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ABSTRACT BOOK

Nordic Co-operation

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KEYNOTE SPEAKERS

ANIMAL WELFARE AND SUSTAINABLE DEVELOPMENT GOALS

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The contribution of animals in achieving the United Nations (UN) Sustainable Development Goals (SDGs) is not recognized nor made explicit. Nevertheless, there are notable areas where animals play an essential role in the context of sustainable development. Therefore, understanding how animal welfare affects the SDGs and vice versa is essential to formulate balanced targets that take account of animal welfare aspects. Together we will examine a methodological approach toward analyzing this interaction and its potential application in teaching, research and policy by reflecting on the characterization of the relationship found across different stakeholders, contexts and experiences.

SCORING ANIMAL WELFARE AND OTHER COMPONENTS OF SUSTAINABILITY

Donald Broom
University of Cambridge, United Kingdom

The public increasingly demands to know about all components of sustainability when purchasing food and other products. For this, a scientifically-based scoring system is needed for impacts on animal welfare, biodiversity, carbon cost, pollution, consequences for human communities etc. Some methods for achieving this will be discussed.

WHAT CAN STUDIES ON FREE-RANGING CATTLE TELL US?

Stephen Hall
University of Lincoln, United Kingdom

The behaviour of cattle in silvopastoral or rewilding situations, and the behaviour of their extinct ancestor, the aurochs, are of practical and academic interest and of potential relevance to animal welfare. Insights might be provided by the study of cattle that range freely with minimal human involvement. This could also help with understanding the processes by which cattle were domesticated.

ANIMAL WELFARE AND ORGANIC FARMING

Lindsay Whistance
Organic Research Centre, United Kingdom

ORAL PRESENTATIONS

AROUSAL TENDS TO DISTORT TIME PERCEPTION OF DOMESTIC PIGS

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Ability to perceive time is a cognitive characteristic, shared by numerous species. However, time perception does not only involve cognition, but is intrinsically connected to affective states – time flies when having fun and drags when feeling bored. This study set out to establish and validate a task to study time perception of domestic pigs. Pigs (n=28) were trained to discriminate between a short and a long tone (1 s vs 8 s) and were then tested with tones of intermediate lengths (2.75 s, 4.5 s, 6.25 s) across six test sessions. Twenty-six pigs learned the task in 8 to 39 sessions (mean±sd: 20±9). Prior to testing, pigs experienced either enriched (2 sessions) or unenriched waiting (2 sessions) for 4 minutes each, or started a control session (2 sessions) without prior waiting. During enriched waiting, pigs had access to straw, toys and a rooting box. Unenriched waiting took place in the same location, but in a completely barren room. After having experienced waiting treatments, pigs tended to make choices indicative of time going by faster during testing ($x(2,2)=5.77$, $P=0.056$) when compared to control sessions. On average, during unenriched waiting, pigs performed more behaviours indicating arousal than during enriched waiting, namely more vocalisations (unenriched: 73.9±46.9 s, enriched: 2.8±6.8 s) and more time spent being alert (unenriched: 41.6±25.8 s, enriched: 0.1±0.4 s). Despite the likely difference in valence during the two waiting treatments, both tended to distort time similarly. This tentatively suggests that arousal rather than valence affected pigs' time perception. Our study forms the basis for future projects on identifying chronic boredom characteristics and the potential consequences for pig welfare.

SYSTEMIC INFLAMMATION IN NEWBORN RUMINANTS – ADAPTATION TO EXTRAUTERINE LIFE?

Marina Loch, Elisabeth Dorbek-Kolin, Kristel Peetsalu, Tarmo Niine, Lea Tummeleht, Toomas Orro

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Birth is a stressful event. As the newborn animal adapts to life, its immune system is challenged. This can be seen in rising concentrations of inflammatory markers: Serum amyloid A (SAA), haptoglobin (Hp), and interleukin-6 (IL-6) increase in the serum of healthy newborn ruminants, peaking around two weeks. What causes this phenomenon and what does it mean for future performance?

Observational studies were performed in cattle and sheep, analyzing the markers' concentrations in colostrum and in offspring's serum during the first three weeks of life. Fecal samples were taken from diary calves and fecal microbiota was analyzed by sequencing. Regression analysis was performed to investigate possible associations.

IL-6 in colostrum and calf serum is positively associated throughout the three weeks, and on days three and six in lambs. SAA in cow colostrum is negatively associated with SAA in calf serum in the first week of life, but a positive association has been found in sheep.

Higher concentrations of Hp and SAA during the second week of life are associated with lower weight gain of cows up to one year of age, higher age at first calving, and longer calving-conception interval. IL-6 concentrations of the first week of life are positively associated with risk of reproductive diseases in the first lactation. Abundances of certain bacterial genera in feces of the second week of life are positively associated with inflammatory marker concentrations in serum and negatively with weight gain up to one year.

While the first week of life is influenced by colostrum, the inflammatory response during the second week of life seems to be due to microbial colonization, and the microbiota may influence host performance via immunomodulation. Thus, the fluctuation in inflammatory markers during the neonatal period may not be a sign of pathologic events, but rather of physiological adaptation processes.

ASSESSMENT OF ŽEMAITUKAS BREED HORSES FOR HIPPOTHERAPY

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Introduction
Finding the right place and field of activity plays a crucial role in the preservation of native horse breeds. Nowadays most horses are more frequently used as sport horses. Additionally, hippotherapy is considered as a beneficial field of activity for Žemaitukas, a Lithuanian native horse breed. Therefore, appropriate selection of these horses for their use in hippotherapy is essential. The aim of this study was to analyse the suitability of Žemaitukas breed horses for hippotherapy by using a set of tests based on the temperament, personality, behaviour, and zoometric measurements.

Methods
In total, 32 horses were evaluated. Twenty-nine of the evaluated horses were horses of the Žemaitukas breed that had never been used for hippotherapy, the others were hippotherapy horses representing different breeds, which were considered the control group.
Three groups of tests were used for assessment. First group was for assessing of horse's temperament Research methodology consisted of six different tests: Novel object, Sweet-salt, Unusual smell, Sensitivity to pressure, Unknown surface test and Unusual sound. Second group ("Hippo-test") assessed horse's reaction to somebody entering the loose box, to grooming and saddling, to novel equipment, to someone doing exercises on its back, to being left by the herd, to the oral command, to fear stimuli and ability to stand still. Third group of tests in fact were zoometric measurements for assessing the index of massiveness.

Results and conclusions
The hippotherapy horses scored better in many tests, thus confirming the suitability of these tests for the evaluation of horses for hippotrapeutic use. Nevertheless, the results suggest that Žemaitukas breed horses may be suitable for hippotherapy due to their temperament characteristics and body

size, and especially after undergoing training courses. They could also be added to the list of hippotherapy horses selected for breeding.

POSTER PRESENTATIONS

JERUSALEM ARTICHOKE FLOUR CONCENTRATION AND ITS SYNBIOTIC EFFECT ON CALF GROWTH AND GASTROINTESTINAL TRACT DEVELOPMENT

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Until the 3–4 weeks of life, the calf's digestive tract is more like a unicameral stomach than a ruminant stomach. The greatest risk to the health and life of calves is between the ages of 7-21 days, because the weight ratio of the rumen to the amasum changes and the digestibility of roughage increases and the need for milk decreases. It is possible that feeding prebiotics, probiotics or synbiotics to calves would accelerate the morphological and functional development of the rumen, which would reduce the cost of feeding milk replacer to farmers. The aim: to determine the effect of the different doses of Jerusalem artichoke flour (containing prebiotic inulin ~50%) and of the new synbiotic (J.artichoc flour with Enterococcus faecium) on 4-12 weeks old calves health, on the development of the gastrointestinal organs and on animals growth.
Seven different groups (10 calves (4 weeks old, 50 kg±5 kg) per group) were created: 1 control ConG; 3 prebiotic: PreG6; PreG12; PreG24 (6 g, 12 g or 24 g/d artichoke); 3 symbiotic: SinG6; SynG12; SinG24 (0.25 g/d E.faecium (2×109 CFU/g) with similar artichoke dose). We observed the general state of health of the animals (including faecal consistency) and weight gain. On the 56th day (12 weeks old) after the planned slaughter we performed a macroscopic evaluation of the animal's digestive tract, measuring and weighing organs. When fed a medium dose of Jerusalem artichoke flaour concentrate (12 g/d) and especially with 0.25 g of E.faecium (2×109 CFU/g), faecal consistency was more consistent and species-specific. Exactly these doses of prebiotics and synbiotics significantly (at least $p<0.05$) improved the growth and development of the rumen and abomasum, as shown by masometric and morphometric measurements of these parts of the stomach, and significantly ($p<0.01$) improved live weight gain in calves during transition to ruminant.

POTENTIAL OF JERUSALEM ARTICHOKE CONCENTRATE AND ITS COMBINATION WITH YEAST IN REDUCING METHANE PRODUCTION IN THE RUMEN OF CALVES

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Today, more and more attention is paid to the global problem of increasing greenhouse gas emissions (GGE). Cattle produce approximately 80% of the total GGE from the agricultural sector. It is mainly methane (CH4) that comes from enteral anaerobic fermentation processes. Enteral CH4 is mainly produced in the rumen (87-90%) and to a lesser extent (13-10%) in the large intestine.

The aim of the research was to measure the amount of CH4 in calves' rumen, and to compare the obtained results between the control group (CoG) and the prebiotic group (PreG) which received the additional of Jerusalem artichoke (Helianthus tuberosus) concentrate, and the synbiotic group (SynG) which received this concentrate in a synbiotic with yeast.

Materials and Methods. The study included 15 Holstein Friesian crossbreed calves (32±4 days old). The CoG calves (n=5) 56 days received the standard diet, PreG calves (n=5) diet was supplemented with 12 g/d of artichoke concentrate (contains 6 g/d of prebiotic inulin). The SynG (n=5) in addition received synbiotic (12 g/d of artichoke concentrate, 5 g/d probiotic S.cerevisiae strain 1026). CH4 was measured using a Picarro G2508 mobile gas spectrophotometer. Samples of calves' rumen were obtained by rumenocentesis and evaluated on the 1st, 28th, and 56th experimental days.

Results. The amount of CH4 in the rumen of the SynG group calves on the day 28 and day 56 of the study was significantly lower than that of the CoG group calves and PreG calves ($p<0.001$).

Conclusions. These results suggest that Jerusalem artichoke concentrate (inulin content 6 g) alone cannot significantly affect the amount of this gas in the rumen, whereas, in combination with S.cerevisiae strain 1026, it can significantly reduce the amount of CH4 produced in the rumen.

USE OF L. FARCIMINIS AND L. RHAMNOSUS COMPLEX TO REDUCE THE HARMFUL EFFECT OF AMMONIA ON THE RESPIRATORY TRACT OF BROILER CHICKENS

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Studies have shown that adding lactobacilli to drinking water or feed results in faster live weight gain and reduced NH3 excretion (Mahardhika et al., 2019; Pezzuolo et al., 2019). There is an in vitro study (Chen et al., 2018) describing the ability of L.rhamnosus to utilize NH3 nitrogen. Therefore, the aim of our study was to find out whether it is possible to reduce NH3 emissions and harmful effects on the respiratory tract of broiler chickens by adding a mixture of L.farciminis CNCM-I-3699 and L.rhamnosus CNCM-I-3698 (MixL) simultaneously to feed and litter.
In a triplicate 35-day study, 780 (260 per replicate) newly hatched Ross 308 broiler chicks were housed in two identical biochambers with full microclimate control. The control group (Con, n=130) received basal diet ad libitum, and the probiotic (ProX, n=130) additionally received MixL. MixL was spread on the ProX bedding every week. Every day, the amount of NH3 was determined with electrochemical sensors (E2618-NH3-RP) in the incoming and outgoing air of each biochamber. Litter moisture was determined every 7 days. The titer of antibodies to IBV was determined in the blood of chickens at the end of the study (ELISE 25). The organs of the respiratory system were examined macroscopically (pathoanatomically) and microscopically (H&E). Comparison of the Con and ProX groups showed that the emission of NH3 differs statistically significantly at 1-3 weeks and becomes unsignificant at 4-5 weeks of bird life. The results for IBV in the first repetition were negative, but the second and third AV titers showed positive results in both groups. No macroscopic changes were detected in the lungs. Histological examination showed that the inflammatory picture with a more severe degree is observed more often in the Con group. In general, the probiotic group managed to reduce the harmful effects of NH3 more effectively.
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