# Suitability of Selenate Containing Silage Additives for the Supply of Beef Cattle

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**Introduction** Selenium concentrations in herbage are frequently insufficient (< 100 µg Se/kg dry matter (DM)) to meet the requirements of ruminants. Whereas increasing Se supply by feeding mineral mixtures is a reliable method to prevent Se deficiencies for dairy cows, adequate Se supplementation is more difficult to achieve in extensive systems (McDowell, 1996). A suitable measure could be the addition of Se to herbage before ensiling.

**Materials and methods** A laboratory ensiling experiment with four replicates was carried out with the following factors: addition of $Na_2SeO_4$ (= 0, 75, 150, 300, 1200 µg Se/kg DM), pre-wilting (= 30, 40% DM) and source material (= primary growth of *Festuca arundinacea,* secondary growth of *Lolium perenne,* no further additives). The Se concentration in silage after a storage period of 120 d was determined by hydride generation atomic absorption spectroscopy following microwave digestion. Silage quality was assessed by pH (potentiometric determination), lactic acid (colorimetric determination) and volatile fatty acids and ethanol (by gas chromatography). Ammonia-N was measured with an ion sensitive electrode. Aerobic stability was assessed as the time needed to increase temperature by 1 °C above the ambient temperature.

**Results** Measured Se concentrations are in accord with the Se amounts added to fresh herbage plus the initial Se in herbage (Table 1). The addition of 75µg Se/kg DM was sufficient to give total concentrations > 100 µg Se/kg DM, but even a 16-fold higher dosage did not affect silage quality as reflected in values for pH, lactic and acetic acid. Concentrations of other volatile acids, including butyric acid, were negligible and differences between treatments in $NH_3$-N and ethanol were not significant (data not shown). Aerobic stability was not affected.

**Table 1** Effect of the addition of selenate to herbage on silage properties

| Herbage | DM content | Selenate µg Se/kg DM | Se in silage µg/kg DM | pH | Lactic acid g/kg DM | Acetic acid g/kg DM | Aerobic stability days |
|---|---|---|---|---|---|---|---|
| Primary growth of Festuca arundinacea | 30 % | 0 | 25 | 4.7 | 59 | 18 | 4.1 |
| | | 75 | 110 | 4.7 | 61 | 20 | 4.4 |
| | | 150 | 181 | 4.7 | 58 | 19 | 3.9 |
| | | 300 | 356 | 4.6 | 57 | 17 | 4.1 |
| | | 1200 | 1170 | 4.7 | 57 | 18 | 4.1 |
| | 40 % | 0 | 20 | 5.0 | 35 | 13 | 4.6 |
| | | 75 | 109 | 5.0 | 36 | 14 | 4.6 |
| | | 150 | 178 | 5.0 | 36 | 14 | 4.3 |
| | | 300 | 350 | 5.0 | 35 | 14 | 5.1 |
| | | 1200 | 1163 | 5.0 | 37 | 13 | 5.3 |
| Secondary growth of *Lolium perenne* | 30 % | 0 | 44 | 4.4 | 98 | 16 | 4.6 |
| | | 75 | 130 | 4.4 | 95 | 17 | 5.0 |
| | | 150 | 212 | 4.4 | 97 | 18 | 5.4 |
| | | 300 | 368 | 4.4 | 95 | 16 | 6.2 |
| | | 1200 | 1187 | 4.4 | 99 | 17 | 6.3 |
| | 40 % | 0 | 43 | 4.6 | 77 | 14 | 7.3 |
| | | 75 | 136 | 4.7 | 79 | 14 | 6.2 |
| | | 150 | 214 | 4.7 | 77 | 15 | 6.6 |
| | | 300 | 359 | 4.7 | 78 | 14 | 7.4 |
| | | 1200 | 1120 | 4.7 | 81 | 13 | 6.7 |
| | $LSD_{0.05}$ | | 33.4 | 0.1 | 4.9 | 1.9 | 0.58 |

**Conclusions** Because silage additives containing nitrate or nitrite are usually necessary anyway to produce well-fermented silage from herbage of extensively managed grassland, the addition of selenate would be a reliable and cheap method to improve the supply of selenium deficient cattle in low-input systems.

**Reference**

McDowell, L.R. (1996). Feeding minerals to cattle on pasture. *Animal Feed Science Technology*, 60, 247-271.