The Reproduction Symposium titled “External Influences on Reproductive Neuroendocrinology” was held at the Joint Annual Meeting of the American Dairy Science Association and American Society of Animal Science (ASAS) in Indianapolis, IN, July 8 to 12, 2013. The purpose of the symposium was to discuss results of recent research focusing on how environmental cues, such as feeding strategies, management practices, or exposure to pollutants, can alter reproductive development of livestock to either enhance or impair reproductive function. The symposium was composed of 3 invited presentations, which are discussed subsequently, and 3 presentations selected from submission of standard abstracts.

The symposium began with an invited presentation by N. P. Evans (University of Glasgow, UK) who discussed the effects of grazing livestock on pastures treated with biosolids (Evans et al., 2014). Application of biosolids to agricultural pastures in the United States and Europe is actively promoted as a means of disposing of processed sewage waste while simultaneously providing “organic” fertilizer to farm lands. Although biosolids are a source of nutrient-rich organic matter, they also contain pollutants arising from intentional or unintentional disposal of a myriad of household and other compounds, including endocrine-disrupting compounds (EDC), into sewage. Whereas application of biosolids to pasture doesn’t significantly increase concentrations of environmental chemicals in soil and adult livestock grazing biosolids-treated pastures, Evans et al. (2014) presented results of studies that demonstrated some alterations in morphology and function of reproductive tissues of fetuses from pregnant ewes grazing biosolids-treated pastures. These results indicate that application of biosolids to pastures could pose a risk to health and reproductive performance of livestock, and especially, their fetuses, subsequently grazing on those pastures. Clearly, more research is needed to assess the risk to human health from consuming meat and milk from livestock grazed on biosolids-treated pastures.

The second invited presentation, by V. Padmanabhan (University of Michigan, Ann Arbor) focused on developmental programming of the reproductive system in fetuses exposed in utero to steroids and steroidal-like compounds (Padmanabhan and Veiga-Lopez, 2014). Prenatal exposure of female fetuses to excess testosterone has long been known to contribute subsequently to an array of reproductive disorders. Deleterious effects are thought to be due primarily to excess estrogenic activity from aromatization of testosterone to estradiol. Results of studies were discussed that showed that exposure of ewes to testosterone during d 30 to 90 of pregnancy increased concentrations of circulating estradiol and impaired subsequent reproductive function of female offspring, effects that were not mimicked by similar exposure to the non-aromatizable androgen, dihydrotestosterone (Padmanabhan and Veiga-Lopez, 2014). Exposure of livestock to increased estrogenic activity could occur through environmental pollutants, such as EDC, or through other environmental insults that alter the dam’s endogenous production of estradiol during pregnancy.

The final invited presentation was made by M. Amstalden (Texas A&M University, College Station) who discussed nutritional programming of puberty in heifers. Onset of puberty in mammals is controlled, in part, by plane of nutrition and especially energy balance. The orexigenic peptide, neuropeptide Y (NPY), and the anorexigenic peptide derived from proopiomelanocortin,
melanocyte-stimulating hormone α (αMSH), are known to mediate much of the effect of feed intake on reproductive cyclicity in livestock. Amstalden et al. (2014) discussed how feeding-induced signaling by NPY and αMSH mediates hypothalamic function through kisspeptin signaling during pubertal development. This information can be used to develop nutritional strategies to control onset of puberty in livestock, thereby improving reproductive management.

The Reproduction Symposium on “External Influences on Reproductive Neuroendocrinology” provided a forum for discussion of environmental influences on developmental programming in livestock. The symposium focused specifically on environmental factors that influence reproductive tract development in livestock. Whereas developmental programming is frequently seen as deleterious effects occurring in conceptuses and offspring of dams exposed to environmental insults during gestation (Evans et al., 2014; Padmanabhan and Veiga-Lopez, 2014), it is clear that developmental programming also continues well into the period of postnatal development (Bartol et al., 2013; Soberon and Van Amburgh, 2013; Amstalden et al., 2014). Moreover, developmental programming can be altered to positively impact development thereby allowing management approaches that can be used to improve livestock production.

**LITERATURE CITED**


