1065-92-139 **James F Selgrade*** (selgrade@math.ncsu.edu), Department of Mathematics, North Carolina State University, Raleigh, NC 27695-8205, and **Alison Margolskee**, Department of Mathematics, North Carolina State University, Raleigh, NC 27695. *Comparing the Effects of Delay and No Delay in a Model for Hormonal Regulation of the Menstrual Cycle.* Preliminary report.

A model is presented for hormonal control of the menstrual cycle, which has 41 parameters and one discrete time delay for the effect of inhibin on the synthesis of follicle stimulating hormone. Although the model with no delay gives an adequate fit to data in the literature, a delay of 1.5 days improves the fit to data and improves model behavior with respect to variations in sensitive parameters. One of the most sensitive parameters represents the level of estradiol sufficient for significant synthesis of luteinizing hormone, which causes ovulation. Bifurcation diagrams with respect to this parameter reveal an interval of parameter values for which a unique stable periodic solution exists and it represent an ovulatory cycle. This interval is referred to as the cycle uniqueness interval and is determined by two saddle-node bifurcations of periodic solutions. As the inhibin delay is increased from zero, degenerate Hopf bifurcations and transcritical bifurcations cause the cycle uniqueness interval to enlarge. These dynamics are illustrated and biological implications are discussed. (Received September 10, 2010)