Nutritional Lens Opacities in Two Litters of Newfoundland Dogs

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EXPANDED ABSTRACT

KEY WORDS: nutritional cataract • protein • amino acids • arginine • phenylalanine • puppy • Newfoundlands

Nutritional cataracts, resulting from a deficiency of certain vitamins and essential amino acids or an excess of particular sugars, have been observed in different species. It has been postulated that a deficiency of the essential amino acids arginine and phenylalanine produces cataracts in dog, cat and wolf puppies raised on commercial, as well as experimentally produced, milk replacers (1–5). Several commercial kitten milk replacer products are available on the market. However, there are no guidelines for testing milk replacers before marketing a product corresponding to the feeding trial guidelines of the Association of American Feed Control Officials (AAFCO) for growing-kitten pet food products.

The characteristics of cataracts resulting from deficiency differ from those resulting from an excess of nutrients. Cataracts resulting from deficiency of the essential amino acids arginine and phenylalanine are described as a nuclear–cortical junction ring and some vacuolization of the equatorial fibers and Y-sutures. The risk of cataract formation seems to increase with an earlier onset of supplementary feeding of the milk replacer. A cataract formation was also observed in kittens fed a diet deficient in the essential amino acid histidine (6). A cataract could be produced experimentally in Foxhound puppies with a very low protein diet (7).

Cataract formation in Newfoundland dogs is not frequent and a heritable basis has not been demonstrated.

CASE REPORT

Cataracts were diagnosed by an experienced ophthalmologist in two litters of Newfoundland puppies with a history of abnormal behavior. Both litters of 8 pups came from the same kennel but the parent-pairs were not related and previous litters showed no signs of cataracts. For one of the two bitches, two out of three litters showed no cataract formation, although in one case the same male dog was used as in the affected litter. The other bitch produced two litters and one litter was unaffected. In these two litters different male dogs were used. There were no unaffected litters in the kennel at the time.

Because of agalactia of the bitches both litters needed to be supplemented with a commercial milk replacer (marketed as a complete food) every 2 h from postpartum d 2. The first litter exhibited abnormal behavior at 8 wk of age, and cataracts were identified by an experienced ophthalmologist. The next day the second litter, consisting of 3-wk-old pups, was examined by the same ophthalmologist. In both litters (8 and 3 wk old) 7 out of 8 puppies showed different degrees of lens opacities, described as usually beginning with a cloudy, equatorial opacification in the rear of the lens. There were no nuclear cataracts, but rather mild opacification of the posterior Y-sutures, equatorial clouding in the rear of the lens and posterior subcapsular ringlike cataracts.

The breeder started to feed a canned complete puppy food to both litters at 3 wk of age. After the discovery of the cataracts in 8- and 3-wk-old pups the milk replacer was replaced by the moist complete puppy food and at the same time the essential amino acids arginine (200 mg/d) and phenylalanine (500 mg/d) were supplemented additionally to the food of every puppy for 15 wk.

At 7 wk after the first examination a slight remission of the opacities in 8 out of the 16 puppies could be seen. Four affected puppies did not change; two got worse. Most often the opacities of the Y-sutures had changed to ringlike opacities in the posterior subcapsular area. Two eyes also showed light vacuoles in the rear.

After an additional 7-wk period four puppies experienced total regression of the cataracts. Four puppies showed no changes in their opacities and only one puppy got a total cataract in one eye. Ringlike opacities in the posterior lens were the most prominent findings.

DISCUSSION

An analysis of the milk replacer showed that the protein and amino acid composition is adequate for growth according
to the guidelines of the American and European organizations NRC, AAFCO and FEDIAF (8–10). Analysis of the protein content in the commercial milk replacer showed that it was lower than that in natural milk of bitches compared on both a dry matter basis and an energy basis. The most prominent finding in amino acid analysis was a very low arginine content, which was only half of that in milk of bitches. The protein and arginine contents were 31.60% and 1.11% dry matter, respectively; according to Meyer et al. (11), milk of bitches contains 37.87% and 2.12%, respectively (Table 1). Meyer et al. (11) examined the composition of dog milk relative to breed size (small, medium and large breeds). The Newfoundland is a large breed like Boxer, Setter and Afghan Hound. Peculiarities in bitch milk composition of these breeds were not observed.

The clinical picture of the characteristic cataract and the development are consistent with the literature citations of nutritional cataracts in other canines resulting from deficiency of the amino acids arginine and phenylalanine (1–6).

These findings indicate that the current recommendations for the supply of certain amino acids might not be appropriate for very young puppies for all breeds, particularly because it is already known that Newfoundlands have a special need for certain amino acids. Backus et al. (12) demonstrated a higher need of the amino acid methionine in Newfoundlands consuming AAFCO-tested diets to correct taurine deficiency.

**LITERATURE CITED**


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**TABLE 1**

Analysis of the milk replacer

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Milk replacer</th>
<th>Milk of bitches (11)</th>
<th>NRC1 (8)</th>
<th>AAFCO2 (9)</th>
<th>FEDIAF3 (10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein</td>
<td>31.60</td>
<td>37.87</td>
<td>22.00</td>
<td>22.00</td>
<td>22.00</td>
</tr>
<tr>
<td>Arginine</td>
<td>1.11</td>
<td>2.12</td>
<td>0.50</td>
<td>0.62</td>
<td>0.70</td>
</tr>
<tr>
<td>Phenylalanine</td>
<td>1.61</td>
<td>1.89</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tyrosine</td>
<td>1.61</td>
<td>1.51</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Phe + Tyr)</td>
<td>3.22</td>
<td>3.40</td>
<td>0.72</td>
<td>0.89</td>
<td>1.02</td>
</tr>
<tr>
<td>Histidine</td>
<td>0.97</td>
<td>1.17</td>
<td>0.18</td>
<td>0.22</td>
<td>0.25</td>
</tr>
</tbody>
</table>

1. Required minimum concentrations (available nutrients).
3. Nutrient guidelines (all stages minimum).