ABSTRACTS

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POTENTIAL ROLE OF PROLACTIN IN PATTERNS OF REPRODUCTIVE ACTIVITY IN DOGS: A MALE MODEL

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Prolactin is known to play a permissive role in ovarian and testis function in several species, especially in laboratory rodent models. Prolactin secretion is typically pulsatile, but mean prolactin has been reported to undergo circannual changes in selected carnivore species with photo-period entrained annual reproductive cycles, including wolves and mink; the latter are not unlike annual changes reported for other photo-entrained species including sheep, albeit seasonally phase shifted according to the breeding season of the individual species. Prolactin is a metabolic hormone as well as a mammotrophic, luteotrophic, and gonad-modulating hormone, and can modulate activity of cells of the immune system, adipose tissue lipolytic activity, hepatic function and in some species is associated with fur growth cycles. In most mammalian species studied, the photo regulation of annual reproductive rhythms involves the photoperiod entrainment of an underlying endogenous circannual cycle with an inherent if unregulated rhythm that can vary within and among individuals, typically observed to vary from 7-11 months, with normal Northern or Southern hemisphere photoperiods being able to slow and entrain the cycle to periods of 12 months. Carnivores shown to have annual cycles in reproductive activity include some felids including domestic cats; mustelids as a group; and foxes and wolves. The Basenji, among domestic dogs, with breeding anecdotally typically restricted to autumn may be included in this group. Other domestic dog breeds appear to have little or no photo responsive annual, although cycles of fur growth and shedding are anecdotally reported. However, whether there can be obtained sufficient evidence to support the hypothesis that there is nevertheless a vestige (or more) remaining of the endogenous cycle in domestic dogs as demonstrated in naturally photo-entrained species when experimentally deprived of annual or circannual photoperiod cues (e.g., sheep, horse, woodchucks and other marmotine rodents).

Groups of 4 or more males dogs each were studied for periods of up to 2.5 years by collecting observations on semen collectability and quality, blood samples to be analyzed for LH, FSH, and/or testosterone as well as prolactin. Housing provided control of temperature and humidity within narrow ranges, and exposure of dogs to unchanging neutral daily photoperiods. Additional acute studies involving experimental challenges of male dogs with regimens of dopamine agonist and or dopamine antagonist were also initiated but are not formally part of this report. Herein, we report preliminary results for 4 dogs in a groups of intact males studied weekly from one year of age for more than 2 years and for which peripheral concentrations of testosterone, FSH and prolactin have been measured. Overall mean FSH, testosterone and prolactin concentrations were similar to those previously reported for male dogs and show little or no evidence of an annual cycle when examined in relation to the calendar year. Testosterone routinely measured between 1 and 7 ng/ml; in three dogs, post pubertal testosterone concentrations showed intervals of 3-4 months with concentrations primarily below 2 ng/ml intersperse among longer period with testosterone elevate above 2 ng/ml. There were no obvious circannual rhythms in FSH in any of the dogs. Prolactin ranged between 5 and 50 ng/ml over 95% of the time, but in some animals periods of prolactin below 2-3 ng/ml were encountered for 2-3 weeks periods. Three dogs showed ‘seasonal’ rhythms that were mostly asynchronous among animals, with apparent phases ranging from 6 to 14 months and variable in timing and duration within dogs in all but one case as well as variable among dogs. Precision as to estimating phase duration of endogenous cyclic changes in prolactin concentrations was likely hampered by the rather long (one week) sampling intervals and by a pulsatile pattern of secretion. However, prolactin in samples collected hourly for 24 hours at four different periods of the year showed no intra-day changes that
would affect interpretation of results of the once-weekly sampling. In dogs, LH, testosterone, and prolactin secretion are all reported to be pulsatile and variable, and weekly intervals of sampling only once on the day of sampling may nevertheless be insufficient to accurately document and characterize the extent to which circannual rhythms in these hormones occur in either intact or gonadectomized dogs. However, the present results suggest that large endogenous circannual-like phases of waxing and waning prolactin secretion can be encountered, and may in turn participate in subtle or more pronounced changes in testis activity and/or libido in male dogs, and if confirmed for female dogs, perhaps account for some of the variability in interestrus intervals within and among bitches. They may also be the basis for some dogs (in other studies) showing pronounced and predictable responses in prolactin to challenges with dopamine agonist or dopamine antagonist while showing minimal or blunted responses at other times. Additional analyses are being conducted to determine if any of the rhythms in individual be statistically correlated to less pronounced modulations in testosterone.