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**Title:** Network-based Inference on the International Wheat Trade

**Date/Time:** Wednesday, April 1, 2020 12:30–2:00 p.m.

**Speakers:** Vyacheslav Lyubchich, PhD, and Srishti Vishwakarma, University of Maryland

**Chair:** Mike Bellow, USDA/NASS

**Sponsor:** WSS Agriculture and Natural Resources Committee

**Location:** Bureau of Labor Statistics Janet Norwood Conference Center (Please check board for room number once you arrive)

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**Abstract:** International trade plays a crucial role in balancing food resources among nations. In the context of global food systems and food security, it is extremely important to investigate the factors behind establishing the trade connections; however, not many studies have attempted it due to an exceptional complexity of the multi-source data on the international trade. The complexity swells due to nonstationary space-time structure, highly nonlinear relationships between the factors, and introduction of 'shortcut' connections between politically or culturally allied countries. We approach this problem by utilizing a flexible framework of exponential random graph models (ERGMs). To account for predisposition of countries to trade based on asynchrony of their yield volatility, we propose novel predictors based on synchrony of long-term trends in the yields and synchrony of fluctuations around those trends. Moreover, to study the effect of such complex large-scale network-like processes, we introduce the concept of network causality. We demonstrate our approach by quantifying the network effects of extreme weather events and crop production on the international wheat trade network.

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