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Proceedings of the 19th Nordic Symposium of the International Society for Applied Ethology

24-26 January 2007
Skara, Sweden

Edited by
Lena Lidfors, Margareta Rundgren & Maria Andersson
Swedish University of Agricultural Sciences

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Swedish University of Agricultural Sciences

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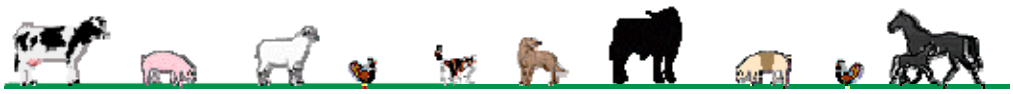

Wednesday 24 th January in the Aula

10.00-12.00 Registration in Undervisningshuset
12.00-13.00 Lunch in Smedjan
13.00-13.15 Welcome

Chair: Lena Lidfors
13.15-14.15 Plenary 1
Björn Forkman – Behavioural ecology and applied ethology.

14.15-14.35 Ulrika Alm Bergvall – Development of feeding selectivity in fallow deer: ethological and evolutionary aspects.
14.35-14.55 Margit Bak Jensen – What are suitable rooting materials for slaughter pigs?
14.55-15.15 Jenny Nilsson – Foraging and diurnal behaviour of adults and offspring in blue monkeys (*Cercopithecus mitis stuhlmanni*).

15.15-15.35 Coffee
Chair: Jens Jung
15.35 -15.55 Emelie Ingman – Human impact on food choice and diurnal behaviour in blue monkeys (*Cercopithecus mitis stuhlmanni*).
15.55-16.15 Anne-Charlotte Hansson - Foraging ecology of lactating and non-lactating blue monkeys (*Cercopithecus mitis stuhlmanni*).
16.15-16.35 Maria Wagner - Impact of bush fire on habitat choice of migrating herbivores in Massai Mara: Wildebeest (*Connochaetes taurinus*), Thomson gazelles (*Gazella thomsonii*) and Plains zebras (*Equus burchelli*).
16.35-16.55 Sara Gabrielsson – Impact of fire management on resident herbivores in Maasai Mara National Reserve.

16.55-17.05 Short brake

17.05-17.15 Per Eriksson – Do solitary trees influence distribution of African herbivores and vultures?
17.15-17.30 Sophie Ståhlberg – Suckling, grazing and social behaviour in topi calves (*Damaliscus lunatus*).
17.30-17.45 Adroaldo J. Zanella - Brain measures and animal welfare.

18.00-19.00 Dinner
19.00-20.30 Workshop organised by Noldus in lecture rooms with computers

20.30 Pub

Thursday 25 th January in the Aula

Chair: Jenny Loberg
8.30-9.30 Plenary 2
Hanne Lövlie – Chicken sex – the parts we don´t see.

9.30-9.50 Lovisa Häggström – The effect of teat per calf ratio, on feeding behaviours, competitive behaviours and cross-sucking in group housed dairy calves.
9.50-10.10 Anne Pavlenko – The influence of sole ulcers and digital dermatitis on dairy cows behaviour and milk composition.

10.10-10.30 Coffee

Chair: Björn Forkman
10.30-10.50 Annelie Andersson – Wild boar sows farrowing in an enclosure – what are they doing?
10.50-11.10 Inger Lise Andersen – Litter size and maternal investment in sows – preliminary results.
11.10-11.30 Evgenij Telezhenko – Floor preference of lame and non-lame cows.
11.30-11.50 Sara Asteborg – Can foraging enrichment reduce oral stereotypies in horses?
11.50-12.10 Malin Gustafsson - Influence of silage structure on feeding behaviour and stereotypies in dairy heifers.

12.10-13.10 Lunch

13.10-16.00 Excursion with cake and coffee

19.00 Conference dinner in Smedjan

Friday 26 th January in the Tidén

Chair: Margareta Rundgren
8.30-8.50 Janicke Nordgreen – Do rainbow trout (*Oncorhynchus mykiss*) form CS-CR or CS-US associations during classical conditioning? Implication for cognitive capacity.
8.50-9.10 Hanna Orjala – Blue foxes value an earth floor dichotomously.
9.10-9.30 Sari Hänninen – Aggression, stereotypies and adrenal function in group housed juvenile mink.
9.30-9.50 Linda Keeling – Group housing and managing horses under Nordic conditions: strategies to improve horse welfare and human safety.

9.50-10.10 Coffee

Chair: Evgenij Telezhenko
10.10-10.30 Jenny Loberg – Behaviour in dairy calves when weaned and separated in two steps from foster cows.
10.30-10.50 Anette Wichman – The effect of loosing or gaining access to peat on the dustbathing.
10.50-11.10 Rie Henriksen – Alternative loose-housed pen systems for farrowing and lactating sows: effect of pen design on where the sows choose to rest.
11.10-11.30 Grete Helen Meisfjord Jørgensen – Reducing space for dairy goats – effects on social interactions and feed intake.
11.30-11.50 Linda Nykvist – Parturition behaviour in Brazilian beef cattle in relation to presence of vultures.
11.50-12.10 Jens Jung - Suckling and grazing behaviour in Plains zebra (*Equus burchelli*).

12.10-12.30 Closing and Klaus Vestergaard price
12.30-13.30 Lunch

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Behavioural ecology and applied ethology.

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Behavioural ecology has a long and very strong foundation in theory driven research. In contrast with applied ethology it has had the advantage of a being able to use a very general principle - the evolutionary process. This has made it possible to make strong predictions based on what is expected to be maximised, i.e. inclusive fitness. There has been nothing corresponding in applied ethology (nor in e.g. psychology or physiology).

A number of studies in applied ethology have been inspired by evolutionary biology, e.g. in the areas of signalling (Weary et al. 1998), aggression (Andersen et al. 2004) and mother-offspring interactions (Jensen et al. 1998). Very few articles in which farm animals have been used to test theories of behavioural ecology have been published in "pure" behavioural ecology journals (but see e.g. Kellner and Alford 2003). To some extent this is understandable since the underlying assumptions of natural selection are affected in farm animals. For a number of years there has been a trend of behavioural ecology becoming more and more interested in the mechanisms of behaviour .

The advantages of using farm animals are a much better control of the rearing conditions of the animals, ease of working with the animals, number of animals that can be used and finally the huge background information available on the species/strain. In many cases however the biologists working with behavioural ecology are ignorant of these possibilities, both because there is very little knowledge about farm animal species, and because applied ethology is a comparatively small research field compared to behavioural ecology. Any initiative to collaboration will therefore probably have to come from applied ethology.

In my opinion here is a huge unexploited area in which scientists from applied ethology may find a fruitful collaboration with scientists from behavioural ecology. It is more probable that a good research project results from such a collaboration rather than anyone from one field "dabbling" in the other.

References:
Andersen et al. (2004). Anim. Behav. 68(4): 965-975
Jensen et al. (1998). Anim. Behav. 55(4): 779-786
Kellner & Alford (2003). Am. Naturalist 161 (6): 931-947
Weary et al (1998). Appl. Anim. Behav. Sci. 56(2-4): 161-172

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Development of feeding selectivity in fallow deer: ethological and evolutionary aspects

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Wild mammalian herbivores are selective in their food choice, but exactly how this selectivity is developed is not well understood. There is also a lack of information of individual differences in selectivity. Within-individual consistency in behaviour over time can be regarded as a behavioural syndrome or personality. Behavioural syndromes have been viewed from an evolutionary perspective in an attempt to explain the maintenance of individual variation in behavioural types and limited behavioural plasticity. In order to shed some light over the development of feeding selectivity in fallow deer, and to identify individual differences in selectivity, ten hand-reared fallow deer fawns were tested in preference experiments and their feeding behaviour was observed during the first period of life and at several occasions during six years. When fawns were between ten and 27 days old they showed a preference for sweet taste (sucrose) and an aversion towards astringency (tannic acid) and sour taste (ascorbic acid) (Paired *t*-test; tannin: $P<0.0001$; ascorbic acid: $P=0.00063$; sucrose $P=0.0012$). The type of explorative behaviour and the type of food ingested were recorded and compared between period one (11 to 41 days) and period two (65 to 97 days). The time a fawn spent eating increased (Wilcoxon matched pairs test $P=0.005$) and the time spent on exploration ($P=0.005$), smelling ($P=0.005$) and tasting ($P=0.005$) plants decreased between period one and two. When comparing the two periods, the fawns increased their intake of grass (Wilcoxon matched pairs test $P=0.007$) and herbs ($P=0.005$), while the intake of soil ($P=0.011$) and dead plant material ($P=0.005$) decreased between the first and second period. Overall, fallow deer fawns seem to select foods containing less plant secondary compounds in the beginning, and thereafter increase the intake of plants containing secondary compounds with age. Individual differences in selectivity were present before fawns became functional ruminants and lasted several years (ANOVA of relative preference for low over high tannin food 2000 – 2004; individual: $P=0.0003$; year: $P<0.0001$), and the selectivity was also negatively correlated with search behaviour ($r=-0.7$, $P=0.023$). This study suggests that behavioural syndromes occur in mammalian herbivores in the foraging context (ANOVA of relative preference for low over high tannin food 2000 – 2004; interaction individual x year: $P=0.15$).

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Which materials are suitable rooting materials for growing pigs?

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According to new European legislation pigs must have permanent access to a sufficient quantity of rooting material to enable proper investigation and manipulation activities. Materials such as straw, hay, wood, sawdust, mushroom compost and peat are mentioned, but in practise many less manipulative materials are used. A relevant question is therefore which materials are suitable rooting materials for pigs? The domestic pig has a behavioural need to perform the exploratory behaviour, which is essential for the survival of its ancestor, the wild boar. The explorative behaviour may be appetitive behaviour, i.e. exploration for food and other resources to meet its immediate needs. The explorative behaviour may also be novelty seeking behaviour, i.e. exploration of novel environmental features and search for environmental change. The domestic pig primarily uses the snout in direct exploration and elements such as rooting, sniffing and chewing are common elements of explorative behaviour. If there is nothing to explore under production conditions, pigs redirect their exploratory behaviour towards pen fixtures, or other pigs, and behavioural problems arise. Materials that are manipulative, changeable and destructible stimulate the exploratory behaviour of pigs, and these are also the materials that reduce abnormal behaviour under production conditions. Various rooting materials are ranked based on observations in the home environment, preference tests and operant condition tests. The rooting materials for growing pigs, which are commonly used under production conditions, are discussed in relation to the scientific knowledge on pigs' explorative behaviour and the effect of various rooting materials on pig behaviour.

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Foraging and diurnal behaviour of adults and offspring in blue monkeys (*Cercopithecus mitis stuhlmanni)*

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The blue monkey is an Old World monkey mainly found in rain forests of central, eastern and southern Africa. Breeding occurs throughout the year and results in the birth of one offspring. As a part of a larger study of the blue monkey my study focuses on the suckling behaviour and interactions between mother and offspring.

Our study site was located in the forest of Kichwa Tembo Tented Camp which is a tourist lodge at the western border of the Masai Mara National Reserve in Kenya. Data collection took place in June and July 2006. Recordings of the monkeys' behaviour were made on foot between 8:00 and 18:00 with a total observation time of 320 hours. Observation time was spent half on mother and offspring, evenly spread between the ten observations hours. We could not recognize the animals individually but estimated the focal animals to seven females and seven offspring; the latter of an age of up to four months.

Every minute, one of the following behaviours was recorded in both mother and offspring: Foraging behaviour, playing, grooming and carried by the mother. Suckling was recorded continuously. Data were analysed with Anova GLM and the non-parametric Kruskal-Wallis Test. The mothers had feeding peaks in early morning, at midday and in late afternoon. This feeding rhythm was in direct contrast to the offspring's which suckled mainly in the late morning and early afternoon when the mothers were resting. The duration of each suckling meal had an average duration of 86 seconds, having a wide range from 10 seconds to 10 minutes. The meal consisted usually of one long un-interrupted bout (mean 58 seconds) and two or three shorter bouts: Breaks counted in average for 3 seconds only. Suckling was evenly distributed on left and right teat. Their time spent foraging solid food was close to zero. The offspring spent a quarter of their time carried by the mother and were very active in playing and exploring its surroundings. We conclude that the offspring in our study were nutritionally dependent on their mothers.

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Human impact on food choice and diurnal behaviour in blue monkeys (*Cercopithecus mitis stuhlmanni*)

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I studied the foraging behaviour in adult female blue monkeys in a forest belonging to a lodge area at the edge of Maasai Mara National Reserve, Kenya. The first aim of the study was to investigate the monkeys diurnal feeding habits and moving patterns, in an area. The second aim was to investigate if the human environment had any impact on the behaviour of the monkeys, such as aggressive behaviour and different diurnal rhythm than in wild monkeys. We recorded the diurnal feeding and moving pattern of the monkeys, what they were foraging (leaves, fruit or human-provided food) and how much they were sitting, moving and standing. The monkeys ate in total 30.7 % leaves, 41.9 % fruits and 26.4 % human-provided food, and 1.0% invertebrates, flowers and bark. This means that our blue monkey population spent a third of their foraging time with human provided food. This is much more than blue monkeys in other studies, e.g. in Kakamega forest, simply because our population had access to it. The most frequent of the known human-provided food eaten was ugali 76% then fruit 18%, bread, egg yogurt and drinks (beer and juice) 6%. The frequency of eating was between 8-10 (16.4 ± 1.4) higher than in the mid day between 11-14 hours (13.1 ± 1.1) and at hours 15-17 (17.7± 1.5); these differences was significant ($P = 0.027$, $H = 7.24$, Kruskal-Wallis Test). Whilst blue monkeys in other studies rest around noon our had a peak in feeding activity in mid day when they ate human food from the trash bins a lot more than leaves and fruit. They also lied down a lot more at mid day than in the morning and afternoon, when they moved a lot instead. The peak of feeding of human-provided food could be because of the opening hours of the kitchen, the peaks are at the same time the humans eat. When it comes to human impact, our monkeys at the lodge area showed no aggressive behaviour towards humans, like in some cases (e.g. macaques at Gibraltar) when monkeys are given food by humans. Perhaps because the guests and staff at the lodge did not feed the monkeys directly neither follow nor tried to touch them. I suggest that the relationships with humans are not hurting anyone, both sides (monkeys and humans) may benefit from it. Monkeys have accesses to food even when their natural food sources are scares and the monkeys attract guests to the lodge that will bring money, meaning that the lodge will stay and the forest remains for the monkeys to live in. Considering this, my general conclusion is that the human environment and food had an effect on the monkeys feeding and moving patterns but in a good way. Maybe it is stupid to assume that the monkeys do not get hurt by this relationship but it is a fact that many endangered species have been recovered because of supplementary feeding (Orams 2002) from humans. I do not deny that the natural behaviour of the monkeys not will/have changed but sometimes it is just hard o asses, maybe even more when the blue monkeys are known to be highly adaptable, and I suggest that further studies on the issue and population need to be preformed.

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Foraging ecology of lactating and non-lactating blue monkeys (*Cercopithecus mitis stuhlmanni*)

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We studied foraging behaviour in lactating and non-lactating blue monkey females in a forest belonging to a lodge area at the edge of Maasai Mara National Reserve, Kenya. The first aim of the study was to investigate how lactating blue monkeys satisfy their larger demand for food, i.e. by eating more or by selecting more concentrated food. The second aim was to investigate which tree species are the most important ones for foraging and resting. We recorded time spent foraging and the object of foraging (leaves, fruits and other plant parts as well as human-provided food). Lactating females carried the offspring a quarter of their time. Surprisingly, lactating females spent less time foraging than non-lactating females (11.1± 0.9 vs.. 19.7 ± 1.2 % of total time budget, P = 0.006). We did not measure food intake in weight per time unite and can hence not exclude that lactating monkeys ate faster. However, they selected different items for foraging. Lactating monkeys spent a higher percentage foraging on trash from the kitchen and less from natural food sources; in particular they ate less fruits. Regarding natural food, there were huge differences in the preference of certain tree species between lactating and non lactating monkeys. Ten tree species of 17 totally accounted for almost the entire foraging frequency; another five were used for resting only. Both leaves and fruits were eaten in all foraged tree species except vines but in many species with different proportions by lactating and non-lactating females. Lactating females preferred foraging from *Diospyros abyssinica*, *Grewia bicolor*, *Ficus sycomorus, Teclea nobilis* and *Warburgia ugandensis* whereas non-lactating ones foraged mostly on *Diospyros abyssinica, Ficus lutea*, *Euclea divinorum, Grewia bicolor* and *Warburgia ugandensis* (all trees in order of preference within lactating/non-lactating monkeys). For resting on trees, the monkeys had different preferences than for foraging. *Diospyros abyssinica, Teclea nobilis, Turraea robusta, Craibia brownii and vines* were more used for resting whereas *Elaeodendron buchananii* more for foraging. The most striking difference was in vines that were used mainly for resting and much more by lactating than by non-lactating females (10.7 vs. 2.4 % of time, P=0.001). We suggest that lactating females used vines like hammocks to reduce the impact of the carried offspring. Our general conclusion is that lactating females' foraging time was limited since they were occupied with offspring. Instead of eating longer, they selected different food items and maybe increased food intake per time unit of foraging.

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Impact of bush fire on habitat choice of migrating herbivores in Massai Mara: Wildebeest (*Connochaetes taurinus*), Thomson gazelles (*Gazella thomsonii*) and Plains zebras (*Equus burchelli*)

Maria Wagner and Jens Jung

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Fire is commonly used in African savannas to remove long, dry, low-nutritious grass and generate fresh grass, both for livestock and wildlife. Since different herbivore species have different demands on amount and quality of biomass, bush fires might change the composition of the herbivore community. We studied how grass fires on the savanna affected habitat choice and foraging behaviour of the three main migrating herbivore species in the Maasai Mara Conservancy Area in south-western Kenya by observing wildebeest, Thomson gazelles and plains zebras on burned and non-burned areas.

Along a set of straight lines, so called transects, we recorded species and behaviour of every group of animals. All observations were made between 6.30 am and 18.30 pm. Each transect was driven 12 times (once per hour) during the study period. Each of the 48 transects was 1000 m long and 300 m wide, thus covering an area of 0.3 km^2. The study was carried out during two seasons (November 2004 and August/September 2005), after fires arranged in June and October 2004 and in July 2005. In November 2004, 9 out of 36 transects were placed on previous June fire, 9 on October fire and 18 on non-burned control areas. In August/September 2005, 16 transects were placed on areas burned one month ago, 16 were burned in the previous year, and 16 were controls which had not been burned for at least two years. The three types of transects were matched according to several aspects such as type of soil, vegetation and topography.

To determine nutritional value of the grass, samples were collected on each transect and was analyzed. Recently burned areas provided less biomass but of higher energy and protein content, and with less fibre than controls and areas burnt during the previous year.

Wildebeest, Thomson's gazelle and zebra all preferred the burned areas. In November 2004, i.e. one and five months after the last fire, respectively, zebras and Thomson gazelles preferred the recently burned areas whereas wildebeest preferred areas burned five months ago. Hence, zebras and Thomson were on areas with the shortest grass of highest quality and wildebeest on medium-high grass. In August all three focal species preferred the recently burned areas. Differences between species can be explained in part by the anatomy and physiology of their digestive systems, and could also be affected by the increased visibility of predators in the shorter vegetation on the burned areas. With these data we gain knowledge on how fires can be used to influence vegetation and herbivores. All three focal species seem to be favoured by bush fires.

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Impact of fire management on resident herbivores in Maasai Mara National Reserve

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In African savannas, burning is a common management tool. We investigated the effects of fire on the habitat choice of larger fauna in the Maasai Mara National Reserve in Kenya. During three seasons, November 2004, January/February 2005 and September 2005 we counted all larger non-migrating animals on 48 transects with different fire treatments. Recordings in November 2004 were carried out when one respective five months had past since fire and the formerly burnt grass was still low. In February 2005 recordings were three and seven months after fire; the burnt grass was now medium high. Recordings in September 2005 were just one months after a new fire (the two fires from previous years were now regarded as one treatment); the grass on recently burnt areas was green but short. Control transects had not been burnt for at least two years and contained relatively high grass in all three seasons. When matching transects characteristics such as topography, soil type, and vegetation were considered. Transects were 1000 m long and 300 m wide, hence covering 0.3 km^2. During the observation period 20 grass samples per transect were cut and dry matter was weighed to estimate food availability. Burnt areas provided less biomass compared to non-burnt areas and had higher protein and energy levels but lower fibre content. Daily animal observations were between 6:30-18:30 hours. Each transect was covered once every hour, i.e. 12 times, within each observation period.

Topi and warthog preferred the burnt areas in all seasons whereas elephants preferred control areas during all seasons. Buffalo used mainly the burnt areas in January/February when the burnt grass was of medium high. However, in the two seasons when the burnt grass was low, buffalo used the control areas. Reasons for topi and warthog to use the burnt areas might be the higher nutritional value in the shorter grass and for warthog the easier access to roots. The only observed bird species, the Secretary bird, used the burnt areas. Secretary birds may have had easier time hunting in burnt areas because of the reduced ground cover that exposes small mammals and insects. Prey that do not get killed by the fire directly are more vulnerable to predation. Buffalo use a strategy where they inhabit the burnt areas some time after the fire when the grass is of medium height; we suggest that the newly burnt vegetation was to short to grip. When burnt areas have low grass height the buffalos concentrate on the control areas with higher biomass. Elephants use the control areas for a similar reason; the burnt areas always have the lesser biomass and their need for bulk made them choose the areas were the grass is longer.

Our conclusion is that fires favour herbivores that prefer short grass of high quality. Increased visibility in the burnt areas may also have been important in facilitating predator detection. Species that have a muzzle morphology that prevent them from feeding on short grass or that have a digestive system were they are forced to ingest a large amount of biomass avoid areas that had recently been burnt. Some of the results suggest that other factors such as territorial behaviour and other social behaviour might affect the habitat choice as well. However, long-term effects of fire might differ since repeated fire can change vegetation species composition. Controlled burning may also increase biodiversity of herbivores and their predators.

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Do solitary trees influence distribution of African herbivores and vultures?

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We examined if shade-providing solitary trees affect animal distribution and behavior. These trees, consisting mostly of desert dates (*Balanites aegyptiaca*), are diminishing in the study area. The study was conducted in September 2005 in the western part of Maasai Mara National Reserve in Kenya. Focal animal species were blue wildebeest (*Connochaetes taurinus*), plains zebra (*Equus burchelli*), Thomson's gazelle (*Gazella thomsonii*) and griffon vultures (*Gyps spp*.). In the study area, we chose 167 tree and treeless control areas situated 115 m from each other. Photos were taken from a distance of 150 ± 2 m from the tree and control areas. When analyzing the photos we put an oval corresponding to a circle with radius 20 m on each picture. The numbers of animals in the nearby small areas were then counted and compared. We took pictures of each focal tree and control areas in four different time periods (9:30-11:29, 11:30-13:29, 13:30-15:29, and 15:30-17:29), resulting in 668 pictures with and 668 without solitary trees. Results are shown as mean ± standard error. Data was analyzed with the non-parametric Wilcoxon signed rank test and Mann-Whitney test. Zebras, wildebeests and vultures preferred tree and treeless areas (zebras 47.7 ± 16.3 vs. 8.34 ± 3.57 animals per km^2, $P = 0.012$; vultures 59.6 ± 18.3 vs. 2.38 ± 1.69 animals per km^2, $P < 0.001$; wildebeests 840 ± 124 vs. 323 ± 48.0, $P < 0.001$ animals per km^2). Thomson's gazelles avoided tress with 20.2 ± 8.12 animals per km^2 close to trees vs. 59.6 ± 17.8 in control areas ($P = 0.035$). Since wildebeests were so numerous, we also analyzed how trees and time of the day affected the behavior of the animals. Wildebeests were standing and lying more in tree areas compared to treeless areas, while grazing occurred more in the treeless areas (standing 40.6 % ± 3.79 % vs. 15.0 % ± 3.07 % $P = 0.0034$; lying 17.0 ± 2.36 % vs. 2.87 ± 1.23, $P < 0.001$; grazing 31.7 ± 4.25 % vs. 60.1 ± 4.95 %, $P < 0.001$). Wildebeests were standing more the first time period compared to the rest of the day (42.7 ± 7.51 % vs. 26.9 ± 2.87 %, $P = 0.0406$) and had a strong tendency for lying more the first and last periods compared to the other two periods (14.1 ± 2.56 % vs. 7.81 ± 1.76, $P = 0.0585$ adjusted for ties). Numbers of vultures perching in trees was compared with numbers on the ground; they were found more in the trees than on the ground in tree areas (42.9 ± 10.3 % vs. 16.7 ± 11.1 % animals per km^2, $P = 0.011$). We conclude that the trees were important for wildebeest, zebra and vulture, but not necessarily for Thomson's gazelle. Thomson's gazelle might have avoided the trees because of the presence of other herbivores or vultures.

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Suckling-, grazing and social behaviour in topi calves (*Damaliscus lunatus*)

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We investigated suckling and grazing behaviour of 96 topi calves up to 7 weeks of age in Masai Mara National Reserve, Kenya. Grazing and locomotive behaviour was recorded in one-minute intervals whereas social and suckling behaviour was recorded continuously. Behaviour of offspring and their mothers was related to offspring's age and other factors such as weather and time of day. I examined interactions between mother and calves as well as calves and other group members. The frequency of suckling meals decreased when calves reached an age of 5-7 weeks compared to younger calves, whereas frequency of grazing increased after the third week of life. In the first and second week of life, topi calves hardly grazed at all. Calves of 1-2 weeks of age have longer duration of suckling bouts and spend more time per hour suckling than older calves. Suckling bouts were almost always interrupted by the mother except for in the youngest calves; the reverse-parallel position was observed in all but one of our observations. By the sixth week, calves still did not ruminate. Group size did not affect any behaviour and we could not see that weather (temp, humidity and sunlight) had any effect on suckling or grazing behaviour. The calf's diurnal activity was higher during early morning hours and lower during hot afternoon hours. The calves' activity budgets differed to a great extent from the mothers'. Mother and calves under three weeks kept close contact which decreases with age.

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Brain measures and animal welfare

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We conducted research to understand the consequences of restrictive housing, abnormal behavior, social stress in pigs, and weaning age in pigs (Broom and Zanella, 2004; Poletto et al., 2006a&b) on the organization stress responsive pathways in the brain. Most of our previous studies involved terminal experiments followed by tissue collection to assess changes in receptor binding (Zanella et al., 1996); neurotransmitter concentration (Zanella et al.., 1998) and mRNA expression (Poletto et al., 2006 a & b). Data resulting from the analysis of tissue samples has limited relevance to understand complex biological processes. The information obtained using tissue samples is restricted to one data point in the life trajectory of the brain, which shows remarkable plasticity during the life time of an individual animal. Terminal experiments are also challenging from an ethical perspective if the main focus of the research program is to address animal welfare issues.

Our primary goal at the Norwegian School of Veterinary Science (NVH) is to establish a cutting edge brain imaging center dedicated to animal welfare research. Our aim is to develop a core facility as a joint venture with our colleagues from the Nordic countries. The NVH has allocated space and initial resources to purchase and to install a 4.7 Tessla MRI (Magnetic Resonance Imaging) unit. We also submitted a grant application to the Norwegian Research Council, November 30th/2006, requesting funds to establish the Nordic Countries Core Imaging Center. In our research program, initially, we would like to develop comparative research to study the role of early environment in shaping the responses of the brain to difficult situations and to study the expression of pain pathways in the brain of animals.

Brain imaging techniques such as PET (Positron Emission Tomography) and MRI/fMRI are powerful tools that can provide real time information related to brain activity in living organisms. The measures obtained can be repeated over the life time of an animal. The major pitfall is the lack of well-developed protocols to collect brain imaging data from unrestrained domestic animals. The Nordic countries have advanced expertise in the areas of behavioural development and cognition in animals and also have a proven history of collaboration.

Zanella, A.J.; Broom, D.M.; Hunter, J. and Mendl, M. (1996) Brain opioid receptors in relation to stereotypies, inactivity and housing in sows. Physiol and Behav 59:769-775.

Zanella, AJ.; Brunner, P, Unshelm, J.; Broom, D.M. & Mendl, M.T (1998) The relationship between housing and social rank on cortisol, ß-endorphin and dynorphin (1-13) secretion in sows. Appl Anim Behav Sci 59, 1-10.

Broom, D.M. & Zanella, A.J. (2004) Brain measures which tell us about animal welfare. Animal Welfare, 13:41-46

Singer, T.; Frith, C. (2005) The painful side of empathy. Nature Neuroscience 8, 845-846.

Poletto, R.; Steibel, J.P.; Siegford, J.M. and Zanella, A.J. (2006a) Effects of early weaning and social isolation on the expression of glucocorticoid and mineralocorticoid receptor and 11beta-hydroxysteroid dehydrogenase 1 and 2 mRNAs in the frontal cortex and hippocampus of piglets Brain Research, 1067: 36-42 .

Poletto, R.; Siegford, J.M.; Steibel, J.P.; Coussens, P.M. and Zanella, A.J. (2006b) Investigation of changes in global gene expression in the frontal cortex of early-weaned and socially isolated piglets using microarray and quantitative real-time RT-PCR. Brain Research , 1068:7-15

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Chicken sex –the parts we don't see

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When females are sexually promiscuous, sexual selection can occur before mating -typically as male-male competition and female choice of mating partner, and after mating as the parts we do not see; sperm competition (i.e. the competition between ejaculates of two or more males over fertilisation of a given set of eggs) and cryptic female choice (i.e. biased female sperm utilisation in favour of ejaculates of certain males following insemination). From a male point of view, both sperm competition and cryptic female choice are likely to decrease certainty of paternity, selecting males to avoid sperm competition when possible, and when sperm competition is inevitable, to allocate sperm supplies strategically to increase reproductive success. Since cryptic female choice occurs inside the female productive system and allowing females to retain some control of paternity when pre-copulatory mate choice is constrained, males are also selected overcome cryptic female choice when in conflict with males' interests. In the sexually promiscuous red junglefowl (*Gallus gallus*) and it's descendant, the domestic fowl (*Gallus domesticus*), females store sperm for on average 14 days and have thousands of sperm storage tubules in their reproductive system, setting the scene for both cryptic female choice and intense sperm competition. Females eject ejaculates of unfavourable males directly after mating, but also select against inbreeding at an even later stage in the reproductive event. Males counter-act cryptic female choice by inseminate more sperm when selected against, and respond to faced sperm competition by faking sex and allocating sperm strategically according to the level of competitors. The fowl clearly show that the road from mating to fertilisation can be long and complexly affected by tactics we do not see, tactics important to include in studies of sexual selection to understand the evolution of mating behaviours and the outcome of a copulation.

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The effect of teat per calf ratio, on feeding behaviours, competitive behaviours and cross-sucking in group housed dairy calves.

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The effects of increasing teat/calf ratio in group housed dairy calves were investigated. In a pen with five calves they had access to one or five teats with milk in an ad-lib system (five groups of five calves). The result showed that feeding behaviours were changed. The time a calf was manipulated the teat increased from 63.89 (±3.07) to 81.14 (±4.84) min/24h and the frequency of manipulating the teat increased from 6.92 (±0.34) to 7.91 (±0.34) times/24h. The result also shows that in the pens with five teats, the calves had less frequency of eating concentrate and hay then in the pens with one teat.

Offering five teats instead of one would logically reduce competitive interactions and non-natural oral behaviours but the frequency of displacing another calf from the milk or concentrate feeder and cross-sucking showed no correlation with teat per calf ratio in this study. On the other hand there was a tendency that both wait for milk ($p=0.08$) and wait for concentrate ($p=0.06$) decreased with higher teat/calf ratio. In conclusion the increased access to the milk feeder results in an increased frequency and duration for the calf manipulating the teat and decreased frequency for the calf eating concentrate and hay.

To collect these results both direct- and video observations were used. The method for direct observation was one/zero sampling with 30 seconds intervals. In the video observations both instantaneous sampling with five minutes intervals and, for duration and frequency when the calf was manipulating the teat, continues recording was used.

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The influence of sole ulcers and digital dermatitis on dairy cows behaviour and milk composition

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The aim of this study was to investigate if digital dermatitis and sole ulcer in high producing dairy cows are associated with behavioural changes, other health problems, milk production and composition. The study was carried out on a commercial farm with about 300 dairy cows with the breed of Swedish Red and Swedish Holstein. Lactating cows were kept in a cubicle system with scraped alleys and were mostly in their first and second lactation. Clinical examination of the claws was done at claw trimming of all cows. Cows scored for medium to severe degree of digital dermatitis (DD) or sole ulcer (SU) was listed, and ten cows suffering from each claw disorder were selected for the study. For each diseased cow a paired healthy control cow was selected blocked on breed, age, parity and lactation stage. General clinical examination of each cow used in the study was performed before observations started. The second clinical examination of the claws was performed between the second and third observation period. Behavioural observations were made on paired cows (one with digital dermatitis or sole ulcer and one healthy cow) during four two weeks periods with the 0-1 sampling method. The interval between periods one to three was one week and between the third and the fourth period was two weeks. Control milking results were collected monthly from February to April and milk production was recorded once per six days. For statistical analyses generalised linear models were used (Proc GENMOD in SAS).

Cows with DD were lying significantly less than healthy cows during period one ($P<0.0471$), but not during period two, three and four. Cows with SU were lying significantly less than healthy cows during the first period ($P<0.0079$). Cows with SU walked significantly more than healthy cows during period one ($P<0.0134$) and they walked significantly less than healthy cows during period three ($P=0.0003$). When cows were observed while standing and ruminating then healthy cows stood and ruminated during period one significantly less than cows with SU ($P<0.0222$) and DD ($P<0.0170$). During the second period healthy cows had a tendency to stand and ruminate less than cows with DD ($P<0.0731$).

In period one and two cows with DD produced significantly less energy corrected milk (ECM) ($P=0.0111$, $P=0.0314$) than healthy cows ($P=0.0111$, $P=0.0314$). They had also a tendency to produce less ECM milk during the fourth period ($P=0.0602$). Cows with SU had a tendency to produce less ECM than healthy cows during the second period ($P=0.0561$). Cows with SU had tendency to have higher milk fat percentage during the third period. There was not found a significant difference between observation groups in milk protein percentage. In period two and three cows with SU had significantly higher somatic cell count than healthy cows ($P=0.0196$, $P=0.0031$) and cows with DD had tendency to have lower cell count than healthy cows in period four ($P=0.0543$).

It was concluded that digital dermatitis and sole ulcer have an influence to the high producing dairy cattle behaviour and production. The study proves again how essential is preventing and treating of foot diseases in early stage.

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Wild boar sows farrowing in an enclosure –what are they doing?

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Wild boars (*Sus scrofa*) are kept in about 100 enclosures in Sweden and their behaviour in these is relatively unknown. Studies from free living and captive wild boar sows and from domestic pig sows show that behavioural changes take place in connection with farrowing, but detailed data for wild boars are sparse. The aim of this study was to quantitatively describe wild boar sows´ behaviours when farrowing in an enclosure and to compare the results to those available for the domestic pig.

A field study was carried out during the farrowing seasons of 2003, 2004 and 2005 (feb-apr) in a 12 ha hunting enclosure in Östergötland, Sweden. The enclosure was very heterogenous with many different habitats and inhabited six to ten sows, one to two boars and their offspring, numbers depending of year. 1100 hours of behavioural data were collected by focal animal sampling (Martin and Bateson, 1993) before, during and after farrowing in a total of ten farrowings. Sampling methods used were instantaneous sampling to measure activity (locomotion, foraging, resting, nursing), distances to nearest individuals and habitat use and continuous sampling to measure social behaviours (agonistic behaviours, nosing with other individuals). Farrowing nest data (habitat, distance to feeding area, point of the compass) were collected in a total of 22 farrowings.

The results showed that the wild boar sows in the enclosure significantly changed their behaviours in the farrowing period (wilcoxon´s test for matched pairs). The farrowing period (day -14 to 14) could be divided into three periods: before farrowing, isolation and sociality period (day -14 to -1, day 1 to 8, day 9 to 14 respectively). Locomotion and foraging decreased during the isolation period ($p<0.05$) and slowly increased in the sociality period ($p<0.05$) while resting increased in the isolation period ($p<0.05$) and slowly decreased in the sociality period ($p<0.05$). The time spent >20m from nearest adult increased in the isolation period ($p<0.05$) and the time spent 0-5 m to nearest adult increased in the sociality period ($p<0.05$). Nosing when spending time with adults or sub adults increased in isolation period ($p<0.05$). Nursing did not change during the first two weeks post-partum and there was a tendency for a peak in the number of nosing per piglet during the first week. The sows seemed to show clear habitat preferences rather than using habitats in proportion to their availability. The use of open habitats before farrowing changed towards more dense habitats after farrowing. 73 % of the nests were situated in a slope to south or with some protection to north and 68 % were placed in edges between habitats. The median distance to the feeding area was 130 m (min 65, max 310) with a maximum possibility of 330 m to the feeding area.

We conclude that farrowing induces a number of changes in the activity, habitat preference and social behaviour in captive wild boars. This may need attention when enclosures for this species are designed.

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Litter size and maternal investment in sows – preliminary results

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The aim of the present study was to examine how litter size affected maternal behaviour and piglet survival and success in competition for teats. Forty healthy, LY sows of different parity (1 to 4) and with a litter size ranging from 9 to 16 piglets were used. The piglets were weighed on day 1, 2.5 weeks and 5 weeks after birth (at the time of weaning), and all the dead piglets were subjected to a post mortem examination to ascertain the causes of death. Direct, behavioural observations of the sows and their litters were made on day 1, 2.5 weeks and 5 weeks after farrowing. General activity pattern of the sows were scored using instantaneous sampling with 5 minutes intervals during a 6-h observation period. The quality of 6 nursings per sow in terms of: nursing interval and duration, who was initiating and terminating the nursing (sow or piglets), no. of interrupted nursings, no. of piglets that did not get access to a teat during each milk let-down, and no. of piglets not being present at the udder at milk let-down were observed in the same time period.

Increased litter size resulted in increased piglet mortality from birth until weaning ($P < 0.0001$), both due to crushing ($P < 0.05$) and starvation ($P < 0.05$), lower piglet weight at day one ($P < 0.0001$) and 5 weeks ($P < 0.05$) after birth, and lower weight gain in the lactation period ($P < 0.01$). Nursing frequency tended to increase with increasing litter size ($P = 0.06$), but only at day one after farrowing. Number of piglets not getting access to a teat ($P < 0.01$) and not being present at the udder ($P < 0.01$) during milk let-down both increased with increasing litter size on day 1 after farrowing. On average 1 piglet did not get access to a teat during milk let-down at a litter size of 12 piglets. Sows giving birth to large litters spent more time on activities not involving the piglets, such as standing ($P < 0.05$), moving ($P < 0.05$), rooting on the floor/litter ($P < 0.05$) and were generally more active with the piglets being close and active around their feet outside nursing already at day 1 and 2 after birth. In conclusion, an increased litter size resulted in more piglets being crushed and starved, an increased number of piglets not getting access to a teat, and that the sows spent less time on piglet-directed activities.

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Floor preferences of lame and non-lame cows

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Concrete is the most commonly used alley flooring in confined dairy herds due to its qualities of construction and ease of cleaning. However, the hardness, abrasiveness, and slipperiness of concrete floors have adverse effects on animal wellbeing and health, and rubber flooring is becoming popular as a way of improving the flooring conditions on walkways. The aim of this study was to investigate cows' preferences for rubber compared to concrete flooring in cows with different conditions of locomotory apparatus.

The study was conducted in an organic dairy cow herd with free-stall housing. Floor preference was tested on a 12 × 3 meter walkway as the cows left the parallel parlor. The walkway was divided lengthwise into two identical sections. Resilient slatted and resilient solid rubber mats were tested against each other and slatted concrete. Each floor type was tested over four days on the left side and four days on the right side of the walkway. Concrete flooring on both sides of the sections was tested as a control method before the comparisons of different materials. All observations of the distribution of cows were made continuously from video recordings captured in association with the afternoon milking. Lame cows were identified during every observation, and their floor choice was recorded separately. Only cows with moderate and severe lameness (clear visible gait asymmetry) were considered to be lame. Repeated measures ANOVA with the first order autoregressive correlation structure, for the group within a tested floor-combination and side, was used to analyze the effect of the flooring on the choice of cows on a group level. Due to a weak negative correlation between the distributions of lame and non-lame cows (r = -0.19) these two subgroups were analyzed separately using the same model.

In comparison with control observations the proportion of cows walking only on the rubber mats increased gradually during the four days of testing on the same side. In the case of non-lame cows, the application of slatted rubber mats resulted in a 25% increase ($P<0.001$) of the proportion of cows walking on the same side at the 4th day testing the flooring on the same side. Use of solid rubber mats at the 4th day caused a 30% increase ($P<0.001$). A slightly higher preference was observed for walking on solid rather than slatted rubber mats. The preference of lame cows for soft surface was not as distinct as in non-lame cows (19% ($P<0.001$) and 12% ($P<0.05$) of increase on 4th day for the slatted rubber and solid rubber mats respectively). The proportion of non-lame cows walking alone on the test side was significantly greater (P = 0.008, F = 7.57, df = 1) and proportion of lame cows walking alone on the test side tended to be higher (P = 0.075, F = 3.26, df = 1) than the proportion of cows walking together with herd mates. That suggested the probable underestimation of the preference for soft flooring tested within a group.

It was concluded that though the majority of cows preferred to walk on soft rather than concrete flooring, when rubber mats only partially covered the floor, lame cows (those who probably need the improved flooring most) may not be able to make use of this resource because of competition with non-lame, higher-ranked cows.

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Can foraging enrichment reduce oral stereotypies in horses?

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Crib-biting in horses is an oral based stereotypy and is defined as when a horse seizes a fixed object with its incisor teeth and pulls back as it draws air into the oesophagus while emitting a characteristic grunt. There are several theories what cause crib-biting and among them are unsatisfied feeding behaviour, unbalanced diets and stomach disorders. Many horse owners attempt to prevent crib-biting by using a crib-collar since some believes that crib-biting is harmful for the horse and can be learned by horses adjacent to the crib-biting horse. On the other hand crib-biting might fulfil a specific function and a crib-collar could affect the welfare of the horse. An alternative method to thwart crib-biting could be preventing it by enriching the horse's environment by introducing a foraging device with the aim to increase their feeding behaviour.

In this study a foraging device known as a Snak-a-Ball was used. A Snak-a-Ball is a ball filled with forage and when the horse manoeuvres it some forage falls out through a hole in the ball. This study investigated if a Snak-a-Ball had any effect on the frequency of crib-biting in crib-biting horses. The hypothesis was that the foraging behaviour would increase and the crib-biting would decrease when horses had access to a Snak-a-Ball filled with small pieces of carrots.

Eight crib-biting horses participated in the study and they were individually exposed to three different treatments; Baseline, Enrichment and Carrots. Each treatment lasted for two consecutive days and the behaviour of each horse was observed during two hours, one hour before feeding time and one hour after feeding time each day. During Baseline normal management practices were followed and during Enrichment the horse had access to a Snak-a-Ball filled with 1 kg of chopped carrots. During the Carrot treatment the horse received 1 kg of chopped carrots put directly into the crib when the observation started. The behaviour of the horses was registered every minute during the observations using a periodic occurrence measurement. During observation the frequency of crib-biting was registered using a continuous recording.

Data were analysed using a Two Way Repeated Measures ANOVA and when there was a significant difference in the material a post-hoc test was used (Holm-Sidak method). A Wilcoxon Signed Rank Test was used to compare the Snak-a-Ball use.

During Enrichment the horses rested significantly less ($p<0,05$) compared to Baseline and Carrot treatments. When the horses were given carrots directly into the crib the frequency of crib-biting was significantly higher ($p<0,05$) compared with the two other treatments. The activity ball did not have any significant decreasing effect on crib-biting in horses. An explanation could be that the ball was filled with carrots which increased the crib-biting. There was not a significant difference in foraging time between the different treatments.

In conclusion this study showed that crib-biting horses rested less when they had access to a Snak-a-ball filled with small pieces of carrots. However, the results did not support the hypothesis that foraging behaviour would increase and the crib-biting would decrease. The foraging enrichment device, as it was used in this study, could not reduce oral stereotypies.

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Influence of silage structure on feeding behaviour and stereotypies in dairy heifers

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In today's dairy production, replacement heifers are often fed a ration that fulfils their nutritional requirements, but not always their natural feeding behaviour. The most important factors influencing feed intake and chewing behaviour in cattle are particle size and fibre digestibility of forages.

The aim of this study was to examine if particle size and fibre digestibility influence eating behaviour and development of abnormal behaviours in dairy heifers.

The trial was performed at a dairy farm near Skara, Sweden; as a change-over trial with two treatments and three 3-week periods. Holstein dairy heifers were divided into two groups with 22 heifers, aged 3-7 months, in group 1 and 27 heifers, aged 9-14 months, in group 2. The treatments were early harvested cut silage (230 (S.D. 150) mm) with low fibre content (508 g NDF (total fibre)/kg dry matter) and high digestibility (12 MJ/kg dry matter); late harvested long silage (370 (S.D. 240) mm) with high fibre content (615 g NDF (total fibre)/kg dry matter) and low digestibility (10.5 MJ/kg dry matter); and a mixture of the two silages that was fed during one week before the trial started. Early harvested cut silage was fed to the young heifers in group 1 for two periods and to the older heifers in group 2 for one period. All heifers were also offered concentrate in feeding automates. The heifers were weighed and scored for body condition at each feed change. Behavioural observations were conducted for two hours after feeding in the morning and for two hours before feeding in the evening for four fixed days during each 3-week period. The recorded data were analysed using generalized linear model (proc genmod) in SAS.

The preliminary results show that the heifers ruminated less during the control period than during both treatment periods ($P < 0.05$). Furthermore, there was a significant interaction between group and treatment on rumination ($P < 0.01$) but it was only early harvested cut silage that showed a significant difference between the groups that differed in age (group 1: 1.6 vs. group 2: 0.9). Early harvested cut silage fed to the younger heifers in group 1 resulted in more individuals performing stereotypic behaviours, compared to when the same silage was fed to the older heifers in group 2 (group 1: 18 vs. group 2: 13). Late harvested long silage fed to the younger heifers in group 1 resulted in less individuals performing stereotypic behaviours, compared to when the same silage was fed to the older heifers in group 2 (group 1: 10 vs. group 2: 18). When both groups were fed a mixture of the two silages, heifers in group 2 performed more stereotypies than heifers in group 1 (group 1: 6 vs. group 2: 2). Data are under evaluation.

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Do rainbow trout (*Oncorhynchus mykiss*) form CS-CR or CS-US associations during classical conditioning? Implications for cognitive capacity.

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The last ten years have seen an increasing interest in fish welfare in general and the question of pain perception in particular. The question of pain perception is often linked to the question of cognitive capacity, as it is inferred that a species with complex cognitive capacities would be more likely to experience negative emotions - such as the emotional aspect of pain – than a species only capable of simpler forms of learning. Classical conditioning is often described as a very simple form of learning. However, the *type* of association underlying this learning has implications for what learning by classical conditioning may tell us about the general cognitive capabilities of the animal. An animal able to make an association between a conditioned stimulus (CS) and an unconditioned (US) stimulus is most likely able to form expectations and predictions based on its environment.

We wished to investigate whether rainbow trout are capable of forming CS-US associations in a classical conditioning paradigm compared to a simpler CS-CR (conditioned response) association.

Rainbow trout were kept in the experimental tanks and trained in a light (CS_a) + food (US) paradigm. Control fish were subjected to completely random presentations of CS and US. After this first step the value of the food was changed by a food (CS_b) + weak electric shock (US) paradigm. When the flight response to the presentation of food was stable, all fish were tested with the original CS_a (green light). A flight response would imply that the fish had indeed learnt by associating CS and US and responded to the devaluation of food by changing their response to the original CS_a.

The experiment is still in its early stage but preliminary results will be presented and discussed.

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Blue foxes value an earth floor dichotomously

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Farmed blue foxes (*Allopex lagopus*) are willing to work for access to an earth floor. However, when the foxes have free access to both earth and wire mesh floors they prefer the wire mesh floor, in particular while resting. Accordingly, it seems that blue foxes are motivated for access to an earth floor, but in some circumstances they may even consider it aversive. We compared earth floor use between blue foxes working to leave a wire mesh floor to enter an earth floor and foxes working to leave an earth floor to enter a wire mesh floor.

The subjects were 16 blue fox males in two cohorts of eight foxes. From the age of 12 weeks, the foxes were individually housed in test cages. Each test cage consisted of two traditional fox cages (115×105×70 cm, L×W×H), with two openings (23×28 cm, W×H), equipped with one-way doors, between the cages. The force needed to open the one-way doors could be altered. There was a wire mesh floor in one of the cages and an earth floor with a 30 cm layer of sand in the other cage. There were two groups in both cohorts, i.e. in four test cages door weight was altered in the door leading from the wire mesh floor to the earth floor (TOEF), and in the other four test cages in the door leading from the earth to wire mesh floor (FROEF). After 10 days of training, the foxes were exposed three times to door weighs of 0, 0.5, 1.5 and 2.5 kg. The door weights were changed after every 24h. The mean duration and number visits, and the percentage of time spent on the floor materials were measured. One FROEF fox was removed from the experiment. The data for 15 foxes were analysed using Linear Mixed Model analysis (SPSS).

As expected, the number of visits decreased with increasing workload ($p<0.001$), and no difference between the groups was found ($p>0.05$). As the workload increased the percentage of time spent on the earth decreased in the TOEF (29% on 0kg weight to 15% on 2.5kg weight), but increased in the FROEF (23% on 0kg to 50% on 2.5kg) ($p<0.001$). The mean duration of the earth floor visits did not change in TOEF (41 min on 0kg, 42 min on 2.5kg), but increased in the FROEF (15 min on 0kg to 210 min on 2.5kg) with increasing door weight ($p<0.001$). The mean duration of the visits on the wire mesh floor increased (TOEF: 73 min on 0kg, 155 min on 2.5kg; FROEF: 47 min on 0kg, 106 min on 2.5kg) with increasing door weight ($p<0.001$) and there was no difference between the groups ($p>0.05$) or group-workload interaction ($p>0.05$).

The results confirm the earlier findings that blue foxes visit an earth floor, but they still prefer to stay on a wire mesh floor. A greater workload to enter the earth floor was not compensated for by longer visits there, which indicates that the value of an earth floor visit is not increased by staying longer on the earth floor. This supports the earlier findings that blue foxes value the earth floor for behaviours of short duration, e.g. exploration. However, it seems that they accept to stay longer (i.e. rest) on the earth floor when it becomes costly to leave the earth floor. A detailed behavioural analysis will clarify the reasons to enter and leave the earth floor.

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Aggression, stereotypies and adrenal function in group housed juvenile mink

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Traditionally juvenile mink are housed in male-female pairs in cages with nest boxes. Housing entire mink litter in a cage system comprising of several cages and nest boxes would provide the animals with both social and physical enrichment. However, aggression problems may arise when mink are housed in groups. We compared the occurrence of aggressions (by measuring behaviour and evaluating skin damages) and stereotypies, and adrenal function in group-housed and pair-housed juvenile mink to assess the welfare effects of group housing. The experimental animals were weaned and moved to experimental cages at the age of eight weeks in July. Thirteen mink litters were housed in groups of three male and three female kits in row cages where three standard cages with nest boxes were connected to each other (GH group). Another set of 13 litters was housed in brother-sister pairs, three pairs of kits from each litter, in standard mink cages with nest boxes (PH group). The behaviour of the animals was analysed from 24-h video-recordings made in August and November. Aggressive behaviour (clear fightings, or threatening or biting another animal) and stereotyped pacing in the cage were analysed using one-zero sampling for 50 s periods with 3.5-4 min intervals. Mink's behaviour in the nest boxes could not be observed. The behaviours were analysed for entire litters, not for individual animals. Serum cortisol level after ACTH administration was measured at pelting time in December. Immediately after euthanizing the animals, the animals and their adrenals were weighed, and the severity of scars in the leather side of the skins was evaluated on a subjective scale (0-5). The differences between the groups and the months in the frequency of aggression and stereotypies were compared with the Friedman's test followed by *post hoc* tests. Groups were regarded as matched pairs (matched for the original litter size and date of birth) and months as repeated measurements (N=13). Serum cortisol levels and adrenal weights were analysed with Linear mixed model with litter and matched pair litters as random factors, group and sex as fixed factors and body mass as a covariate (N=156). Severity of the scars was analysed with Friedman's test followed by *post hoc* tests (N=13).

There were more aggressive acts in August, i.e. during the natural dispersal time of the wild mink, than in November in both groups: GH 23±4 % vs. 6±4 % (of observation periods, mean±SD) ($P<0.01$) and PH 24±4 % vs. 3±2 % ($P<0.01$), respectively. The difference between the groups was significant only in November ($P<0.01$). The GH females (3.4±1.3) had severer scars in their skins than the PH females (2.1±1.2) and PH males (2.2±1.3) ($P<0.05$), whereas the GH males (3.1±1.3) did not differ ($P>0.05$) from any of these. The GH mink had less stereotypies than the PH mink: 0±1 % vs. 4±5 ($P<0.05$) in August and 7±9 vs. 19±12 ($P<0.05$) in November, respectively. In both groups the frequency of stereotypies increased ($P<0.01$) from August to November. The group had no effect on the mass of the adrenals or serum cortisol level after the ACTH administration ($P>0.05$ for both the main effect and the group-sex interaction), whereas the females had lighter adrenals ($P<0.001$) and higher serum cortisol level ($P<0.05$) than the males.

The results show that the mink kits adapted themselves quite well to living in litter groups despite the higher frequency of aggressive acts in the group-housed than pair-housed animals. The lower frequency of stereotypies in the group-housed mink may indicate better

coping success and, thus, better welfare as compared to the pair-housed animals. However, a more detailed analyses of the associations between aggression, stereotypies and adrenal function are needed before any firmer conclusions can be made.

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Group housing and managing horses under Nordic conditions: strategies to improve horse welfare and human safety

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Over the past decades there has been a dramatic increase in the number of horses kept for leisure activities in the Nordic countries; hobby horse owners and breeders, trekking holidays, eco-tourism etc. The requirement is for horses that are calm and adaptable to a wide range of situations, and which are safe to handle for people of varying skills and experience.

This Nordic research project which started in 2006 is unique in that it focuses on just these 'average' horses rather than high performance competition horses. It takes as its starting point group housing of horses, since it has already been shown in controlled studies that this system is better for horse welfare and because group housing is the most flexible housing system that can be used in a wide range of situations. Yet, despite its obvious advantages, group housing of horses is not as widely used in practice as might be expected. One aim of this project is to determine whether or not the problems that have been suggested in these systems are indeed genuine problems when group housing horses and, if so, develop possible practical solutions for Nordic countries. A second aim is to carry out basic experimental studies of the behaviour of horses towards other horses and towards humans.

We group the alleged problems in group housing systems into two categories; those related to horse-horse interactions (such as horses injuring each other or being difficult to separate from the group and handle when alone), and horse-human interaction (since some people claim that there is a higher risk to the human when moving among a group of horses). Experiments will be carried out to refine existing methods and develop new methods of studying horse-horse and horse-human relationships under controlled conditions. These will be carried out mainly in Sweden and Denmark. The methods will then be used to study horses kept in different types of groups in Finland, Denmark and Norway. The horses in these countries will be kept in groups that vary according to their composition, to the amount of time the horses spend in the group and the complexity of the environment. These are three aspects of management that can easily be manipulated by horse owners in practice. The ultimate aim is to identify general underlying principles and practical strategies of how to keep leisure horses in groups so that their welfare is maximised and the risk to humans is minimised.

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Behaviour in dairy calves when weaned and separated in two steps from foster cows

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One way to improve the possibility for calves in organic dairy production to perform their natural behaviour is to let them suckle a foster cow during the milk period. In such a system the calves are held in small groups and can suckle the milk in a natural position, which is a requirement in Swedish organic legislation. However, many farmers report and increase in vocalisations and activity when the calves are weaned and separated from the foster cow, which they interpret this as signs of stress. Therefore a technique for weaning and separation that decreases this response would benefit the animals.

The aim of this study was to investigate if the prevention of suckling, and the separation from a foster cow in two steps lower the behavioural stress reaction in calves as compared with if the two actions occur simultaneous.

Twelve groups with one cow and four calves per group were used. Both the Swedish Holstein breed (SH) and the Swedish Red breed (SR) were represented. The foster cow-calf group was formed when the calves were one week old and the calves were prevented from suckling at 10 weeks of age. In six of the groups, the calves were prevented from suckling by simultaneous separation from the cow (control). In the other six groups the calves were fitted with a nose-flap, which prevented them from suckling, whilst kept together with the cow for another two weeks before they were separated (two-step). The behaviour of the calves was observed at 0-2, 8.5-9.5, 24-26 and 72-74 hours after the calves were prevented from suckling (both treatments) and after the later separation (two-step). The method used was focal animal sampling with the behaviour observed continuously during one minute periods. The behaviour was analysed with a generalised linear model (PROC GENMOD, SAS). Heart rate and salvia cortisol were also recorded but those results will be presented in a later publication.

The two-step calves vocalised less and walked less when prevented from suckling ($p<0.001$) compared to control calves when they were prevented from suckling and separated simultaneously. The highest number of recorded vocalisations and walking was during the second observation, i.e. 9 hours after the prevention from suckling. Calves in the two-step treatment sniffed the interior of the pen less ($p<0.001$) and were less social with calves in the group ($p<0.001$) compared to calves in the control treatment. On the other hand, calves that were prevented from suckling and still with the cow had more recordings of lying ($p<0.001$) and ruminating ($p<0.001$). There was no difference between the treatments in the frequency of eating. Calves of the Swedish Red breed were more social with other calves ($p<0.001$) than calves of the Swedish Holstein breed in the group that were separated from the cow at ten weeks of age.

We conclude that weaning in two steps by first preventing suckling and secondly separating the calf from the cow will reduce the behavioural stress reaction of dairy calves when weaned from foster cows.

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The effect of loosing or gaining access to peat on the dustbathing behaviour of domestic chickens

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The aim of this study was to investigate how the dustbathing behaviour of young birds was influenced by being reared with or without access to peat and the subsequent effects of loosing or gaining access to the same substrate. In addition we also wanted to investigate if sham dustbathing can be considered to be normal dustbathing for a bird which does not have access to litter.

Forty-eight LSL chicks were reared in groups of four in pens with a wire floor and free access to food and water. In addition, half of the groups had a box containing peat and the other half had a box containing corrugated paper. When birds were around six weeks of age new treatments were created by regrouping the birds so half of the birds from peat were moved to pens with corrugated paper and half of the chicks previously kept on corrugated paper were moved to pens with peat. Thus we had four treatments based on the time period the birds had access to peat (1) Always, (2) Never, (3) From 0 to 6 weeks of age and (4) From 6 weeks of age and onwards. Birds were filmed for six consecutive days when the new treatments were created and then the filming was repeated when the birds were around 16 weeks of age. Observations from the recordings were carried out on the number and the length of the dustbathing bouts the birds performed.

When the four treatments were created, there was a difference in how long it took before the birds performed their first dustbath for birds that had changed substrate, but not for the birds which remained on the same substrate (GLM; $F_{3,37} = 3.78$, $P = 0.018$). The difference was due to birds which had been moved from paper to peat being the quickest to dustbathe whereas the birds that moved from peat to paper waited the longest to dustbathe. Chicks that stayed on peat performed significantly fewer dustbathing bouts compared to birds that had stayed on paper ($F_{3,38} = 4.00$, $P = 0.014$), whereas the treatments which changed substrate performed an intermediate number of bouts. The difference between treatments with birds on paper performing more bouts remained when the birds were 16 weeks old but now the treatments which had changed substrate were not intermediate anymore and behaved similar to the birds that had stayed on the same substrate (Kruskal-Wallis; $H = 7.93$, df 3, $P = 0.048$). The same pattern is also shown in the length of the dustbathing bouts, where the first substrate birds had experience of does not influence the length of their dustbathing bouts when they are 16 weeks old, but there was a significant difference between the two substrates they currently had access to with a larger variance in the bout lengths of birds kept on paper compared to birds kept on peat (Equal Variances test; $F = 5.72$, $P = 0.001$).

Our results show that birds changed their dustbathing behaviour depending on the substrate they were kept on. This indicates that birds do not need to be reared on litter to later acquire a seemingly normal dustbathing behaviour. If we assume that birds that always have dustbathed on peat perform normal dustbathing then our results imply that birds with only paper to dustbathe on (ie sham dustbathing) do not perform normal dustbathing since they show a more irregular dustbathing behaviour with more short and long dustbathing bouts.

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Alternative loose-housed pen systems for farrowing and lactating sows: Effect of pen design on where the sows choose to rest.

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Recent years' welfare considerations have lead to increased interest in loose-housing systems for farrowing and lactating sows. However, failure in keeping piglet losses and management demands as low as in crate-system has been a common problem with these systems, and further development in the design of loose-housing system is needed.

Being able to predict and control were the sows choose to rest could be helpful knowledge when arranging the geometry of the pen. Recent studies have shown that sows prefer to lean against a sloping wall when lying down. Combined with the knowledge that sows seek isolation prior to parturition an experiment was set up to test the effect of access to isolation and sloping walls on sows choice of resting place.

The behaviour of forty sows was studied in two alternative pen systems (A-pens, length = 2.7 m, width = 2.4 m; B-pens length = 2.7 m, width = 2.7 m) from 4 days before farrowing until 2 days after farrowing. The two pen systems both had a resting area (A-pen = 2 x 1.6 m; B-pen = 2 x 1.8 m) with solid floor and three solid walls, and an activity area (A-pen 0.7 x 2.4 m; B-pen 0.7 x 2.7 m) with slatted floor, access to food, water and contact to other sows through iron bars. In the A-pen the two solid walls closest to the activity area was equipped with slopping walls. The B-pen was equipped with sloping walls on all tree solid walls.

Sows in the A-pen preferred to rest against the sloping walls, with there head facing the other sows ($P < 0.05$). Of the two sloping walls they significantly ($P < 0.02$) preferred the one farthest away from the side were the stable people would pass. There preference did not change over days. Sows in the B-pen preferred to rest against the sloping wall in the back of the resting area ($P < 0.05$). There preference also did not change over days.

The results show that sows prefer to rest against a sloping wall, preferably as far away from the surroundings (other sows and stable people) as possible, and that they prefer to lie facing the surroundings in contrary to turning their back to them.

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Reducing feeding space for dairy goats – effects on social interactions and feed intake

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The aim of this experiment was to examine the effects of an increased number of goats per feeding place and type of roughage on feeding time, feed intake and amount of aggressive interactions.

A total of 48 adult goats divided into 8 groups, were rotated in a 3 x 2 factorial experiment using number of goats per feeding place (1-3) and type of roughage (silage or hay) as treatments. All groups were exposed to all treatments for one week in each of the three feed space treatments on the same type of roughage. Later the roughage type was switched between the groups and another week with each of the feed space treatments was conducted. The goats were moved from their pen to a milking parlour twice a day for milking. Every morning the residues were carefully gathered and weighed, so that all pens were given 120 % of the roughage consumed the day before, to ensure *ad libitum* access. Cameras were mounted above each pen and connected to a time lapse video recorder and a multiplexer unit. General activity was recorded for 24 hours, using instantaneous sampling every 10 minute with the following ethogram: eat, queuing, stand/walk, lying and out for milking. The number of social interactions were continuously recorded for 6 hours (from 9 A.M. to 3 P.M.) and registered using the following ethogram: physical displacements at the feed barrier, passive displacements at the feed barrier, non-successful displacement attempt at the feed barrier, frontal head clashing, head-to-body butting, chasing, withdrawal and avoidance. Physical displacements and all forms of clashing, butting or chasing were summarized into total number of aggressive interactions. Individual goats from each group were ranked as high, medium or low according to the number of times they were displaced from the feed barrier.

The dry matter consumption was greater for hay (1.15 ± 0.05) than for silage (0.9 ± 0.03, $P<0.01$), suggesting a preference for hay. The number of aggressive interactions increased significantly with increasing number of goats per feeding place (1 goat per feeding place: 16.4 ± 1.8 %; 2 goats per feeding place: 19.1 ± 2.3 %; 3 goats per feeding place: 23.2 ± 3.9 % of tot. obs., $P<0.05$). Furthermore, the number of physical displacements (23.4 ± 1.6) and the number of aggressive interactions in total (26.8 ± 2.3) were significantly higher when the goats were given hay compared to silage (physical displacements: 9.2 ± 0.6; aggressive interactions in total: 12.2 ± 0.9, $P<0.0001$). When increasing from 1 to 3 goats per feeding place, 31.2 % of the goats reduced their feeding time by more than 40 % when fed silage, and 54.1 % of the goats reduced their feeding time by more than 40 % when fed hay. High ranked goats spent significantly more % of total observations feeding hay than goats in medium and low rank categories, and this effect became more pronounced as the number of goats per feeding place increased (1 goat per feeding place: high: 24.0 ± 1.2, medium: 21.3 ± 1.5, low: 18.7 ± 2.0, $P<0.1$; 2 goats per feeding place: high: 20.9 ± 1.4, medium: 15.5 ± 1.7, low: 15.6 ± 1.3, $P<0.05$; 3 goats per feeding place: high: 17.7 ± 1.8, medium: 12.0 ± 1.2, low: 8.6 ± 1.5, $P<0.01$).

Since the goats both consumed more hay and fought more to get access to hay, it appears that this type of roughage is more preferred than silage. Restricting the number of feeding places available will affect low ranked animals to a greater extent, and the cost of increased competition is much higher for subordinates than dominants. Because of the increased aggression level, restricting the feeding space to more than one goat per feeding place can not be recommended.

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Parturition behaviour in Brazilian beef cattle in relation to presence of vultures

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We investigate calving behaviour in Brazilian beef cattle of four breeds (Nelore, Guzera and Gir, all *Bos indicus*, and Caracul, *Bos taurus*). We observed 70 births, most of them in Nelore. In addition to behaviour of cow and calf, we recorded the number of present vultures. Vultures may just stay in some distance waiting for the placenta, which hardly interferes with the birth. They might also, however, attack the calf and hurt it. The biggest damages was expected not by direct injuries but rather by delaying colostrum intake since the cow fights the vultures instead of nursing the calf. Delayed colostrum intake beyond three hours post partum is known to reduce the calf's odds of survival dramatically. We recorded number of vultures every minute and allocated each birth to one of three vulture groups: Few vultures present (in average 0.1 vulture as mean of the first two hours post partum, N = 23 births), some vultures present (in average 0.6 vultures, N = 23), and many vultures present (in average 8.6 vultures, N = 24). Number of vultures did not have any impact on when the calf got licked first time post partum (mean 0.5 seconds post partum), moved its head first time (1.3 seconds), when it lifted its head first time (2.4 seconds), and when it was lying sternal (3.7 seconds). There was a tendency that number of present vultures had a negative impact on time of first raising attempt ($P = 0.058$). Number of vultures delayed time to first being on carpal joints ($P = 0.023$). With few vultures present, 87 % of the calves sucked within two hours but only 70 % when some vultures were present and only 50 % with many vultures present ($P = 0.025$, Kruskal-Wallis Test adjusted for ties). We suggest that these effects are mainly because the vultures delayed first suckling. The fact that all calves where equally vital just after birth suggests that the results are not because the vultures were attracted by calves that were weaker from the beginning. However, the delayed raising attempts and being on carpal joint might indicate that vultures were attracted by weaker calves.

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Suckling and grazing behaviour in Plains zebra (*Equus burchelli*)

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We investigate suckling and grazing behaviour of Plains zebra (*Equus burchelli*) by recording suckling and grazing behaviour in zebra foals and their mothers. We selected 100 foals and their mothers in three different age classes from newly born to about 9 months old. We measured the interval between two nursing meals and recorded suckling behaviour in detail. Between the two nursing meals we recorded time budgets of grazing and locomotive behaviour in offspring and mare in 1-min intervals. Social and vigilance behaviour was recorded continuously. Fifty % of the observations were on areas recently exposed to controlled bush fires whereas fifty % were on non-burnt areas. For each zebra pair we collected 6 grass samples, recorded fresh and dry weight to estimate food availability and quality. Analysis of variance GLM was used for statistical analysis and Kruskal-Wallis test for significance when not normally distributed. Burned areas provided less biomass compared to non-burnt but of much higher protein and energy content. There was no difference in behaviour in adult lactating mares due to fire treatment; adult zebras grazed 62% on both habitats. The foals spent half the time compared to adults grazing but grazing time increased with age. Foals spent more time than adults standing, walking, lying, and with social behaviour. On non-burnt area foals contacted the mare more intensely. More vigilance behaviour was recorded in adults, probably due to less sight presented by the high grass. The younger foals suckled more frequent. Typically, a suckling meal consisted of one long bout which included in many meals also shorter bout, usually at the beginning of the meal. A meal lasted in average 70 seconds; the interval between two meals was in average 44 minutes. Compared to many other ungulates, zebra foals have short meals but short interval in-between. There was no difference in suckling behaviour in zebra offspring due to fire treatment and related grass quality. Younger foals exhibited more frequent intervals, longer total meal duration divided in several shorter bouts with longer breaks than the older foals.

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