9A.3

Circadian variations in rectal temperature responses of packed donkeys deprived of feed and water administered with ascorbic acid during the cold-dry (harmattan) season

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The study investigated the influence of cold-dry (harmattan) season and ascorbic acid (AA) administration on daily rhythmicity of rectal temperature (RT) in packed donkeys deprived of feed and water for 24 hours. Six experimental donkeys administered with AA and six control donkeys given distilled water were used for the study. The RT of each donkey and the DBT, RH and THI in the animal pen were recorded bi-hourly for 24 hours. The DBT and RH values fluctuated between 17°C and 33°C, and from 13% to 35%, respectively, predominately outside the thermoneutral zone for the donkey. The application of the periodic model showed a clear daily rhythmicity of RT in the donkeys. Rhythm characteristics of the mesor of RT in the donkeys did not differ between control (36.3 ± 0.3°C) and experimental (36.1 ± 0.3°C) groups. The amplitude of daily rhythm of RT in the experimental donkeys (1.80 ± 0.05°C) was greater ($P < 0.05$) than that of the control donkeys (1.35 ± 0.03°C), which showed that the lower the mesor the greater the amplitude. The acrophases of daily rhythm of RT in both experimental and control donkeys were restricted to the light phase of the light-dark cycle at 18:00 h, but, the RT of the experimental donkeys at this hour of the day was higher than that of the control donkeys by 0.6°C. In general, the RT showed a descent phase during the night and early morning hours, with RT lower than normal values; and an ascent phase during the hot afternoon hours of the day. In conclusion, the result, for the first time, demonstrated the circadian rhythm of RT values in donkeys during the harmattan season, and that AA, by lowering the mesor, modulated the rhythm of RT in donkeys, deprived of feed and water for 24 hours.

9A.4

Impact assessment of climate change on intensive pig and poultry production by the simulation of the indoor climate of livestock buildings

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In the near future, intensive of pig and poultry production may be severely affected in the middle latitudes by heat stress, which will increase due to the expected climate change. In temperate climate regions like Central Europe these animals are predominantly kept in confined housing systems which are characterised by ventilation systems. Therefore, the impact of climate change scenarios on these systems cannot be assessed only by ambient meteorological parameters, as they are modified by the confined livestock building and the livestock itself. This means that the indoor climate, which is the environment relevant for farm animals, has to be considered by simulation models, describing the interaction between animals which release sensible and latent (water vapour) heat, the insulation of the building to capture the sensible heat, and the ventilation system. The ventilation system is the most effective link to the outside, but inevitably differences will occur between climatic conditions outside and inside livestock buildings. The indoor climate will in turn impact on animal health and welfare, productive, reproductive and economic performance. The features as well as the limitations of such simulation models will be presented and discussed. On the basis of such model calculations the husbandry conditions can be simulated to reveal the effectiveness of adaptation measures (i.e. adaptive capacity), which sums up to livestock and farm vulnerability. The thermal environment is a major parameter as it directly impacts animal welfare and health. The productivity of farm animals can be investigated by parameters which are sensible to the thermal environment: For fattening pigs and broilers this can be described by daily weight gain and feed conversion, egg production for laying hens and the reproductive performance of sows (litter size, number and body weight of weaned piglets etc.).

9A.5

Estimating the Climatic Energy Demands (Feed and Water) of Dromedary Camels Fed at the Maintenance Level: A Theoretical and Practical Aspect

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Background: Energetics constitutes a highly important aspect of animal biometeorology. Due to the necessity for dromedary camels to adapt their energy budget to the thermal environment in order to optimize comfort, determining their energetics at every spatio-temporal scale is undoubtedly of vital importance. Nevertheless, data on climatic energy demands (feed and water) for these animals appears to be lacked.

Design: The present experiment was carried out inside a climatic-controlled chamber on 10 dromedary camels individually fed at the maintenance level. Using a two-dimensional steady heat transfer model, the rate of sensible ($q_{sensible}$), latent (q_{latent}), total heat dissipation, and thus total heat production were all estimated and expressed in terms of an effective ambient temperature (T_e). Accordingly, the lower (LCT) and upper (UCT) limits of the thermo-neutral zone were defined. More importantly, the climatic feed demand was estimated from the slope of the increasing rate of $q_{sensible}$ below the LCT, while the climatic water demand was estimated from the slope of the increasing rate of q_{latent} above the UCT.

Results: The obtained findings clearly substantiate that the heat exchange profile has manifested particular differences. The LCT for lies within the T_e range of 17–25°C while their UCT lies in 35–43°C. Moreover, results demonstrated that the extra feed demand under sub-neutral conditions can be met by adding at least 100 g of grass hay (Gross energy estimated as 4.09 Kcal/g) per °C below the LCT, while the extra water demand under supra-neutral conditions can be met by adding at least 500 mL of water per °C above the UCT.

Concluding remarks: Information about the energetic demands estimated herein for dromedary camels exposed to short-term laboratory conditions and fed at the maintenance level can, therefore, be considered as the starting seed for a long-term research program. Such information is crucial to both economical animal production and responsible animal stewardship. Identifying the energetic bottleneck for camels is of further interest.

9A.6

Enteric methane emission of Jersey dairy cows: an investigation on circadian pattern

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