# Effect Of Various Sulphate Salts On Water Consumption By Beef Cattle

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Water consumption in ruminants is closely linked to dry matter intake; therefore, reduced water intake can result in poor growth rates. In certain situations inadequate water intake can lead to dehydration, illness and death. In the southern interior region of British Columbia, sulphates are present in many of the water sources found on rangeland and negatively affect water intake by cattle. It has been shown that cattle consuming water containing high levels of sulphates may also suffer from associated metabolic disorders such as polioencephalomalacia. The objective of this work was to determine the water consumption by beef cattle when they were given access to water containing a range of concentrations of various sulphate salts.

Three experiments were conducted during June to August 2001 at the Agriculture and Agri-Food Canada Range Research Unit in Kamloops, BC. Yearling Angus heifers (300-400 kg), housed and fed in groups but watered individually, were used in all experiments. Water intake was recorded after each drinking event. In Exp. 1, animals were offered either tapwater (8 ppm $SO_4$) or water containing 3000 ppm sulphate ($SO_4$) as sodium sulphate ($Na_2SO_4$). The water treatments were available *ad libitum* during the first two weeks and restricted to twice daily access during the second two-week period. In Exp. 2, animals were watered twice daily with water containing sulphate salts as $Na_2SO_4$, $MgSO_4$, or $K_2SO_4$ at 3000 ppm $SO_4$, plus a tapwater control (9 ppm $SO_4$). Each treatment period lasted one week, for a total of four periods. Exp. 3 was conducted as a "taste test" in which animals were provided with water twice daily containing tapwater (11 ppm $SO_4$), $Na_2SO_4$ or $MgSO_4$ at 1500, 3200, or 4700 ppm $SO_4$. Each test period lasted two days and was separated by two days of access to tapwater.

During Exp. 1 animals drank less ($P < 0.005$) water (4.37 ± 0.90 kg/drink) when it contained $Na_2SO_4$ compared to tapwater (9.00 ± 0.83 kg/drink) when given *ad libitum* access. When access to water was restricted to twice daily, average drink intake was 21.88 ± 2.15 kg for tapwater and 11.19 ± 2.89 kg for water containing $Na_2SO_4$ ($P < 0.01$). Average daily intake of tapwater was less ($P < 0.05$) when water access was restricted to twice daily (44.26 ± 4.13 kg) compared to *ad libitum* access (55.42 ± 5.62 kg); however, average daily intake of the saline water was the not different ($P > 0.05$) for *ad libitum* (25.52 ± 5.16 kg) and restricted access (21.53 ± 5.74 kg). In Exp. 2, there were no differences ($P > 0.05$) in water consumption, with intakes being 95.6 ($Na_2SO_4$), 93.3 ($MgSO_4$), and 97.0% ($K_2SO_4$) of that for tapwater. In Exp. 3 there was a negative response to increasing $SO_4$ levels with $MgSO_4$ having a greater impact than $Na_2SO_4$, given equal $SO_4$ concentration. This was particularly evident at the highest $SO_4$ concentration (4700 ppm $SO_4$), where the average intake of $MgSO_4$ treated water was 6.70 kg/drink compared to 15.38 kg/drink for $Na_2SO_4$ ($P < 0.05$). There was considerable variation in intake between animals, particularly at higher $SO_4$ concentrations.

Differences in consumption between $Na_2SO_4$ and $MgSO_4$ are of particular interest to cattle producers because magnesium is the predominant cation in many ponds and dugouts. The presence of these different cations may affect water consumption and drinking behaviour of cattle kept on rangeland, impacting beef production. The wide range of tolerances for saline water suggests that some animals are much more sensitive to $SO_4$ contamination of water than others, and guidelines regarding maximum allowable limits of $SO_4$ in drinking water should be on the cautious side to account for these animals.