A System to Monitor Urinary Tract Health in Dogs

Abigail E. Stevenson, Brigitte H. E. Smith and Peter J. Markwell

Waltham Centre for Pet Nutrition, Waltham-on-the-Wolds, Melton Mowbray, Leicestershire, LE14 4RT, UK

EXPANDED ABSTRACT

KEY WORDS: • dogs • canine • urine pH • saturation • urinary tract health

Urinary tract health is an important cause of lower urinary tract disease in dogs. Research has focused on gaining understanding of the factors that could either contribute toward urolith formation or be of value in the management of clinical cases associated with their presence. Work in this area has focused on the influences of urinary tract infection and the effects of dietary minerals, water turnover and urinary pH. A noninvasive system has been established at the Waltham Centre for Pet Nutrition to monitor various aspects of canine urinary tract health. A similar feline system has previously been described (Markwell and Smith 1993).

Materials and methods. Dogs were individually housed in an environmentally controlled two-room pen consisting of an inner room (3.75 m²) entered from a central corridor and an outer room (2 m²). The floor covering in the inner room was heat-sealed sheet vinyl extending 40 cm up the walls; the outer room consisted of a fiberglass tray. A section of each inner pen had an underfloor warm bed area heated by electric cable. There was a separate air supply and extract for each pen with 12 air changes per hour. Warm air was supplied to the inner room and extracted from the outer conservatory. The temperature of the inner room was maintained at 22 ± 2°C.

In this study, a dry feline clinical diet (Waltham Veterinary Diet Feline Control pHormula, Effem Foods, Bolton, Cananda), designed for the treatment of struvite-associated urolithiasis, was fed to a panel of six dogs (one Labrador retriever, neutered female, age 5.8 y; two miniature schnauzers, one neutered male, one entire male, age 3.7 ± 0.1 y; three beagles, two neutered females, one neutered male, mean age 9.8 ± 2.5 y) for 42 d. The dogs were fed individually, to adult maintenance energy requirements (calculated as 460 kJ/kg body weight0.75, three times daily at 0830, 1130 and 1530 h, and had free access to water. Blood samples were collected at the end of the study to assess the risk of metabolic acidosis. All housing conditions and procedures fell within the UK Home Office regulations.

Urinary relative supersaturation value of struvite of 0.35 showed that this diet produced a urine that was markedly undersaturated with the components of struvite. The mean diurnal urine pH profile (Fig. 1) showed a marked postprandial rise in urine pH after the first meal at 0830 h.

Discussion. Various other methods have been described previously for collecting urine samples from dogs; these in-
clude cystocentesis (Bartges et al. 1995) and catheterization under anesthesia (Lulich et al. 1991, O’Connor and Summerill 1979, Shaw 1989, Short and Hammond 1964). Zentek et al. (1995) kept dogs in metabolism cages that allowed for collection of freshly excreted urine, although overnight samples were not analyzed until the next morning. There are a number of drawbacks associated with these all of these methods, including interference with normal urination patterns, the need for anesthesia in some cases, the invasive nature of the procedure or the problem of urine left at ambient temperature for some time before analysis. Our system overcomes all of these problems, allowing natural urination by the dogs and sample analysis within 30 s; in addition, because the sampling is noninvasive, it is suitable for both long-term and repeat testing.

The results from the study show that, on average, the diet resulted in the production of an acidic urine, which was undersaturated with respect to struvite, without evidence of having caused metabolic acidosis. These data suggest that, in the absence of complicating factors such as bacterial infections, this dry feline diet should bring about gradual disso-

### TABLE 1

<table>
<thead>
<tr>
<th>Dog number</th>
<th>Mean urine pH</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5.46 ± 0.49</td>
<td>25</td>
</tr>
<tr>
<td>2</td>
<td>5.90 ± 0.23</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>5.45 ± 0.29</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>5.89 ± 1.03</td>
<td>27</td>
</tr>
<tr>
<td>5</td>
<td>5.93 ± 0.42</td>
<td>9</td>
</tr>
<tr>
<td>6</td>
<td>5.41 ± 0.87</td>
<td>49</td>
</tr>
<tr>
<td>Mean</td>
<td>5.67 ± 0.26</td>
<td>6</td>
</tr>
</tbody>
</table>

Values are means ± SD.

**FIGURE 1** Mean trial diurnal urine pH profile for a mixed-breed panel of six dogs fed a dry feline clinical diet for 42 d.

**LITERATURE CITED**


