

PARLODEL LA DECREASES APPETITE, GLUCOSE CLEARANCE AND INSULIN SECRETION FOLLOWING AN IV GLUCOSE CHALLENGE: A ROLE FOR PROLACTIN IN THE SEASONAL GROWTH PATTERN OF RED DEER STAGS.

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Red deer have a seasonal pattern of growth characterised by a faster rate of growth during spring and summer than during autumn and winter. Voluntary food intake has a similar seasonal pattern to that of growth. Glucose clearance and insulin area under the curve (AUC) following an iv glucose challenge are also greater during spring and summer than during autumn and winter. Since plasma prolactin is elevated during summer, compared with winter, we hypothesise that prolactin is permissive to insulin and enhances the insulin response to elevated plasma glucose during summer. Plasma prolactin was reduced using the dopamine agonist parodel LA (Sandoz Pharma Ltd).

Twenty four castrate stags were housed indoors in individual pens, under ambient temperature and photoperiod, and fed a commercial pelleted feed. Food intake and liveweight were recorded weekly. Parodel LA was administered im, once weekly at 1 of 3 doses (control, 0.03 mg/kg, 0.1 mg/kg and 0.3 mg/kg liveweight; n = 6 per group) during two 6 week periods, one in winter, the other in summer. Body composition was determined by the tritiated water dilution method, immediately before and after each 6 week period. At the end of each 6 week period, 3 glucose challenges (a low, 10 mg/kg; medium, 70 mg/kg and a high, 200 mg/kg liveweight) were administered iv, 1 every 3.5 hours, in a latin square design. Two days later, prolactin (oPRL) was administered subcutaneously, then 2 hours later glucose (70 mg/kg liveweight) was administered iv. Frequent blood samples were collected from -30 to 180 minutes after each glucose challenge. Glucose was measured by the glucose oxidase colourimetric method and insulin by RIA (Coat-A-Count), validated for deer plasma. Glucose clearance and the insulin AUC were analysed by ANOVA.

Parodel LA reduced food intake in winter (70.1 in control vs 56.6 ± 4.4 MJME/kg^{0.75} liveweight/d in 0.3 mg/kg parodel LA treated animals, mean ± SED, P < 0.05) and in summer (73 vs 62.8 ± 3.9, P < 0.05). Liveweight gain tended to be lower in parodel LA treated animals in winter and in summer liveweight gain was reduced by up to 80% (302 g/d in control animals vs 60 g/d in 0.3 mg/kg parodel LA treated animals, mean ± SED, P < 0.01). Parodel LA was without effect on body composition and all animals gained fat during the trial (7.7 vs 17.9 ± 2.9 %, mean ± SED, P < 0.01). Insulin AUC increased in a dose dependent manner from the 10 to the 200 mg/kg glucose challenge. This was greater in summer compared with winter at the 200 mg/kg glucose dose (3906 vs 3259 ± 374 pmol/l, mean ± SED, P < 0.05). Glucose clearance rates were unaffected by parodel LA in winter, however in summer glucose clearance in parodel LA treated animals were reduced by up to 63% compared to that of control animals (1.54 vs 0.57 ± 0.46 mmol/l/min, mean ± SED, P < 0.05). Glucose stimulated insulin AUC tended to be lower in parodel LA treated, compared to control animals, in both winter and summer. Acute treatment with oPRL did not increase insulin AUC in either winter or summer and glucose clearance was also unaffected.

These results support the hypothesis that elevated plasma prolactin during summer increases the insulin response to an iv glucose challenge. In addition, since acute treatment with oPRL does not influence insulin AUC or glucose clearance, a longer exposure to prolactin is necessary to augment the insulin response. While parodel LA reduced appetite and liveweight gain it did not affect body composition. This may be partly due to parodel LA not reducing food intake below maintenance energy requirements. We conclude that the increase in plasma prolactin during summer increases appetite in deer and further that prolactin is permissive to the action of insulin on glucose clearance; it thus may play a role in seasonal nutrient partitioning.