



International Equine Science Meeting 2012

University of Regensburg

Abstracts

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Friday, March 16, 2012

Registration starts at 7:00 am

Session Equine Cognition

Focus: social cognition/ perception/learning/ memory/ human-horse interaction/ movement decisions/ "high-level" mental abilities

09:00 - 10:00 Lecture

Ödberg, F. History of schooling and its relation with conditioning laws and welfare

10:00 - 12:00 Contributed Talks

Isensee, A. Influence of psychological and physiological arousal in humans on horse heart rate and behaviour

Becker-Birck, M.; Heart rate and heart rate variability in the horse and its rider: different responses to training and a public equestrian performance

Vidament, M. Temperament of stallions: relation with age, breed and level of riders 11:00 - 11:20 Coffee Break

Komárková, M. Lateralized suckling in domestic horse foals (*Equus caballus*)

Hausberger, M. On the significance of puzzling behaviours: what do yawning and adult play tell us about horse (*Equus caballus*) welfare?

12:00 - 13:00 Lecture

Shultz, S. Are equid brains social? Exploring the evolution of equid social structure and social intelligence

13:00 - 14:00 Lunch Break

14:00 - 15:00 Lecture

Pick, D.; **Krüger, K. Heuristics and complex decisions in man and horses**

15:00 - 18:00 Contributed Talks

Sigurjonsdottir, H. How does group stability and composition affect interactions in horse groups?

Pierard, M. Agonistic and affiliative interactions in group housed riding horses (*Equus caballus*)

Christensen, J.W. Object habituation in horses: Voluntary vs. negatively reinforced approach to frightening stimuli

Gabor, V. Cognitive testing in Shetland ponies (*Equus caballus*) using a computer based learning device

Lovrovich, P. The human-given cues and behavioural plasticity of horses during a delayed three choice task

Westermann, W. The contribution of horses (*Equus caballus*) to human health Requirements, stresses and strains, selection, training, compensation and rectification

17:00 - 17:30 Coffee Break

Kultus, K.B. Analysis of Human-Horse-Relation

De Giorgio, F. Why isolate during training? Social learning and social cognition applied as training approach for young horses (*Equus caballus*)

Pokorná, M. Social learning in horses 1

8:30 - 19:30 Round table discussion: Do scientific findings correspond to “common knowledge” on the part of experts on horses? How do horse management and training benefit from the findings?

19:30 Poster session and welcome reception, with drinks and snacks

Saturday, March 17, 2012

Session Equine Ecology

Focus: Social behaviour / mating systems / predator avoidance, interactions / resource allocation / habitats / movements / domestic horse husbandry and nutrition

08:00 - 09:00 Contributed Talks

Bartosova, J. Nursing behaviour in pregnant domestic mares (*Equus caballus*): Can they cope with dual maternal investment?

Stanley, C. Mummy's Boys: Sex Differential Maternal Offspring Relationships in Semi-feral Horses

Dubcová, J. Impact of weaning method on weanlings' weight gain in domestic horses

09:00 - 11:30 Lecture

Klingel, H. **Social Organisation and Social Behaviour of the Equids**

10:00 - 10:30 Coffee Break

Hinrichs, T. Group management in Active-Stables

Flauger, B. Introduction of horses into new social groups

Erber, R. Physiological stress parameters in sport horse mares transferred from group housing to individual stabling

11:30 - 12:30 Lecture

Haupt, K.A. **Horse husbandry and equine stereotypies**

12:30 - 13:30 Lunch Break

13:30 - 16:10 Contributed Talks

Wulf, M. Identification of horses – hot iron branding versus microchip transponders

Burla, J.-B. Validation of the MSR145W Data Logger for Gait Determination in Horses (*Equus caballus*)

Mezei, A. Analysis of eventing competition results of Hungarian Sporthorses

Posta, J. Genetic evaluation of competition years, as a kind of measurement of durability in Hungarian show-jumping horses

Ahmadinejad, M. Common injuries in athletic horses in Tehran's riding clubs

Bahman, M. The prevalence of parascaris equorum in Tehran's riding clubs

15:30 - 16:00 Coffee Break

Bartos, L. Promiscuous behaviour disrupts pregnancy block in domestic horse (*Equus caballus*) mares: A counterstrategy against possible male infanticide

Ralston, S. Trainability and reactivity of Mustang Horses (*Equus Equus*) fed Forage-Based Total Mixed (TMR) rations with or without added grain

Hampson, B. The effect of a novel dynamic feeding system on horse behavior and movement

Aldridge, B. Recent Molecular Advances in Equine Nutrition - from Test Tube to Practice

17:20 - 18:20 lecture

Russell, M.A. Solving Current Domestic Horse Nutrition Challenges

19:30 Konferenz Dinner

Sunday, March 18, 2012

Session Wild Equid Husbandry and Management

Focus: Wild life management with horses in renaturation projects.

08:30 - 09:30 Lecture

Rubenstein, D. Wild Equid movements, leadership, habitat use and predation pressure

09:30 - 11:30 Contributed Talks

Bouskila, A. Group composition and behavior of reintroduced *Equus hemionus* near a water source in the Negev Desert

Bouskila, A. Leadership roles in movements of free-roaming Konik horses (*Equus caballus*) in a Dutch reserve

10:10 - 10:40 Coffee Break

Spasskaya, N.N. Results of investigations of an island population of the feral horse (Rostov Region, Russia)

Kampmann, S. Population dynamics of Australian feral horses in a semiarid environment

Hampson, B.A. Distances travelled by feral horses in 'outback' Australia

Hillgruber, F. Humans and Horses 300.000 years ago - An approach to public presentation in the research and experience centre Schöningen spears

12:00 - 13:00 Round table discussion: Welfare of equids in parks and renaturation projects: A combined approach with conventional and wild equid science.

13:00 - 14:00 Lunch Break

Attention: Public part of conference in German - Der folgende Teil ist in deutscher Sprache

Sonntag, 18. März 2012

Tag der Öffentlichkeit

14:00 - 15:00 Eröffnungsredner

Klingel, H. Soziale Organisation und Sozialverhalten der Equiden

15:00 - 17:00 Kurzvorträge: von Deutsch sprechenden Wissenschaftlern(innen)

Stucke, D. "Animal Welfare Indicators (AWIN) - Erforschung von Schmerzindikatoren am Pferd"

Krüger, K. Konfliktlösungsstrategien der Pferde

15:45 - 16:15 Kaffee Pause

Hinrichs, T. Gruppen Management in Aktiv Ställen

Zeitler-Feicht, M.H. Checkpunkte für eine tiergerechte Fütterung von Pferden an Abrufautomaten

Kultus, K. Untersuchungen zur Mensch-Pferd-Beziehung

Westermann, K. Das Therapiepferd: Was macht es so besonders und wertvoll?

Reuber, W. Kennen Pferde ihren Namen?

17:15 - 18:00 Filmdarbietung

Zimmermann, W. Operation unterm Kranichhimmel

18:00 - 19:00

Diskussionsforum: Wichtige Schlüsse aus der Forschung für die Haltung, das Management und das Training von Pferden.

Social Activity

Monday, March 19, 2012

08:00 - 20:00 Tour, Palaces for Horses and Humans

Visiting the Hit Aktivstall® Gut Kastensee, Lunch, visiting Palace Neuschwanstein

Poster Presentations

Ahmadinejad, M. Promotion of stud management using equine applied science programs

Mohsen A. Nejad University of applied science and technology, Tehran, Iran

Bahman, M. The prevalence of parascaris equorum in Tehran's riding clubs

Berger, A. Project on paternal effects to the cognitive and social development of the offspring on feral horses (*Equus caballus*)

Berger, A. How to come together best? - Studies on integration processes of Przewalski horses into new groups (*Equus ferus przewalskii*)

Dalla Costa, E. A study on inter-observer reliability of castration pain assessment in horses

Ermilina, J.A. Dominance hierarchy in feral horses in Rostov Region

Flauger, B. Social feeding decisions in horses (*Equus caballus*)

Hall, C. Picture recognition of con-specifics and facial expression in the horse (*Equus caballus*)

Hori, Y. Are there breed difference in referential behavior in horses (*Equus caballus*)?

Lojek, J. Certain factors influencing the condition of free-ranging Konik Polski horses (*Equus caballus*) in the Biezska National Park

Novotný, F. Differences of biochemical and haematological indices in the aging process in cold-blooded horses Norik Murán type

Owen, H. The use of GPS to measure feeding behaviour and activity patterns in the horse (*Equus caballus*)

Krueger, K. Third-party intervention

Mshelia, W.P. Husbandry and Management Practices in Domestic horses in Northern Nigeria and their Clinical Implications

Ralston, S. Trainability and reactivity of Mustang Horses (*Equus Equus*) fed Forage-Based Total Mixed (TMR) rations with or without added grain

Spasskaya, N.N. Results of investigations of an island population of the feral horse (Rostov Region, Russia)

Stanley, C. Mummy's Boys: Sex Differential Maternal Offspring Relationships in Semi-feral Horses Takimoto, A.; Do horses (*Equus caballus*) show a preference for a fair person?

Theodoropoulou, P. Prevalence of stereotypies amongst Thoroughbred race horses (*Equus caballus*) in Greece

Waiblinger, S. Human and horse behaviour during veterinary treatments

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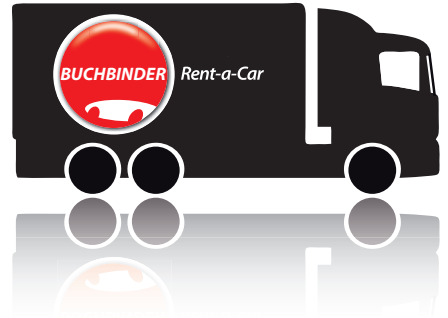
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Horse husbandry and equine stereotypes

Invited Presentation

Katherine Albro Houpt

Department of Clinical Sciences, College of Veterinary Medicine, Cornell University

Traditionally riding horses (*Equus caballus*) are kept in box stalls with varying durations of time outside in paddocks with or without grass. There is a trend, especially in Europe, to house horses in groups and in enriched environments. Whether these arrangements are healthier, either physically or behaviorally remains to be seen. The restrictive stall environment seems to predispose horses to stereotypic behaviors. The use to which the horse is put also influences the prevalence of stereotypic behavior. A higher percentage of horses used for dressage exhibit stereotypic behavior than horses used for jumping or endurance. This effect of dressage usage applies even in horses of the same breed housed under the same conditions. There are two types of equine stereotypes - locomotor and oral. The locomotor stereotypes include weaving, stall walking and pawing. Weaving is reduced by provision of visual contact with other horses via windows, mirrors, or even pictures of horses. Pawing can be a displacement behavior, when the horse is prevented from moving freely, an operantly conditioned behavior when food is anticipated, or a functional behavior, if the horse uses the holes dug to redistribute its weight.

Cribbing is the major oral stereotypy and is associated with eating sweet feed, especially in weanlings. Approximately 4% of US horses crib. There is a marked breed difference in prevalence; 13% of Thoroughbreds, but only 3% of Arabians crib. Whether or not cribbing is learned is still controversial. Although only 1% of horses exposed to a crib biting horse begin to crib, being stalled next to a cribber doubles the risk of that horse cribbing; however being stalled next to an aggressive horse increases the risk of cribbing five fold. Horses spend 20% of their time cribbing. Exercise does not reduce cribbing, but certain toys and diets do. Cribbing does not increase salivary production so it does not appear to be a functional behavior. When horses are prevented from cribbing they may have an increase in the stress hormone cortisol, may have

altered gastrointestinal activity, and are more stressed by food frustration than horses that can crib. Horses are very motivated to crib being willing to work as hard when operantly conditioned for the opportunity to crib as for food. they pull with a force of 30 kg with each crib bite.

Key words: stereotypic behavior, cribbing , horses, weaving, housing

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Wild equids ecology and behaviour, distribution, social behaviour, and social organization

Invited Presentation

Hans Klingel

Technische Universität Carolo-Wilhelmina at Brunswick, Zoological Department Mari

In contrast to the great similarity in behaviour and ecology of the 6 extant Equid species, 2 distinct types of social organisation have evolved, and both are adapted to life in semi-arid to arid regions where environmental conditions force them to migrate seasonally or opportunistically.

The ranges of the various species overlap: Mountain Zebra *Equus zebra* and Plains Zebra *E. quagga* in South Africa and Namibia, Plains Zebra and Grevy's Zebra *E. grevyi* in Kenya and Ethiopia, Grevy's Zebra and African Wild Ass *E. africanus* in Ethiopia, Asiatic Wild Ass *E. hemionus* and Przewalski Horse *E. przewalskii* in Mongolia and China. Although, in the overlap zones, individuals of the different species are using the same resources like water and grazing next to each other, they rarely make closer contacts.

In the type 1 species, Horse, Plains Zebra and Mountain Zebra, the adults live in non-territorial, stable, one-male families and as single bachelors and in bachelor groups. Family stallions have the exclusive mating rights with the mares in their harems. These consist of up to 6 unrelated mares plus their offspring, totalling up to 20 members.

Mares stay in their harem until death. Stallions' tenure is from age 5-6 years, i.e. when they succeed in controlling a harem, for close to life time, but are replaced when dead or incapacitated. Harems are stable even in the absence of a stallion, indicating voluntary membership. Adolescent mares leave their parental families to become members of another harem.

In Plains Zebra the adolescent mares are abducted, during an oestrus, by suitors who fight the defending family stallion/father. Successful stallions are bachelors who start a family, or family stallions enlarging their harem. Young stallions leave their parental families voluntarily at age 2-3 years and join bachelor stallion groups from where the family stallions are recruited.

An individualised dominance hierarchy exists

with the stallion in the alpha position. It is based on individual knowledge and recognition of the members.

In the type 2 species Grevy's Zebra, African Wild Ass and Asiatic Wild Ass adult stallions monopolise territories in which they have the exclusive mating rights. Stallions are tolerant of any conspecifics entering their territory. Bachelor stallions behave subordinately - or fight for the possession of the territory which is a prerequisite for reproduction.

Mares join up to form anonymous and unstable groups or herds. The only stable unit is of a mare and her offspring. In Grevy's Zebra mares with foal join preferentially conspecifics of the same social status, as do mares without foal.

Matings take place inside the territory. There is no lasting relationship of the mare with a particular stallion, and the mare may be mated by any stallion whose territory she is visiting.

Territories measure up to 10 or more square kilometres, and tenure is for several years.

Grevy Zebra territorial owners leave their territories for a few hours to visit a water hole, or for months when grazing and water conditions are below requirements, and re-occupy it upon return, unchallenged.

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History of schooling and its relation with conditioning laws and welfare

Invited Presentation

F.O. Ödberg*, L. Gombeer[▲]:

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While writings from the Hittite Kikkuli and the Greek hippiatrica concerned stamina training and mainly veterinary aspects, the first explicit writings left about schooling are from the hand of Xenophon. He showed already an intention to understand the horse's behaviour and apply an animal-friendly schooling. What happened in Roman times and early middle ages is unclear through a lack of documents. Literature increased in late middle ages (a few Iberic authors and the Italian Rusius) but remained scarce. One presumes knights were brutal because of the strength of bits and spurs, but iconography shows also horses ridden without coercion. Linear progress in schooling cannot be found before the transition between the renaissance and baroque periods. Writings from renaissance masters such as Grisone, Fiaschi, Pignatelli and de la Broue, show a generally violent way of schooling (excepted Conte and Pavari) strangely contrasting with appeals for kindness. One then observes from the 17th century authors to the 18th century baroque masters a gradual improvement concerning important aspects: evolving 1/ from anthropomorphism to understanding horse behaviour, and 2/ from coercion to obtaining gradually suppleness and applying the laws of physics concerning weight distribution. Many baroque and early 19th century masters had understood intuitively conditioning laws discovered scientifically in the 20th century by the Pavlovians and behaviourists. The essence of schooling was settled in the baroque period. It subsided unfortunately in the 19th (with better survival in Germany, Austria and Iberic countries) because of a/ more interest for racing and hunting, b/ the French revolution that closed academies and c/ mass army training. Pressure of competition in the 20th nearly eradicated academic tradition. In the second part we translate some fundamental riding principles into scientific terminology. "Independence of aids" is based on discrimination of stimuli and overshadowing. "Discretion of aids" on generalization and second-order conditioning. "Descente de mains et

de jambes" on avoidance of habituation, of confusion, and of the impossibility to apply negative reward. "Legs without hands, hands without legs" on avoidance of experimental neurosis due to contradictory stimuli. Time permitting, processes such as positive social modelling and occasion setting will be explained. The above mentioned principles are rarely applied nowadays. The FEI holds a large responsibility in the acceptance, even institutionalizing, of a probably animal-unfriendly riding. It is also shameful that some schools, that for years, or even centuries, were the guardians of old principles, are relinquishing them under commercial pressure. All too often, modern riding is obviously animal-unfriendly for the intuitive rider. Scientists however seek facts. Frequency of conflict behaviours is an indicator at ethological level. However, some horses could be in learned helplessness. There is no litmus test for that (except complicated avoidance learning procedures). There is a need for physiological stress parameters according to breed, age, sex. Horses schooled according to different philosophies are often from different breeds making matched-pairs studies difficult. The important role of pre- and postnatal experience complicates precise scientific evaluation in everyday equine practice. One cannot standardize ontogeny in horses as in laboratory animals.

Key words: academic riding principles, history, learning theory, welfare

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Heuristics and complex decisions in man and horses

Invited Presentation

Konstanze Krueger*, David Pick*

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Darwin's claim of differences in mental abilities between man and other animals is a matter of degree rather than of kind and appears to apply nicely to a comparison of choice behaviour in humans and equine. Humans and horses make two kinds of decisions, fast reflexive decisions based on heuristics, and slower more considered decisions that require more complex cognitive processing. Heuristic use is adaptive in that decisions based on them are most often useful in helping an organism to survive while requiring little time and cognitive effort. There is considerable evidence that there is an innate basis to many heuristics in humans as well as horses. A case will be made that the investigation of heuristics specific to horses will lead to an understanding of equine behaviour that has not been possible using traditional learning theories alone. Traditional learning theories are restricted in explaining behaviour to appeals to reinforcement regimes or to the formation of associations between novel stimuli and stimuli that cause innate reflexes, but they are of no use when behaviour is controlled by stimuli that have never been reinforced or been systematically paired with other stimuli that cause reflexive responses. For example, a horse in a two-choice discrimination task may choose a familiar stimulus which has never been reinforced over a new stimulus added to the discrimination task, simply due to the use of an heuristic that usually works -- when in doubt, choose a more familiar object over an unfamiliar one. Conflict resolution strategies provide another good example of heuristic vs. slow decision making. In both humans and horses, conflict resolution strategies are used within, but not typically between social groups. Such groups can be defined as community of interest. Depending on the resource that has to be defended, groups may well be small identities, such as human families or horse harems, or large aggregations such as herds in horses,

or religious groups or nations in humans. Fast and simple resolution is possible with stable social identities in simple environments, but more complicated and time consuming deliberative processes are required to resolve conflict over long-term resource acquisition, for decisions in complex conflicts situations and complex social settings.

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Wild Equid Movements: Impacts of Habitat Quality, Predation Pressure and Leadership

Invited Presentation

Daniel Rubenstein

Princeton University, Department of Ecology and Evolutionary Biology

Animals spend much of their lives on the move searching for food, shelter and mates. As long-legged, large bodied species, equids are well suited for traveling long distances. Understanding where free-ranging equids go, why they choose particular locations, some near and some far, and what impact such movements have on patterns of sociality, demography and human livelihoods are only now coming into focus. This talk will explore how bottom-up factors, such as the abundance and distribution of key resources, and top-down factors, such as the type and location of predators, interact to shape overall movement patterns of equids, how leadership roles develop and what outcomes such movements are likely to have on human activities.

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Solving Current Domestic Horse Nutrition Challenges

Invited Presentation

Mark A. Russell and Blaire E. Aldridge, Purdue University

Solving horse nutrition challenges require contributions from Psychology, Biology, Agriculture, and Veterinary Medicine because these are biological challenges of an anthropological nature. The domesticated horse has shifted from an animal of war, transportation, and farmwork, to a companion enjoyed for sport, leisure and recreation. The first realization and responsibility must lie in the fact that it is the owners and managers which are the source of many of the horses' challenges. Nutritional challenges include: defining requirements and absorption of nutrients, improving feed efficiencies for performance, improving feeding management and eating behaviors, and preventing or treating clinical problems. These challenges can be addressed through science, horse management, and education. Many of today's challenges in horse nutrition can be related to the equine genome and genetics. Those that can be addressed with nutritional consequences include Polysaccharide Storage Myopathy, Equine Metabolic Syndrome, Recurrent Exertional Rhabdomyolysis, Glycogen Branching Enzyme Deficiency, Hyperkalemic Periodic Paralysis, and Development Orthopedic Disorders. It is the scientific understanding of cellular processes in relation to nutrients which address the symptoms associated with these diseases. Consequently, feeding management can be changed to actually treat the disease. The most recent advances in equine nutrition implement the use of molecular and cellular based techniques to understand how nutrients are needed during times of stress, feed withdrawal and to maintain gut health. For example, the absorptive capacity and transporter gene expression and localization, are now being quantified. We are also now assessing the impact of the loss of reproductive endocrines on calcium and phosphorus homeostasis in the horse. Additionally, bioluminescent pathogenic bacteria have been utilized to view attachment rates in the gastrointestinal tract of the horse. These are merely examples of the approaches

of science to these nutritional challenges.

Science is of little use unless it is incorporated into improved management of horses. Every type of horse requires different management and good husbandry. In our country, 70% of the horses are kept in small herds, on limited acreage, and used for recreation and sport. Since we have taken the horse out of its natural environment and subjected it to these roles, we now seek to determine ways to feed the horse in our environments; i.e. obesity, inconsistent exercise, confinement, surgery, competition, diseases. Private horse feed agribusinesses have aggressively positioned excellent products with claims to improve health, reproduction, performance, and even horse happiness. Owners and managers seek unbiased science upon which they ultimately make their own decisions. General challenge categories seem to be feeding geriatric horses, active performance horses, and idle horses with secondary metabolic problems. Thus, feeding recommendations include the determination of specific horse nutrient requirements, maximization of available forages, providing other nutrients, and exercise to manage horses more as horses. Private and public companies and Extension systems exist to provide online and other sources of information. As more and more people own horses as a hobby and for recreation, they share responsibility to inform themselves on how to best feed and care for their horses.

Key Words: horse nutrition, clinical diseases, digestion, feeding, management

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Are equid brains social? Exploring the evolution of equid social structure and social intelligence

Invited Presentation

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The living equids display a variety of different forms of social organisation; plains (*Equus quagga*) and mountain zebra (*Equus zebra*) associate in small, closed harems, whereas the asses and Grevy's zebra (*Equus grevyi*) are found in looser, more ephemeral associations. Feral domestic horses appear to be somewhat intermediate: although stallions generally maintain harems, there is some movement of individuals between groups. This talk will use several statistical approaches to explore evolutionary explanations for these differences. Firstly, we will explore the relationship between brain architecture and social organisation both among the equids and across all Perissodactyls. Equids have larger relative neocortices than other Perissodactyls; within the equids, species typically found in more stable groups have larger neocortices than equids in more unstable ephemeral groups. The strong relationship between group stability and brain size and architecture mirrors that found in other mammals, including primates. Thus, living in stable social groups consistently appears to impose cognitive demands across species. In order to understand the historical trajectory resulting in the relatively large, social brains found in some species, we then reconstruct the evolutionary pathway of social living in the equids. Finally, we discuss how we can use network theory to measure social structure and how these differences may impose different cognitive demands on individuals.

Key words: social brain hypothesis, Bayesian modelling, social networks, brain size, social evolution

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Common Injuries in Athletic Horses in Tehran's Riding Clubs

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Various forms of intensive sport activities places stresses on the musculoskeletal system of the horse while involve in any forms of the activity (race &/or training). The musculoskeletal system of the horse has an inherent ability to adapt to the demands of high speed exercise, though if a threshold in adaptive capacity is exceeded, then some forms of damages to the structures of the musculoskeletal system may result. In case, if the insult (race &/or training) continued, it may worsen the repair and adaptation process and put the horse at risk of more serious musculoskeletal injury.

The result of this research describe the finding of the study performed in different breeds of horses involved in various types of activity in Tehran's riding clubs, concentrating on the types of injuries observed in those horses. The study was then focused on the types of injuries observed in various activities (events) horses involved in.

Totally 400 horses took part in various activities during race season (March - September) in Tehran's riding clubs, out of which 26 horses injured, in most of which musculoskeletal system of the fore limbs were involved.

From the sexual aspect of the study the percentages of the stallions were more (54%) when compared to the mares (46%). In this study the relation between the sex, breed, age and the weight of the horses with anatomical site of the injury, outcome of the injury, climate and the type of the event (jumping, polo etc.) were studied and compare with each other.

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Recent Molecular Advances in Equine Nutrition from Test Tube to Practice

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The use of molecular techniques has increased our understanding of biological systems; in particular how genes and proteins operate within a cell or organ in response to various stimuli. These techniques can be used to study modes of action or mechanisms in disease states, or in response to applied management or nutritional changes. While applied and basic research are often conducted independent of one another, the real advantages to the equine industry will come from the use of molecular techniques to address applied challenges and/or opportunities within the industry. Therefore, the overall goal of our research has been to use basic and molecular tools to investigate modes of action resulting from changes in nutrition or management.

We investigated active nutrient transport capacities of the small and large intestine, the effects of feed withdrawal on intestinal transporter gene expression and function, as well as other measurements pertaining to gut health (gut barrier function and gastrointestinal morphology). This novel and thorough approach to characterize sectional differences (fore- and hind-gut) of nutrient absorption has resulted in quantitative measures of active transport capacity for glucose, phosphorus, glutamine, lysine, and di-peptides in the horse. This research demonstrates that by-products of fermentation in the cecum such as microbial proteins and hydrolyzed phytate phosphorus, can be absorbed in the colon. Previously unidentified in the hindgut of the horse, we reported the expression of the di- and tri-peptide transporter, PepT1, as well as the neutral amino acid transporter, ASCT2, and transport of their substrates. We observed that nutrient transporters for glucose (SGLT1), glutamine (ASCT2) and for di-peptides (PepT1) can be regulated by diet, implying biological relevance to feeding management strategies.

Feed withdrawal in horses pre- or post-surgery, prior to or during horse shows, during transport, or for other management reason is common. It is therefore

important to understand how the removal of nutrients impacts gut health and/or disease susceptibility. The use of molecular techniques has provided a basis for the roles of certain core nutrients during times of feed withdrawal. For example, nutrients such as glutamine play a major role in proliferation and repair in the gut, serve as a major energy substrate, and may provide a means of assessing nutritional stress in the gut. Recent data concludes that following a feed withdrawal, the need for glutamine increases up to 116% in the proximal jejunum, and the gene expression of its transporter (ASCT2) increases by 78%. Additional studies utilizing molecular techniques to address nutritional challenges in the horse include how hormone loss due to ovariectomy impacts the homeostatic regulation of calcium and phosphorus in the horse.

To improve nutrition and feeding management practices in horses, knowledge regarding how and where nutrients are absorbed, utilized and regulated under varying physiologic stressors (disease, exercise, reproductive status, etc.) is needed. The integration of applied and basic research facilitates a better and more complete understanding of mechanisms underlying common health and nutritional challenges facing the equine industry.

Key words:

Molecular Biology, Equine, Gut

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The prevalence of *parascaris equorum* in Tehran's riding clubs

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Parascaris equorum (ascarid; roundworm) is a common nematode parasite which occurs in the small intestine of immature horses world-wide. Adult female ascarids lay eggs in the small intestine, and these eggs pass into the environment within the feces of the host. *Parascaris equorum* is one of the rare nematodes which induce absolute acquired immunity. Most horses become immune during the first year of life, so patent ascarid infections are rarely diagnosed in horses over two years of age.

The aim of this study was to determine the prevalence of infection with *parascaris equorum* in Tehran's riding clubs. The prevalence and rate of infection was determined based on the coproscopic examination. Fecal samples were tested for the presence of *parascaris* using suspend method. In this investigation, 442 fecal samples of horses from North-East of Tehran's riding clubs examined. From the viewpoint of *parascaris* roundworms, fecal samples were obtained from each box separately and send in containers with plastic lid. The samples were then transferred to the parasitology lab for further examination. The infection was recognized based on the observation of *parascaris* eggs in coproscopic examination. The infection rate in the foal in this study was zero percent. Another interesting result was increasing the infection rate in horses of 10 years or even older and gelding. Out of 442 samples, the infection rate in the samples taken in summer, was 3.16%, and in the fall, winter and spring it was 2.4%, 10% and 3.16% respectively. The infection rates in relation to the age, sex, excursion condition, seasons and deworming programs was studied too. The results showed that the local and the imported horses should be monitored parasitologically, because endoparasites may create a major epizootiologic problem when these animals are kept in an organic raising system. Deworming program is to be continued with proper methodology, dose and throughout the productive age of the horses.

Key words:

Parascaris, coproscopic examination, parasitology, deworming, endoparasites

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Promiscuous behaviour disrupts pregnancy block in domestic horse (*Equus caballus*) mares:

A counterstrategy against possible male infanticide

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Common practice that the domestic horse mare is removed from her home environment and transported elsewhere for mating. After conceiving she is returned back into her home environment and social group, containing often familiar stallions and geldings. If we presume that the behavioural adaptation for infanticide relevant for wild, or free-ranging horses has not been lost in domestication (and it is clear that it remains at least within feral populations), then we may expect that, unless prevented by fencing or other management measures, the dominant males in the home social group may subsequently attempt infanticide.

Foetal loss is a common phenomenon in domestic horses, being usually substantially higher than that in other domestic ungulates reaching up to 40%. One adaptive response to infanticide risk in polygynous populations is the Bruce effect. Pregnant females terminate their pregnancies when exposed to a dominant strange male. Our previous studies on plain zebra suggested the possibility of the Bruce effect also in equids. In this study we therefore tested the presumption that the Bruce effect could explain foetal loss in domestic horses.

Based on reproduction records from horse breeders, we have recently published that bringing a pregnant mare which had been mated away from home into a vicinity of a familiar male who was not the father of her foetus increased probability of pregnancy disruption (Behav Ecol Sociobiol DOI: 10.1007/s00265-011-1166-6). These mares aborted in 31% of cases, while none of those mated within the home stable aborted. Repeated sexual activity either by a stallion or dominant gelding from the normal home group was observed shortly after the mare came from away-mating. Pregnant mares isolated from home males by a fence were even seen soliciting them over the fence. Therefore, there is probably some other mechanism than the Bruce effect leading to pregnancy block in the mare.

We speculate that, once returned to the home "herd", and introduced to familiar males, mares were

more likely to terminate their pregnancy to save energy and avoid likely future infanticidal loss of their progeny by dominant male(s) of the home social group. Additional data has now showed that if a mare was mated away from home and was brought into an environment containing mares only, she was less likely to abort than a mare returning to an environment containing familiar male or males. This further supports our above hypothesis.

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Key words: foetal loss, domestic horse, Bruce effect, sexual behaviour

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Nursing behaviour in pregnant domestic mares (*Equus caballus*): Can they cope with dual maternal investment?

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Among mammals, lactation is the most energy demanding part of parental care and so parent-offspring conflict should arise over milk provided by the mother. Mother and offspring should disagree over the length and amount of the milk provision. We focused on effect of pregnancy on suckling behaviour variables as indicators of mother-offspring conflict in domestic horses. We presumed shorter suckling bouts and higher rates of ejected and/or terminated suckling in pregnant mares compared to non-pregnant ones. Increasing conflict over amount of maternal investment between mother and her young are to be expected because of her parallel investment into a nursed foal and a foetus. Eight groups of loose housed lactating mares with foals of Kladruby horse were studied at the National Stud Kladruby nad Labem (Czech Republic) from deliveries to abrupt weaning (at the age of 127 to 210 days). We recorded 10 848 suckling solicitations of 79 mare-foal pairs, from which 10 607 resulted in a suckling bout. In 41 cases a nursing mare became pregnant during lactation. We found no significant effect of pregnancy either on probability of the mother rejecting suckling solicitation of her foal or probability that she terminated a suckling bout. However the overall effect of mother's pregnancy on suckling bout duration was not significant, there were considerable differences in pregnant and non-pregnant mares according to who terminated a suckling bout, whether the mother or the foal ($F(1, 9776) = 12.1, P < 0.001$). In case it was the mother then the suckling bout was longer if she was pregnant (65.36 ± 1.25 s) than barren (60.55 ± 1.36 s). We found no impact of pregnancy on duration of suckling bouts terminated by the foal. Further, nursing a foal during the first two trimesters of pregnancy had no negative impact on birth weight of the foetus. In conclusion, we found not higher, but a lower mother-offspring conflict in pregnant than in non-pregnant lactating mares while expecting just the opposite. We suggest that pregnant mares compensate their nursed foals during intensive

stages of lactation through a relaxed mother-offspring conflict for later decrease in investment due to increasing demands of the foetus and/or for the shorter period of milk supply. Our results (partly published in Bartosova et al. 2011, PLoS ONE 6(8): e22068) are of high importance in horse breeding. One of the main arguments for early weaning of the foals is regeneration of their pregnant mothers before upcoming delivery. Here we present evidence that a pregnant mare "counts" with her dual maternal investment and "employs" evolutionary mechanisms enabling her to rear a vital foetus. From this point of view there is no objective reason for stressful weaning of her nursed offspring practised in conventional breeding.

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Key words: Suckling behaviour, pregnancy, parent-offspring conflict, domestic horses, *Equus caballus*

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Heart rate and heart rate variability in the horse and its rider: different responses to training and a public equestrian performance

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While detailed information exists on the cardiovascular response of horses to racing or endurance, much less is known about cardiovascular function of the rider in equestrian sports. Combined analysis of the horse-rider-team has not been investigated so far. In this study, we have analyzed changes in heart rate and heart variability (HRV) variables SDRR (standard deviation of beat-to-beat interval) and RMSSD (root mean square of successive beat-to-beat intervals) both in well-trained horses (n=9) and their highly experienced riders (n=7) during the airs above the ground (*sauteurs en liberté* of the *Cadre noir de Saumur*) at a public performance and at an identical, but non-public training session, both lasting for exactly 7 min.

Heart rate in the horses and riders increased during the airs above the ground, both in training and in the public performance (p<0.001 over time). In the horses, this increase did not differ between training and public performance (training: from 35±6 in the stable to 97±17 beats/min during riding, performance: from 43±13 to 103±13 beats/min, respectively). In contrast, in the riders, the increase in heart rate was significantly more pronounced (p<0.01) during the public performance (basal value 91±10, maximum 150±15 beats/min) than during training (basal value 94±10, maximum 118±12 beats/min).

With regard to HRV in horses, overall SDRR did not change significantly over time and did not differ significantly between training and performance. RMSSD decreased during both training and performance to the same extent, indicating a decrease in parasympathetic (vagal) tone. In the riders, both HRV variables decreased significantly during riding (p<0.001) and for SDRR the decrease was more pronounced (p<0.05) during an equestrian performance compared to a training session. During the performance SDRR decreased from a basal value of 5.0±1.5 to a minimum

of 3.2±0.6 msec while respective values for the training session were 5.3±1.1 and 2.3±1.1 msec.

Both a public performance and an identical training session of the airs above the ground in the ridden horse caused an increase in heart rate and a decrease in HRV variables. While increases in heart rate are mainly caused by physical activity, decreases in HRV also indicate a stress response. The cardiovascular response in the horses did not differ between a training session and a public performance but clear differences could be demonstrated in the riders. During a public performance, the increase in heart rate and decrease in SDRR were more pronounced than during a similar training session. In conclusion, the presence of an audience thus causes more pronounced sympathoadrenal activity in experienced riders than the same equestrian tasks ridden without spectators present. In contrast, the presence of an audience was without effect on sympathoadrenal activity in experienced horses.

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Group composition and behavior of reintroduced *Equus hemionus* near a water source in the Negev Desert

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The Asiatic Wild Ass, *Equus hemionus*, was once abundant in western Asia. The species declined due to hunting and habitat loss. Between 1982-93 38 *E. hemionus* (21♀ 17♂) that originated from Iran and Turkmenistan were reintroduced to the Negev Desert, Israel. Saltz, Rubinstein and co-workers studied the released population till 1999. The current population in the Negev is estimated at more than 200 individuals, yet, their social and genetic structures are not known. Here we report group composition and behavior of *E. hemionus* near a water sources from the 2010 and 2011 field seasons, which is part of a wider study of the mating system and genetic diversity. We recorded and videotaped group composition and social interactions from a shelter, 150m from the water source. We recorded a total of 377 observations, in which 251 only males were observed, in 105 observations we observed females and juveniles, and only in 21 cases we observed a mixed group of females with at least one male. Not all wild asses were individually identified, but so far, we analyzed data from 69 individual profiles (based on photos), and recorded in which groups were they videotaped. Before reaching the water source, wild asses often aggregate in large groups and wait for the first few individuals to approach cautiously the water, and only then the rest of the individuals make a swift final approach. We did not consider these aggregations as social groups. We defined a group when individuals approached or left together the valley in which the water source is located. In a few encounters between *E. hemionus* and wolves (around sunset) we noticed that the wild asses showed interest in the wolves and increased alertness, but the wolves did not approach the equids under these conditions. Female groups (including those with a male) were larger than male-only groups (range 2-49 and 1-34, respectively; $P = 0.0191$). From records of individuals observed more than once, individuals appear on different days in groups of various sizes and compositions, suggesting

a social structure with a certain degree of fission-fusion. The mean proportion of juveniles per female was 0.57 and this value is higher than the average found in the 1990's study (0.5). Apart from the proliferation of the population, an important difference between the earlier and the current study stems from the fact that the *E. hemionus* in the Negev Desert expanded their range and it includes now the Negev Highlands, an area with slightly more mesic and stable conditions. Except for Sep., fewer adult females were observed compared to males ($P=0.028$). Different daily activity patterns of the two sexes may explain this observation. These results will be combined with the genetic work and will contribute to the assessment of population viability.

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Leadership roles in movements of free-roaming Konik horses (*Equus caballus*) in a Dutch reserve

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We observed the activity and movements of Konik horses (*Equus caballus*) in order to determine the initiators of movements and the individuals taking the lead in movements of the main groups. We conducted our observations between March-June 2010 along the shores of the Rhine river, in the Blauwe Kamer reserve, in the Netherlands. The horses were introduced to the reserve alongside with cattle to prevent the growth of the forest and maintain the grass habitat. We videotaped all observations on two digital video cameras, one providing the general view of the group and the other scanning and focusing on the individuals, to aid with identification. Horses were recognized based on individual profiles that were created for each one, consisting of photos of both sides and notes of the main characters, such as orientation and coloration of the mane, prominent scars and markings, etc. Twenty three horses (not counting foals) were organized in two harem groups with 11 individuals (two of which were dominant stallions) in the large group and six individuals (one of which was a stallion) in the second group. These two main groups were always within sight of each other, and two bachelor males moved usually in their vicinity. An additional group of three young bachelor males roamed elsewhere in the reserve. We divided the movements of the horses to local movements while grazing and to long-distance movements, in which the horses moved to a different grazing location, to a pond of water, resting area or groups of trees that were used by the horses for scratching themselves. During the local movements, any two of the three oldest females in the large harem group were enough to cause the whole group to follow them and gradually change position within the pasture. The smaller harem always followed the large harem's movements. The long-distance movements of the large harem were sometimes initiated by one of the harem stallions that herded their group and at other times – by the oldest females. Soon after the movement was clearly initiated, the dominant

stallions positioned themselves in the back of the group or in the center and had no influence on the direction of move that was only determined by the leading females. In the long-distance movements too, the small harem followed the large harem group, and the two bachelor males usually followed behind them. Social interactions included aggressive interactions between the two dominant males within the large harem or between dominant stallions and the two bachelor males accompanying the two harems. In addition, dominant males courting or attempting to mate with mares sometimes caused a turmoil that eventually initiated movement of the harems.

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Validation of the MSR145W Data Logger for Gait Determination in Horses (*Equus caballus*)

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Observing locomotor activity and resting behaviour is used to determine time budgets that may give some indication for the assessment of horses' welfare in different housing systems. Direct observation requires much manpower, and thus, a common method is the use of pedometers, which count and store single step events of a certain time interval. One disadvantage of these devices is the loss of information due to pooling of data, which also disallows the distinction of individual gaits. For gait determination, we tested a versatile skilled accelerometer, aiming to define activity value ranges for each gait, i.e. stand, walk, trot, gallop. The data logger (MSR145W, MSR Electronics GmbH, Switzerland) includes integrated temperature, humidity, pressure, light and three-axis acceleration (x-, y-, z-axis) sensors. The waterproof MSR145W (approx. 60x20x15 mm, 25 grams) has a memory capacity of 2 million values (expandable with optional microSD card) and a lithium polymer battery (260 or 900 mAh) for measurements over several days. Data is transferred to the PC via USB cable using MSR Software (Version 5.06).

For the validation, 19 horses of different breed and height at withers (125 - 169 cm) were ridden or longed in walk, trot and gallop and stood still for 5 minutes each in total. The logger was attached to the left front leg above the fetlock. Data was measured using the y-axis acceleration sensor, recording at a sampling rate of 10 Hz and a maximum sensitivity of ± 10 g. Tests were conducted at different training arenas with variable floor surfaces.

The absolute activity values of every horse were averaged per second for each gait. A linear mixed-effects model was used to evaluate influences on gait determination according to activity values. Explanatory variables included gait, breed class (pony ≤ 148 cm / horse > 148 cm) and their interaction as fixed effects and the individual horse as random effect. Statistical assumptions were checked using graphical analysis of

residuals. Results show only a significant influence of the gait ($F_{3,36} = 566.7$, $p < 0.0001$). Therefore, a clear limitation of activity value ranges and the distinction between gaits was possible.

The validation reveals a clear suitability of the MSR145W data logger for gait determination in horses. Due to the loggers' battery and memory features, it furthermore seems well-suited for measurements of locomotor activity over longer time periods.

Key words

horse, activity, acceleration, gait determination

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Object habituation in horses: Voluntary vs. negatively reinforced approach to frightening stimuli

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The ability and ease of horses to habituate to frightening stimuli greatly increases safety in the horse-human relationship. Several different techniques have been suggested for habituation training of horses and under certain conditions, preventing animals from avoidance reactions during exposure to frightening stimuli is believed to facilitate habituation. Response prevention does, however, lead to a loss of control, which is a known stress inducer in both animals and humans. This experiment investigated whether horses show increased stress responses when negatively reinforced to approach a mildly frightening stimulus, compared to horses allowed to voluntarily explore the same stimulus. We further investigated whether the prevention of avoidance responses in horses that are negatively reinforced to approach the stimulus, facilitates habituation to the stimulus. Twenty-two 2-3 years old Danish warmblood geldings were included in the study. Half of the horses (NR group) were negatively reinforced (through halter and rope pressure) by a familiar human handler to approach a collection of frightening objects (six open and colourful umbrellas) placed in a semi-circle in a familiar test arena. The other half of the horses were released in the arena and were free to avoid or explore the objects (VOL group). On the next day, all horses were exposed to the objects again without a human to investigate the rate of habituation. Behavioural and heart rate responses were recorded on both days. Data were analysed in a two way repeated measures ANOVA and post hoc analysed via the Holm-Sidak method. In the VOL group, all horses initially chose to avoid the unknown objects, whereas the handler managed to get all horses in the NR group to approach and stand next to the objects within the first 2-min session. As expected, horses in the NR group had a significantly longer duration of alertness (sec, mean \pm se: NR: 23 \pm 4.1 vs. VOL: 16 \pm 4.7, $P=0.026$) and a higher max HR in the first session (bpm, mean \pm se: NR: 106 \pm 5.2 vs. VOL: 88 \pm 4.4, $P=0.004$). On the

next day, however, the NR horses spent significantly less time investigating the objects (sec, mean \pm se: NR: 13 \pm 4.1 vs. VOL: 24 \pm 6.0, $P=0.005$) and had a shorter latency to approach a feed container, placed next to the objects (sec, mean \pm se: NR: 25 \pm 3.9 vs. VOL: 47 \pm 16.2, $P=0.031$), indicating increased habituation. In conclusion, negatively reinforced approach to mildly frightening objects appears to increase stress responses during the initial exposure, but also to facilitate habituation in young horses.

Key words: Habituation, learning, fearfulness, stress, reinforcement

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Why isolate during training? Social learning and social cognition applied as training approach for young horses (*Equus caballus*)

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In the last decade an increasing number of studies has been oriented towards equine social learning and their social behavior within the herd (Kruger, 2006-2008). In social species, social learning is important to learn and gain useful skills to move and live in their own social and environmental context. Group housing has been recognized as an important element to fulfill the physical and behavioral needs of horses, especially their need for social contact (Søndergaard, 2011). Still, when it comes to horse training, the social aspect and, in general, cognitive abilities of the horse are rarely taken into account. Although it is widely accepted that social isolation is stressful for horse (Mal et al, 1991a and 1991b) still isolating a young horse is the first step when it comes to training methods. Due to tradition and culture and our performance-oriented society it is both difficult to accept and apply a different social/cognitive training approach. Training sessions are focused on immediate results whereas in cognitive learning part of the process is latent and will not be visible immediately, but taking the cognitive skills into account plays an important role in avoiding tension both in the horse as in the human-horse interaction (Baragli and De Giorgio, 2011). In this study we tested the possibility to apply social learning by creating a social environment, favoring a cognitive learning approach, for the training of six young horses. The group existed in three males and three females, between two and three years old. All six showed initial difficulties and defense to human interaction. They were housed in two groups in adjacent spacious paddocks where they had ample opportunity to move and express their individual and social behavioral repertoire. Each horse had one training session per week without isolating it from the others. The training sessions were held following a cognitive-relational model defined as the equine-zoanthropologic approach (De Giorgio, 2010 – Marchesini, 2011). The learning objectives were to be able to handle each horse, conduct it, saddle and ride it

within a maximum time-frame of two years. Every time a defensive or alert behavior would occur the training activity was re-arranged to not over-pressure the horse. Therefore the persons working with the horses carried out the activities without tight expectations focusing on the horses' positive attention. After eighteen months all six horses were used to the saddle and to riding. None of the horses ever fled or showed defense behavior and in the case of unexpected events they showed no emotional reactivity/reactive behavior. Today the horses show the same calm behavior whenever worked individually.

This preliminary study highlights how social learning applied to equestrian activity can be fundamental for safety and welfare and the establishment of a more problem-free relationship between horse and human. Safety as the defensive behavior seems to have been reduced and welfare as the horses have been trained in a social context without being isolated and thus without being stressed during the training experience.

Key words: Cognitive approach, Horse training, Horse-Human relationship, Social environment, Social learning

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Impact of weaning method on weanlings' weight gain in domestic horses

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Artificial weaning is associated with various stresses for the foal, such as loss of the mother, feeding changes, new and unfamiliar environment, etc. We investigated the impact of two different methods of abrupt weaning on weight gain in group housed Kladruby horses born 2009 (National Stud Kladruby nad Labem, CZ). Two groups of the foals were weaned abruptly at age from 5,5 to 8 months and transported to the other facility but the first group (G1, N=14) spent one week in their home environment after their mothers were led away. The other foals (G2, N=15) were moved away immediately after separation from the mothers (i.e. they lost the mother and known environment at one time). Foals were weighed: at the weaning day, weekly within the first month and then monthly up to 6 months after weaning. Neither birth nor weaning weight differed significantly between the two groups kept under similar nutrition. We hypothesised that a week spent in the home environment should reduce foal's weight loss usually following the loss of the mother and moving to the unknown environment.

The weaning type significantly influenced weight gain the foals reached one week after weaning ($p < 0.001$, GLM, PROC GLM, SAS). Contrary to our expectations, G1 foals lost their weight whereas G2 ones gained weight during the same period (-4.9 vs. +3.2 kg). G1 foals reached back their weaning weight within 3 weeks after weaning. The weight of the foals at 6 months after weaning was still marginally higher in G2 than G1 foals (388.2 vs. 365.7 kg, $p < 0.07$).

We found lower detrimental effect on weight gain in G2 foals (i.e. weaned and immediately moved) compared to G1 foals (weaned and stayed before moved). Thus, our results indicate lower stress induced to the foals in more radical type of weaning.

Key words: Horse, *Equus caballus*, weaning, weight gain

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Physiological stress parameters in sport horse mares transferred from group housing to individual stabling

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Initial equestrian training and especially first mounting of a rider are stressful challenges for young horses. Most young horses are raised in groups but, in association with equestrian training, they are commonly transferred to individual stabling in loose boxes. Although, in most stables, visual contact with horses in adjacent boxes is possible, separation from the herd might be an additional stressor. We have studied physiological stress parameters in 3-year-old sport horse mares (n=8), transferred from a group stable with access to a paddock to individual boxes without paddock. Once stabled in the individual boxes, mares underwent a standard training for young horses. Horses had been accustomed to lunging and tolerating a rider on their back several weeks before the study. Mares were studied from 5 days before to 5 days after changing the stable. Cortisol concentration in saliva, locomotion activity (ALT pedometers), heart rate (HR) and HR variability (RMSSD: root mean square of successive beat-to-beat intervals) were determined. We hypothesized that the change of the stable increases cortisol release and is associated with changes in HR and RMSSD and reduced locomotion.

Before mares were moved to individual boxes, cortisol concentration showed a pronounced diurnal rhythm with values around 0.6 ng/ml in the morning and a continuous decrease throughout the day. When the mares were moved to individual boxes, cortisol concentration increased to 1.8 ± 0.2 ng/ml and did not return to baseline values within 6 h ($p < 0.05$ over time). On subsequent days, a diurnal rhythm was re-established but shifted to a higher level than before. Locomotion activity determined by ALT pedometers was increased for some minutes only after mares had been placed in individual boxes but was only slightly higher than during the time mares spent with the group in a paddock. On

days 2 to 5 in individual boxes, locomotion activity was reduced compared to the group stable. HR increased and the HRV variable RMSSD decreased when mares were separated.

In conclusion, separating horses during initial training from their group is an additional stressor, although the stress is less pronounced than induced by other social challenges, e.g. weaning of foals. When stabled in individual boxes, mares move less than when kept as a group. Horses kept in a group thus appear to exercise themselves freely, such an effect is absent when the animals are kept individually.

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The introduction of horses into new groups: Social interactions and cortisol release

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Domestic horses are kept in so-called “fate societies” where they have to deal with frequent mixing. Several studies have evaluated and discussed the aggression level and injury risk during the introduction of horses into new groups, but nothing is known about the endocrine responses and thus if horses experience stress during introduction.

In this study we analysed the efficiency of four approved introduction techniques and evaluated the introduction of 30 horses into 11 different groups. Horses were introduced: 1) immediately, 2) after observing the new group for several days, 3) together with an “integration horse” after several days of observation, or 4) with a mixed strategy. Aggressive as well as positive social behaviour between the introduced horses and the group members were analysed the two hours following the introduction event. In addition, we focussed on the glucocorticoid production of the newcomer horses by measuring faecal cortisol metabolites (FCM) on the day of the introduction as well as the following three days.

For the four introduction techniques we found significant differences in the horses’ aggressive and submissive behaviour as well as in their total interactions. The introduction together with an integration horse led to significantly lower levels of aggression and less total interactions than the immediate introduction of single horses.

Horses which were introduced immediately or after an observation period showed significantly elevated levels of FCM on the first, second and third day after the introduction. For horses introduced together with an integration horse FCM were already significantly higher on the day of the introduction, indicating a stressful event before the introduction itself. In contrast, FCM levels were always very low when using the mixed technique.

In sum, horses have the ability to deal with conflict when they are introduced to new group members. The

introduction event itself appears not to be as stressful as previously assumed. Standing together with an “integration horse” on a separate paddock and not being able to integrate immediately into a new group appears to be stressful for the newcomer. Based on the findings of our study we suggest to introduce new horses in group management together with a new group mate, a so-called “integration horse”. This would reduce the number of total social interactions as well as the aggression level. While this technique may be stressful for the newcomer, it lowers aggressive behaviour between the introduced horse and the group members and consequently reduces injury risks.

Key words: Introduction technique; Aggression; Injury risk; Endocrine response; Stress; Integration horse

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Cognitive testing in Shetland ponies (*Equus caballus*) using a computer based learning device

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Complex housing environments such as group housing with automatic feeding or the close contact to humans in sports make high demands on the learning ability of the horse. These learning processes include not only habituation, sensitization and simpler forms of operant conditioning, but also stimulus generalization and possibly some type of concept learning. Studies concerning cognitive abilities in the horse increased in the last decades, but for optimizing housing conditions and horse training, deeper insight into the learning behaviour of this species is necessary. In the present study we used the advantages of a computer based learning device to train 7 Shetland ponies to solve a matching to sample task. With this more complex type of a discrimination task, animals are trained to recognize two out of three presented stimuli as identical. In a first step animals learned to operate the learning device and in further learning steps to recognize and assign geometric symbols (dot, cross, square, and triangle) presented on a LCD screen that were 'equal'. Four of the 7 ponies could solve the given task by performing over 80% correct responses in two consecutive sessions ($p < 0.001$). In the subsequent transfer test with new symbols, we found that the ponies were able to transfer the learned rule. In further experiments it should be clarified whether the good learning performance of the ponies in the present study is indeed based on their capability to form an abstract concept of sameness. The present results indicate that ponies possibly possess higher cognitive abilities than so far known.

Key words: Shetland ponies, Cognitive abilities,
Concept learning, Concept of sameness

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The effect of a novel dynamic feeding system on horse behavior and movement

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Introduction: Horses kept in small enclosures move very little in comparison to horses living in an unconfined environment. There are health consequences of this sedentary lifestyle. The use of GPS allows the accurate quantification of distance travelled by horses. Methods: Ten horses (5 pairs) were alternated between a control paddock and a research paddock, both measuring 20 x 30m. Grass hay was fed from a novel feeding system in the research paddock, while the same hay was fed from a standard hay feeder in the control paddock. In the research paddock access to hay was alternated at 5 min intervals between either side of a fence, forcing horses to walk around a walkway to access feed continuously. The interactive behavior of horses was observed and movement was monitored using GPS. Results: All 10 horses learnt to use the feeding system quickly. Dominance behavior in some horses was modified by competition for feed. On average, horses in the research paddock travelled 5.4 times more distance than in the control paddock. Conclusion: The dynamic feeding system was successful in encouraging horses to exercise in a small paddock. However, due to the exaggeration of dominance behavior in some horses, horses should be well matched if housed in pairs. This system may have application in the management of equine obesity and insulin resistance in horses.

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Distances travelled by feral horses in 'outback' Australia

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Reasons for performing study: The distance travelled by Australian feral horses in an unrestricted environment has not previously been determined. It is important to investigate horse movement in wilderness environments to establish baseline data against which the movement of domestically managed horses and wild equidae can be compared.

Objectives: The aim of this study was to determine the travel dynamics of two groups of feral horses in unrestricted but different wilderness environments.

Methods: Twelve feral horses living in two wilderness environments (2,000 km² vs. 20,000 km²) in outback Australia were tracked for 6.5 consecutive days using custom designed, collar mounted global positioning systems (GPS). Collars were attached after darting and immobilising the horses. The collars were recovered after a minimum of 6.5 days by re-darting the horses. Average daily distance travelled was calculated. Range use and watering patterns of horses were analysed by viewing GPS tracks overlaid on satellite photographs of the study area.

Results: Average distance travelled was 15.9 ± 1.9 km/day (range 8.1-28.3 km/day). Horses were recorded up to 55 km from their watering points and some horses walked for 12 hours to water from feeding grounds. Mean watering frequency was 2.67 days (range 1 - 4 days). Central Australian horses watered less frequently and showed a different range use compared to horses from central Queensland. Central Australian horses walked for long distances in direct lines to patchy food sources whereas central Queensland horses were able to graze close to water sources and moved in a more or less circular pattern around the central water source.

Conclusions: The distances travelled by feral horses were far greater than those previously observed for managed domestic horses and other species of equidae. Feral horses are able to travel long distances and withstand long periods without water allowing them to survive in semi-arid conditions.

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On the significance of puzzling behaviours: what do yawning and adult play tell us about horse (*Equus caballus*) welfare?

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Some behaviours remain a mystery and their determinants are still uncertain. Here we propose a critical interpretation of two puzzling behaviours, *i.e.* yawning and adult play, recorded in large samples of domestic horses kept in sub-optimal conditions (*e.g.* time-restricted feeding practices, social isolation). Yawning is involved in behavioural state changes, especially in quiet contexts of motor relaxation, but seems also to be triggered by stress and emotional contexts. Thus, we investigated specific correlates of yawning and stereotypic behaviours in two large samples of working horses ($n_1 = 87$, $n_2 = 59$). A clear co-occurrences of yawning and stereotypic behaviours appeared: stereotypic horses yawned more than the non-stereotypic horses (Fisher test, $p < 0.02$), yawning increased at the same time periods as stereotypic behaviours did (Wilcoxon tests, $p < 0.05$ to 0.001) and yawning frequency was even sometimes positively correlated with stereotypic behaviour frequencies (Spearman correlations, $p < 0.005$). Play, more typical of young stages in healthy individuals, occurs rarely at adult stages but then more often in captive/domestic animals (which can be challenging to welfare) than in animals living in natural conditions. Thus, we tested the hypothesis that adult play may reflect altered welfare states in horses, where, as in several species, play rarely occurs at adult stages in natural conditions. We observed the behaviour (in particular social play) of 29 adult riding school horses during occasional outings in a paddock and measured several stress indicators (health-related, behavioural and physiological) when these horses were in their home individual boxes. Results revealed that the number of horses and rates of adult play appeared very high compared to field report data and that most stress indicators measured differed between “players” and “non-players”, revealing that most “playful” animals were more prone to suffer from chronic stress contrarily to “non-playful” horses (Fisher, Chi-square, Mann-Whitney and Spearman

correlation tests, $p < 0.05$ to 0.001). Altogether, these results show that yawning and adult play can both reflect altered welfare states in horses, highlighting that these puzzling behaviours should not be considered, as currently thought, as reliable indicators of good welfare states and / or expression of positive emotions.

Key words: welfare indicators, yawning, adult play, altered welfare, horse

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Humans and Horses 300.000 years ago - An approach to public presentation in the research and experience center Schöningen spears

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We are introducing a new research and experience center located near the stripmine of Schöningen in western Germany, one of the most important archaeological sites in the world, which is scheduled to open its doors in 2013. The 1995 discovery of wooden hunting spears (Thieme 1997) in conjunction with the remains of hunted and butchered horses (*Equus mosbachensis*) contributed significantly to change the scientific view of early European Hominids being “marginal scavengers” (Binford 1981, Gamble 1987) to skilled hunters. The remains of at least 19 horses were unearthed along a former lakeshore. Initial publications demonstrate early hominid butchery systematics designed to achieve a thorough acquisition of horse products (Voormolen 2008). In order to get a better understanding of the possible hunting scenario (Thieme 2007) knowledge of wild horse behaviour is of primary interest. The exhibit section of the new center is developed to present an experience oriented concept. Access to artefacts, such as the over 300.000 year old spears, is correlated with exhibits concerning Pleistocene horse morphology, group structure and behaviour of modern day wild horses in order to draw a vivid image of the past.

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Group management in active stabling

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In active stabling the horses live in a group and are in constant social contact with their equine companions. Separate, dedicated areas define the concept. The key element of active stabling is the automatic feeding of hard feed, minerals and forage. This ensures the correct level of feeding and encourages the horses to increase their level of activity. The organisation of the dedicated areas in active stabling is dependent on a number of factors, such as the given facilities, the planned group sizes and the commercial and working aspects.

The ongoing acquisition of knowledge from science and research, practical experience from the horse industry, and the relevant national guidelines and conditions for keeping horses, form the basis for the planning of active stabling.

For example, in Germany, an important contribution to the further development of the active stabling concept is coming from the current research by Dr Zeitler-Feicht and her team into automatic feeding systems and the arrangement of areas to lie down in the quiet space. Together they run around 500 active stabling facilities, and they made a significant contribution to the 2009 guidelines for horse husbandry in the animal protection regulations.

At the ISEM 2012, practical examples of group management in active stabling will be presented. The aim of the participants is to achieve a continuing improvement in horse husbandry, combining the requirements of animal protection with the uses of the horses.

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Influence of psychological and physiological arousal in humans on horse heart rate and behaviour

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The interaction of horses with humans is a dynamic state, but it is not clearly understood how horses perceive humans. Nervousness is transmissible from humans to horses indicated by increased horse heart rate (HR), however no studies have investigated whether horses can differentiate between humans who are physiologically-stressed (eg. after exercising) as opposed to psychologically-stressed (eg. feeling nervous/afraid). Horses (N=10) were randomly subjected to each of four treatments: 1) no human [control], 2) a calm human comfortable around horses [CALM; N=2 humans], 3) a physically-stressed human [PHYS; human exercised to reach 70% of maximum HR; N=2 humans], and 4) a psychologically-stressed human [PSYCH; human who was nervous around horses; N=14 humans]. Humans ranked themselves on a scale of 1-10 for their nervousness around horses. Both humans and horses were equipped with a HR monitor. Behavioural observations of the horses [gait, head position relative to the human, distance from human, orientation toward human] were recorded live. Horses were allowed to wander loose in a round pen for 5 minutes of baseline recordings, at which time the human subject entered the round pen, stood in the centre and placed a blindfold over his/her eyes. The human remained in the centre of the round pen for an additional 5 minutes. Horse HR during control did not differ from when the human was present in the CALM and PSYCH treatment, and was lower during the PHYS treatment (51^a vs 54^a vs 55^a vs 45^b bpm for control, CALM, PSYCH and PHYS respectively; a,b differ p<0.0001). Over the 5 minute test period, horse HR decreased in PHYS and PSYCH (p<0.01) whereas it increased in CALM (p<0.0001). Horse HR decreased with increasing human rank of nervousness around horses (p=0.0156), and horses stood nearer to the human when they faced the human (p<0.0001) regardless of treatment. Horses moved at a faster gait in the control treatment, and their gait was slowest in the PSYCH treatment (p<0.0001), and the horse's head

position was lower in the PHY and PSYCH treatments compared to CALM or baseline (p<0.0001). A lower horse head position was positively correlated to a lower horse HR (p<0.0001) and negatively correlated to horse age (p<0.0001). Human HR was affected by treatment, with PHYS having the highest HR (p<0.0001). Human HR increased when the horse was facing away from the human, even though the human was blindfolded (p=0.0395). Overall, horses appear to be influenced by the physiological and psychological state of a human without any direct contact. Horses' posture does reflect their physiological state. Understanding how horses react to human physiological and psychological states is especially important in equine-assisted activities, where the response of the horse has specific implications for the human participant.

Key words: horse-human interaction, heart rate, behaviour, human nervousness

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Population dynamics of Australian feral horses in a semiarid environment

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Introduction: The feral horse population of Australia is the largest in the world and, in average seasons, increases at a rate of approximately 20% per annum. Recent record rainfall in much of semi-arid Central Australia has led to a population increase in excess of normal rates and this project aimed to document the increase. Uncontrolled feral horse numbers have habitat degradation and horse welfare implications and were the reasons for performing the study.

Materials and Methods: The study area was an unmanaged 4,000km² semi-arid area in Central Australia (Lat 24.50, Long 132.10). The population of feral horses within the study area is estimated to be in excess of 10,000. During an 8 week period at the end of the winter season of 2011, horses were identified by ground searches, movement sensor cameras and from hides positioned at key water holes. The area surveyed represented only a small percentage of the overall habitat. Horses were identified by descriptive features and markings. Where possible, sex and age category were documented. Population growth rate was estimated from the observed sample and was expressed as the number of foals born in the current year, divided by the number of horses older than one year.

Results: A total of 1,486 horses were identified and categorised, of which 335 were foals born within the current foaling season. Only 129 juveniles, presumably born in the preceding year, were identified. Of the adult horses, 54% were male and 46% were female. Seventy-four percent of mares (n=452) had a foal at foot and the population growth rate was 29%.

Conclusion: With a sustained population growth rate of 29%, this population of feral horses will more than double within 3 years. The high rate of increase is concerning because it will negatively impact on the native fauna and flora and fragile semi-arid ecosystems of Central Australia. In addition the feral horses of the study area have experienced an unusual period of high rainfall and plentiful grazing but a return to normal

drought conditions is imminent. Starvation, thirst and death from diminished resources will then be a serious welfare concern for horses.

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Lateralized suckling in domestic horse foals (*Equus caballus*)

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Animals with eyes placed laterally on their head would respond differently to stimuli detected on their different sides. Visual cues from the left eye are processed in the right hemisphere which controls the intensive emotion expression and fast response to the stimuli, while the left hemisphere receiving the information from the contralateral eye is responsible for the routine behaviour and concentration. Different use of left/right eye for exploring environment and evaluation of different stimuli was recently described in domestic horses. They use left eye predominantly for watching novel object or frightening stimulus which indicates specialization of right hemisphere (RH) for appraisal of these types of stimuli. We presumed such lateralisation also in foals during suckling when only monocular vision can be employed for observing surroundings (foals suck mostly in antiparallel body position). Two mutually exclusive hypotheses about the origin of probable foal's preference for particular suckling side were postulated: 1) visual lateralization, then the foals should suck more often from the mother's right side ('from right'), so as potential danger would be detected by the better adapted right hemisphere (i.e. left eye); 2) motor lateralization (the analogous concept as human "handedness"), then a foal should suck predominantly from one side, either left or right, more often. Within two seasons, suckling behaviour of 59 Kladruby mares giving birth to 79 foals was observed from deliveries to abrupt weaning (4-7 months of age). From 10 607 recorded suckling solicitations, 50.2% were performed from right, thus there was no preference of the suckling side on a population level. However, we found large variability in the probability of suckling from right among individual foals ($p < 0.0001$); the probability ranged from 0.22-0.98. One third of the foals (35.4%) showed strong, either right ($N=13$) or left ($N=15$) side preference which further strengthened with age (interaction suckling side preference*foal's age: $p < 0.0001$). Other tested variables, i.e. sex of the foal, age of the

mother and identity of the herd were not significant. The probability that the mother rejected foal's suckling solicitation ($N=108$) did not differ according to the suckling side (right/left) or suckling side preference (right/left/no preference). Suckling bout duration was not significantly influenced neither by the suckling side nor suckling side preference regardless the mother or the foal terminated the suckling bout.

In conclusion, only 16% of the foals revealed significant right side preference for suckling while 19% left side and 65% no preference. Thus, we can reject the visual hypothesis because a general trait to suck with left eye open for better danger detection and recognition is unlikely to occur, at least in up to 7 months old foals. Such a young foal is probably fully focused on suckling and relies on mother's vigilance. Observed individual side preferences indicated more likely a kind of motor lateralization in part of the foals. Further research is needed to clear up the effects of age and individual experience of the foal.

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Key words: laterality, suckling, horse, foal

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Analysis of Human-Horse-Relation

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The relation between humans and animals is one of the most famous factors for animal welfare in modern housekeeping systems.

Words like intuition and empathy in exposure to the horse are difficult to describe, to measure or to teach. In German speaking countries there is the sentence: a good rider knows what the horse will do before it can do it; a bad rider only reacts to what the horse has done.

By using the monitoring system smardwatch® in connection with chronobiological regulation diagnostics it becomes possible to get insight in the interaction between human and horse. The smardwatch® enables measuring of so called psycho-physiological parameters like skin resistance, skin potential, electromyogram and skin temperature, measured 10 times per second; it also registers behavior information as 3D-acceleration and -position and over this environment information like temperature, noise and brightness.

Cutting hooves, cleaning and riding a horse are monitored for example. The data were analyzed under distinct aspects by chronobiological regulation diagnostics developed by Balzer and Hecht (2000). The physical and vegetative activities of the human and the animal were pointed out separately and in their interaction at different levels. Very interesting is the influence of different humans on one horse or the influence of one human on distinct horses. The synchronies or asynchronies in the behavior of different human-horse-pairs could be proved at the level of their vegetative functions. While riding phases of exhaustion of the horse could be shown just as the increasing activity of the rider to compensate this exhaustion.

The method could be a basic approach to develop new training methods which agree with individual rhythms of riders and horses to optimize their achievement. These analyses are not only important for riding, they also give useful directions for daily contact with horses. So it will be possible to detect harmony/disharmony between human and horse for their pairing in order to teach them and to buy or sell a horse, respectively.

Key words: horse, human, chronobiology, synchronization, smardwatch

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The human-given cues and behavioural plasticity of horses during a delayed three choice task

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Recent studies have tested the ability of horses to understand human gestures. But even at the moment results are rather contradictory. This study was aimed at analyzing ability of horses to understand, remember and use human-given cues in a delayed three choice task. After the training period, sixteen horses had to choose between three blue buckets. One of them hid a carrot. Eight horses (A-group) saw the person hiding the carrot and they had to choose the correct bucket only after the person had hidden carrot and gone away. Control group, eight horses (B-group) did not know where the carrot was, and could only choose the bucket through the use of smell or by random choice. Each horse carried out 10 trials in the same test session. A-group chose the correct bucket to a greater extent on the first try (4.37 ± 1.42), compared to the second (3.00 ± 0.53) and the third try (0.75 ± 0.71). With significant differences between the first and the second try ($t_{14} = 2.582$, $p = 0.022$), the first and the third try ($t_{14} = 6.508$, $p = 0.000$), and between the second and the third try ($t_{14} = 7.180$, $p = 0.000$).

Also the B-group chose the correct bucket to a greater extent on the first try (3.87 ± 0.83) compared to the second (3.37 ± 1.51) and the third (1.75 ± 1.49). Anyway, there was no differences between the first and the second try ($t_{14} = 0.821$, $p = 0.425$). As regards the B-group, statistical differences were found between the first and the third try ($t_{14} = 3.523$, $p = 0.003$) and between the second and the third try ($t_{14} = 2.171$, $p = 0.048$).

Moreover, A-group showed a negative correlation ($r = -0.652$, $p = 0.0409$) between the number of correct answers at first trial and the number of test, and seemed that they used human information during the first half of the trials. As the trials proceeded, the average time required to find carrot decreased, with a negative correlation ($r = -0.779$, $p = 0.0079$) over trials while, the number of overturned bucket to find carrot increased over trials ($r = 0.770$, $p = 0.0091$). As the trials proceeded, the horses tended to choose at first the

bucket where the carrot had been found in the previous trial ($r = 0.450$, $p = 0.013$). Any kind of correlation over trials was found in B-group.

In the first trials, the horses we studied seemed to understand human given-cues information, store it and use it appropriately even in absence of a person. As trials proceeded they seemed to change strategy, searching carrots where it had been found in the previous trial. Therefore, horses could use human given-cues or other cognitive strategy depending on the time, energy cost and mental effort required to solve the task.

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Analysis of eventing competition results of Hungarian Sporthorses

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The aim of the study was to evaluate the Hungarian Sporthorse population based on eventing competition performance. The database contained the results of 792 horses and 449 riders between 2000 and 2006. The eventing results were gathered from Hungary and other European countries. Blom transformed ranks were used to measure competition performance. Sporthorses competed in fourteen categories but only the easiest category (category 'A') contained enough result to handle it as a single category (model I.). The other 13 categories were handled together based on professional reasons in a different model (model II.). In model III., all records were analysed together and the results were weighted according to the difficulty of the category. The competition results were classified into five groups, each group had a weight (0-4) and it was multiplied by a constant 3, and the result of this formula was added to the original Blom score. The linear mixed models included fixed effects for age, sex, breeder, owner, location, year and random effects for animal and rider. The model II. contained one more fix effect for difficulty of the competition level.

The distribution of number of horses and number of starts by sex were heterogeneous ($P < 0.05$). For category 'A' mares and geldings appeared in higher proportion, on the contrary ratio of stallions is greater in higher competition levels.

Considering the goodness of fit in each model, model fitting to the weighted Blom scores was the best $R^2 = 0.63$. In model III. all fix effects (age, sex, breeder, owner, location, year) and random effects for animal and rider were significant. The variance components estimated for the weighted Blom scores were the highest also (0.47 rider effect, 0.82 animal effect and 0.18 the animal x rider interaction effect). The other hand the variance proportion of rider effect exceeded the variance proportion of animal effect in model I. and model II.

Breeding values of eventing performance were

predicted using model III. The reliability of the estimated breeding values was acceptable for only a few stallions. To improve the reliability of breeding values, more progenies should be used in eventing competitions (as a kind of progeny test) and more competition records needed (as a kind of own performance test).

Key words: Sport horse, eventing, model comparison

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Agonistic and affiliative interactions in group housed riding horses (*Equus caballus*)

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Group housed horses at a stud farm/riding stable in Belgium were observed on 17 days between 21 February and 25 April 2008, totalling 54hr25min of detailed data. The original group consisted of 8 Irish Cob mares, 1 Warmblood mare, 1 Arabian gelding and 2 Arabian mares. The group had been established in December 2007. During the course of the study 5 horses were removed from the group and 2 foals were born. 3 highly pregnant mares were housed adjacent to the group for part of the period. Horses were regularly used for lessons. Available surface area differed with the group on pasture at the end. Continuous all occurrence sampling of 10 agonistic and 2 affiliative behaviours was carried out for all group members present.

Overall the group showed a frequency of 44.75 agonistic interactions per hour and 11.25 affiliative per hour. Of those agonistic interactions 46.3% were threats while 47% were less active interactions (displacement, being avoided), leaving only 6.7% more aggressive interactions (mainly biting, some kicking and chasing).

The effect on acting agonistically was not significant for age ($p=0.1591$) and borderline significant for density ($p=0.0627$). The analysis of the frequency of affiliative interactions showed there is no significant effect of age ($p=0.1865$) or density ($p=0.7923$). Agonistic and affiliative interactions were not significantly correlated ($p=0.72$). Affiliative behaviour a horse received showed a borderline effect ($p=0.0787$) on agonistic behaviour, as did the interaction between received agonistic and affiliative interactions ($p=0.0725$). Received agonistic interactions had a borderline negative effect ($p=0.0656$) on affiliative behaviour.

A dominance hierarchy was calculated based on agonistic interactions using Empirical Bayes' estimates based on Poisson regression with random effects. Agonistic behaviour expressed to other horses was significantly effected by relative rank ($p=0.0243$). Overall horses tended to be 3.7 times more aggressive towards lower ranking horses compared to higher

ranking horses. Affiliative behaviour shown to other horses was not significantly influenced by the rank of the social partner ($p=0.7915$). Some individuals did show a significant effect whereby they showed more affiliative behaviour towards lower ranking individuals.

This study was a small project to look at a practical situation of riding horses being kept in group housing. The frequent changes in group composition and available surface made it possible to look at agonistic and affiliative interactions in such circumstances. This is useful as instability in group composition is often used as main reason not to keep horses in social groups. The results from this study showed a borderline effect of density on agonistic behaviour. In reality it was also influenced by practical details, like a narrow paddock with only 2 hay crates on the smallest surface. Rank in a dominance hierarchy, based on agonistic behaviour, had a significant effect on the agonistic behaviour expressed towards higher or lower ranking horses. No injuries or escalating fights were observed. This study shows it is possible to keep a group of riding horses in a social context without excessive aggression.

Key words: horse, group housing, social interactions

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Social learning in horses

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Social observational learning is one of learning abilities expected in domestic horses (*Equus caballus*) because of their ecological and evolutionary history. However, a few studies on this type of learning in horses failed to provide clear evidence of observational learning and/or could not distinguish it from other types of learning. We tested interspecific observational learning abilities using the spatial task and a human demonstrator. We hypothesised that 1) horses with possibility of observing a human demonstrator will complete the task in shorter time than control horses without any demonstrator, and 2) horses observing a familiar demonstrator will carry out the task in shorter time than horses with an unfamiliar demonstrator due to established positive human-horse relationship. We randomly allocated 24 riding horses of mixed age and breed to three groups per 8 and started the task either with observing a familiar demonstrator, unfamiliar demonstrator or without demonstrator (control group). Each horse was released individually at the starting point in the experimental paddock and the latency to pass the task was recorded. A horse completed the task once it walked 25 m from the starting point to the squared area (4x4 m) fenced by a tape, went into it through the entrance on the opposite side and touched the bucket with food. Eight people served as demonstrators, each for one familiar and one unfamiliar horse. Horses from groups with a demonstrator, either familiar or unfamiliar, reached the food bucket significantly faster than control horses during the first trial (mean±SE: 29.1±3.13 s with familiar, 28.9±3.13 s unfamiliar and 41.5 ± 3.13 s without demonstrator, $P<0.02$, GLMM, PROC MIXED, SAS). Horses did not differ in time needed to reach the fence of the squared area, but in "solving time", i.e. time from reaching the fence of the squared area and touching the bucket (14.6±2.34, 14.3±2.34 and 27.6±2.34 s in horses with familiar, unfamiliar or without demonstrator, $P<0.001$). Despite our presumption, the horses observing a familiar demonstrator finished the task in compa-

rable time as horses with an unfamiliar demonstrator ($P=0.85$) which indicated little effect of long lasting positive relationship between a horse and a particular human. We found, however, large individual variability in performance of individual demonstrators. Further, horses did not differ in time needed to pass the same task without a demonstrator repeated either shortly or 7 days after the first test which supported that interspecific observational learning rather than social facilitation occurred. In conclusion, horses with a human demonstrator, regardless familiar or unfamiliar, were able to solve the task in shorter time compared to control horses but they did not differ in performing repeated task if they learned it by individual or social learning process. This indicates that interspecific observational learning does occur in horses.

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Key words: horse, human demonstrator, interspecific observational learning

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Genetic evaluation of competition years, as a kind of measurement of durability in Hungarian show-jumping horses

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The aim of the study was to investigate the possibilities to use “number of years in competition” as a measure of durability in the genetic evaluation of Hungarian show-jumping horses. Competition results recorder between 1996 and 2009 in show-jumping competitions were used to estimate genetic parameters for number of years in competition. The results were collected by the Show-jumping Group of the Hungarian Horse Breeder’s Society. For estimation of genetic parameters for number of years in competition different linear mixed models were tested. In the first model, sex and birth year were taken into account as fixed effects. In the second model, an adjustment was made for age at first result in competition. The model fit was compared based on their determination coefficient. Variance components were estimated with VCE-6 software package. The determination coefficients of the models were 0.09 and 0.20, while the estimated heritability for number of years in competition was 0.27 and 0.23, respectively.

Key words: Sport horse, show-jumping, genetic evaluation, durability

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Trainability and reactivity of Mustang Horses (*Equus ferus caballus*) fed Forage-Based Total Mixed (TMR) rations with or without added grain

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The relationship between ration and behavior in horses has not been extensively studied, though it is widely thought that the type of feed fed can influence how a horse behaves. For example, rations high in sugar and starch have been documented to increase young horses' reactivity to novel stimuli. Since the temperament of a horse has been linked to the ease with which it can be trained, documenting if a horse's behavior can be altered by its ration would be of interest to the equine industry. We hypothesized that increasing the starch intake of young mustangs by addition of corn or oats to a forage-based total mixed ration (TMR) would alter their reactivity to stimuli and responsiveness to learned commands. To test this hypothesis 8 recently tamed mustangs (4 geldings and 4 fillies, one and two years of age) were used. The mustangs were divided into two groups based on age, sex and temperament. In a series of three experiments they were fed TMR cubes with or without 10% added corn free choice (Exp. 1, Fall 2010), or a basal ration of TMR cubes free choice with morning meals of 1kg TMR cubes versus an equicaloric amount of corn (Exp. 2, Spring, 2011) or oats (Exp. 3, Spring 2011) in a simple crossover design with 2 to 2.5 week adaptation periods for each trial. The horses' trainability and reactivity to stimuli were evaluated before the treatments were initiated and after each adaptation period 60 to 90 minutes after the morning meals were fed. In the tests the horses were asked to perform a standardized series of commands (ie: walk on, turn, stop and stand still, back up), and were then confronted with a novel stimulus, which varied with each trial. A single handler (SLR) led each horse through the tests, which was then repeated on the next day using a student handler instead. Treatments were then switched and the horses were re-tested, so that each horse was tested on each feed type in all 3 experiments. Each horse's performance was scored by 2 judges, who were both professional trainers who had

been assigned 4 horses to train throughout the study. These judges scored the horses' performances as the tests were done. Each test was videotaped for further evaluation by a third judge (D. Ramnath) who was not familiar with the horses and who was blind to the ration being fed. The performances were scored using a numerical scale of 0-5, with 0=total noncompliance and 5=perfect execution of the tasks asked of the horse. There were no differences ($p>0.1$) in responses to commands or reactivity to stimuli between rations in any of the trials or with respect to which trainer had trained the horse. There were, however, differences ($P<0.05$) among horses, handlers and judges with respect to the scores. It appears that addition of a moderate amount of starchy feed to a horse's ration has less influence on the horse's trainability and reactivity than the animal's natural temperament and handler ability.

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How does group stability and composition affect interactions in horse groups?

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Results from studies on the social behaviour of the Icelandic horse kept in different types of groups will be presented. Most groups were studied for more than 75 hours. The groups vary in composition and in stability. Some groups include stallions (6 groups) while others breeding mares and foals (1), geldings, mares, sub-adults and foals (3), geldings, sub-adults and mares (2), geldings and mares (4), one-sex 1year olds (3) and sub-adults (1). In some of the groups the residency of individual horses was similar (stable groups) while in others the composition changed frequently or unfamiliar horses were all put together at the same time. The results show that both negative and positive interactions are more frequent in unstable groups. Also, interesting differences emerged when different group types were compared. The results are important for management and will be discussed in that context.

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Results of investigations of an island population of the feral horse (Rostov Region, Russia)

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A feral horse population inhabiting the Vodnyi Isl, Manych-Ghudilo Lake, on the territory of Rostov Region, S Russia, has been established in 1950s according to questionnaire data (Paklina, Klimov, 1990). It is a sole permanent grouping of feral horse known to exist in European Russia (Spasskaya, Spasskiy, 2007; Spasskaya, 2008). Range of this group is part of Federal Reserve "Rostovsky" established in 1995, and its monitoring has being been conducted since 2006. The principal aim of monitoring includes gathering data on demographic, spatial, and ethological structure of the island horse population, along with investigation of its phenotypic and ethological patterns.

Analysis of previously published (Paklina, Klimov, 1990) and recently obtained data on the color patterns of the island horse indicate that they have become isolated supposedly about 18–20 years ago. Some trends in variation of several phenotypic traits indicate slight rising of inbreeding level in this population, including decrease in the horse withers height, changes in body proportions, increase of heterogeneity in body color patterns (size and number of head and leg spots), and increase of frequency of dental malformations, especially of false polydonty of P1 (Spasskaya et al., 2010).

Principal demographic parameters of this population are similar in general to those known for other feral horse studied by now. However, several peculiar features of this population were revealed: its age structure appeared to be of steadily fading type judging by high proportion of mature individuals (64–72 %); high mortality rate of individuals of the first year of life (16–25 %); predominance of males among newborns with increase of population size.

Ethological structure of the population included standard harem bands and bachelor groups, with few solitary animals (usually old or sick stallion). The most of individuals (58.2–84.3 %) were the part of harem bands, which appeared to be the most stable

groupings. The harems were small in their numbers with predominatingly 3–8 individuals. The bachelor groups were inconstant in composition, their portion in population being not high (7.7–15.4 % of the total number).

A lot of "mixed" groupings of various composition were recorded in the population during its high number phase: harem bands with several mature stallions; associations consisting of several harem bands; youth groupings consisting of approximately coeval stallions and mares. These "mixed" groupings appeared to be rather stable, with their total number reaching up to 25.8 % of the population. They however used to disappear with population number decrease.

The Rostov population is characterized by absence of conspicuous home range of social groupings (Spasskaya, Shcherbakova, 2007; Spasskaya, 2009), so the latter form a united herd with minimal intergroup distances. This phenomenon is probably not related to population density or to the island size, but is rather caused by some other factors to be revealed.

Key words: feral horse, island population, social population structure, demography

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Mummy's Boys: Sex Differential Maternal Offspring Relationships in Semi-feral Horses

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In polygynous species with high reproductive skew in males, mothers often show differential investment between sons and daughters; however consistent sex differential investment has not been found by previous studies in horses. We investigated sex differences in mother-offspring relationships in nutritionally independent sub-adult semi-feral Carneddau Welsh mountain ponies *Equus ferus caballus*. Mothers and their sub-adult sons had consistently closer relationships than mothers and daughters.

Stronger affiliative bonds between mothers and sons were quantified by their maintenance of closer proximity, higher rates of affiliative interactions and more frequent suckling bouts. These measures of affiliation were temporally associated with higher aggression levels directed towards sub-adults by other band members, particularly stallions.

We suggest that aggression may serve as the proximate mechanism driving male dispersal in feral horses and that the stronger mother-son bond signals an attempt to delay their dispersal, highlighting conflict within the band concerning dispersal timing. Since males become increasingly central within the band over time, with mature stallions requiring excellent social skills in order to both acquire and keep a band of mares, we propose that delaying colts' dispersal allows for further development of these skills in a relatively safe environment. This additional investment is expected to maximise their reproductive success.

This study illustrates how social network theory can be used to quantify individuals' social experiences, contributing to a greater understanding of the evolution of group living. It also gives us further insight into the mechanisms underlying dispersal in wild and semi-wild horse populations and how conflict often arises when individual needs differ.

Key words: dispersal, *Equus ferus caballus*, social, maternal investment

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Temperament of stallions: relation with age, breed and level of riders

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Temperament is an important factor when working with horses. Behavioral tests have been developed to measure certain dimensions in horses. Relations between temperament and ability to riding activity have been highlighted (Lansade 2008a). The aims of this study were 1) to evaluate the effect of age on temper-ament, 2) to verify that temperament are related to breeds 3) to check if the ease to be ridden is in relation with temperament, on a first set of data.

Five dimensions of temperament have been measured in 98 field stallions (Table 1). They were tested as described by Lansade (2008 a,b): fearfulness/curiosity (tests: crossing a novel aera, suddenly opening an umbrella, novel object), gregari-ousness (test: isolation), locomotor activity (during the other tests), reactivity/curiosity to a non familiar human (tests: passive and active human), tactile (Von Frey filament) and auditory sensitivities.

Breeds or groups of breeds	Young (<13 years)	Old (≥13 <20 years)
Merens ¹	15	10
Leisure horse breeds ²	13	10
Jumping pony breeds ³	7	20
Jumping horse breeds ⁴	9	10
Arabians	7	11
Total	37	61

(1) Merens : french mountain horse breed (2) Appaloosa, Barbe, Lusitanian, Polish, Paint (3) French Saddle Pony, Connemara, New Forest, Welsh (4) French Saddle Horse, Anglo-Arab, KWPN, Foreign breeds

Effect of age. Due to imbalanced data, only stallions from 3 breed groups were compared (29 young ones selected at random and 30 old ones). Young stallions presented a higher emotivity (more elevated distance/intensity of the flight after umbrella opening (P=0.001)) and curiosity (more sniffings/nibblings the passive human (P=0.04) and the novel object (P<0.0001)) compared to old ones.

Relation with breed groups. In young stallions, differences were noted: in the number of trots during social isolation (P=0.001) and in the tactile sensitivity

(P=0.005). Merens had smaller values than Jumping horses for these 2 variables.

In older stallions, differences were also noted: in the number of sniffings/nibblings the novel object (P=0.04), in the manner to cross the novel aera (P=0.03), in the distance and intensity of the flight after umbrella opening (P=0.04), in the number of trots during isolation (P=0.02) and in the tactile sensitivity (P=0.03). Merens had lower reactivity compared: 1) to Arabians (for novel aera) and 2) compared to Jumping ponies and Jumping horses (for isolation and tactile sensitivity).

Minimal level of rider. Stallions of all ages and breeds were divided into 3 groups according to the level of riders able to ride them safely, according to a questi-onnaire: low level, intermediate level and pre-national competition level. Stallions adapted to low level riders showed lower values in the number of trots during isolation (P=0.02) and in the tactile sensitivity (P=0.03) than stallions rode by pre-competition level riders.

Conclusion: The intensity of fear reactions to suddenness decreased with age. Differences between breeds and eases of use have been related to tempe-rament measurements.

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Key words: temperament, age, breed, fear, gregarity

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The contribution of horses (*Equus caballus*) to human health - Requirements, stresses and strains, selection, training, compensation and rectification

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Delphine des Nordens

For a longer time, I occupy myself in my profession as a veterinarian, with the requirements and strains of horses (*Equus caballus*) used to contribute human health.

For the first time complex and interdisciplinary scientific investigations are made to draw conclusions from determined requirements and strains of so-called therapy horses in regard to an adequate selection and training as well as compensation of physical and psychic strains and rectification of these horses. Focusing the physical and psychic resources of horses as well, it becomes obvious, that a horse which received conventional training, compensation and rectification is neither adequately prepared for its task as a therapy horse, nor adequately escorted through its employment.

Therefore it is time now for hippologists and veterinarians to promote a justifiable use of horses for therapy purposes by suitable means having in mind not only the efficiency of the intervention, but also the safety of clients, therapists and horses as well as our responsibility towards the horse and animal welfare in general.

For a concept profitable for all participants, different, each other complementing modules are worked out. Based on an interdisciplinary exchange of know-how and interdisciplinary cooperation, the decisive elements of a comprehensive, targeted, requirement-oriented and horse-friendly training, compensation of the horse's strains and rectification are outlined.

Key words: therapy horse, requirements, stresses and strains, training and compensation

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Identification of horses Hot iron branding versus microchip transponders

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Identification of horses with hot iron branding is one of the most controversial issues in German horse breeding and also discussed in other countries. Traditionally horses have been identified by hot iron branding with breed-specific symbols and additional numbers. Since 2009, European Union legislation requires that all horses born after that year must have a microchip implanted for identification, although some exceptions are possible. So far it has not been tested using scientific criteria to what extent branding and microchips reliably allow identification of individual horses. In this study, the readability of branding symbols and numbers was analyzed by 3 independent investigators in 248 horses participating in an equestrian competition. Microchip transponders implanted into the neck were read in another 182 horses on different breeding farms. Microchip readings were made on both sides of the neck and 3 different commercially available ISO 11785/11785 scanners were compared (A: Minimax II, B: I-MaxPlus, C: Isomax V, all by Virbac, Germany).

Correct reading of the branding breed symbol in horses at an equestrian championship by the individual investigators was close to 90% and differed only marginally between the investigators. Correct identification of the breed-specific symbol by all 3 investigators occurred in 84% of cases. The double-digit number branded together with the breed symbol was identified correctly by all 3 investigators in 39% of cases with correct readings by individual investigators ranging from 47 to 54%. Correct identification of the branding signs did not differ significantly between horses of different coat color and age group.

Readability of microchips differed between scanners. Best results were obtained with scanner C which allowed microchip reading on the implantation side in 100% and on the contralateral side of the neck in 95% of 182 horses. Time for location of the microchip on the implanted side ranged from 1 to 4 sec (1.1 ± 0.4). Scanner A identified 92 and 25% of microchips on the

implanted and contralateral side, respectively while corresponding values for scanner B were 86 and 20%. Readability of microchip transponders on the side contralateral to implantation was influenced by size and thus caliber of the horse.

In conclusion, hot iron branding does not allow unique identification of horses and individual branding numbers can be read in less than 40% of the horses. Readability of microchip transponders is more reliable compared to hot iron branding but depends on the type of scanner used. Scanner C allowed identification of all horses tested and gave good results also when used on the contralateral side of the horses' neck.

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Promotion of stud management using equine applied science programs

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The University of Applied Science and Technology (UAST) was founded in 1992, with the objective to promote the technical as well as the scientific knowledge of the job holders, mainly those who are working as low-skilled or semi-skilled laborers in different sectors of the economy. With a growing importance of the equestrian sports and horse husbandry, there is an increasing need for well-trained professionals in the equine sector. The need for specific equine university programs has been questioned occasionally; however, neither university programs in the equine veterinary medicine (focusing on diseased horses) nor animal science (focusing on food-producing farm animals) meet the broad requirements of today's equine industry. So far four programs in the equine sector have been approved in the UAST; an associate diploma program in the horse husbandry, an associate diploma program in the equine coaching, a bachelor program (2 + 2 years course) in the horse husbandry and a post graduate program in the horse physiotherapy and massage at master level (Msc. program). The main specifications of the applied science programs are; the abilities of the applicants and their attainable jobs are pre-planned before starting the program (each applicant will be aware of what abilities he/she would earn and what jobs he/she would attain after graduating from such scientific and applied programs). The first academic program in the equine science and management in Iran was established in 1998 by the UAST. The 2 year associate diploma program (74 credit points) includes sciences, anatomy, physiology, genetics, nutrition, horse behavior, economics, marketing, management, horse disease and disorders, basics of shoeing and basics of riding. In 2004 when more than 200 students were graduated in this program a two years course (a 2 + 2 bachelor program) was established. In this program almost all subject taught at the previous program were taught, but at advance level. Courses are provided by the partner higher education centers affiliated to the UAST and approved by the Iranian Equestrian Federation and by

the lecturers from practice and riding clubs. Lectures and seminars are complemented by a scientific thesis and placements in the equine industry. Out of 400-500 applicants each year, 60 students are selected (to study in two higher education centers) on the basis of their previous activities, a written test and interviews. The majority of the students enter the program with previous experience of working with the horses and about 35% of the students enter the program directly after leaving secondary school. More than 50% of the graduates enter into the subsequent BSc. program in horse husbandry. Other 50% graduates (almost those with previous experience) return to the horse husbandry business and works as stud managers or management assistants in riding clubs. In conclusion, graduates of the University of Applied Science and Technology programs follow a wide-range of professional and academic activities within the equine industry as well as equine medicine (graduates of the UAST's master program in the horse physiotherapy). This spectrum is by far more extensive than the sector covered by merely academic training. With practical experience obtained on the job, adequately qualified graduates will more and more obtain leading positions.

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The prevalence of *parascaris equorum* in Tehran's riding clubs

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Parascaris equorum (ascarid; roundworm) is a common nematode parasite which occurs in the small intestine of immature horses world-wide. Adult female ascarids lay eggs in the small intestine, and these eggs pass into the environment within the feces of the host. *Parascaris equorum* is one of the rare nematodes which induce absolute acquired immunity. Most horses become immune during the first year of life, so patent ascarid infections are rarely diagnosed in horses over two years of age.

The aim of this study was to determine the prevalence of infection with *parascaris equorum* in Tehran's riding clubs. The prevalence and rate of infection was determined based on the coproscopic examination. Fecal samples were tested for the presence of *parascaris* using suspend method. In this investigation, 442 fecal samples of horses from North-East of Tehran's riding clubs examined. From the viewpoint of *parascaris* roundworms, fecal samples were obtained from each box separately and send in containers with plastic lid. The samples were then transferred to the parasitology lab for further examination. The infection was recognized based on the observation of *parascaris* eggs in coproscopic examination. The infection rate in the foal in this study was zero percent. Another interesting result was increasing the infection rate in horses of 10 years or even older and gelding. Out of 442 samples, the infection rate in the samples taken in summer, was 3.16%, and in the fall, winter and spring it was 2.4%, 10% and 3.16% respectively. The infection rates in relation to the age, sex, excursion condition, seasons and deworming programs was studied too. The results showed that the local and the imported horses should be monitored parasitologically, because endoparasites may create a major epizootiocal problem when these animals are kept in an organic raising system. Deworming program is to be continued with proper methodology, dose and throughout the productive age of the horses.

Key words:

Parascaris, coproscopic examination, parasitology, deworming, endoparasites

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Project on paternal effects to the cognitive and social development of the offspring on feral horses (*Equus caballus*)

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Horses provide an interesting animal model to test short- and long-term effects of the paternal influence on the offspring under natural conditions. As a highly social animal, horse naturally is living in long-term harem groups building strong familiar bonds. Arguing that the environment of a juvenile is highly important for the development of cognitive and social functions as well as for the emotional competence, a future study on domestic horses wants to highlight the paternal influence on the offspring as well as special effects of the stallion during the first two years of the foals' life.

Nowadays, in most husbandry systems it is still common to keep the stallions separated, raising the offspring in an intact harem group is very rare. The aim of this study is to describe the role of the stallion in the early development of the foal in an extensive pasture management system living in natural harem groups. Results are going to be compared to findings of studies on groups without the male present in the rearing phase. A precise behavioural analysis is planned; direct behavioural observations are going to be supported by long-term and continuously activity measures by special telemetry collar systems. Additional physiological measures should give evidence of the investment of the stallion. The young horses will be confronted with different tests of cognitive and social abilities (exploration behaviour, fear behaviour, play behaviour).

The results of this study will contribute to fundamental research in the behaviour of the horse and might display an important step to animal welfare in modern horse husbandry. It will be possible to set a time-frame in which the male does have positive influence on the offspring and therefore should be kept with the family. A detailed knowledge of the influence of the male to cognitive and social abilities could as well be applicable in the training of horses and therefore be of great importance in equestrian sports.

Key words: horse, paternal investment, socialization, cognitive behaviour

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How to come together best? - Studies on integration processes of Przewalski horses into new groups (*Equus ferus przewalskii*)

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Conservation of endangered species in zoos and other protected areas has saved several species from extinction. The Przewalski horse (*Equus ferus przewalskii*) is one of that species and, being an attractive large ungulate, it is a "flagship species" for conservation projects. Reintroduction into its former habitat is accompanied by many difficulties and is a great challenge.

Semireserves have been defined as enclosures large enough to maintain groups of Przewalski horses throughout all seasons of the year without any supplemental provisioning. The animals are kept isolated from external human influences as far as possible, except for necessary interventions such as veterinary care. Hence, the purpose is not limited to preparing animals for survival under natural conditions, but is equally related to the need to gain experience in establishment of free-ranging populations.

Naturally, horses live in groups in which all individuals are long-term acquainted with each other and a stable hierarchical system is established. In conservation management an integration of horses into strange groups is often needed but at the same time implies social fights, stress and risks for the animals.

We investigated the integration process of 4 Przewalski horses from Zoo Leipzig into the herd of 5 Przewalski horses in the semireserve Liebenthal (Brandenburg, Germany). Before transportation the social structure was determined in both the herd in Zoo Leipzig and in Liebenthal. After transportation the social hierarchy and the individual dominance indices were determined by daily observation. Continuous records of activity and feeding were taken from several individuals using the ETHOSYS-storage telemetry system. The automatically recorded behaviours were analysed for daily and ultradian rhythms and used for stress detection by calculating a value (DFC) representative for regularity and stability of rhythmic structures.

In zoo conditions, the behaviour was very regular and the daily pattern nearly identical from day to day

as expressed by DFC's near of 100%. After transportation, the behaviour became much less regular, DFC's dropped significantly, recovered slowly and stabilised on values typically for semireserve conditions. Social bindings and dominances of the former two herds were mainly retained.

As an important result, long lasting and stepwise transition from zoo to natural habitats with special training using new observing techniques can be strongly recommended.

Key words: Przewalski horse, zoo, semireserve, transportation, integration process

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A study on inter-observer reliability of castration pain assessment in horses

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Pain evaluation is a key issue for equine welfare and it is often cause of concern because it is difficult to determine its intensity and duration. This is essential when different people are looking after the animals and they need to decide when or not giving analgesics to guarantee the welfare of the subject. The most widely used technique to determine pain in horses is identifying pain related behaviors.

The aim of this study was to determine inter-observer reliability of two different assessors evaluating pain related behaviors in horses undergoing castration.

8 stallions of different breed, aged between 2 and 4 years, were included in the study. All the subjects underwent routine castration (closed technique in general anesthesia). The subjects were placed in an observation box for 5 days and their behavior was recorded for 15 minutes before the surgery and 4, 8, 16, 24 and 40 hours after intervention. Two blind observers, using a given ethogram of horse pain related behaviors modified from literature (for a review Ashley, 2005), analyzed horses behavior at each interval.

Descriptive statistics and K Kendall test were performed.

Observers agreed significantly assessing agitation, reluctance to move, kicking the abdomen, lethargy, rolling, attention and curiosity ($P < 0.05$), however agreement was low for head movements, stretching, flank watching, lowered head carriage, weight shifting, abnormal movement, fixed stare.

Our results show that assessing pain in horses should be a cause of concern, because different pain related behaviors are difficult to identify and to have agreement between two observers. Training of care takers of horses on identification of specific behaviors is needed to standardize pain assessment.

The study was supported by the EU VII Framework programme (FP7-KBBE-2010-4) in financing the Animal Welfare Indicators (AWIN) project and providing funds for Emanuela Dalla Costa and Michela Minero to present this paper.

Key words: Horse, Pain, Behavior, inter-observer reliability

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Dominance hierarchy in feral horses in Rostov Region

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Horses maintain the social structure through the establishment of dominant-subordinate hierarchical relationships, both within and between groups. The object of study was the feral horse population, living on the Vodnyi Isl, Manych-Ghudilo Lake, on the territory of Rostov Region, S Russia the State Nature Biosphere Reserve "Rostov". The social structure of this population is represented by the harem and bachelor groups, and their variety - the "mixed" groups, the presence and composition of which is atypical for the populations of feral horses. The main objectives of this work were to identify the hierarchical structure of different types of social groups and the role of the stallions in them, defining the dominance rank of animals. The method of continuous logging occurred aggressive reaction, ritualized interaction between stallions, take into account the direction of interactions between individuals. We observed 5 harem, 3 bachelor and 3 mixed groups. Each group was studied for a total of 60 h (8 h per group per days). Behavioral observations were carried out in summer 2009-2011. Based on the number and direction of aggressive interactions the hierarchical coefficient was calculated for individual horses (Ivanov et al, 2007).

Harem group consists of an adult stallion (<5 years old) and a few mares with their offspring. Our observations of harem groups confirm the previously known information about this type of social groups (Berger, 1986; Carson, Wood-Gush, 1983, Keiper, 1983). Hierarchical system between mares is close to linear with reversal. The stallion is not included in the hierarchy of the mares; he is the leader and serves to maintain the integrity of the group and inter-group hierarchy, and has reproductive function.

Bachelor groups consist of stallions 2-3 years and older who do not have their own harem. It is known that dominance hierarchy in these groups is linear, young males or males who recently had joined the group have low ranks (Berger, 1977; Houpt, Keiper, 1982; Kirillov Paklina, 1990). In observed bachelor groups dominant

stallion have a significantly higher rank in the hierarchy. However, among other stallions is not always observed strict linear hierarchy - some individuals have very similar ranks. Function of managing the group and maintaining the intergroup hierarchy can be distributed among the all stallions in the group.

Mixed groups are composed of several mature stallions, one or more mares (sometimes with the offspring). In the study population in this type of social groups animals may be mature (age 5 and older) and semi-mature (2-5 years). The hierarchy of these atypical groups has not been studied. In the studied 3 mixed groups stallions have very similar hierarchical rank, dominant and subordinate stallions share a function of managing the group, participation in ritualized interactions.

Our studies have revealed the plasticity of the hierarchical structure of groups of horses and the need to further investigate the distribution of social roles among stallions.

Key words: feral horse, island population, dominance, hierarchy

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Social feeding decisions in horses (*Equus caballus*)

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Like many other herbivores equids feed on rather evenly distributed resources. Especially in ruminants several studies have proved the influence of social organisations, rank, sex and the depletion of feeding sites on the feeding behaviour of individuals. However, it is not yet understood whether social aspects affect horses' feeding decisions. Horses roam on vast habitats with constantly changing vegetation. In non-competitive situations domestic horses tend to return to the same feeding site until it is overgrazed. Whereas, for competition over limited food the social status of the individuals appears to be important. Curiosity about the influence of social rank and different social feeding conditions on the horses' feeding decisions between two buckets, equally filled with high-quality surplus food, led us to create the test situation described here. The observer horses were alternately tested with a dominant and a subordinate demonstrator placed in one of three different positions. We conclude that domestic horses use cognitive strategic decision making in order to decide where to feed in a social feeding situation. When possible they tend to return to the same, continuously supplied feeding site and switch to an "avoidance tendency" when another horse is already feeding from it or in the presence of a dominant horse. Thus the position and the social rank of conspecifics affect the feeding strategy of horses.

Key words: Feeding decision; Horse; Rank; Social behaviour

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Picture recognition of con-specifics and facial expression in the horse (*Equus caballus*)

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The management of the domestic horse often requires them to be kept in isolation from con-specifics. Installing a picture of a horse (generally head and neck view) with a view to providing surrogate companionship has been shown to reduce the negative impact of this isolation. This study aimed firstly to compare the spontaneous response of horses (N=10) to a 2-D image of a horse's face (FP) with their response to a comparable abstract 2-D image (AP). Secondly, the spontaneous response of horses (N=20) to a 2-D image of a horse's face with the ears forward (PFP positive) was compared with the response to a 2-D image of a horse's face with the ears back (NFP negative). The posters were A1 sized and displayed in the horse's own stable. In study 1, one poster was displayed for 5 minutes and the horse's behaviour video-recorded. This was removed and the second poster was displayed for 5 minutes and the behaviour video-recorded. FP was displayed first for 5 of the horses and AP displayed first for the other 5. The video footage was observed and the behaviour of the horses and number of times they touched the poster recorded. For the purpose of identifying the area of the poster that was touched by the horse it was divided into 4 equal quarters (TL, TR, BL, BR). In FP the nose of the horse in the 2-D image was located in BL, eyes and ears in TL, chest and lower neck in BR and upper neck in TR. In AP each area contained similar but unique abstract patterns of comparable colour to FP. Differences in behaviour were found according to which poster was displayed. FP was touched significantly more than AP ($p=0.001$) and was looked at more often ($p=0.008$). With FP the horses spent significantly longer with their ears forward ($p=0.008$) and licking and chewing ($p=0.016$). When the number of touches per poster area was compared (FP and AP) a significant difference was found in the number of times that BL (nose) and BR (chest/lower neck) were touched ($p=0.011$). Both areas were touched more frequently on FP, with BL being touched the most. In study 2 the same experimental protocol was used to compare responses

to positive (PFP) or negative (NFP) 2-D images of a horse's face (same horse in both PFP and NFP). Again, differences in behaviour were found in response to the two posters. PFP was touched significantly more than NFP ($p=0.002$) and on both posters the area BL (nose) was touched more frequently than the other areas (PFP: $p=0.02$, NFP: $p=0.01$). More ears back behaviour ($p<0.001$) and more ear locked on behaviour ($p=0.008$) was shown with NFP. The results of these studies indicate that horses can recognize 2-D images as con-specifics as well as responding to differences in facial expression. There is now the potential for further investigation into the importance of other visual cues in recognition and social interaction as well as the application of findings to enhance equine welfare.

Key words: horse, picture, recognition, communication

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Are there breed difference in referential behavior in horses (*Equus caballus*)?

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Domesticated animals are characterized by variability of breeds. There is a great diversity in body size and/or coat color between different breeds. However, there are few scientific researches about difference in cognition and behavior between breeds. Comparison of behavior between breeds may be useful for the study of genetics behind the diversity of cognition and behavior. In the present study, we investigated behavioral differences between horse breeds. We tested two different breeds which have different histories, thoroughbreds and creoles. Thoroughbreds are racing horses which have been exposed to strict selection toward racing performance for about 300 years. Creoles are descendants of horses which were brought to South America by Spanish people in 15th century and used by native cowboys for riding. We compared the behavior in a difficult situation by using an "unsolvable task". The experimenter put a food reward into a transparent box and closed it firmly so that horses could not take the reward. We compared the referential behavior (gazing behavior toward the experimenter) between thoroughbreds and creoles. We analyzed referential behavior by using generalized linear models (GLM) and model selection by Akaike's information criterion (AIC). There were no effect of breed in the frequency and the duration of the referential behavior. But the latency before looking at the experimenter tended to be shorter in thoroughbreds than in creoles. This result suggests that there may be breed differences in horses' social cognition and behavior. However, the effect of sex was also seen. Furthermore, we could not exclude the environmental effect (e. g. feeding environments, trainings) in this study. So we cannot explain the variation in referential behavior by breed effect only. We need to replicate the result by controlling environmental effects.

Key word: breed difference, social behavior, referential behavior

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Certain factors influencing the condition of free-ranging Konik Polski horses (*Equus caballus*) in the Bierzka National Park

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The objective of the study was to analyze certain factors influencing the condition of free-ranging Konik Polski horses in a fenced area measuring 200 ha located in the Bierzka National Park (Bierzka NP). The Body Condition Scoring system (BCS) was used not only as means of assessment of health and fitness of the horses but also for evaluation of the quality and productivity of the grazing area selected for horses, as well as stocking rate. Body Condition Scoring was determined with a 9-point scale by averaging the scores that were assigned to each of the six body areas that are most responsive to changes of body fat (Hennecke, 1983). The condition of horses was assessed 7 times from February 2009 to December 2011 on a total of 59 horses (3 stallions (n= 12 observations), 21 females 3–8 year olds (n=81) and 35 youngsters (up to 2 year olds) (n=88)). The number (from 1 to 3) and composition of family bands varied throughout the period of investigation. The horse population in the Bierzka NP consist of horses from 3 different breeding centers. The analysis of variance (GLM) was used to investigate the effects of the fixed factors - weather conditions, family band, breeder of the horses, age and sex, on the mean of BCS points of horses (SPSS, version 19.0). The most important factor influencing the condition of free-ranging Konik Polski horses in the Bierzka NP were weather conditions, what is shown by the data concerning temperature from 3-month period preceding condition scoring ($P < 0.01$). This factor influenced not only animals, but also vegetation characteristics. The highest BCS means of horses (5.09) were achieved when average temperature during the 3-month period preceding condition scoring amounted between +1 to +8°C, and was better than obtained when average temperature amounted +18°C (4.80). The last temperature seems too high for horses and can be connected also with other factors, like high incidence of insects which could deteriorate grazing activity of animals. The lowest BCS means (4.56) were obtained when mean temperature was below 0°C. Other factors had no significant effect on the BCS means. As concern to breeder, the highest BCS means achieved mares from Popielno (5.08) – the oldest

Polish free-ranging population of Konik Polski horses, which confirms that horses from this breeding center are justly considered to be the toughest and well adapting to difficult environmental conditions. The horses from the Bierzka NP achieved also high BCS means (4.79) which prove that they were well suited to the specific conditions of this habitat, which is overgrown mostly with forest – 73,7%, and willow and birch shrubs - 13,3% of area. The grazing area measures about 40 hectares and consists of wetlands dominated by sedges (*Carex* sp.). The horses moved from the Seven Island Reservation to Bierzka NP achieved the poorest results as far as adaptation to the conditions of the new habitat, and reached the lowest BCS means (4.57). The youngest horses (up to 2 year olds), 3-5 year olds, and 6-8 year olds had similar BCS means (respectively 4.94, 4.83, 4.68) which indicates good acclimatization of horses from different age categories to the grazing resources in the Bierzka NP. The highest means achieved by youngest horses indicate important trait of Konik Polski horses – mare's careful care of offspring. The BCS means of horses from different family groups show the highest value of horses from family group of the most experienced stallion – Mrok (4.97). In every BCS scoring, stallions achieved the highest means, which was the reason to exclude their results from analysis. The results of this study suggest that the Body Condition Scoring of horses in the Bierzka National Park depends primarily on the acclimatization of horses to harsh environmental conditions and less importantly to belonging to a specific breeder, family band, age or sex. Key words: Body Condition Scoring, free-ranging, Konik Polski horses, Bierzka National Park

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Approaching a horse, approaching a human: Tolerating and seeking human contact in pastured horses

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We tested untrained horses (foals and breeding mares) in 3 different breeding centres. Horses were kept in a pasture during daytime in bigger groups (median 12, min: 6, max 35 / pasture) according to age, gender and breed (hungarian halfbred, hucul, arabian and thoroughbred). To measure their reactions to an unfamiliar person we conducted an active and a passive human test.

In the active human test the test person (TP) approached a focal animal in the group from a predetermined direction: from their front, from their side (left or right) or from the rear. As TP reached the horse (of app. 0.5 m distance), she tried to pet the animal's head. The TP always chose and approached a standing or a grazing horse (ie. those that were not walking, galloping, playing etc.). The horse's reaction to the approaching human was scored 1-5. Score 1: the horse moved away and the TP could not even approach it within 0.5 m; Score 2: the horse made max. 2 steps away, but could be reached and petted; Score 3 and Score 4: the horse stood in its place but showed different signs of discomfort (head turn – Score 3; backing ears, tail slash – Score 4); Score 5: the horse stood and did not show any sign of discomfort or actively approached the TP. There was no significant difference in the horses' reaction between approaching from their left or right side. Approaching from their front or from their side (left or right) did not differ significantly either. However, the odds of walking away from the TP (score 1 or 2) was 2.7 (Fisher-test, $p=0.039$) and 3.3 ($p=0.012$) times higher when TP approached from the rear compared to approaching from their front or from their side (left or right), respectively.

In the passive human test the TP stood immobile for 4 minutes in 5 or 10 m far from the horses during their active (grazing) or inactive (standing idle during noon) period. Horses approached TP significantly sooner (general linear model, $p=0.017$) when she stood 5m distance (38 ± 63 s) compared to 10m (97 ± 52 s).

The arrival of a second horse after the first horse approached the TP showed significant high correlation with the latency of the first horse arrival (Pearson correlation, $r=0.96$, $p<0.001$). The horses were less keen ($p=0.008$) to approach the human when they were tested in an inactive period (177 ± 110 s) compare to active period (38 ± 63 s).

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Husbandry and Management Practices in Domestic horses in Northern Nigeria and their Clinical Implications

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This study was conducted to identify common husbandry and management practices associated with domestic horses in Northern Nigeria. Fifty (50) of the horse was purposely selected as units of analysis. Primary data was generated by means of a pre-tested, semi-structured questionnaire administered to the sampled respondents. A simple inductive statistics was applied to the primary data. The study revealed that the whole facilities studied 50(100%) had a prior experience with horses. A large number of horses, mostly West African Dongola and West African Barb are kept solely for pleasure or ceremonial purposes (60%). While the other breeds of horses like Argentine (6%) and South Africa polo ponies (2%) are kept for polo. Recently, the Sudan country-bred (4%) and Western Sudan pony (6%) have found a place in West African polo. Other breeds found within the facilities studied are Argentine criollo; Nigerian ponies and various crosses. Only 10% of the facilities had breeding stocks with only 2% carrying out artificial insemination while 8% do natural mating. The housing management system includes stables (40%) and open fields (60%) where horses are tethered. Bedding materials includes straws (50%); sand (20%) and wood shavings (30%). Feed grade provided include a combination of rations-bran; cracked grain and hay (40%), Bran; cracked grain and legumes (48%) and Bran and hay (12%), all feed combination administered along with fresh grass. Watering and feeding practices involves provision of feed and water twice daily (50%) and while others provide it adlib (25%). Feeding horses with various additives accounted for 19% of the studied facilities. The health status as shown by the body condition score ranges from II-IV/V (88%) of the population studied. Routine dental care is regular (30%) with all the facilities while others (70%) are not irregular. Grooming is common in all the facilities especially within the performance horse circle. Routine hoof care including trimming and

shoeing is common in 26% of the facilities while hoof trimming without shoeing is a common practice in 74% of the facilities. Orthodox medicine practiced in 80% of the studied area. While ethnoveterinary consist of 10%, while a combination of orthodox and ethnoveterinary medicine was common in 10% of the study area. Vaccination against African horse sickness equine influenza and tetanus is common in the various equine communities. Though 16% of the population do not vaccinate against any known disease. Parasite control program include pasture hygiene (4%); interval dosing (10%); continuous in-feed (4%); selective dosing (40%) and strategic dosing constitute 42%. Exercise is a common practice but intensity and duration is not strictly adhered to especially during tendon injuries. Manure management differs from facility to facility-some dispose manure within the facilities (40%) while others dispose it outside the facilities (60%). A number of clinical signs like limping, coughing, ocular and nasal discharge, swellings on the body, abnormal mucous membrane, fever, ventral oedema and reluctance to move, foul respiratory odour was observed. Clinical cases like laminitis; pigeon fever; bran disease; colic; African horse sickness; exertional rhabdomyolysis; sinusitis; piroplasmosis; dermatomycosis and tumours was observed.

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Differences of biochemical and haematological indices in the aging process in cold-blooded horses Norik Muráň type

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The aim of was to compare of biochemical and haematological parameters in the aging process in a cold-blooded mares breed Norik Muráň type. 27 of breeding mares Norik Muráň type without pathological symptoms in horse breeding farm in Dobšiná (Slovakia) were used in this study. Mares were divided by age into four groups: A (n = 7, 5-8 years), B (n = 6, 9-15), C (n = 7, 16-20) and D (n = 7, 21-23). Blood samples were collected from v. jugularis externa by needles (Vacutainer ® Precision Glide™, BD Diagnostics, USA) in serum tubes (Serum-SST™ II Advance, BD Diagnostics, USA) in the morning hours, kept at 8 to 10 °C and analyzed as soon as possible. Biochemical parameters of blood serum like aspartate aminotransferase (AST), alkaline phosphatase (ALP), creatinine (CREA), urea (Urea), albumin (ALB) and glucose (Glu) were analyzed using biochemical analyzer Cobas c 111 (Roche, Switzerland). Reference values were determined by Laboratory of Clinical Biochemistry and Haematology (UVMF, Košice). Were used a same nutrition for all mares. The results were statistically processed using Student's t-test. The concentrations of AST decreased in mares with aging (A=5.69 ± 1.13 µkat/l; B=5.36 ± 0.9 µkat/l; C=5.13 ± 1.1 µkat/l), but in the oldest mares (D=5.88 ± 1.37 µkat/l). Were higher than the youngest age group A. Were found no significant differences between groups (P> 0.05). The concentrations of ALP increased with age (A=2.47 ± 0.3 µkat/l; C=2.66 ± 0.43 µkat/l; D=2.77 ± 1.17 µkat/l), but in the middle age mares were found (B= 2.44 ± 0.46 µkat/l) (P> 0.05). Crea concentrations had a decreasing trend (A=139.1 ± 37.49 µmol/l; B=118.45 ± 23.18 µmol/l; C=119.31 ± 19.85 µmol/l; D=111.59 ± 21.08 µmol/l) (P> 0.05). Urea increased with age (A=7.88 ± 2.04 mmol/l, B= 7.97 ± 0.8 mmol/l, D= 8.29 ± 1.23 mmol/l) except C (7.76 ± 0.85 mmol/l) (P> 0.05). ALB decreased with age (A=31.34 ± 3.24 g/l; B=30.03 ± 2.41 g/l; C=30±2.77 g/l; D=29.67± 2.85 g/l) (P> 0.05).

Also glucose concentrations were lower in older mares (A=4.51 ± 0.99 mmol/l; B=4.69 ± 1.05 mmol/l; C= 4.69 ± 1.05 mmol/l; D =4.03 ± 0.64 mmol/l) (P> 0.05). Significantly differences were found in leukocytes between group A =2.76±1,82 g/l versus groups B=6.74±0,56 g/l, C =6,46±1,14 g/l and D =6.13±1,61 g/l (P<0.05), also in neutrophiles between A=2.06±1.26 10⁹/l versus B= 3.47±1.17 10⁹/l, C =3.12±0.9 10⁹/l and D =2.88±0.71 10⁹/l (P<0.05). Were found significantly differences in eosinophiles between group A =0.06±0.09 10⁹/l versus groups B=0.21±0.17 10⁹/l, C=0.19±0.1 10⁹/l and D=0.12±0.11 10⁹/l (P<0.05), also in lymphocytes between A=4.59±1.5910⁹/l versus B =2.95±1.0410⁹/l, C=2.99±1.1410⁹/l and D=2.65±1.8710⁹/l (P<0.05). This research evaluated selected biochemical and haematological parameters of breed mares Norik Muráň type of different ages. We found that age affects these indices in mares Norik Muráň type. Data from this study may enhance our understanding of the biochemical parameters in this species, allowing a veterinarian to fix the interpretation of laboratory data and give these animals the appropriate care.

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The use of GPS to measure feeding behaviour and activity patterns in the horse (*Equus caballus*)

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The global positioning system (GPS) has been used to record activity and monitor habitat use in many animal species. In the horse (*Equus caballus*) the monitoring of activity and feeding patterns has been used to assess the impact of environmental factors on behaviour and welfare. In free-ranging animals GPS can provide such information but the accuracy and reliability of these devices has yet to be confirmed. The aim of this study was: 1) to compare the results of visual observation with GPS recordings of the horse's head and neck position (head up (HU) and down (HD)) used to quantify time spent grazing; 2) to test the use of GPS collars to monitor activity patterns where distance, speed and location paths were recorded. In both studies two animals were fitted with Lotek GPS 3300S collars (with integrated GPS data logger and removable battery pack) round the top of the neck. In study 1 two horses were fitted with collars and turned loose into a 20x40m sand arena for 45 minutes. Feed balls and hay were provided (in nets and on the ground) to encourage movement and feeding behaviour for comparison using the two methods (observation from digital video recordings and GPS). HD was recorded by the GPS collars for a significantly longer time (interpreted as feeding/grazing time) than that recorded by observation ($p=0.004$). However when the visual observation was split into HU, HD and also head in mid-way position (HMW), where the nose of the horse was level or just above the chest, then no difference between the collar (HU and HD) and visual observation for (HU and HD+HMW) was found. It is likely that when in HMW the GPS collar may not be sufficiently angled to trigger the sensor to record HU or the collar may move on the neck. Conclusions relating to time spent feeding should be treated with caution. In study 2, the collars were fitted to two ponies with access to 2.02 hectares of lowland grazing. Activity (distance travelled and speed) and location was recorded for 2 days. The total distance travelled by the ponies in 24 hours (2.84km) and their average speed (4.04m/minute) was calcu-

lated and showed no significant difference between day and night. The total area was split into four equal segments and there was no significant difference in the time the ponies spent in each area although they were found to move at slower speeds and stand for longer in some areas. Movement paths could be identified by inputting the GPS collar data into ArcGIS and viewed on Google Maps. There was a high level of comparability observed between the two ponies confirming behavioural synchronicity. As in other species, the use of GPS collars to monitor the movement and location of horses/ponies was found to be effective, but data relating to head position did not provide a reliable means of recording the time spent feeding.

Key words: horse, GPS, activity, feeding behaviour, grazing

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Third-party intervention

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Third-party intervention is the interruption of a dyadic interaction by a third animal. We observed such interventions in affiliative interactions in free-ranging Iberian ponies (*Equus caballus*). It is known that horses intervene in affiliative contexts especially when a preferred partner is involved, probably to protect their social bond to this preferred partner. To prove this hypothesis the present study investigated whether the preferred partner was targeted, i.e. challenged, or supported by the intervener or both randomly. Therefore we examined the social relationship between the intervener and both dyadic interacting individuals. We found that interveners usually supported individuals to which they have stronger social bonds than to other group mates, while they have no particular relationship to the targeted animals. This indicates that interveners in stable horse groups protect their social bonds to the supported animals by challenging their interaction partners. Of all observed horses only some mares showed intervention behaviour. Their social position, reflected by their position in the dominance hierarchy, social networks, and the spatial group structure were investigated. We found that interveners occupy no unique position, but they are involved in a high amount of affiliative interactions, high-ranking, and relatively aggressive.

Key words: third-party intervention, horse, social bond, social network, rank

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Do horses (*Equus caballus*) show a preference for a fair person?

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It is advantageous to identify individuals who are likely to behave fairly and those who are not. This ability to judge others' fairness seems important for social species to interact or cooperate with their partners. Domestic horses (*Equus caballus*) have lived with humans for over five thousand years, hence they might have developed sensitivity to human personality. In the present study, we investigated whether horses would discriminate between a person who behaved fairly and a person who behaved unfairly. Specifically, we asked whether horses show a preference for the former.

We tested 12 horses (11 thoroughbred and 1 Anglo-Arabian horses) at the horseback-riding club of Kyoto University. They were divided into 6 pairs which consisted of a participant and a partner. A participant was picketed between two polls next to a partner at the hoof washing place. Each horse put his/her mouth in an actor's hand when the actor (an unfamiliar person) stood in front of them, and then received food from the actor. A fair actor always behaved fairly and gave a small quantity of hay (low-value food) to both of them in return for the task. An unfair actor always behaved unfairly, giving a small quantity of hay to the participant in return for the task, but always giving a piece of carrot (high-value food) to the partner in return for the task. Both actors always stood in front of the partner first, so the partner always did the task and received food from the actor before the participant. Finally, the participant was offered a piece of carrot by the two actors. The participant indicated which offer was accepted by stretching toward the chosen actor. The latter then moved the hand forward to allow the participant to take the food while the other actor's hand withdrew.

The orders (1st or 2nd) and the positions (left or right) of the two actors varied pseudo-randomly across trials. The color of the clothes of the two actors (white or black) was counterbalanced between sessions. We conducted 8 sessions, consisting of 8 experimental trials, across which the actors maintained their respective roles (fair or unfair) of the fair and unfair

person. Furthermore, the two actors switched roles across sessions so that they played both roles the same number of times. One session was run per day.

If horses can discriminate between fair and unfair people and show a preference for the former, they should choose the former significantly more often than the latter when both actors offered food.

The participants showed no overall preference for accepting food from either actor. However, three of six participants showed a side preference. The result of the present study suggests that horses are insensitive to humans' fairness. Horses may not have expectations about fair treatment.

Key words: horses, fairness, horse-human interaction

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Prevalence of stereotypies amongst Thoroughbred race horses (*Equus caballus*) in Greece

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Thoroughbred horses are keen to develop stereotypies in higher rates compared to other breeds. In Greece, race horses are exclusively thoroughbreds, which are intensively kept under strict environments. Our study, the first of its kind in Greece, explores the prevalence of stereotypic behaviour in these horses and its interrelation to intrinsic and management factors. For these purposes, we recorded intrinsic (age, gender, indoors and outdoors temperament, playfulness, etc.) and management parameters (time spent out, number of horses per groom, etc.) in association with established stereotypic behaviours (box walking, weaving, head nodding, wind sucking, bed eating) in 209 horses in the Markopoulo Race Track, Attica, Greece. Our analysis showed an overall prevalence of 46.6 %, which is way too high compared to those reported for other race horses worldwide. Furthermore, box walking was strongly associated with indoors temperament ($p=0.012$), playfulness ($p=0.03$), and horses per groom ($p<0.001$). Bed eating with gender ($p=0.009$), outdoors temperament ($p=0.018$) and playfulness ($p=0.004$), while head nodding with indoors and outdoors temperament ($p=0.001$ and $p=0.002$, respectively). These results corroborate with previous investigations in other race horses, and indicate the importance of intrinsic factors in developing stereotypies in Thoroughbreds.

Key words: Thoroughbred, race horse, stereotypy, Greece

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Human and horse behaviour during veterinary treatments

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Veterinary treatments are often aversive or painful, resulting in stress, avoidance, or aggressive behaviour. This preliminary study investigated which behaviours horses and humans display during veterinary examinations or treatments and if specific behaviours are shown more often during particular situations. Moreover, possible links between human and equine behaviour were investigated.

Behaviours of horses, veterinarians, and assisting people were recorded at 5 clinics during 49 routine treatments that were divided into 111 situations (assigned to 7 categories: giving injections, waiting, leading horses, inspections with light body contact, invasive inspections, leg inspections, spraying/shaving). Behaviours of humans present during a situation were summarised. Behaviours (frequencies/minute) were analysed by Kruskal-Wallis tests and Spearman rank correlations.

Horses showed insecurity (stopping, baulking, defecation) with different frequencies in the different categories ($\text{Chi}^2=23.38$, $\text{df}=6$, $P=0.001$), e.g., often during leading. In humans, activating behaviour (e.g., arm waving, whistling, tongue clicking) was displayed with different frequencies ($\text{Chi}^2=20.42$, $\text{df}=6$, $P=0.002$), e.g., frequently during leading. Restlessness in horses (e.g., stepping, head movements) tended to occur with different frequencies ($\text{Chi}^2=12.37$, $\text{df}=6$, $P=0.054$), e.g., often during invasive inspections. Humans applied restraining techniques considered to be painful (e.g., ear twisting) with different frequencies ($\text{Chi}^2=26.20$, $\text{df}=6$, $P<0.001$), e.g., mostly during invasive inspections. Restlessness in horses correlated with negative human interactions (e.g., hitting, talking impatiently, shouting: $r_s=0.28$, $P=0.002$, $n=111$) and neutral human interactions (e.g., slight hits, talking dominantly: $r_s=0.45$, $P<0.001$, $n=111$) as well as with the use of painful restraint techniques ($r_s=0.46$, $P<0.001$, $n=111$). Moreover, avoidance behaviour of the horses (turning and stepping away) correlated with negative human interactions ($r_s=0.30$, $P=0.002$, $n=111$).

Thus, humans and horses showed certain

behaviours in different situations with differing frequencies. Moreover, links between human and animal behaviour were found. Future studies should analyse causal connections, i.e., if the observed animal behaviour is the result of/or the reason for human interactions by sequence analysis.

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Soziale Organisation und Sozialverhalten der Equiden

Eröffnungsredner

Tag der Öffentlichkeit

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Verhalten und Ökologie der 6 rezenten Equiden sind in vieler Hinsicht identisch, jedoch in der Sozialen Organisation haben 2 deutliche verschiedene Formen evolviert, die beide an das Leben in den semi-ariden und ariden Lebensräumen angepasst sind, wo sie zu saisonalen oder opportunistischen Wanderungen gezwungen sind.

Die Verbreitungsgebiete der verschiedenen Arten überlappen, in Südafrika und Namibia von Bergzebra *Equus zebra* und Steppenzebra *E. quagga*, in Kenya und Äthiopien von Steppenzebra und Grevy-Zebra *E. grevyi*, in Äthiopien und Somalia von Grevy-Zebra und Afrikanischem Wildesel *E. africanus*, in China und der Mongolei Asiatischer Wildesel *E. hemionus* und Przewalski-Pferd *E. przewalskii*. Obwohl die Vertreter der verschiedenen Arten in den Überschneidungsgebieten die gleichen Ressourcen wie Wasser und Weide nutzen, nehmen sie kaum Kontakt zueinander auf.

Die Vertreter von Typ 1, Steppenzebra *Equus quagga*, Bergzebra *E. zebra*, Pferd *E. przewalskii*, leben in nicht-territorialen, dauerhaften 1-Hengst-Familien, in Hengstgruppen und als Einzelgänger. Die Familienhengste haben die alleinigen Paarungsrechte mit den Stuten in ihrem Harem. Dieser besteht aus bis zu ca. 6 nicht-verwandten Stuten nebst ihren Nachkommen und kann bis 20 Mitglieder haben.

Stuten bleiben bis zu ihrem Tod im Harem. Hengste können mit 5-6 Jahren einen Harem erobern oder gründen, können gleichfalls bis zum Tod die Familie begleiten, werden aber meist vorher von einem anderen Hengst ersetzt. Harems sind auch ohne Hengst stabil, ein Hinweis, dass die Stuten freiwillig im Harem sind und bleiben. Junge Stuten verlassen ihre elterliche Familie und schliessen sich einem anderen Harem an. Beim Steppenzebra werden die Jungstuten während eines Östrus (Rosse) von Bewerbern entführt, gegen den Widerstand des Familienhengstes = Vaters. Bewerber sind Junggesellen, die so eine Familie gründen, und Familienhengste, die so ihren Harem

vergrössern. Junghengste verlassen mit 2-3 Jahren ihre elterliche Familie und schliessen sich Jungesellengruppen an, aus denen sich die Familienhengste rekrutieren.

In der Gruppe besteht eine Rangordnung mit dem Hengst in der alpha-Position. Sie beruht auf individuellem Kennen und Erkennen der Mitglieder.

Bei Typ 2, Grevy-Zebra, Afrikanischer und Asiatischer Wildesel, monopolisieren Hengste über Jahre Territorien von 10 und mehr km², in denen sie die alleinigen Paarungsrechte haben. Territoriale Hengste tolerieren Artgenossen, auch erwachsene Hengste, soweit diese sich unterlegen verhalten. Oder sie stellen sich zum Kampf um den Besitz des Territoriums, eine Vorbedingung für die Fortpflanzung. Stuten im Östrus können von mehreren Hengsten begattet werden, wenn sie sich in deren Territorien aufhalten bzw diese durchwandern.

Stuten und Fohlen und nicht-territoriale Hengste schliessen sich zu anonymen instabilen Gruppen oder Herden zusammen. Feste dauerhafte Bindungen bestehen nur zwischen Stute und Fohlen. Hengste verlassen ihr Territorium für Stunden, Tage, im Extrem auch Monate, um zu Wasserstellen oder Weidegründen zu ziehen, sind aber bei Rückkehr wieder unangefochtene Besitzer.

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Tag der Öffentlichkeit

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Hit Aktivstall,
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In einem Aktivstall leben die Pferde in einer Gruppe und sind im ständigen Sozialkontakt mit ihren Artgenossen. Getrennte Funktionsbereiche kennzeichnen das Konzept. Das Kernstück eines Aktivstalles ist die automatisierte Fütterung für Kraft,- Mineral,- und Raufutter. Sie gewährleistet die bedarfsgerechte Fütterung und regt die Pferde zur vermehrten Bewegungsaktivität an. Die Gestaltung der Funktionsbereiche eines Aktivstalles hängt von mehreren Faktoren wie den örtlichen Gegebenheiten, geplanter Gruppengröße und -zusammensetzung sowie betriebs- und arbeitswirtschaftlichen Aspekten ab.

Die Grundlage für die Planung eines Aktivstall – Konzeptes sind die laufenden Erkenntnisgewinne aus Wissenschaft und Forschung, die praktischen Erfahrungen auf Pferdebetrieben sowie die länderspezifischen, offiziellen Richtlinien und Bestimmungen zur Pferdehaltung.

So sind z. B. in Deutschland die aktuellen Untersuchungen zu den Themen automatisierte Fütterungssysteme und Liegeflächengestaltung im Ruheraum von Frau Dr. Zeitler – Feicht und ihrem Team, den ca. 500 Aktivstallbetrieben und den seit dem Jahr 2009 geltenden Leitlinien zur Pferdehaltung unter Tierschutzgesichtspunkten wesentliche Bestimmungparameter für die Weiterentwicklung des Aktivstall-Konzeptes.

Auf dem IESM 2012 wird den Teilnehmern das Gruppenmanagement in Aktivställen am Beispiel von Praxisbetrieben vorgestellt. Ziel ist es, eine kontinuierliche Verbesserung der Pferdehaltung im Sinne des Tierschutzes in Verbindung mit der Nutzung der Pferde zu erreichen.

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Konfliktlösungsstrategien der Pferde

Tag der Öffentlichkeit

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Charles Dawins Gundsatz geistige Fähigkeiten unterschieden sich zwischen Mensch und Tier mehr in ihrer Ausprägung als in ihrer Existenz scheint auf die vergleichende Evaluierung von Konfliktlösungsstrategien hervorragend anwendbar zu sein. Sowohl beim Mensch als auch beim Pferd werden Konfliktlösungsstrategien innerhalb aber nicht zwischen sozialer Gruppen ausgetragen. In diesem Sinne dienen die soziale Organisation, die sozialen Bindungen, die Individualerkennung und die Erinnerungsleistungen als Grundvoraussetzung für Konfliktlösungen. Oft werden bei Mensch und Pferd schnelle und einfache Konfliktlösungsmechanismen benötigt. Diese sind nur möglich wenn sie auf stabilen sozialen Identitäten und einfachen Heuristiken anstatt komplexer kognitiver Mechanismen begründet sind. Allerdings werden für die Aneignung und langfristige Wahrung von Ressourcen im komplexen sozialen Umfeld sowohl des Menschen als auch des Pferdes gelegentlich geistig anspruchsvolle Konfliktlösungsstrategien benötigt. So zeigen Pferde Bestrafungs-, Schlichter- und Wiedergutmachungsverhalten welche in gleicher Art aber in höherer Komplexität ebenfalls von Menschen verwendet werden

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Untersuchungen zur Mensch-Pferd-Beziehung

Tag der Öffentlichkeit

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Die Mensch-Tier-Beziehung steht in wesentlicher Verantwortung für das Wohlbefinden der Tiere in einer durch den Menschen geprägten Haltungsumwelt.

Begriffe wie Intuition und Einfühlungsvermögen im Umgang mit dem Pferd ließen sich bisher ebenso schwer fassen wie die Aussage, „ein guter Reiter wisse, was das Pferd vor hat, noch bevor es dies tut und kann entsprechend ‚vorbeugend‘ agieren; der schlechte Reiter hingegen steht in der Position des auf das Tun des Pferdes Reagierenden“.

Unter Verwendung des Monitoringsystems smardwatch® in Verbindung mit der Analyse Chronobiologischer Regulationsvorgänge wird es möglich, detaillierte Einblicke in das Zusammenwirken von Mensch und Pferd zu erhalten.

Mit der smardwatch® können so genannte psycho-physiologische Parameter wie Hautwiderstand, Hautpotential, Elektromyogramm und Hauttemperatur im 10tel-Sekunden-Takt gemessen und darüber hinaus die Verhaltensreaktion als 3D-Beschleunigung und Lage im Raum, die Umgebungstemperatur und seit kurzem Lärm und Licht aufgezeichnet werden.

Beispielhaft wurde die Hufbearbeitung bei verschiedenen Pferden sowie das Putzen und Reiten gemessen und analysiert. Die erfassten Datenverläufe wurden mit Hilfe der Chronobiologischen Regulationsdiagnostik nach Balzer und Hecht (2000) unter verschiedenen Gesichtspunkten ausgewertet. Auf unterschiedlichen Ebenen wurden die körperlichen und vegetativen Aktivitäten des Tieres und des Menschen separat und in ihrem Zusammenspiel dargestellt. Interessant ist besonders der Einfluss verschiedener Menschen auf ein und dasselbe Tier bzw. der Einfluss eines Menschen auf verschiedene Pferde. Das synchrone oder asynchrone Verhalten verschiedener Mensch-Pferd-Paare konnte anhand ihrer vegetativen Funktionen nachgewiesen werden. Beim Reiten ließen sich z. B. Phasen von Ermüdung des Pferdes ebenso zeigen wie die entsprechende Steigerung der Aktivität des Reiters, um dem entgegen zu wirken. Hieraus

könnten neue Trainingsmodelle geschaffen und auf die individuellen Rhythmen von Reiter und Pferd zur Leistungsoptimierung abgestimmt werden.

Die Analysen ermöglichen aber nicht nur für das Training von Pferden neue Ansätze sondern geben auch für den täglichen Umgang mit dem Tier wertvolle Hinweise. So könnte man künftig Harmonien/Disharmonien zwischen Mensch und Tier identifizieren und z. B. Reiter-Pferd-Paare entsprechend zusammenstellen, was nicht nur im Training sondern schon vor Beginn einer gemeinsamen Karriere beim Kauf des Pferdes zur Entscheidungsfindung genutzt werden könnte.

Schlüsselwörter: Pferd, Mensch, Chronobiologie, Synchronisation, smardwatch

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Kennen Pferde ihren Namen?

Tag der Öffentlichkeit

Wolfgang Erlend Reuber, Kerstin Reuber
Tierklinik Teisendorf

Wohl die meisten Pferdeleute rufen ihre Pferde beim Namen. Aber: Verstehen die Pferde ihn?

In Annäherung an eine Antwort, ergriffen wir die Gelegenheit, mit zwei von Männern in Freidressur trainierten Lusitanos ein Experiment zu machen: Eine ihrer Lektionen ist, dass ein Pferd auf Anruf seines Namens in die Manegenmitte kommt, während das Partnertier weiter auf dem äußeren Hufschlag kreist (und umgekehrt). Das gab uns Gelegenheit zu prüfen, ob sie das auch auf den Anruf durch eine ihnen fremde Stimme tun würden. In diesem Fall könnte man schließen, dass Pferde nicht nur auf den gewohnten Klang vertrauter Stimmen reagieren, sondern auch auf den Wort-Laut ihres Namens.

Methoden: Wir platzierten eine den Pferden unbekannte weibliche Person dicht hinter dem männlichen Trainer in der Manegenmitte, und gaben beiden ein drahtloses Mikrofon, um über grafisches Stimmrecording den Unterschied des Klangbildes der männlichen und der weiblichen Stimme demonstrieren zu können. Zugleich fertigten wir Serienfotos der Reaktion beider Pferde an.

Würden die Pferde dem Namensruf durch eine fremde Stimme ebenso folgen wie der vertrauten Stimme ihres männlichen Trainers? Streng genommen hatten wir bei jedem Tier nur einen Versuchsdurchgang, um Lerneffekte oder Habituation zu vermeiden.

Resultate: Jedes der Pferde folgte prompt und ohne Zögern dem Namensruf in die Bahnmitte, während das jeweilige Partnertier weiter auf dem Hufschlag kreiste.

(Letzteres schließt einen „kluger-Hans-Effekt“ durch unbemerkte akustische oder visuelle Signale aus, denn beide Pferde hatten die selben äußeren Gegebenheiten; der einzige Unterschied lag im Namensanruf).

Schlussfolgerung: Möglicherweise reagieren Pferde nicht lediglich auf gewohnte Klangmuster, sondern sind in der Lage, auch einen Wort-Laut zu unterscheiden und auf sich zu beziehen.

Die kleine Stichprobe ermutigt nach unserer

Auffassung jedenfalls dazu, dies näher und in größeren Fallzahlen zu untersuchen.

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Animal Welfare Indicators (AWIN) Erforschung von Schmerzindikatoren am Pferd

Tag der Öffentlichkeit

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in Kooperation mit dem Scottish Agricultural College (SAC), Edinburgh, der Università degli Studi di Milano, Dipartimento di Scienze Animali, Mailand und dem Institute of Animal Science, Prag, Tschechische Republik.

Das EU-Projekt AWIN (Animal Welfare Indicators) hat zum Ziel, ein weltweites Netzwerk zum Thema Tierschutz und Wohlbefinden von Tieren zu erstellen, durch welches Forschungsergebnisse und neue Erkenntnisse ausgetauscht werden können. Diese Informationen sollen auch dem Gesetzgeber zur Verfügung gestellt werden, um neue Gesetze auf wissenschaftlichen Grundlagen beschließen zu können. Des Weiteren soll diese Plattform zu Trainingszwecken genutzt werden, damit Personen, die im Bereich Tierschutz arbeiten, sich fortbilden können.

In vier Arbeitsgruppen wird am Tier zum Thema Wohlbefinden und Schmerz geforscht. In der ersten Arbeitsgruppe werden Beurteilungsprotokolle für Ziegen, Schafe, Pferde, Esel und Puten erarbeitet, um Wohlbefinden und Schmerz objektiv bestimmen zu können. Dabei geht es sowohl um die Erfassung individueller Parameter, als auch um haltungsbedingte Parameter wie Tierdichte, Gruppengröße oder Mensch-Tier-Interaktion. Das Ziel dieser Protokolle ist die einfache Anwendbarkeit auf große Tierbestände.

Die zweite Arbeitsgruppe erforscht die Beziehung zwischen Wohlbefinden und Krankheit bzw. Schmerz. Der Einfluss von akuten oder chronischen Schmerzen kann das Wohlbefinden erheblich beeinträchtigen. Anhand des Krankheitsbildes der akuten und chronischen Hufrehe sowie durch den chirurgischen Eingriff einer Kastration an gesunden Pferden sollen Schmerzindikatoren am Pferd erforscht werden. Die akute Hufrehe dient als Modell für sehr starke Schmerzen. Die Schmerz-assoziierten physiologischen Parameter Herzfrequenzvariabilität und Zytokinreaktion im Blut werden bestimmt. Mit einem Schmerzbeurteilungsbogen werden außerdem ethologische Parameter wie z. B. Körperhaltung, Kopfbewegungen, Lahmheitsgrad, abnormale Gewichtsverlagerungen, Mensch-Pferd-Interaktionsverhalten und weitere physiologischen Parameter wie Atemfrequenz, Herzfrequenz, Darmgeräusch und Körpertemperatur erhoben. Durch das Krankheitsbild der chronischen Hufrehe sollen die

ermittelten Schmerz-assoziierten Parameter auf ihre Aussagefähigkeit auch für weniger starke Schmerzen überprüft werden. In der Kastrationsstudie werden Basiswerte ohne Schmerzen vor dem chirurgischen Eingriff erhoben und mit den Werten nach der Kastration verglichen. Neben den oben genannten Parametern werden zusätzlich Cortisolmetaboliten im Kot bestimmt und es werden Videoaufzeichnungen von der Mimik des Pferdes gemacht und ausgewertet. Außerdem soll der Einsatz von Schmerzmitteln vor und nach der Kastration und deren Einfluss auf das Befinden des Pferdes nach der Operation erforscht werden. Das Forschungsziel der zweiten Arbeitsgruppe ist die Bestimmung von geeigneten Messparametern, durch die Schmerz objektiv beurteilt werden kann.

Die dritte Arbeitsgruppe beschäftigt sich mit dem Einfluss von pränatal erlebtem Stress auf die Individualentwicklung des Fohlens. Veränderungen in der Herdenstruktur, soziale Isolation oder abruptes Absetzen des letzten Fohlens während sensibler Trächtigkeitsphasen beeinflussen die tragende Stute und den Foetus. Nach der Geburt wird das Verhalten der Mutterstute und die Entwicklung des neugeborenen Fohlens beobachtet.

In der vierten Arbeitsgruppe schließlich wird das wissenschaftliche Netzwerk zusammengesetzt. Neben wissenschaftlichen Forschungsergebnissen und Publikationen werden auch Lernmaterialien („learning objects“) erarbeitet und zur Verfügung gestellt. „Learning objects“ sind digitale Lernmaterialien, in denen spielerisch Stück für Stück der Lerninhalt interaktiv erarbeitet werden kann.

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Das Therapiepferd Was macht es so besonders und wertvoll?

Tag der Öffentlichkeit

Katharina Westermann

Delphine des Nordens

Als Tierärztin beschäftige ich mich seit geraumer Zeit mit den Anforderungen und Belastungsmomenten von Therapiepferden. Mein Ziel ist es, geeignete Methoden für die Auswahl, Ausbildung, Ausgleichs- und Korrekturarbeit dieser Pferde zu entwickeln.

Umfangreiche Recherchen haben ergeben, dass ein Pferd unter Berücksichtigung seiner physischen und psychischen Fähigkeiten durch die derzeit verbreitete Ausbildung, Ausgleichs- und Korrekturarbeit nur unzureichend auf die Aufgaben eines Therapiepferdes vorbereitet bzw. während seines Einsatzes begleitet wird.

Aber genau hier liegt der Schlüssel für die Sicherheit von Klient, Therapeut und Pferd und den Erfolg der Therapie- und Fördermaßnahme. Darüber hinaus ist es auch im Sinne der Verantwortung für das Pferd und des Tierschutzes an der Zeit, durch geeignete Maßnahmen die verantwortbare Nutzung des Pferdes als Therapiepferd zu unterstützen.

Auf der Basis von interdisziplinärem Wissenstransfer und interinterdisziplinärer Kooperation werden die entscheidenden Elemente einer nachvollziehbaren, zielorientierten, bedarfs- und pferdegerechten Ausbildung, Ausgleichs- und Korrekturarbeit von Therapiepferden kurz skizziert.

Schlüsselwörter: Therapiepferd – Anforderungen – Belastungsmomente – Auswahl – Training

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Checkpunkte für eine tiergerechte Fütterung von Pferden an Abrufautomaten

Tag der Öffentlichkeit

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In der Offenstallhaltung von Pferden wird für die individuelle Fütterung der Fressstand, der eine art-typische synchrone Nahrungsaufnahme erlaubt, empfohlen (BMELV 2009). Seit einigen Jahren kommen jedoch vermehrt Abrufstationen für Kraft- und Raufutter zum Einsatz. Diese ermöglichen nur ein asynchrones Fressen, was das Risiko für Auseinandersetzungen im Fressbereich erhöht.

In einer repräsentativen Studie an insgesamt 567 individuell unterschiedenen Pferden in 32 Offenlaufställen mit Abrufstationen und 10 Betrieben mit Fressständen wurden die Aufenthaltsdauer und Besuchshäufigkeit sowie das Droh- und Meideverhalten der Pferde im Fütterungsbereich und die Häufigkeit von Blockaden erfasst, des Weiteren Herzfrequenz und Integumentverletzungen. Fazit war, dass es an den Abrufstationen doppelt so oft zu Auseinandersetzungen kam als an den Fressständen. Als Ursache hierfür konnte die starke Frequentierung der Automaten eruiert werden. Umso wichtiger ist somit die tiergerechte Ausführung der Abrufautomaten. In der Studie konnte nachgewiesen werden, dass Durchlaufstationen pferdegerechter sind als Rücklaufstationen. Als nicht tiergerecht wurden Stationen mit Strom führender Austreibhilfe eingestuft. Die für das fressende Pferd als verhaltensgerecht empfohlene Variante (Fressstand mit Eingangssperre und ohne Austreibhilfe) führte zu einer Erhöhung der Besuchshäufigkeit und Aufenthaltsdauer und somit auch zu einer erhöhten Anzahl an Drohgesten je Tier und Tag. Die Herzfrequenz lag im Wartebereich bei den meisten Pferden im physiologischen Bereich ($45,1 \pm 12,42$ Schläge/min), erhöhte sich jedoch in der Abrufstation um ca. 20 Schläge/min. Einige Tiere zeigten möglicherweise stressbedingt auffallend hohe Herzfrequenzwerte (≥ 100 Schläge/min). Integumentverletzungen im Zusammenhang mit dem Fütterungssystem traten nicht auf. Das Flächengebot und die Konzeption der Offenstallanlage sowie das Management erwiesen sich als maßgebliche Einflussfaktoren auf alle überprüften Kriterien zur Tiergerechtigkeit.

Um die Anzahl an Auseinandersetzungen im Fütte-

rungsbereich von Abrufstationen zu mindern wird eine Reduzierung der Fütterungshäufigkeit von üblicherweise bis zu 24 Mahlzeiten auf nur 10 Mahlzeiten empfohlen, gemäß dem natürlichen Fressrhythmus von Pferden. Unabhängig vom Fütterungssystem traten die wenigsten Auseinandersetzungen auf, wenn die Pferde täglich etwa 1,5 kg Heu pro 100 kg Körpermasse erhielten bei zusätzlicher ad Libitum Fütterung von Stroh.

Nach bisherigen Erkenntnissen ergeben sich nachfolgende Empfehlungen für Abrufautomaten:

Checkpunkte für Abrufstationen

- Schutz des Pferdes durch Trennwände über die gesamte Körperlänge
- Trennwände mit Sichtkontakt zu den anderen Pferden
- Durchlaufstationen mit separatem Ein- und Ausgang
- Eingangssperre für eine stressfreie Futteraufnahme
- Ausgang mit Pendeltüre und Rücklaufsperre
- Ausgang in einen anderen Funktionsbereich
- Ausreichend Ausweichmöglichkeiten für rangniedere Tiere
- Räumliche Trennung von Kraftfutter- und Heuautomaten
- Maximal je 10 Kraft- und Grobfutterstationen je Tier und Tag
- $\geq 1,5$ kg Heu bzw. Heulage pro 100 kg Körpermasse je Pferd und Tag
- Stroh zur freien Verfügung (Möglichkeit zum synchronen Fressen)
- Individuelles Anlernen der Pferde am Automaten erforderlich

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Operation unterm Kranichhimmel Ein Film von Waltraut und Moritz Zimmermann

Tag der Öffentlichkeit

Waltraut Zimmermann, Moritz Zimmermann

Auf dem herbstlichen Zug in den Süden rasten bis zu 80 000 Kraniche im Hortobágy Nationalpark im Osten Ungarns. Das einst von Wildtieren besiedelte Gebiet ist heute eine Kulturlandschaft aus Feldern und Weiden, wo seltene Haustierrassen wie Zackelschaf, Graurind und Noniuspferde grasen, die von Hirten mit ihren Hunden gehütet werden. Die noch erhaltenen Steppengebiete zeichnen sich durch eine große Vielfalt in Flora und Fauna aus. Sie sollen möglichst wenig betreten werden, damit vor allem die bodenbrütenden Vögel, wie z.B. die seltene Großstrappe nicht gestört werden. Deshalb wurde die Kernzone – das Pentezug-Gebiet (2400 ha) – mit Przewalskipferden und „Auerochsen“ zur natürlichen Beweidung besetzt. Bereits in den ersten Jahren fiel es auf, dass das Rind deutlich schlechter an die kalte Jahreszeit angepasst ist als das Wildpferd. Deshalb wurden beide Arten besondert, um Körpertemperatur und Herzschlagfrequenz zu messen. Außerdem sollten Gras- und Kotanalysen Aufschluss über die Unterschiede in der Futtermittelverwertbarkeit liefern.

Der Film zeigt die chirurgische Arbeit im Feld und vermittelt einen Eindruck über die Funktion der Sender. Außerdem werden die neuen Bemühungen vorgestellt, aus dem Heckrind eine robuste Rinderrasse zu züchten, die dem Auerochsen noch ähnlicher sieht.

Ein Ziel der Untersuchungen war es, die klimatischen Grenzen zu erkennen, in denen die „Auerochsen“ einen Winter ohne Zufütterung überleben können. Diese Rinderrasse wird verstärkt zur Beweidung in Naturschutzgebieten eingesetzt, ihren Bedürfnissen wird aber nicht immer Rechnung getragen.

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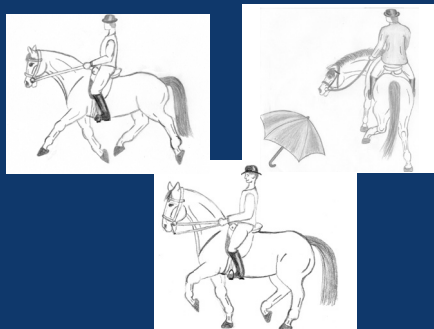
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Trainingslehre für Dressurpferde

Trainingsmethoden
Trainingsmittel
Trainingsplan

Knut Krüger
Konstanze Krüger



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Dressurtraining: Hintergründe und Tipps

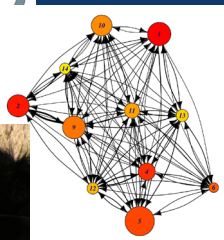
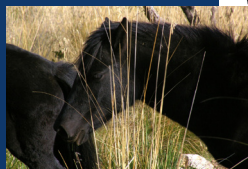
Jeder Reiter, ob Turnierreiter oder Breitensportler möchte ein rittiges, gelöstes und leistungsbereites Pferd, wenn er sich in den Sattel setzt. Dies hängt in erster Linie vom Verständnis des Reiters für Training und Trainingsmethoden ab und kann effektiv durch Kenntnisse von der Physiologie und der Psyche des Pferdes unterstützt werden.

Dieses Buch soll helfen Pferde schonend und ausgeglichen, aber möglichst effizient zum erwünschten Trainingsziel zu begleiten.

Das Pferd im Blickpunkt der Wissenschaft

Sozialsystem
Sehvermögen
Gedächtnis

Konstanze Krüger



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Das Pferd im Blickpunkt der Wissenschaft

bereitet aktuelle Forschungsberichte verständlich und übersichtlich für den interessierten Leser auf. Es erörtert die Relevanz der Forschung für die praktische Anwendung und bietet gezielte, praktische Tipps.

Diese Ausgabe beschäftigt sich mit dem Sozialleben und verschiedenen sensorischen sowie geistigen Fähigkeiten der Pferde. Die Lektüre der Kapitel hilft Ihnen Ihr Pferd besser zu verstehen, seine Reaktionen einzuschätzen und „Problemchen“ im täglichen Miteinander zwischen Mensch und Pferd, sowie in der Haltung Ihres Schützlings zu vermeiden.

Die Autorin dieser Ausgabe, Konstanze Krüger, arbeitet am Lehrstuhl für Zoologie der Universität Regensburg. Sie hat sich auf die Erforschung der geistigen Fähigkeiten und insbesondere auf die Erforschung des sozialen Lernens der Pferde voneinander spezialisiert, und steht im regen Kontakt mit den führenden Forschern des Fachgebietes weltweit.