1128-92-328 **Xin Gao*** (tommy.gao@wsu.edu), Department of Crop and Soil Sciences, 229 Johnson Hall, Washington State University, Pullman, WA 99164-6420, **Hongbo Dong** (hongbo.dong@wsu.edu), Department of Mathematics and Statistics, Neill Hall 409, PO Box 643113, Pullman, WA 99164-3113, **Haiying Tao** (haiying.tao@wsu.edu), Department of Crop and Soil Sciences, 253 Johnson Hall, PO Box 646420, Pullman, WA 99164-6420, **David R Huggins** (dhuggins@wsu.edu), Department of Crop and Soil Sciences, Johnson Hall 247, PO Box 646420, Pullman, WA 99164-6420, and **Tabitha T Brown** (tabitha_brown@wsu.edu), Department of Crop and Soil Sciences, Johnson Hall 253, PO Box 646420, Pullman, WA 99164-6420. *Optimizing nitrogen management for simultaneous control of yield and protein content for wheat.* Preliminary report.

Current nitrogen recommendation for wheat is based on yield goal, adjusted by soil residual nitrogen and organic matter, crop rotation and residue management. It doesn't include grain protein content into consideration, which is the market premium based on. In addition, nitrogen recommendation is based on field average yield goal. The diverse climate and dramatic within/across-field variability in landscapes and soil types result in great variability of yield potential and yield responses to nitrogen rate. Previous models mainly considered nitrogen content, with many other important factors ignored, such as weather, landscapes, plant density and so on, which make these models overly simplistic. In this study, statistical models are established with 3-year data, using grain yield and protein content as output variables simultaneously. Important factors include nitrogen content, soil types and weather conditions. We will demonstrate via simulations that with such statistical models, simultaneous optimal control of crop yield and protein content via nitrogen management is possible. This preliminary study motivates us to extend/apply the framework to larger scale data sets, and develop decision-making tools with a combination of stochastic optimization methods and statistical models. (Received February 28, 2017)