Microbiota clustering and energy balance in early lactation in Lacaune dairy sheep

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Introduction

- Lacaune sheep : 1st month = **Suckling milking** system
- **Energy deficiency** during this period → decrease in **milk production**
- Role of **microbiota** in ewes response

Is the ruminal microbiota of post-partum ewes linked to this energy deficit, and therefore to lower production?

Materials & methods

Animals

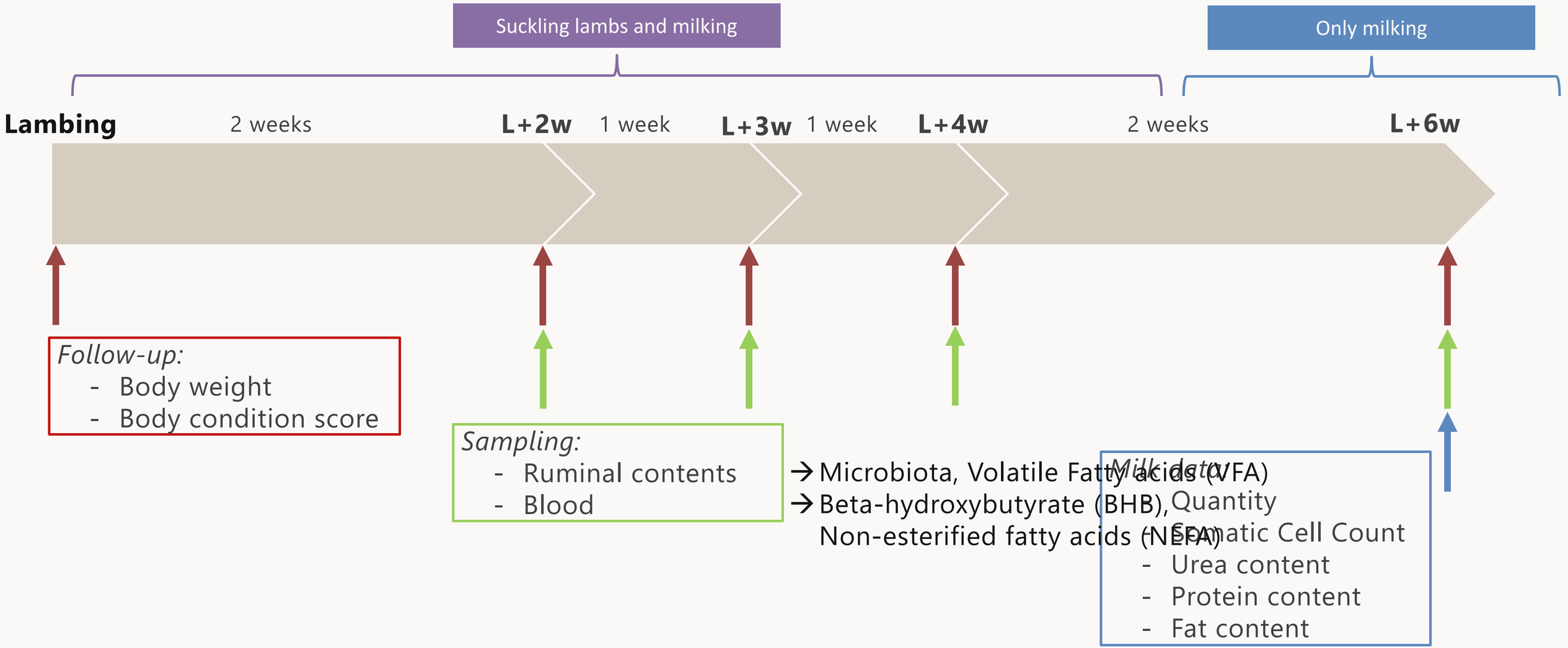
- 65 Lacaune dairy ewes
- Multiparous

Diet:

- 2/3 forages:
  - Alfalfa & cocksfoot hay
  - Grass silage
- 1/3 concentrates

Materials & methods

Sampling and follow-up



Materials & methods

Microbiota analysis

Sequencing:

- V3-V4 regions of 16S rRNA

Bioinformatics:

- Galaxy platform, FROGS
- SILVA base

- 258 samples (ie 4*65)

(2 ech removed - low number of sequences <6000)

- 21600 seq/sample
- 1932 ASVs / sample
- 104 genera

To reduce information

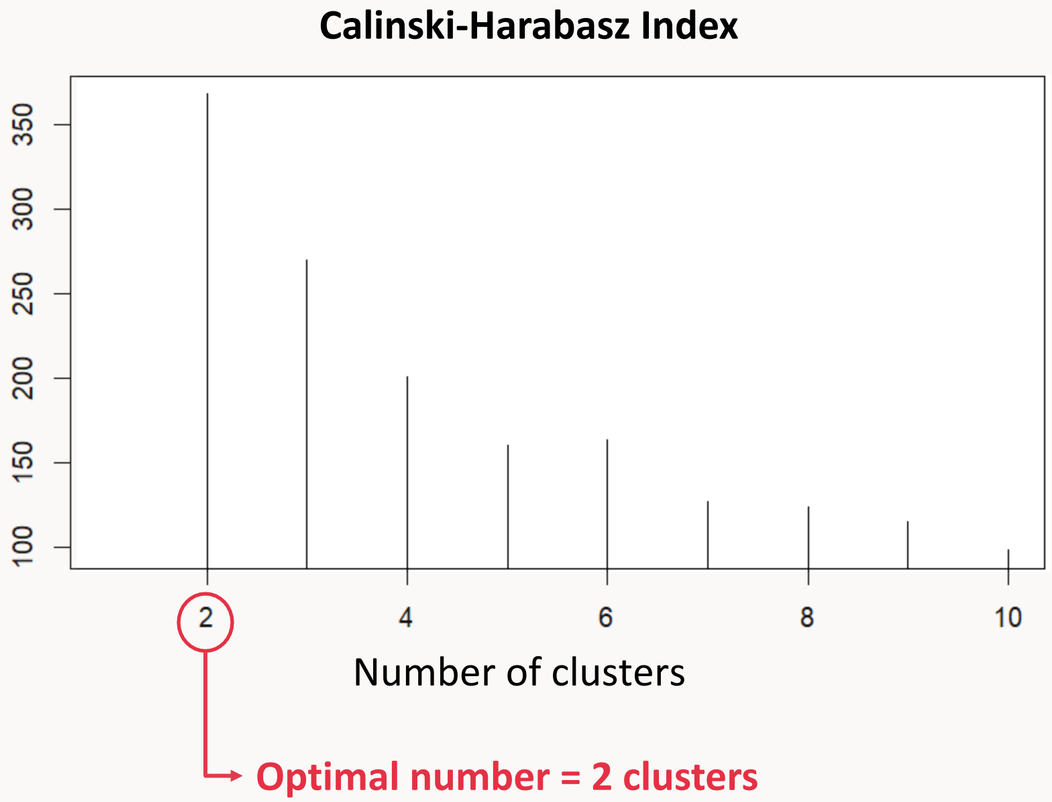
Unsupervised clustering:

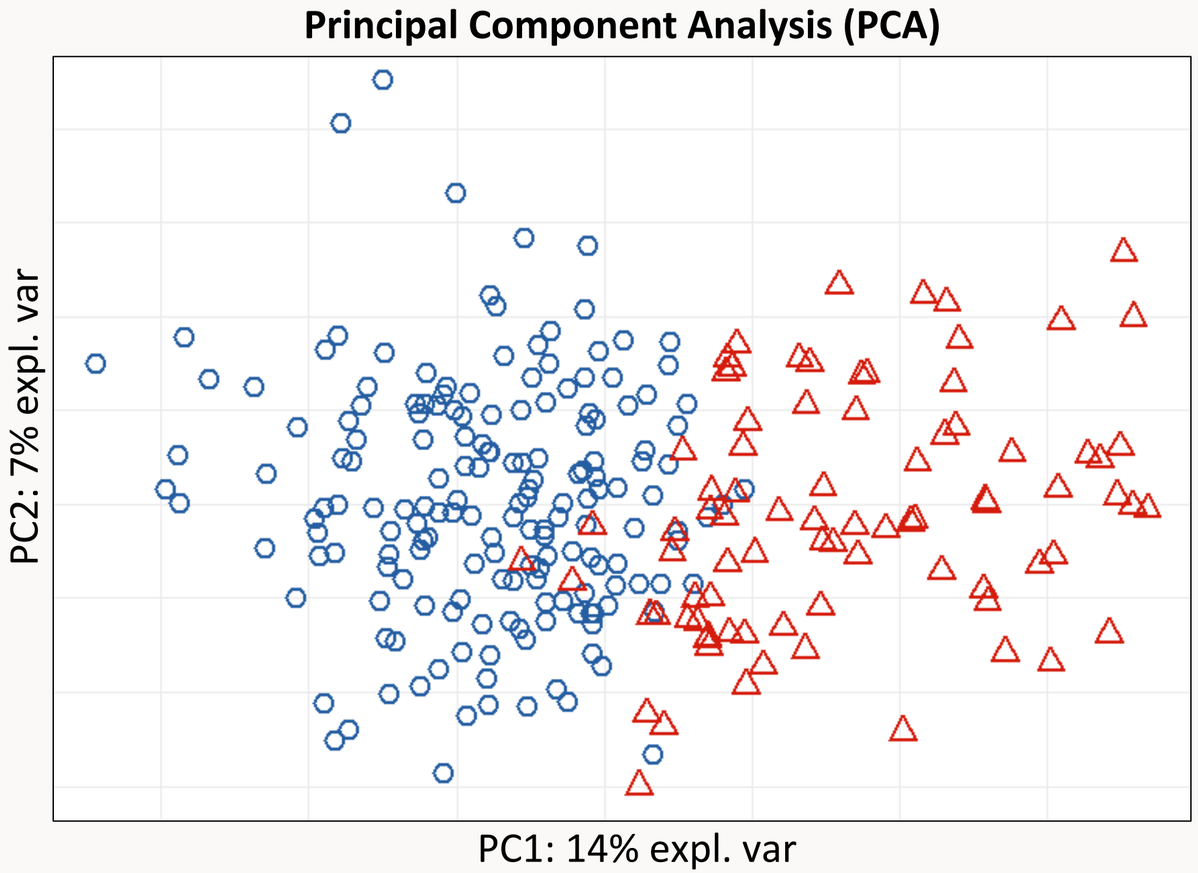
- On total genera table with all samples from all dates
- Distance matrix based on Jensen-Shannon divergence
- Partition around medoids clustering
- Validation: silhouette coefficient

Arumugam 2011, Ramayo-Caldas 2016, Ramayo-Caldas 2019

Results

Microbiota clustering

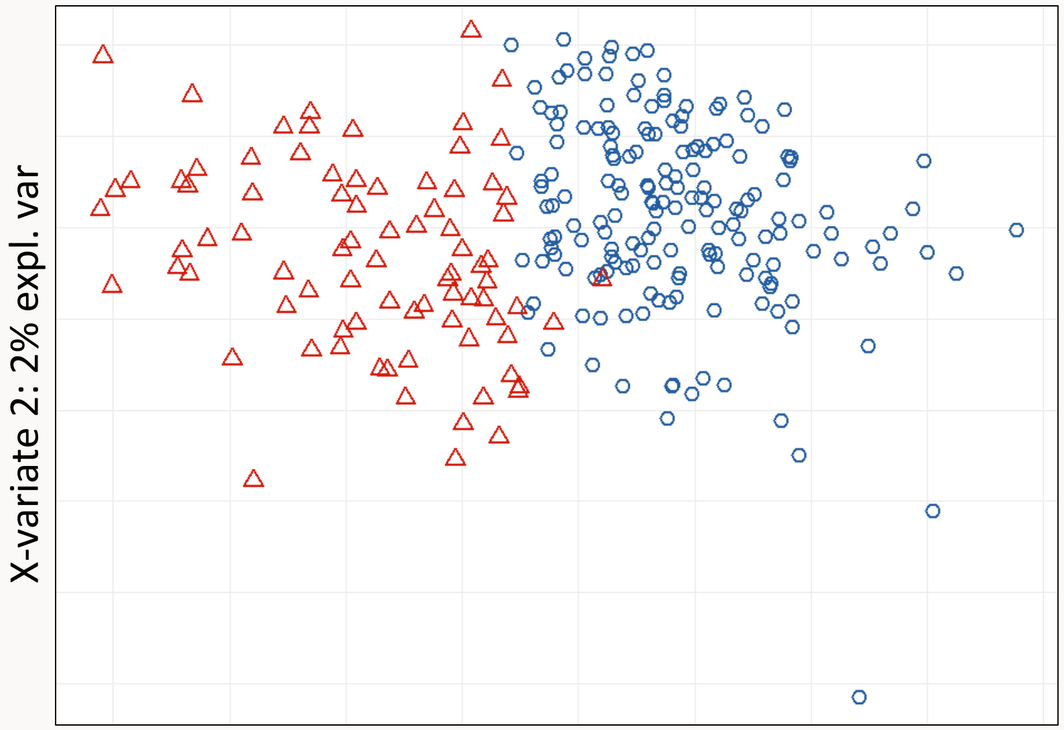


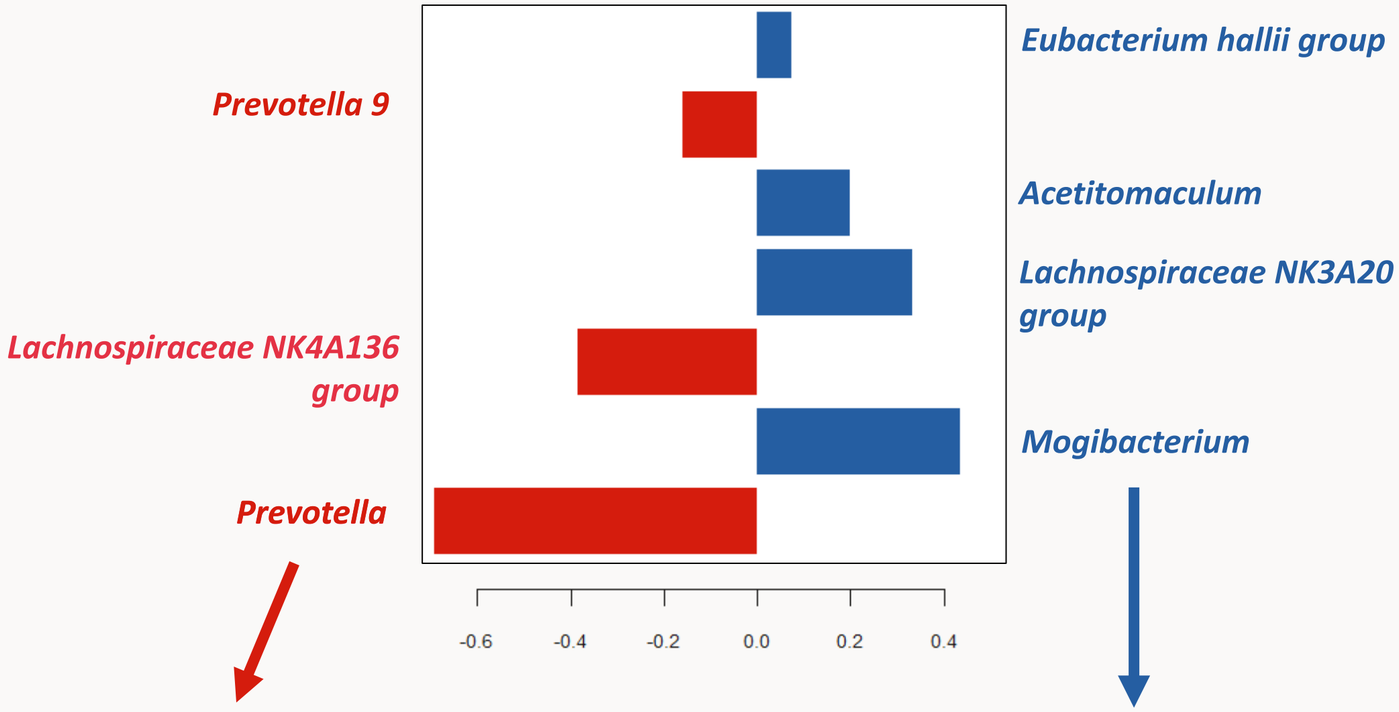


Results

Microbiota clustering

Sparse Partial Least Squares Discriminant Analysis (SPLS-DA)





Prevotella ruminotype = **RuP**

Mogibacterium ruminotype = **RuM**

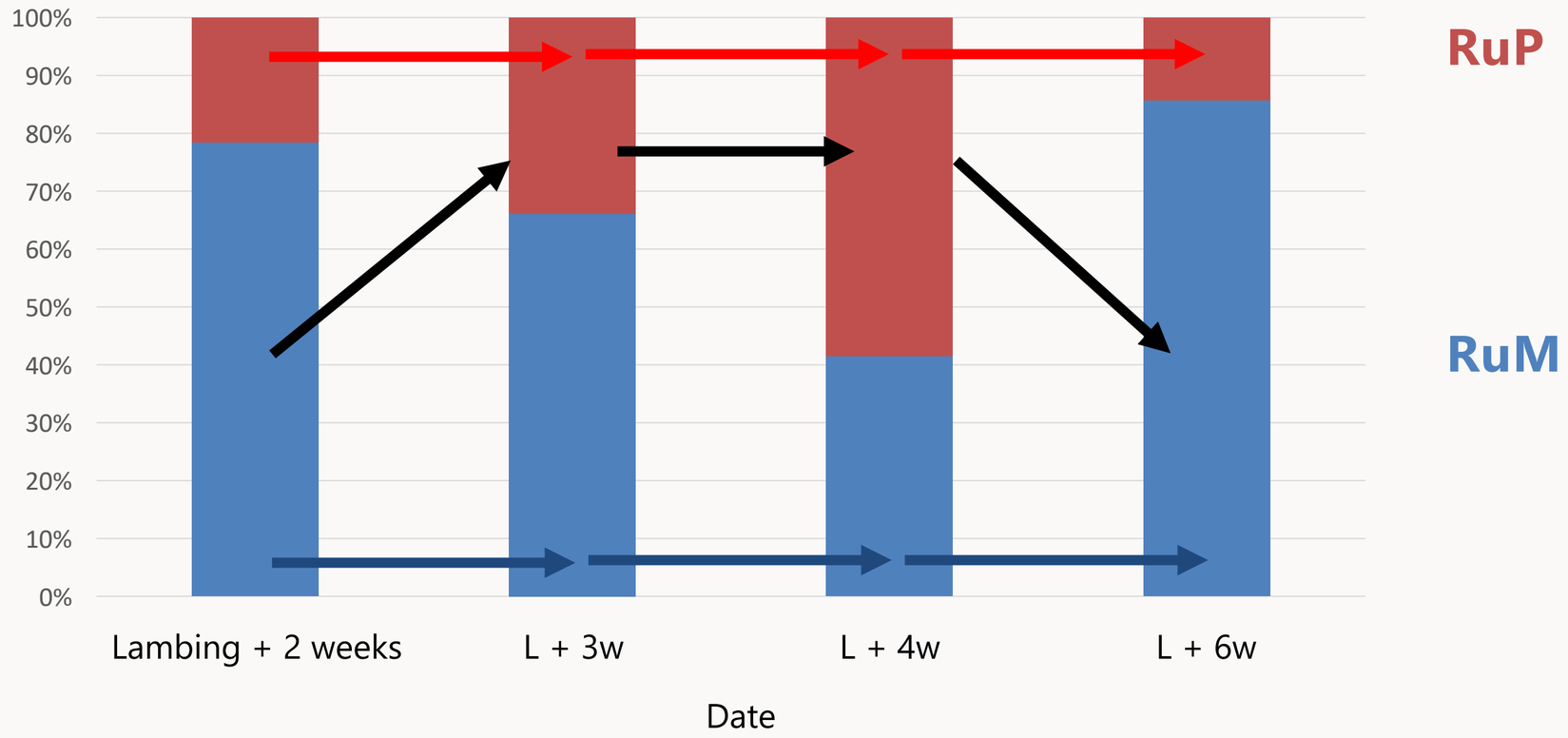
Results

Ruminotypes

Or stay

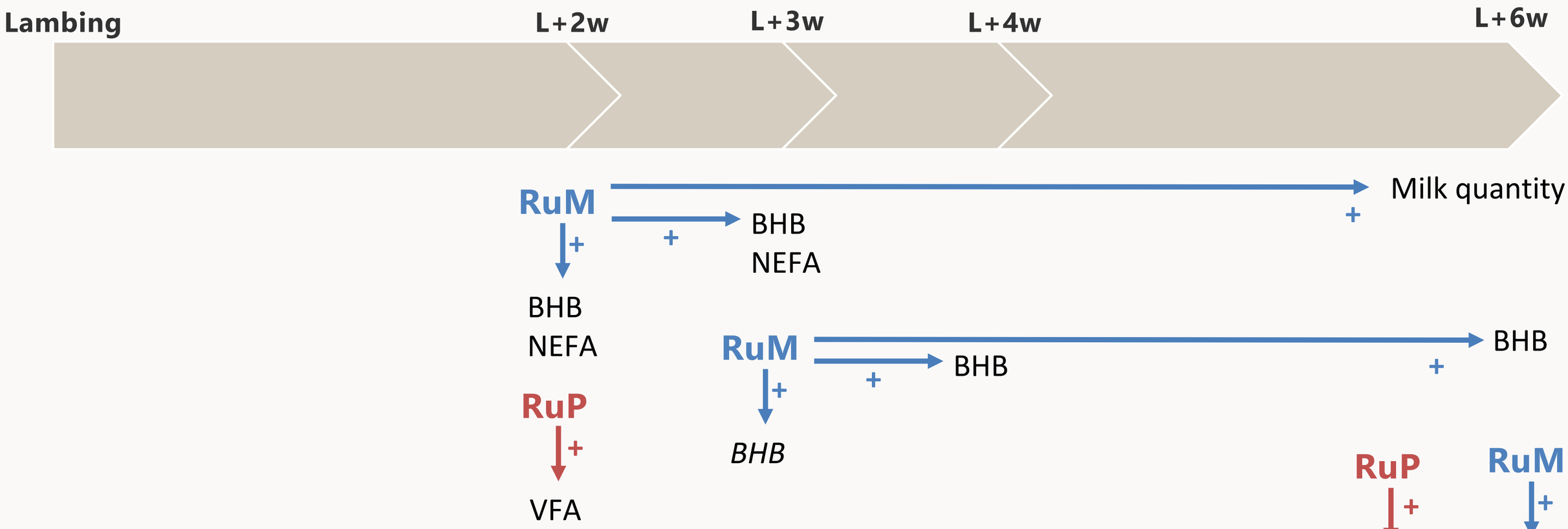
Sheep may change

Or stay



Results

Ruminotypes



BHB: Betahydroxybutyrate
NEFA: Non esterified fatty acids
VFA: Volatile fatty acids

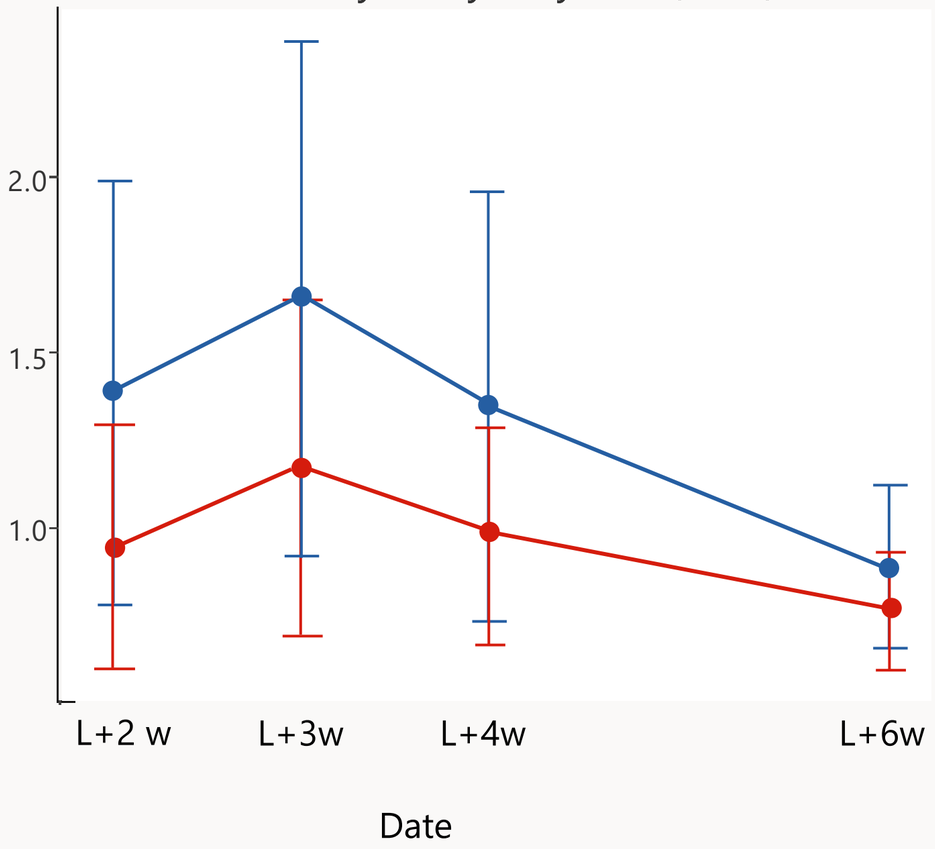
Results

Ruminotypes

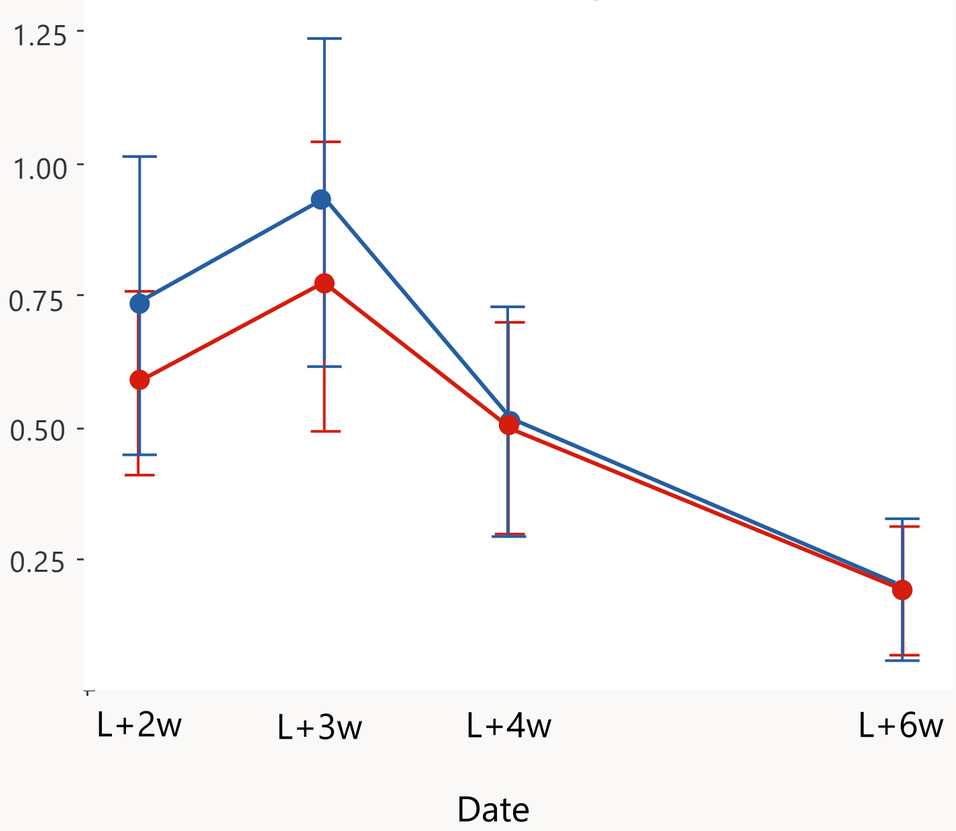
RuM at D1 & D2 (n= 31)

Others (n= 32)

Mean Betahydroxybutyrate (BHB)



Mean Non esterified fatty acids (NEFA)



Conclusion

RuM	RuP
Mogibacterium Lachnospiraceae NK3A20 group	Prevotella Lachnospiraceae NK4A136 group
BHB NEFA Milk production	VFA Milk fat Milk proteins

- Microbiota → Link with lipomobilization
- High lipomobilization → higher milk production?

BHB: Betahydroxybutyrate
NEFA: Non esterified fatty acids
VFA: Volatile fatty acids

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GenPhySE

INRAE

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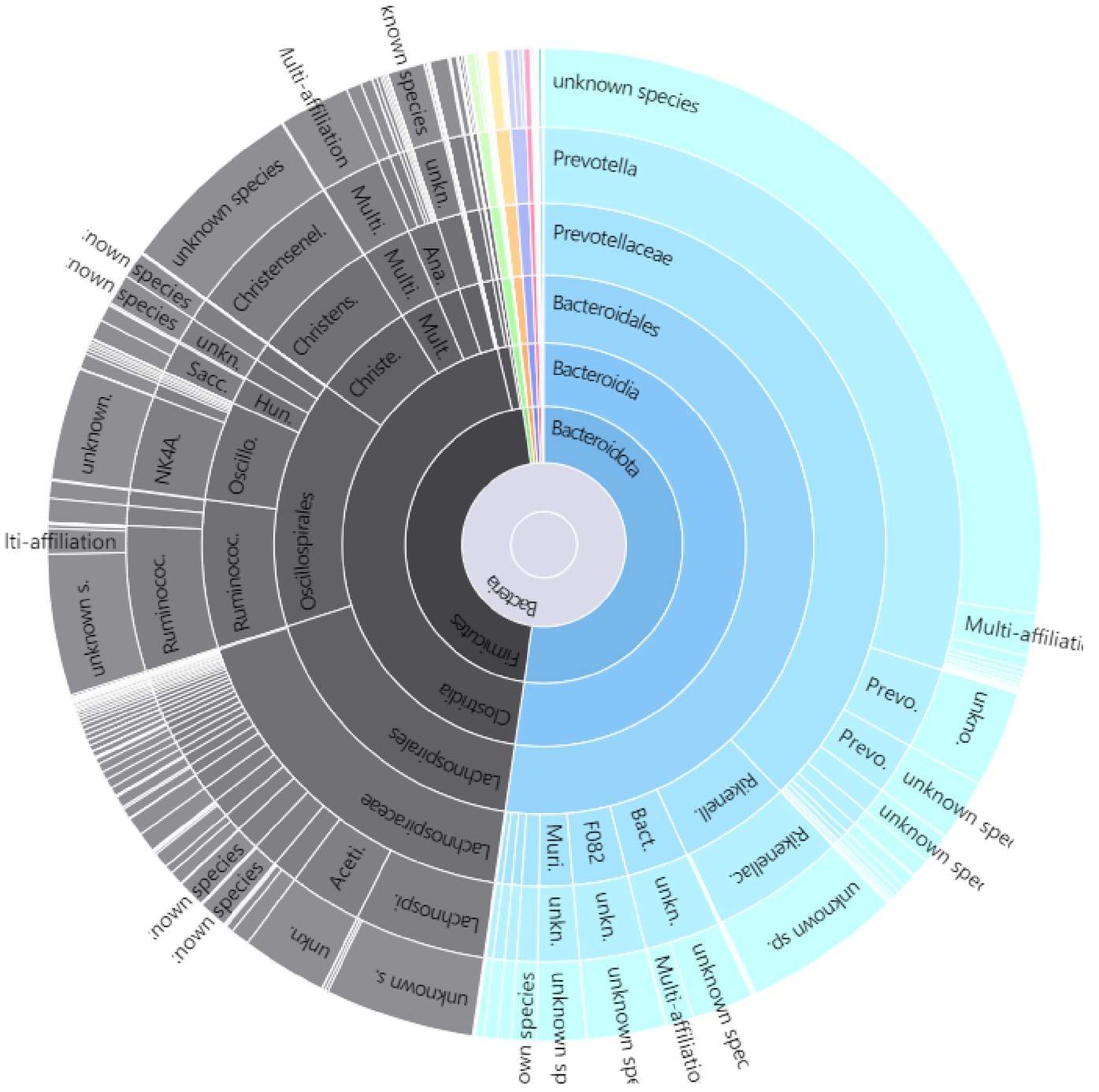
Bacteria
Bacteroidota
Bacteroidia
Bacteroidales
Prevotellaceae
Prevotella
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