The alpacas’ home land

Altiplano regions of Andes
- Seasonally low temperatures
- Intense solar radiation
- Erratic precipitation

Variable feed availability
Alpacas in Australia

Alpacas suit our harsh environment

Alpacas offer an alternative fibre industry

Farming systems change the environment

Producers control nutrition

Limited information available on alpaca nutrition
We need to know …

How alpacas obtain and use energy from their food

How to feed alpacas to satisfy their energy and protein requirements

How to feed alpacas to promote optimal fibre production
How do alpacas get energy?

Blood glucose is about double true ruminants

Glucose is the main energy substrate

Glucose is probably from amino acids
Energy
- Volatile Fatty Acids
  - Propionate
  - Glucose
    - Maintenance
    - Behaviour

Protein
- Recycled urea
  - Plasma Urea
  - Nitrogen
  - Rumen degradable dietary protein (RDP)
    - Ammonia
      - Urea
        - Ammonia
          - Amino acids
            - Deamination of amino acids
              - Grow and fatten

- Un-degradable dietary protein (UDP)
  - Amino acids

Fibre growth
Using propionate to improve fibre growth

Alpacas fed calcium propionate and UDP will produce more fibre than alpacas consuming RDP with no calcium propionate
32 alpaca wethers

- + CaP UDP (n = 8)
- + CaP RDP (n = 8)
- - CaP UDP (n = 8)
- - CaP RDP (n = 8)

Feed intake, fibre growth, body weight, body condition
<table>
<thead>
<tr>
<th></th>
<th>+ CaP UDP</th>
<th>+ CaP RDP</th>
<th>- CaP UDP</th>
<th>- CaP RDP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Weight of fibre</strong></td>
<td>33 ± 2.4</td>
<td>42 ± 4.7</td>
<td>44 ± 1.9</td>
<td>46 ± 2.9</td>
</tr>
<tr>
<td>(mg/cm²)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Change in fibre</strong></td>
<td>-0.4 ± 0.2</td>
<td>-0.6 ± 0.1</td>
<td>0.3 ± 0.2</td>
<td>0.5 ± 0.2</td>
</tr>
<tr>
<td><strong>diameter (µm)</strong></td>
<td></td>
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</tbody>
</table>
They didn’t eat it all!

<table>
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<th>+ CaP UDP</th>
<th>+ CaP RDP</th>
<th>- CaP UDP</th>
<th>- CaP RDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy offered (MJ/d)</td>
<td>6.6</td>
<td>6.4</td>
<td>5.3</td>
<td>5.3</td>
</tr>
<tr>
<td>Energy intake (MJ/d)</td>
<td>5.2</td>
<td>4.7</td>
<td>5.2</td>
<td>5.2</td>
</tr>
<tr>
<td>Energy refused (MJ/d)</td>
<td>1.4</td>
<td>1.7</td>
<td>0.1</td>
<td>0.1</td>
</tr>
</tbody>
</table>
Putting it all together

Alpacas did not spare amino acids

Alpacas regulated their energy intake by refusing the additional energy offered in calcium propionate

Evolutionary adaptation for maintaining a constant balance of rumen flora?
Energy

Volatile Fatty Acids

Propionate

Glucose

Maintenance

Food

Protein

Recycled urea

Plasma Urea

Nitrogen

Rumen degradable dietary protein (RDP)

Ammonia

Urea

Amino acids

Deamination of amino acids

Fibre growth

Un-degradable dietary protein (UDP)

Glucose

Behaviour

Grow and fatten
Using UDP to improve fibre growth

Alpacas fed a diet high in UDP will:

1. retain the energy eaten and produce more fibre
2. excrete less nitrogen than alpacas fed a low amount of UDP
32 alpaca wethers

0% UDP (n = 8)
30% UDP (n = 8)
60% UDP (n = 8)
100% UDP (n = 8)

Feed intake, fibre growth, body weight, body condition

Faecal output, digestible energy intake, behaviour
Time spent urinating (%)

0% UDP 100% UDP
Putting it all together

Fibre diameter decreased by having low levels of UDP in the diet

Feeding a diet low in UDP is not the best way to reduce fibre diameter

A low UDP diet possibly increased N excretion?
The next chapter of this story

Compare the N metabolism of alpacas and sheep fed UDP and RDP
Energy requirement of alpacas is lower than we thought.

Alpacas do not use propionate as a source of glucose.

Alpacas use protein for energy.

We need to feed them the right type of protein to promote fibre growth.
Alpacas are not sheep and cannot be fed like them.