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# Long-term changes in soil characteristics and ley yields on an organic dairy farm in Norway

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## ABSTRACT

Organic milk production was established at Tingvoll experimental farm in 1989, replacing the previous conventional sheep production. Since then, soil nutrient supply has been manure from its own herd, biological nitrogen fixation and liming. Soil samples for concentrations of nutrients and soil organic matter (SOM) have been taken every 5–7-year intervals since 1990, and grass-clover yields have been annually measured since 1991. Overall, changes in SOM concentration and nutrient content in the topsoil (0-20 cm) were greater than in the subsoil (20-40 cm). In the topsoil, in the cultivated areas, SOM concentration and plant-available phosphorus (P-AL), calcium (Ca-AL) and magnesium (Mg-AL), were lower in 2021 than 1991. Potassium (K-AL) content has increased from 1991 to 2021. In permanent pastures, the SOM concentrations were higher than in cultivated areas. Overall, decrease in SOM and soil fertility may be related to the land use change, high initial contents, soil drainage, and climate change. The average air temperature in the growing season has increased about 0.05° C per year during the 30-year period, and three cuts of the ley instead of two cuts per year became more often. The yield of the first cut of the ley has slightly decreased since 1991, but the quality of the ley and the proportion of grass and clover has been stable until the fifth production year within each crop rotation.