

B MODE ULTRASONOGRAPHIC EVALUATION OF PAIRED TESTICULAR DIAMETER OF MATURE BOARS IN RELATION TO AVERAGE TOTAL SPERM NUMBERS

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Previous studies in the boar have established that testicular weight correlates well with daily sperm production, and that testis size is a highly heritable trait. The boar testes are tightly positioned so that it is impossible to obtain circumferential measurement. Consequently, unlike the bull and ram, use of testis size when selecting animals as breeding prospects does not occur in swine. Real-time ultrasonography offers practitioners a non-invasive technique for visualizing and measuring tissues in the live animal, including the testes. Application of this existing technology to the boar may help to bridge the gap between science and current swine production practices by providing the industry with the means to select for potential high sperm-producing boars for breeding programs based on testis size. The objective of this study was to investigate the use of B-mode ultrasonography to obtain testicular diameter measurements of boar testes and evaluate the relationships between paired testicular diameter, total sperm numbers and boar age. Two hundred fifteen postpubertal crossbred terminal sire boars from PIC (Pig Improvement Company, Franklin, KY) stock were assigned to one of seven age groups; and the midpoint diameter of each testes measured using B mode ultrasonography. Age of each boar was obtained on the day of testicular diameter measurement from the boar studs' inventory system. Data for ejaculate volume and sperm concentration (sperm/ml) were used to compare with the testicular diameters obtained using ultrasonography. Significant differences ($p=0.03$) were found between left and right testis diameter measurements (left>right). Normal differences between left and right testicular diameters were within 0.5 cm for this boar population ($N=215$). Paired testicular diameter (PTD) values, therefore, were used in order to compare to average total sperm numbers (ATSN) produced by both testes. As a boar standing at stud ages, PTD appear to change very little. Paired testicular diameter gradually increased in size from 241 days (mean=13.5 cm; range 10.4-16.7 cm) up to 720 days (mean=15.0 cm; range 12.7-20.2 cm) of boar age. This gradual enlargement of testes size as a boar ages did not result in a proportional increase in ATSN. Indeed, a dramatic increase in ATSN was observed in boars going from 241 ($57.0 \pm 27.4 \times 10^9$ sperm) to 420 ($118.6 \pm 33.6 \times 10^9$ sperm) days of age. After 12-14 months of boar age, however, ATSN appeared to plateau ($127 \pm 32.5 \times 10^9$ sperm) in our study population. Consequently, the correlation between PTD and ATSN was low ($r=0.24$) for this study. As a result, unlike our other food animal species, total sperm numbers in a boar ejaculate may be difficult to predict using paired testicular diameter measurements obtained using B-mode ultrasonography.

Keywords: boar, ultrasonography, testes, sperm