
RUIZ, Carmen; RAMÍREZ, Eva; GRANADOS, José Enrique; CANO-MANUEL, Francisco Javier; CANO-MANUEL, Alejandro; ESPINOSA, José; PÉREZ, Jesús M; SORIGUER, Ramón; RÁEZ-BRAVO, Arián y FANDOS, Paulino.
INTRODUCTION

➤ **Life cycle**: birth ➔ death

➤ **Energy limited** and many functions (growth, survival, reproduction)

➤ **Trade off**: energy compensation.
INTRODUCTION

➤ **Horn**: secondary sexual structure (high energetic costs).

➤ Annual growth with a repose period (rut): **MEDRÓN**.

➤ Influenced by **intrinsic** and **extrinsic** factors.

➤ **Reflect** conditions which involved the animal.

➤ Element of biologic information (secondary rings of lactation)
MATERIAL AND METHODS

➤ Collection sample area: Sierra Nevada Natural Space.

➤ Sample of 87 skulls (2003-2006).

➤ Allometric measures

➤ Medron Index

➤ Ovarian Index
MATERIAL AND METHODS

➤ Collection sample area: Sierra Nevada Natural Space.

➤ Sample of 87 skulls (2003-2006).

➤ Allometric measures

➤ Medron Index nº secondary rings / nº medrones -2

➤ Ovarian Index ovarian volume estimated

➤ Statistic analysis R program
## RESULTS

- **Basic statistics**

<table>
<thead>
<tr>
<th>TYPE</th>
<th>VARIABLES</th>
<th>MEAN</th>
<th>SD</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>SKULL</td>
<td>LENGHT</td>
<td>22.70958</td>
<td>1.056516</td>
<td>71</td>
</tr>
<tr>
<td></td>
<td>WIDTH</td>
<td>122.49659</td>
<td>6.344580</td>
<td>82</td>
</tr>
<tr>
<td></td>
<td>OCCIPITAL</td>
<td>114.04159</td>
<td>5.267290</td>
<td>82</td>
</tr>
<tr>
<td></td>
<td>MOLAR LENGHT</td>
<td>64.93728</td>
<td>4.993236</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td>MOLAR HEIGHT</td>
<td>10.26901</td>
<td>2.641489</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td>INCISOR BONE</td>
<td>86.81100</td>
<td>4.893059</td>
<td>70</td>
</tr>
<tr>
<td>HORN</td>
<td>L1</td>
<td>48.01321</td>
<td>10.088245</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td>L2</td>
<td>25.32241</td>
<td>8.812148</td>
<td>79</td>
</tr>
<tr>
<td></td>
<td>L3</td>
<td>17.64139</td>
<td>6.639708</td>
<td>79</td>
</tr>
<tr>
<td></td>
<td>DIAMETER BASE</td>
<td>30.71256</td>
<td>3.465959</td>
<td>82</td>
</tr>
<tr>
<td></td>
<td>TOTAL LENGHT</td>
<td>131.20413</td>
<td>23.861617</td>
<td>80</td>
</tr>
</tbody>
</table>
RESULTS

- **Correlations** between variables
RESULTS

➤ Relation between horn length and age
RESULTS

- Medrón length according to type (position regarding the tip)
RESULTS

➤ How affect mange and reproduction to the horn growth (using GLM)

No significant differences

\[ p = 0.78 \]

\[ p = 0.82 \]
RESULTS

- How affect reproduction to the horn growth using medrón type 3

\[ p < 0.05 \]
RESULTS

- Ovarian Index and Medrón Index: linear regression

Estimated volume  Reproduction performance
Horn parameters show higher variability, because horn grows throughout life.

Type: 1, 2 y 3 with highest variability. Animal invest in growth.

Type 3 y 4, females 24kg and sexual maturity so invest in growth decreases
DISCUSSION

➤ Mange doesn’t affect horn length. It is a **one-time disease** but horn grows throughout life.

➤ Medrón length is influenced by **reproduction on type 3**. At this age there are females in reproduction (24kg) and others still still growing.

➤ Medrón Index allows to **determine reproductive events** and the date when they happen.
Grazie per l’attenzione
Merci pour votre attention
Gracias por vuestra atención!!