INTRODUCTION
The incidence of urinary incontinence in ovarioctomized (OVX) bitches is prevalent compared to intact bitches. Ovarioectomy results in permanently elevated gonadotropin concentrations, which may contribute to the development of incontinence. Reducing gonadotropin concentrations through the use of GnRH agonists restores continence in ~50% of incontinent bitches. Decreasing gonadotropin concentrations by immunizing against GnRH may therefore also restore continence (Figure 1).

OBJECTIVE AND HYPOTHESES
Overall objective was to evaluate the role of LH in the pathophysiology of urinary incontinence in OVX bitches. Hypothesis 1: OVX continent bitches would have lower LH than OVX incontinent bitches. Hypothesis 2: Decreasing LH via GnRH immunization would restore continence in bitches with incontinence.

MATERIALS AND METHODS

EXPERIMENT 1
27 continent and 16 incontinent bitches of medium (30-49 lbs) and large (50-100 lbs) breeds recruited. Venous blood samples were collected to measure plasma LH using a canine-specific ELISA (LH-Detect®, ReproPharm). Comparisons between bitches analyzed using PROC TTEST in SAS® (V. 9.2, SAS Institute Inc.).

EXPERIMENT 2
14 incontinent bitches taking phenylpropanolamine (PPA; Proin®, Pfizer Animal Health) recruited. Nine bitches were vaccinated against GnRH (Canine Gonadotropin Releasing Factor Immunotherapeutic®, Pfizer Animal Health) twice at four week intervals (Figure 2).

RESULTS

EXPERIMENT 1
Continent bitches had significantly higher LH concentrations than incontinent bitches (Table 1).

Table 1: LH concentrations (mean ± SEM) in continent and incontinent bitches

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean LH</th>
<th>SEM</th>
<th>P</th>
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</thead>
<tbody>
<tr>
<td>Continent bitches</td>
<td>27</td>
<td>7.65</td>
<td>1.06</td>
<td>0.04</td>
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<tr>
<td>Medium bitches</td>
<td>14</td>
<td>4.78</td>
<td>1.51</td>
<td>0.98</td>
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<tr>
<td>Large bitches</td>
<td>10</td>
<td>3.39</td>
<td>2.00</td>
<td>0.58</td>
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<td>Large incontinent bitches</td>
<td>8</td>
<td>2.83</td>
<td>1.55</td>
<td>0.57</td>
</tr>
</tbody>
</table>

EXPERIMENT 2
There was an overall significant effect of the vaccine on LH (p=0.0004).

DISCUSSION

Continent bitches had higher LH than incontinent bitches, in agreement with findings by Reichler and coworkers. Also in agreement was the effect of size, specifically that larger bitches had lower LH concentrations. Despite these observations, decreasing LH concentrations restored continence in some, but not all, bitches indicating a role for LH in the pathophysiology of urinary incontinence. However, this role remains unclear.

REFERENCES

ACKNOWLEDGEMENTS
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Figure 1. GnRH immunization mechanism of action

Figure 2. GnRH vaccine for Experiment 2

Figure 3. Time line for Experiment 2

Figure 4. LH concentrations (mean ± SEM) in vaccinated and control bitches. *p<0.05 compared to control