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## Organic chromium forms modifies the expression of orexin and its related receptors and glucose transporters in heat stressed hens

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High ambient temperature reduces the metabolic rates and alters post-absorptive metabolism, regardless of the decreased feed intake. Recent studies reported that orexins/hypocretins regulate energy intake and expenditure, glucose and lipid metabolism by modulating hepatic gluconeogenesis, leading to generation of the blood glucose oscillation. We previously found that organic chromium forms reduces environmental stress factors, regulates glucose metabolism in poultry reared under high ambient temperature. However, the regulation of orexin system by heat stress and Cr supplementation itself remains unclear. Here, we investigated the effects of heat stress and organic chromium forms on the hepatic expression of orexin (ORX) and its related receptors (ORXR1/2) and glucose transporters (GLUTs) in laying hens. The expression of ovary GLUTs was also studied. We found that heat stress significantly down-regulated ORX, ORXR1/2 and GLUT-2 in the liver and GLUT-1 and GLUT-4 in the ovary cells of laying hens. However, chromium form (CrPic and CrHis) supplementation increased hepatic ORX, ORXR1/2 and GLUT-2 and ovary GLUT-1 and GLUT-4 in laying hens ( $P < 0.05$ ). In conclusion, the present data indicated that hepatic orexin system and GLUTs could be a molecular signature in the heat stress response, and CrPic and CrHis supplementation may alleviate negative effects of heat stress by regulation of orexin system and glucose transporters.

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