Evaluation of oral folic acid supplementation on the incidence of cleft palates in Labrador retrievers, Golden retrievers, and Labrador/Golden cross puppies in the Guide Dogs for the Blind breeding colony

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In canine fetuses, cleft palates result when there is a disruption in the sequential steps of palate development during embryogenesis. In dogs craniofacial defects can appear in any breed, but the brachycephalic breeds and dogs with wide skulls seem to be most predisposed. The incidence rate of cleft palates in puppies whelped at Guide Dogs for the Blind between 2004-2015 ranges from 1.2% to 2.3% annually. A small number of studies in Boston Terriers, Pugs, Chihuahuas, and French Bulldogs have shown a reduction in puppies with cleft palates when their dams were supplemented with folic acid during breeding and pregnancy. We hypothesized that supplementing Labrador, Golden retriever, and Labrador/Golden cross dams with oral folic acid during breeding and pregnancy would reduce the incidence of cleft palates in their puppies.

Breeding bitches (n=111) were given 5mg oral folic acid daily at the start of proestrus through day 40 of gestation. Puppies (n=739) were born in the trial period of folic acid supplementation. The incidence of cleft palates in the folic acid supplemented puppies was compared to the control puppies (n=5,334). Because the control group was larger than the study group, puppies were randomly drawn from the control population in numbers, gender and breed to equal those in the study population (5 random control samples were compared), allowing identical matching of each puppy of a given breed and sex by an untreated puppy of the same breed and sex. The goal for this analysis was to assess the impact of feeding folic acid on the prevalence of this disease. Recognizing the binary nature of the phenotype, combined with the extensive pedigree in the colony, we fit a mixed logistic model under a Bayesian framework. The mean of the posterior density for the odds ratio of disease across the two feeding groups, with dogs not fed folic acid in the numerator, was 0.66 with a 95% HPD interval of [0.33, 1.05], indicating that folic acid feeding had no significant impact on reducing the presence of cleft palate. Subsequently, a more refined analysis, using a subset of 53 females (producing 687 progeny) who were fed or not fed folic acid over a two-year period revealed a mean odds ratio across the feeding regimes of 1.06 and a 95% HPD interval of [0.53, 1.88], again indicating no significant impact of folic acid supplementation on disease. Further study will include investigation into the genetic influence of cleft palates.

Keywords: cleft palate, folic acid

References