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### Effect of past manure and fertilizer history on sugar beet production

Manure applications can have both positive and negative effects on crop production and the environment. The effects of past manure applications on sugarbeet production needs to be assessed in the Magic Valley area in southern Idaho where large manure resources are produced and land applied. A study was conducted by USDA-ARS scientists in Kimberly, Idaho in 2014 and 2016 to assess the effects of manure application history and N rates on sugarbeet production. From 2004 to 2009, manure was applied to large field plots either every year (M1), every two years (M2), or no manure (M0). The M0 plots only received commercial fertilizer based on soil tests and published recommendations. Each manure treatment was replicated three times in a randomized block design. The M1 and M2 treatments received 471 Mg/ha and 269 Mg/ha, respectively. From 2010 to 2013 entire study area received the same rate of commercial fertilizer based on soil samples and recommendations from the M0 plots. In 2014 and 2016 commercial fertilizer N rate treatments were superimposed on top of the past manure treatments. In 2014 and 2016, N rates were: 0, 34, 63, 86, 112, 158, 202, and 227 kg N/ha. The study was arranged in a randomized block split-plot design with manure history as the main plot and N rate as the subplot. During both years of the study, N rate did not affect sugarbeet yields, but plots receiving past manure applications had higher sugarbeet root yields compared to plots receiving no manure (commercial fertilizer only). Averaged across all N rates, root yields from both manured treatments were 12% and 36% greater than the non-manured treatment in 2014 and 2016, respectively. The greater root yield difference in 2016 was likely exasperated by a hail storm that occurred in June that reduced the plant leaf area more in the non-manured treatment than in the manured treatments. During both years of the study, the manured plots had greater leaf area early in the season compared to the non-manured plots. Manure applications can potentially increase sugarbeet root yields for an extended period of time after manure applications have ceased.