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Measured soil moisture improves grassland yield models

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Cow and calf grazing at the Marena, OK In Situ Sensor Testbed (MOISST), located at the Oklahoma State University Range Research Station near Stillwater, OK. Photo courtesy of Tyson Ochsner.

While soil moisture is a fundamental driver of plant growth, key roadblocks limit the use of measured soil moisture data in grassland yield models. Novel methods of using soil moisture for this purpose have not been developed. Plus, existing mechanistic models that rely on precipitation-based water balance estimates of soil moisture were not designed to assimilate measured soil moisture data.

In *Agronomy Journal*, researchers report quantified statistical relationships between in situ soil moisture data and grassland-biomass yield in Oklahoma. They developed a simple, mechanistic model capable of assimilating in situ soil moisture data. Using a simple regression model, they found that in situ soil moisture measurements explained 60% of the variability in grassland yield, highlighting the link between available soil moisture and plant growth. They also found that incorporating soil moisture data into a mechanistic model reduced the mean absolute error of yield estimates by 32% compared with a similar model that relied on estimated soil moisture values.

Given the continued growth of in situ monitoring networks and publicly available data, these findings lay the groundwork for soil-moisture-based estimates of grassland productivity, both in Oklahoma and elsewhere.

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Krueger, E.S., Ochsner, T.E., Levi, M.R., Basara, J.B., Snitker, G.J., & Wyatt, B. M. (2021). Grassland productivity estimates informed by soil moisture measurements: Statistical and mechanistic approaches. *Agronomy Journal*. **https://doi.org/10.1002/agj2.20709**

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