Reproductive Hormones

EQ: Why is it important to have a negative feedback loop in reproductive hormones?

I. Male Hormones
   a. Testosterone Feedback
      i. The hypothalamus releases gonadotropin-releasing hormone (GnRH)
      ii. GnRH stimulates the anterior pituitary to release gonadotropins (FSH and LH)
      iii. FSH stimulates spermatogenic cells to produce sperm
      iv. LF stimulates the interstitial cells to release testosterone, which serves as the final trigger for spermatogenesis. Testosterone then enhances spermatogenesis.
      v. Rising level of testosterone exerts feedback inhibition on the hypothalamus and pituitary
   b. Actions of Testosterone
      i. In Embryo - Differentiation of male reproductive organ (occurs before 6 weeks)
      ii. In Puberty – Develop male secondary sex characteristics
      iii. Spermatogenesis
      iv. Negative Feedback (GnRH and LH)
      v. Protein Anabolism
      vi. Behavior: sex drive (libido)
      vii. May affect aggressive behavior
      viii. Stimulates red blood cell production by way of kidney hormone production
      ix. Bone growth

II. Female Sex Hormones
   a. GnRH from the hypothalamus stimulates Anterior Pituitary Gland to produce FSH and LH
   b. Female Menstrual Cycle
      i. Early to mid-follicular phase
         1. Low levels of estrogen exert negative feedback on GnRH, FSH, LH.
         2. Estrogen promotes more estrogen secretion by the follicle.
         3. AMH prevents more follicles from developing.
      ii. Lab follicular phase and ovulation
         1. Rising levels of estrogen plus increasing progesterone cause the LH surge.
         2. FSH is suppressed by inhibin.
      iii. Early to mid-luteal phase
         1. Combined estrogen and progesterone shut off FSH and LH
      iv. Late luteal phase
         1. Estrogen and progesterone fall when corpus luteum dies.
         2. Gonadotropins start follicular development for a new cycle
   c. Female Hormone Functions
      i. Estrogen
         1. Growth of ovary/follicles
         2. Primes smooth muscle and epithelium of repo tract
         3. In Puberty – Breast growth
         4. Female fat deposition
         5. Bone growth
         6. Stimulates Prolactin
         7. Protects against Atherosclerosis
      ii. Progesterone
         1. Affects endometrium

2. Induces thick, sticky cervical mucus
3. Decreases smooth muscle contractions of repo tract
4. Stimulates breast growth
5. Inhibits prolactin (in breast tissue)

d. Menopause (~2 year process)