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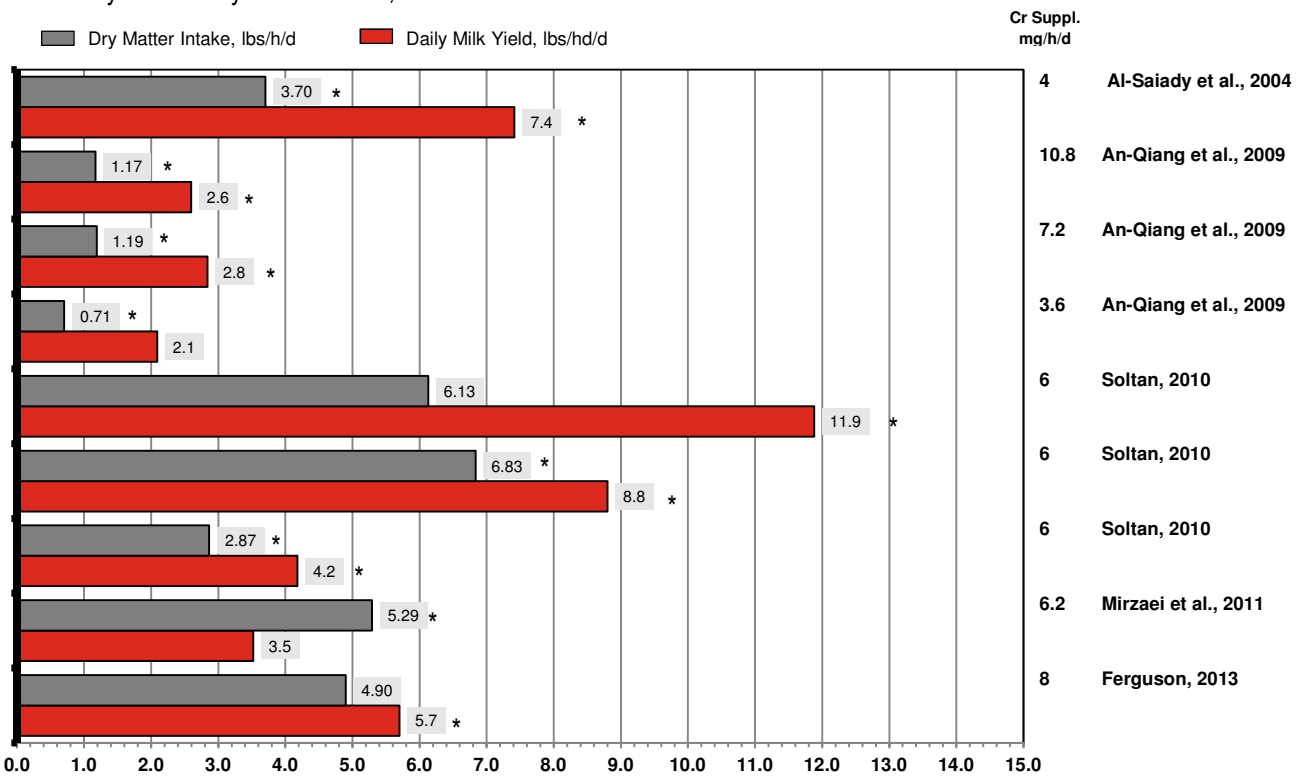
Literature Review: The Potential Benefits of Chromium Supplementation for Dairy Cows during Heat Stress

Cows under heat stress will reduce dry matter intake (DMI) by 20 – 25%[1], but this DMI reduction only accounts for ~40 –50% of the associated milk yield decline[2]. The remaining ~50 – 60% reduction in milk yield is associated with increased maintenance costs (up to 25% increase) and increased insulin effectiveness in peripheral tissues drawing glucose away from the mammary gland[2]. As a result of the decreased DMI, cows under heat stress enter negative energy balance (NEBAL) regardless of their stage of lactation[3], which can lead to losses in body weight (BW) and body condition score (BCS). Therefore, nutritional strategies that improve glucose production and utilization should lessen the NEBAL associated with heat stress and allow cows to more closely maintain milk production.

Feeding supplemental chromium (Cr) to dairy cows in pre-partum and postpartum diets has consistently increased milk yield of cows during early lactation[4,5,6,7]. The influence of Cr on milk production has been attributed to its effects on energy metabolism reflected through decreased mobilization of NEFA from adipose tissue and increased insulin sensitivity[5,8]. Increased glucose availability and utilization may have significant benefits to milk production during extended periods of heat stress at different stages of lactation. Research studies in Iran[9], Saudi Arabia[6,10], China[11], and the United States[12] which were designed to test the effect of Cr on milk yield under heat stress conditions have all shown that cows supplemented with Cr yielded more milk than control cows (Figure 1).

Figure 1: Effect of chromium supplementation in lactating dairy cow diets on response in daily milk yield and dry matter intake, lbs/h/d under heat stress conditions



Response in daily milk yield, lbs/h/d and dry matter intake, lbs/h/d compared to the control within the study
*** Denotes significant difference from control**

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