

8 Iodine and selenium carry over in milk and cheese in dairy cows: effect of diet supplementation and milk yield

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8.1 Abstract

Iodine and selenium are essential trace elements involved in the regulation of thyroid metabolism and anti-oxidant status. Two experiments were undertaken on lactating cows to determine the milk concentrations of iodine and selenium, carry over (CO) in milk, the fraction in curdle fraction and how milk yield affects the milk iodine and selenium concentrations and CO. Sources of elements were potassium iodide and sodium selenite. In Experiment 1, twelve cows were randomly allotted to three diet groups in a completely randomized design: control group (CTR) - total mixed ration (TMR) containing 1.71 and 0.08 mg/kg of DM, group 1 (T1) - TMR plus 23.8 and 2.2 mg, group 2 (T2) - TMR plus 45.5 and 4.3 mg, respectively, for iodine and selenium. In Experiment 2 thirty, multiparous cows were allotted to three groups according to milk yield: high (H), average (A) and low (L). Within each group, cows were randomly assigned two levels of iodine and selenium: level 1 (1): TMR containing 1.55 and 0.15 mg/kg DM; level 2 (2): TMR plus 47.2 mg and 8.0 mg, respectively, iodine and selenium. In both experiments, individual milk samples were collected and analyzed for iodine and selenium contents. In Experiment 1, Grana Padano cheese was obtained at lab scale and the iodine and selenium partition in the curd were measured. In Experiment 1, the iodine intake increased ($P<0.001$, linear) the concentration and excretion in milk. The CO increased ($P<0.05$) from 16 (CTR) to 27 (T1) and 26% (T2); the sampling time was significant ($P<0.05$) with no interaction with treatments. Concentration of selenium in milk was increased ($P<0.05$) by treatment and CO decreased ($P<0.01$) from 26 (CTR) to 12 (T1) and 9% (T2). The iodine showed a mild enrichment factor in the curdle (about 1.7-fold), whereas selenium enriched five to sevenfold. In Experiment 2, the level of iodine supplementation affected ($P<0.05$) the concentration and excretion in milk. No effects on milk iodine concentration were related to milk yield or milk yield x treatment interaction, however, the iodine excretion in milk was major ($P<0.05$) in higher yielding groups. The iodine CO was affected ($P<0.05$) by the milk yield in supplemented groups. The selenium milk concentration and excretion were affected ($P<0.01$) by the milk yield, whereas the CO was affected ($P<0.05$) by the milk yield and selenium supplementation. Results highlight the possibility of fortification with iodine in milk and selenium in cheese through animal feeding.

Keywords: iodine, selenium, milk, carry over, cheese