A. Introduction

- Dogs share a long history with northern Indigenous people.¹
- Today, while dogs still play an important role in Indigenous communities, they can also be a public health risk:
  - Rabies virus, endemic in Arctic Fox, poses a risk to dogs and people in the Arctic.²
  - Injuries and deaths associated with dog attacks are higher in northern Canada³
- Dealing with animal health and welfare concerns and zoonotic disease risks require access to veterinary services⁴, which are very limited in most communities in northern Canada.²
- In the Sahtu Settlement Area (Figure 1), subsidized veterinary services have been offered annually by the University of Calgary’s Faculty of Veterinary Medicine since 2008.²
- On program initiation, only 37% of dogs seen were vaccinated for rabies, 29% had been dewormed, and 20% neutered.
- Our objective was to understand the uptake and impact of 10 years of annual veterinary services in the Sahtu communities.

Figure 1. Sahtu Settlement Area, Northwest Territories

B. Methods

- We did a chart review of 10 years (2008-2017) of dog medical records.
- Data on vaccination, deworming, and sterilization status, and body condition score (BCS) were analyzed using logistic regression with mixed effects. Random effects included community, owner, and individual dog.
- Data on age was analyzed using linear regression with the same random effects.
- P-values <0.05 were considered significant.
- Dog censuses were done using local knowledge, visual dog counts (Figure 2), and door-to-door questionnaires.
- Door-to-door household questionnaires were done with both dog-owning and non-dog-owning households on the topics of dog ownership and husbandry and experiences with dogs.

Figure 2. Dogs housed outside one household

C. Results

- Number of dog owners and dogs seen in clinic increased initially and has stabilized over time (Figure 3).

![Figure 3. Total number of dog owners and dogs seen, 2008-2017.](image)

- Odds of a dog entering the clinic sterilized (Table 1) or up to date on vaccinations (Table 2) increased, as did age, over time (Table 3).

Table 1. Odds of a dog of either sex, a female dog, or a male dog entering the clinic sterilized

<table>
<thead>
<tr>
<th>Year</th>
<th>Either Sex</th>
<th>Spayed Female</th>
<th>Neutered Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008-2009</td>
<td>Reference</td>
<td>Reference</td>
<td>Reference</td>
</tr>
<tr>
<td>2010-2012</td>
<td>3.67*</td>
<td>1.31</td>
<td>5.76</td>
</tr>
<tr>
<td>2013-2015</td>
<td>5.70*</td>
<td>5.75</td>
<td>10.58*</td>
</tr>
<tr>
<td>2016-2017</td>
<td>185.10*</td>
<td>47.84*</td>
<td>226.83*</td>
</tr>
</tbody>
</table>

*Significant: all other year intervals significantly different from each other
†Significant: all other year intervals significantly different from each other except 2010-2012 from 2013-2016

Table 2. Odds of a vaccinated dog entering the clinic

<table>
<thead>
<tr>
<th>Year</th>
<th>Rabies</th>
<th>Combination</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008-2009</td>
<td>Reference</td>
<td>Reference</td>
</tr>
<tr>
<td>2010-2012</td>
<td>4.67*</td>
<td>6.41*</td>
</tr>
<tr>
<td>2013-2015</td>
<td>20.15*</td>
<td>22.23*</td>
</tr>
<tr>
<td>2016-2017</td>
<td>29.35*</td>
<td>28.05*</td>
</tr>
</tbody>
</table>

*Significant: all other year intervals significantly different from each other except 2010-2012 from 2013-2016
†Significant: all other year intervals significantly different from each other

- There were increased odds of seeing a sterilized dog in Communities A (OR 19.8), B (OR 13.4), and D (OR 23.4), compared to C. No community differences were found in body condition scores over time.
- Number of dogs and percent of dog-owning households, varied by community (Table 4).
- Rabies vaccination and female dog sterilization rates in some communities met the World Health Organization recommendations of >70% (Table 4).

Table 3. Change in dog age

<table>
<thead>
<tr>
<th>Year</th>
<th>Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008-2009</td>
<td>Reference</td>
</tr>
<tr>
<td>2010-2012</td>
<td>-1.62 (cons)*</td>
</tr>
<tr>
<td>2013-2015</td>
<td>2.26</td>
</tr>
<tr>
<td>2016-2017</td>
<td>6.95</td>
</tr>
</tbody>
</table>

*Significant: all other year intervals significantly different from each other
†Significant: all other year intervals significantly different from each other

- There were increased odds of seeing a sterilized dog in Communities A (OR 19.8), B (OR 13.4), and D (OR 23.4), compared to C. No community differences were found in body condition scores over time.
- Number of dogs and percent of dog-owning households, varied by community (Table 4).
- Rabies vaccination and female dog sterilization rates in some communities met the World Health Organization recommendations of >70% (Table 4).

Table 4. Census data, rabies vaccination and deworming coverage, and sterilization status, 2017

<table>
<thead>
<tr>
<th>Community</th>
<th>% of Households with Dogs(s)</th>
<th>% of Dogs Vaccinateda</th>
<th>% of Dogs Dewormed</th>
<th>% of Spayed Female Dogs</th>
<th>% of Neutered Male Dogs</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>32.5</td>
<td>79 Dogs</td>
<td>82.3</td>
<td>82.3</td>
<td>95.8</td>
</tr>
<tr>
<td>B</td>
<td>66.3</td>
<td>89 Dogs</td>
<td>47.7</td>
<td>48.3</td>
<td>92.3</td>
</tr>
<tr>
<td>C</td>
<td>56.8</td>
<td>40 Dogs</td>
<td>92.5</td>
<td>92.5</td>
<td>61.5</td>
</tr>
<tr>
<td>D</td>
<td>17.6</td>
<td>47 Dogs</td>
<td>78.7</td>
<td>72.3</td>
<td>50.0</td>
</tr>
</tbody>
</table>

aThis is a minimum estimate as it does not include the 3-year vaccines that were not seen at this year’s clinic

- Dogs with an ideal BCS (Figure 4b) were more likely to enter the clinic than those with a thin or emaciated BCS (Figure 4a) in 2010-2012 (OR 4.4), 2013-2015 (OR 17.6), and 2016-2017 (OR 22.4) than in 2008-2009, as well as in 2013-2015 (OR 4.0) and 2016-2017 (OR 5.1) compared to 2010-2012.

Figure 4. Dogs with thin BCS (a) were seen less in later years than those with ideal BCS (b)

D. Discussion

- Uptake of the program increased over 10 years, which may be attributed to the program continuity and commitment.
- The age of dogs and their BCS improved over the years, indicating an improvement in animal health and welfare (Figure 5).
- Sterilization of dogs improved over time, especially for females, improving dog population control and stability.
- Rabies vaccination rates in 3 of 4 communities have increased to the point that in 2017 they were greater than the 70% minimum recommended by the World Health Organization to prevent canine and human cases.⁵
- Community differences in service uptake were evident. These disparities may be due to differences in community priorities, bylaws, other competing community issues, and the presence or absence of a local ‘champion’ for the program.
- The ability to do an effective program evaluation is similarly affected by these issues.

Figure 5. Veterinary student with the oldest dog in community C.

E. Implications

- Improvements in animal health and welfare measures benefit both dogs and communities.⁶,⁷
- The significant increase in dog rabies vaccination coverage in the Sahtu region has important implications for public health response to dog bites⁷ and for public health resource costs.
- In addition to zoonotic disease prevention, annual subsidized veterinary services, outreach, and education in underserved communities improve animal health and welfare and can reduce injuries related to dog bites.⁸
- Successful programs need to acknowledge differing communities needs, priorities, and resources and adapt programs accordingly.

F. References


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