Handling stress in reindeer. Preliminary report.

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Reindeer are regularly forced to run long distances when they are collected for round-ups and subsequently may be immobilized or transportated in lorries. As a result, certain metabolites may accumulate in the blood or in muscles. We investigated stress and recovery from stress in reindeer associated with commercial slaughtering.

Material and methods

We studied 40 free-living animals divided into 5 subgroups with 8 in each. The groups were selected to be as homogenous as possible. All the animals were in good condition. All trials were carried out on December 16 – 17, 1986. Ambient temperature varied from -26° to -28°C; the wind speed was less than 2 $m \cdot s^{-1}$.

The control animals (group I) were slaughtered immediately after capture. The animals in group II were forced to run at 15 $km \cdot h^{-1}$ for 4 h before slaughter. In group III the animals ran for 8 h before slaughter. Group IV ran for 8 h and then were allowed to rest 16 h before slaughter. Animals in group V were immobilized and transported in a lorry for 4 h before being slaughtered.

Blood haemoglobin was determined by spectrophotometry. Red and white cells were counted under microscope. Serum iron was determined by the ferrozine method. Norepinephrine and epinephrine concentratiaons were determined by liquid chromatography. Sodium and potassium concentrations were measured by flame emission photometry. Calcium and magnesium were measured by atomic absorption photometry and inorganic phosphorus by the phosphomolybdate method (UV). Blood glucose was determined by the ortotoluidine method. Blood lactate, serum total lipids, free fatty acids and cholesterol were assayed enzymatically. Serum enzyme activities of ASAT, ALAT, alkaline phosphatase, lactate dehydrogenase, amylase, lipase and creatine phosphokinase were analysed by the methods recommended by The Committee on Enzymes of the Scandinavian Society for Clinical Chemistry. Total serum protein concentrations were determined by the biuret method. Serum urea was measured by nesslerization and creatinine by Jaffe's reaction. Serum ammonia was determined colorimetrically.

Results

The animals appeared to be in relatively good condition after the 4 h exercise. After the 8 h exercise they appeared to be tired and stopped moving if allowed. The body (rectal) temperature increased by 0.5°C in group III. The highest haemoglobin concentration was found in group IV and the lowest in group V (range 171 - 192 g/l). The red cell count did not vary between groups. Serum protein concentration was highest in group IV (66 g/l).

The catecholamines showed relatively minor changes. Norepinephrine was highest in group

II and lowest in group V (range 0.9 to − 2.1 ng/ml). Sodium and magnesium showed slightly higher values in groups IV and V than in the other groups. Potassium was highest in group I. Serum calcium or inorganic phosphorus did not change.

Blood glucose was lower in groups II and III (4.5 mmol/l) than in the control group (5.4) and it was clearly increased in groups IV (8.1) and V (6.5). Free fatty acids were lowest in group V. Triglycerides were highest in group IV.

ASAT and ALAT increased in the exercised groups, showed a tendency to recover in group IV and increased in group V. Alkaline phosphatase increased in all test groups as well as HBD. The increment was greatest in group V. Amylase increased in the excercise groups.

Creatine phosphokinase increased in groups II (1426 IU/l), III (1944) and V (1555). It was lowest in group IV (392). Creatinine increased in all groups. The changes in creatine were small. Urea increased in the test groups. The ammonia concentration was lowest in group V. Lactate was highest in group IV and V.

Discussion

Body temperature only increased after prolonged (8 h) physical exercise because the weather was cold. The small differences between the groups in norepinephrine levels may be explained by low ambient temperature. In other species catecholamines react rapidly when the animals are disturbed.

The blood glucose concentrations were lowest in the exercised groups. Nevertheless, neither exercised group was hypoglycaemic which indicates that the animals' energy stores were not depleted. The high glucose concentration in t he control group may partly result from sympathetic activity during the sampling. This may also have been the case in group V. The high value in group IV (recovery group) requires more investigation.

The liver enzymes increased during exercise. Immobilization also caused an increase of the concentrations of these enzymes. Creatine kinase (CK), creatinine and creatine are indicators for muscle metabolism. The changes in CK were most prominent and returned to normal during the recovery period. The changes in creatinine were smaller and remained elevated after the recovery period. Lactate did not accumulate in the blood. This indicates aerobic metabolism during the running periods.