Contrasting body condition of migratory caribou female-calf pairs at calving and weaning

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Factors affecting population dynamics

- Environmental stochasticity
- Density-dependence

Individual’s
- Body condition
- Growth
- Reproduction
- Survival

Population dynamics

Sex
Age-class
Season
Juveniles are known to be more sensitive than adults.

Juvenile’s body condition

- Density-dependence
- Environmental stochasticity

Season

Growth → Survival

Maternal traits

Future reproductive success
Influence of maternal traits

Juvenile’s body condition

Maternal traits

Body mass
Age

Season

Parturition/Calving
Lactation/Weaning

Largely unknown for migratory species
Migratory caribou of Northern Québec/Labrador

- Two herds: *Rivière-George & Rivière-aux-Feuilles*
Migratory caribou of Northern Québec/Labrador

- Large annual range
- High fidelity to calving grounds (92%)
- No overlap of calving grounds (800km apart)
Historical changes in population size

Large variations in abundance

Competition for forage on calving grounds and summer range

Are factors affecting calves body condition similar between herds?
Identifying factors affecting calves body condition

Maternal traits
- Age
- Body mass

Calves body condition
- Body mass
- Body size
- Body fat

Two herds

Weaning

Calving
Body condition monitoring

• In 2007, 2008 and 2009: sampling of female-calf pairs (n=15 for each herd)
• Measurements:
  - **Body mass**: total body mass (kg)
  - **Body size**: hind foot length (cm)
  - **Body fat**: kidney fat (%)
**Calving: effect of herd on calves body condition**

**At calving**

- Effect of **year** and **sex of calf** taken into account
- No effect of **female’s age**: young and old females produced similar calves
  
- Effect of **herd**: George calves are bigger and fatter than Feuilles calves

**Regression models**

<table>
<thead>
<tr>
<th></th>
<th>R²</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body mass</td>
<td>0.41</td>
<td>F&lt;sub&gt;5,99&lt;/sub&gt;=13.21,</td>
<td>0.0001</td>
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<tr>
<td>Body size</td>
<td>0.27</td>
<td>F&lt;sub&gt;4,98&lt;/sub&gt;=8.46,</td>
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<td>Body fat</td>
<td>0.21</td>
<td>F&lt;sub&gt;1,99&lt;/sub&gt;=26.46,</td>
<td>0.0001</td>
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**Significant variables**

<table>
<thead>
<tr>
<th></th>
<th>George</th>
<th>Feuilles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body mass</td>
<td>6.05±0.13</td>
<td>5.35±0.12kg</td>
</tr>
<tr>
<td>Body fat</td>
<td>40.0±1.6</td>
<td>28.9±1.6%</td>
</tr>
<tr>
<td>Body size</td>
<td>33.3±0.2</td>
<td>33.0±0.2cm</td>
</tr>
</tbody>
</table>
At calving

- Effect of **female body condition**:
  - Bigger females produce bigger and taller calves
  - The influence of females traits is **stronger for Feuilles**
  - No effect on calve’s body fat
**Weaning : effect of herd on calves body condition**

**At weaning**

- Effect of **year** and **sex of calf** taken into account
- No effect of **female’s age**: young and old females produced similar calves

- Effect of **herd**: George calves are bigger, longer and fatter than Feuilles calves

**Regression models**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>R²</th>
<th>F</th>
<th>P-value</th>
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<tbody>
<tr>
<td>Body mass</td>
<td>0.57</td>
<td>24.23</td>
<td>&lt;0.0001</td>
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<tr>
<td>Body size</td>
<td>0.28</td>
<td>12.26</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Body fat</td>
<td>0.20</td>
<td>26.46</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

**Significant variables**

Herd / Female body mass / Sex of calf

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**George**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body mass</td>
<td>51.2±0.9kg</td>
</tr>
<tr>
<td>Body fat</td>
<td>14.1±1.0%</td>
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<tr>
<td>Body size</td>
<td>48.8±0.3cm</td>
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</table>

**Feuilles**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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<tbody>
<tr>
<td>Body mass</td>
<td>41.6±0.9kg</td>
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<tr>
<td>Body fat</td>
<td>10.1±1.0%</td>
</tr>
<tr>
<td>Body size</td>
<td>47.3±0.2cm</td>
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+10kg (~20%)  
+4%  
+1.5cm
Weaning: simple effects of herd and female’s condition

At weaning

- **Effect of female body condition:**
  - Bigger females produce **heavier**, **taller** and **fatter** calves
  - Positive relationship with calves body fat
  - Similar relationships between herds
Effects of herd and maternal traits differ between seasons

It is important to consider the life stage and to describe body condition with multiple and appropriate measures.

**Negative impact of herd size**
- George > Feuilles
- +8% Stronger at weaning  +20%

**Positive effect of the mother**
- Bigger females = bigger calves
- Stronger for Feuilles
- Similar for both herds
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Peter May, Makivik
For more information on the research program:

www.caribou-ungava.ulaval.ca