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## Mineral blood serum status of Holstein cows during the warm and cold seasons.

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Heat stress decreases productive and reproductive performance of dairy cows, and it may be related to mineral status. The aim was to quantify serum concentrations of Cu, Zn, Fe, Ca, Mg and K in Holstein cows during warm (WS, ITH = 72) and cold seasons (CS, ITH = 56).

Cows (n = 240) with 2 to 6 lactations and 30–60 DIM, milked 3 times per day were selected from 3 commercial dairy farms (F1-F3) in an arid zone of México. Cows were fed similar diets during both seasons, within farm, with a total mixed ration (corn silage, flaked corn, soybean meal, wheat bran, concentrated, alfalfa and wheat hay, molasses and minerals, according to NRC (2001) requirements. Blood samples were obtained from coccygeal vein with Vacutainer tubes, serum was separated by centrifugation at 3000 rpm during 15 min, and stored at –20°C until their analysis. Mineral content was quantified using an atomic absorption spectrophotometer.

Data were analyzed using a lineal model with a 2x3 season x farm arrangement. The interaction season x farm effected ( $P < 0.001$ ) all minerals studied. Concentrations of Cu, Zn, K and Mg in blood serum of cows were not dependent on season.

However, Fe was higher ( $P < 0.05$ ) during CS compared with WS in the cows from the 3 farms, while the reverse was true for Ca. Overall, Cu, Zn, Fe, Ca, Mg and K concentrations in blood serum were below the normal range in 65, 35, 26, 0, 35 and 38% of cows during the WS, while corresponding values during the CS were 42, 45, 4, 40, 52 and 38%.

It is concluded that the dairy cows studied have several mineral problems that depend more of the interaction season × farm than season. It is recommended to study water quality.

**Table 1 (Abstr. M403).** Means of minerals (mg/L) in blood serum of Holstein cows in warm and cold seasons

Mineral (mg/L)							
Season	Farm	Cu	Zn	Fe	Ca	Mg	K
Warm	1	0.92 <sup>a</sup>	0.94 <sup>a</sup>	1.60 <sup>c</sup>	105.53 <sup>a</sup>	18.23 <sup>b</sup>	173.58 <sup>c</sup>
Cold	1	0.84 <sup>a</sup>	0.69 <sup>a</sup>	1.97 <sup>b</sup>	94.95 <sup>b</sup>	20.30 <sup>a</sup>	234.81 <sup>a</sup>
Warm	2	0.77 <sup>b</sup>	0.80 <sup>a</sup>	1.68 <sup>c</sup>	108.38 <sup>a</sup>	19.02 <sup>b</sup>	194.11 <sup>b</sup>
Cold	2	0.78 <sup>b</sup>	0.92 <sup>a</sup>	2.01 <sup>b</sup>	60.27 <sup>c</sup>	10.96 <sup>c</sup>	128.62 <sup>d</sup>
Warm	3	0.68 <sup>c</sup>	0.87 <sup>a</sup>	1.55 <sup>c</sup>	112.64 <sup>a</sup>	20.49 <sup>a</sup>	126.81 <sup>d</sup>
Cold	3	0.88 <sup>a</sup>	0.89 <sup>a</sup>	2.64 <sup>a</sup>	89.16 <sup>b</sup>	18.36 <sup>b</sup>	222.67 <sup>a</sup>
<i>P</i> > <i>F</i>		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
SEM1		0.03	0.08	0.08	1.83	0.33	3.88
Normal		0.8–1.5	0.8–1.4	1.3–2.5	80.–110	18.–30	160.–215

a–dMeans without a common letter in the same column are different.

**Key Words:** mineral diagnosis, heat stress, Holstein cows