Identification of young sires with advanced sexual development and improved productivity is desirable by the beef industry. However, improved productive performance seems antagonistic to sexual development and associated with reproductive abnormalities. Thus, our objectives were 1) to investigate the relationship between productive performance and sexual development and 2) to understand the relationship between mineralization in the testicular parenchyma with productive performance and fertility-related traits. Yearling crossbred beef bulls (year 1=34; year 2=43) underwent productive performance and reproductive evaluation, which included: scrotal circumference, testes echogenicity, sexual and metabolic hormones, scrotum thermography and semen quality. At slaughter, testes, vesicular glands, pampiniform plexus and epididymis were collected and processed for histomorphometry. Testicular tissue of bulls with hyperechoic regions that were casting shadows on ultrasound were histologically observed to have focal mineralization of seminiferous tubules with or without inflammation. Bulls were classified by the presence (n=14) or absence (n=14; selected at random from the full population) of testicular mineralization. Correlations between productive performance and fertility related traits, least square means comparison between bulls with or without testicular mineralization and the probability of identifying bulls with mineralization, using logistic regression, were determined using SAS software (SAS Institute Inc., Cary, NC). Productive performance was associated with measures of sexual development; lean tissue was correlated with thyroxine (r=-0.41) and epithelial height of epididymal corpus ducts (r=0.58). Carcass fat was correlated with scrotal circumference (r=0.47), percent of sperm tail defects (r=-0.34) and vesicular gland cell area (r=-0.34). Bulls with testicular mineralization had greater ribeye area (mean ± SEM; 88.6 ± 1.8 vs. 84.6 ± 1.8 cm²; p=0.03) and tended to have greater initial body weight (308 ± 7.6 vs. 288 ± 7.6 kg; p=0.06), and lower testicular weight (349±10.7 vs. 378±10.7 g; p=0.06). There was no difference in scrotal circumference (35.0 ± 0.5 vs. 36.1 ± 0.5 cm), sperm motility (69.2±4.1 vs. 75.2±3.8 %), normal sperm morphology (76.3±3.1 vs. 72.6±2.9 %) and surface temperature of the scrotum (30.3C ± 0.3 vs. 29.7C ± 0.3) between bulls with and without presence of testicular mineralization (p>0.10). It was determined that productivity, testicular echogenicity, scrotum thermographs and semen quality ensured a certainty of detecting a bull with testicular mineralization by more than 80%. Further analysis of testicular ultrasound, sexual and metabolic hormones and reproductive tissue histomorphometry are in progress. These preliminary results support that improved productivity relates to sexual development and occurrence of abnormalities in the reproductive system of young sires.

Keywords: Scrotum thermographs, semen quality, sexual and metabolic hormones, testicular mineralization, testis echogenicity