STUDIES OF PUBERTAL DEVELOPMENT IN BOARS: RELATIONSHIPS BETWEEN REPRODUCTIVE ORGAN DEVELOPMENT AND PERIPHERAL PLASMA LEVELS OF LUTEINIZING HORMONE AND TESTOSTERONE

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by Simplicia Valenzuela FlorCruz

Two studies were conducted to obtain fundamental data on the process of puberty in Large White x Landrace boars. The first was a longitudinal study designed to evaluate the course of gonadal and epididymal development and the concurrent endocrine changes during the period of sexual maturation.

Twenty-four animals were castrated sequentially at ages ranging from 43 to 241 days. Increases in testicular weight were more highly correlated with body weight ($r = 0.953$, $P < 0.001$) and age ($r = 0.919$, $P < 0.001$) than were similar increases in epididymal weight ($r = 0.558$ and 0.593, $P < 0.01$, respectively). The age at onset of spermatogenesis varied between boars in the range 90 to 127 days. First observations of spermatozoa in seminiferous and epididymal tubules were made at 127 and 146 days of age, respectively.

Longitudinal profiles of LH and testosterone secretion were investigated by assaying plasma samples collected at fortnightly intervals from each of ten boars aged 41 to 236 days. Until 82 days of age mean LH levels were low (0.20 - 1.25 ng/ml), then rose to a peak of 2.19 ng/ml at 110 days. Later LH levels declined gradually and after 166 days fluctuated between 0.5 and

1.0 ng/ml. Mean testosterone levels also were low in the prepubertal period (0.10 - 0.27 ng/ml), then between 110 and 138 days increased from 0.60 to 8.00 ng/ml. Subsequently testosterone concentrations fell slowly, then except for an isolated peak of 7.73 ng/ml at 194 days, fluctuated between 1.40 and 3.80 ng/ml. These results indicated that the major changes in LH and testosterone secretion during puberty in boars were similar to those which have been reported to occur in males of other species.

Two short term studies of LH and testosterone secretory profiles were carried out to evaluate the effects of stage of sexual maturity on the patterns of secretion of these hormones. Four pubertal and three post-pubertal boars were subjected to plasma sampling every twenty minutes for 24 hours. During puberty, plasma profiles of LH varied in a manner indicative of a highly pulsatile mode of secretion. Likewise, large fluctuations in plasma testosterone levels were noted at this age but they were not as frequent as those of LH. In contrast, plasma LH and testosterone profiles of post-pubertal boars showed fewer and smaller fluctuations in hormone concentrations. The respective overall mean levels of LH and testosterone were 0.82 and 1.04 ng/ml in pubertal boars, and 0.39 and 0.81 ng/ml in post-pubertal boars. These values were consistent with those obtained in the longitudinal study and confirmed the greater output of both hormones during puberty and their decline thereafter. At both pubertal and post-pubertal ages, associations between LH and testosterone pulses were not always consistent, nor was there any evidence of diurnal variations in plasma hormone concentrations.

The results reported in this thesis indicated that puberty in boars occurred between the ages of 90 and 146 days, at which

ages, mean body weights were 35.3 and 58.6 kg, respectively. This period was characterized by a rapid growth of the testes and epididymides and was accompanied by concurrent elevations of plasma LH and testosterone concentrations. The less pulsatile nature of LH and testosterone secretion recorded from the post-pubertal boars probably reflected the maturation (increased sensitivity) of hypothalamic negative feedback mechanisms which normally regulate hormone secretion. The existence of such a mechanism was confirmed by an elevation of plasma LH levels following castration of 5 boars at 215 days of age.

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