Effects of prenatal heat stress on the emotional reactivity and behavioral reactions of female dairy goat kids

Wellington Coloma-García, Nabil Mehaba, Ahmed A.K. Salama, Xavier Such & Gerardo Caja

Group of Ruminant Research (G2R), Department of Animal and Food Sciences, Universitat Autònoma de Barcelona, Bellaterra (Spain).

The fifth DairyCare conference 19th and 20th March 2018
Stress during pregnancy period

- Reduction of the duration of pregnancy
- Lower birth weight
- Reduction of neuromotor capacities
  - Locomotion
  - Exploration
  - Learning
- Reduction of social interaction
Objective

The aim of this study was to assess the effects of maternal heat-stress during the prenatal period on emotional reactivity of goat offspring.
Characteristics, treatments and management of goats

Animals:
• 30 Murciano-Granadina dairy goats (41.8 ± 5.70 kg BW)

Housing:
• 5 × 2.5 m² with 5 goats / pen

Adaptation
2 weeks

Treatment
(TN or HS)

Mating
(day 12)

Pregnancy
45 days
(1st 1/3 pregnancy)

Birth

Thermal-neutral
(TN; 15-20°C)

Heat stress
(HS; 30-37°C)

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Animals:
Female kids born in
• **TN** group (n=16)
• **HS** group (n=10)

Behavioral tests
4 x 4 m² arena

8 min/test

Novel arena test
5 days

Birth

Day 30

(age 30 ± 15 days)

Novel object test
+ 48 h

1 day

✔ Distance travel
✔ No. of vocalizations
✔ No. of squares entered
✔ No. of jumps
✔ No. of sniffs of the arena

✔ Latency until the first object sniff
✔ No. of sniffs to the object

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## Results

### Performance and reproductive of goats and goat kids at parturition and early postpartum

<table>
<thead>
<tr>
<th>Variables</th>
<th>TN</th>
<th>HS</th>
<th>RMSE</th>
<th>P value (Treatment)</th>
<th>P value (Litter size)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Litter size (No. kids)</td>
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<td>2.2</td>
<td>0.79</td>
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**TN**: Thermal-neutral  
**HS**: Heat stress
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**TN**: Thermal-neutral  
**HS**: Heat stress
Results: Novel arena test

No. of sniffs

TRT $P = 0.008$

**HS** ↓21%
Results: Novel arena test

**No. of sniffs**

TRT $P = 0.008$

**HS** ↓21%

**No. of vocalizations**

TRT $P = 0.099$

**HS** ↓17%
Results: Novel arena test

No. of sniffs

<table>
<thead>
<tr>
<th>Day</th>
<th>HS</th>
<th>TN</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>30</td>
<td>25</td>
</tr>
<tr>
<td>2</td>
<td>25</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>35</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>40</td>
<td>15</td>
</tr>
<tr>
<td>5</td>
<td>45</td>
<td>10</td>
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TRT $P < 0.008$

HS ↓ 21%

No. of vocalizations

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<tr>
<td>1</td>
<td>17</td>
<td>21</td>
</tr>
<tr>
<td>2</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>13</td>
<td>18</td>
</tr>
<tr>
<td>4</td>
<td>11</td>
<td>17</td>
</tr>
<tr>
<td>5</td>
<td>9</td>
<td>16</td>
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TRT $P = 0.099$

HS ↓ 17%

No. of squares entered

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<th>Day</th>
<th>HS</th>
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<tr>
<td>1</td>
<td>36</td>
<td>40</td>
</tr>
<tr>
<td>2</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>3</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>4</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
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<td>50</td>
<td>40</td>
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TRT $P = 0.101$

HS ↓ 36%
Results

Novel object test

No. of squares entered

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<td>TRT P</td>
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<td>HS</td>
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<td>HS</td>
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No. of sniffs of the object

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*HS* ↓ 16%

TRT $P = 0.126$

*HS* ↓ 36%

No. of sniffs

TRT $P = 0.135$

*HS* ↓ 29%

No. of sniffs of the object

HS

TN

HS

TN

Results
Conclusions

• Heat stress during the first third of pregnancy reduced the duration of pregnancy with effects on the weight of the offspring.

• Behavioral tests showed an altered emotional reactivity during the postnatal life of the goat kids after the heat stress suffered \textit{in utero}. 
Thank you

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The fifth DairyCare conference 19th and 20th March 2018