the measurements taken, and to evaluate the relationship between the techniques. Both flight time and distance were significantly correlated with the visual score made at the time of exit from the chute (r = -0.51, and 0.41, $P < 0.05$; n = 56), but were not related to the visual score made during restraint. Data from both strain-gauge and accelerometer sensors were used to generate parameters such as peak response and area under the curve that were significantly correlated with all three visual scores. Stepwise multiple regression models using visual score as the dependent variable and a combination of 3 to 5 parameters from the strain-gauge and accelerometer tests as independent variables predicted temperament with an accuracy (R2) of 31.3 to 56.5 or 42.8 to 62.6 %, respectively. When strain-gauge, accelerometer, flight distance and flight time were used as independent variables, model accuracy increased to 64.5, 75.8 and 76.7 % for temperament scores made on entry to the squeeze chute, during restraint and on exit from the squeeze chute, respectively. These findings suggest that the objective measures of temperament assessed in this study could be used to identify highly reactive animals with good accuracy.

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Poster 13

Effect of flavor on acceptance of and preference for grain in unweaned beef calves

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Feed preferences of young animals are influenced by social interactions with their dams. These preferences can be long-lasting and may affect acceptance of future feeds. However, little is known about the relative strengths of innate versus learned feed preferences. We hypothesized that calves exposed with their dams to either onion- or cherry- flavored grain would prefer the same flavor at subsequent testing, while naïve calves would show no preference toward either. Six cow-calf pairs were divided into three treatment groups and exposed to cherry-flavored (CHE, n = 2), onion-flavored (ONI, n = 2) or plain grain (CON, n = 2) over 22 days. Within one week of training, based upon weigh-back measurements (CHE μ = 0.4 lb; ONI μ = 0.43 lb; CON μ = 0.49 lb), all treatments were equally consuming grain (one-way ANOVA: F = 0.34; *P* = 0.74). After training, each calf was individually tested to see if they exhibited flavor preferences in a pen containing one trough with cherry-flavored and one with onion-flavored grain. Latency to eat, time spent eating, and initial flavor consumed was recorded. Within 20 s all but one calf had chosen a trough, spending most of the test period eating. Five of six calves chose cherry-flavored grain first. Three of these calves also consumed onion-flavored grain, but only one of these three had been trained with onion flavoring. Calves that ate both grain flavors spent more time consuming cherry-flavor grain during the testing period (Student's T test: t = 2.31; *P* = 0.07). One onion-trained calf did not consume any grain during testing and all control calves consumed only cherry flavored grain. While all calves learned to readily consume grain during training regardless of flavor; the bias toward initial consumption of the cherry-flavored grain during the choice test may indicate that calves have an innate flavor preference.

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Student Competition

Poster 14

Using inter-observer reliability as a teaching tool in a graduate animal welfare assessment course

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Codes of practice and/or regulations and corresponding welfare assessment programs are increasingly used to provide assurances of good welfare. There is a need for students in animal welfare science to understand the underlying concepts of validity and reliability of animal welfare assessment measures and to be able to apply this understanding to the development of animal welfare assessment programs. Students (n = 14) in the 'Assessing Animal Welfare in Practice' graduate level course explored the concepts of reliability and feasibility of animal-based measures through a field trial following a three hour in-class seminar on body condition scoring. Students visited a livestock auction where each used their classroom knowledge to assign body condition scores (BCS based on a 5 point scale) to a sample of 28 dairy cows and then to perform inter-observer reliability tests (independent samples t-test and Kendall's coefficient of concordance, W) on the pooled class scores. Class scores were also compared to the instructor's (expert) scores. The overall goal was to demonstrate to students the usefulness and the limitations of some types of measures in an animal welfare assessment programs. Another goal was to investigate whether delivering a three-hour training seminar in BCS to a group of students from various backgrounds/experience was sufficient for achieving reliable results, since training for animal welfare assessment programs must also be practical. Results from the class data indicated satisfactory inter-observer reliability ($F_{(13,378)} = 1.70$, $P > 0.05$; $W = 0.92$, $P < 0.001$). Results also showed that the class' body condition scores did not differ statistically from the instructor's (expert), on average ($t_{(418)} = 0.43$, $P > 0.05$). This exercise demonstrated that students can be taught to use BCS in a classroom to reliably measure BCS. It also emphasized the importance of using a quantitative approach to validating practical animal welfare assessment.

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