

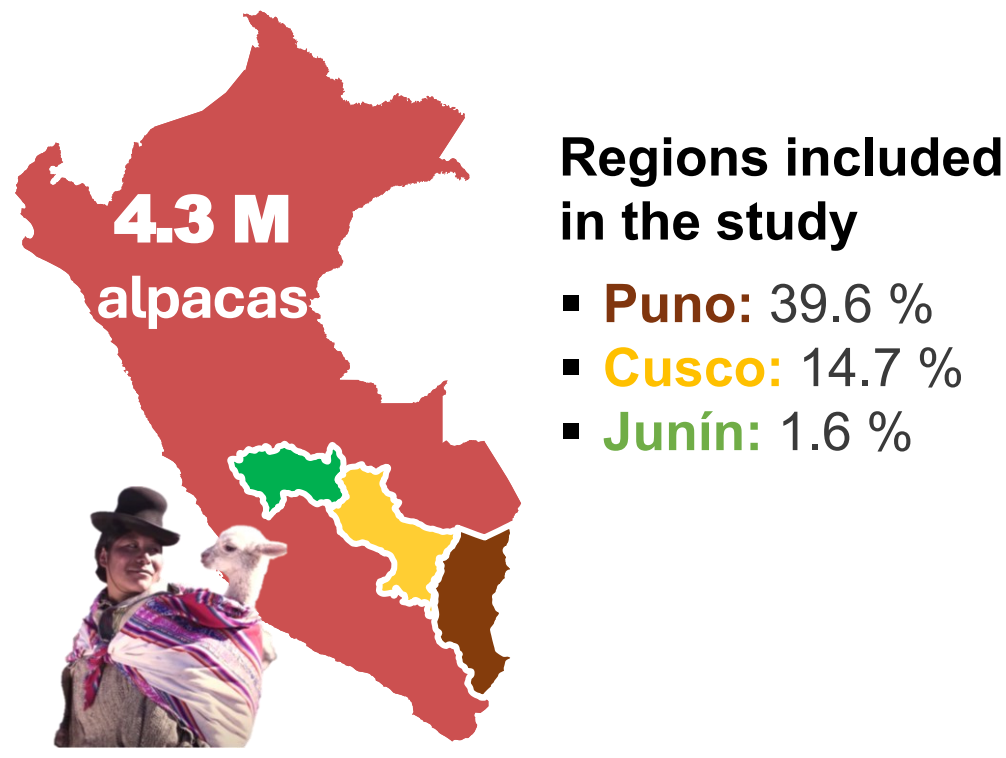
MATERNAL NUTRITION, OFFSPRING PERFORMANCE AND ALPACA RESILIENCE IN ANDEAN AGROECOSYSTEMS

FROM PASTURE QUALITY TO RESILIENT DAM-CRIA SYSTEMS IN THE PERUVIAN ANDES

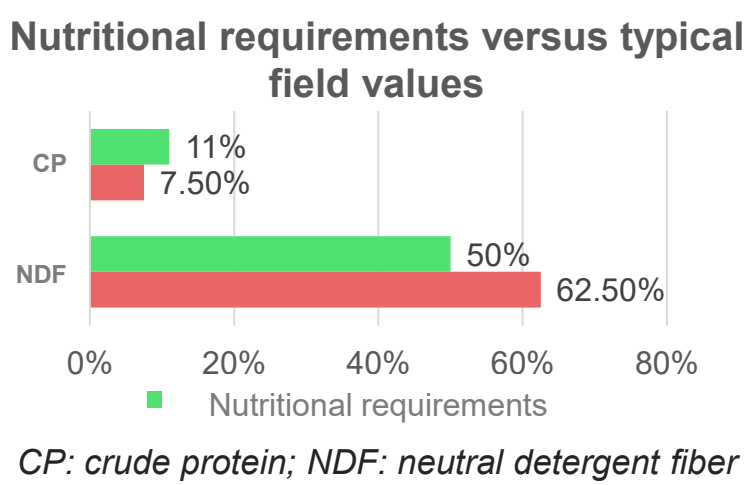
Ana Belén Obregón-Cruz^a, Carlos Alfredo Gómez Bravo^b, Robert John Van Saun^c
^{a,b} Universidad Nacional Agraria La Molina - Lima, Perú ^c Pennsylvania State University, State College – Pennsylvania, USA
✉ abobregonc@gmail.com

I. INTRODUCTION

Peru hosts 87% of the world's alpaca population.



Environmental challenge:
High-Andean conditions
Nutritional variability
Protein deficiency



Physiological response:
Maternal nutrition

Body weight and body condition
Colostrum quality and passive transfer of IgG^{2,3}

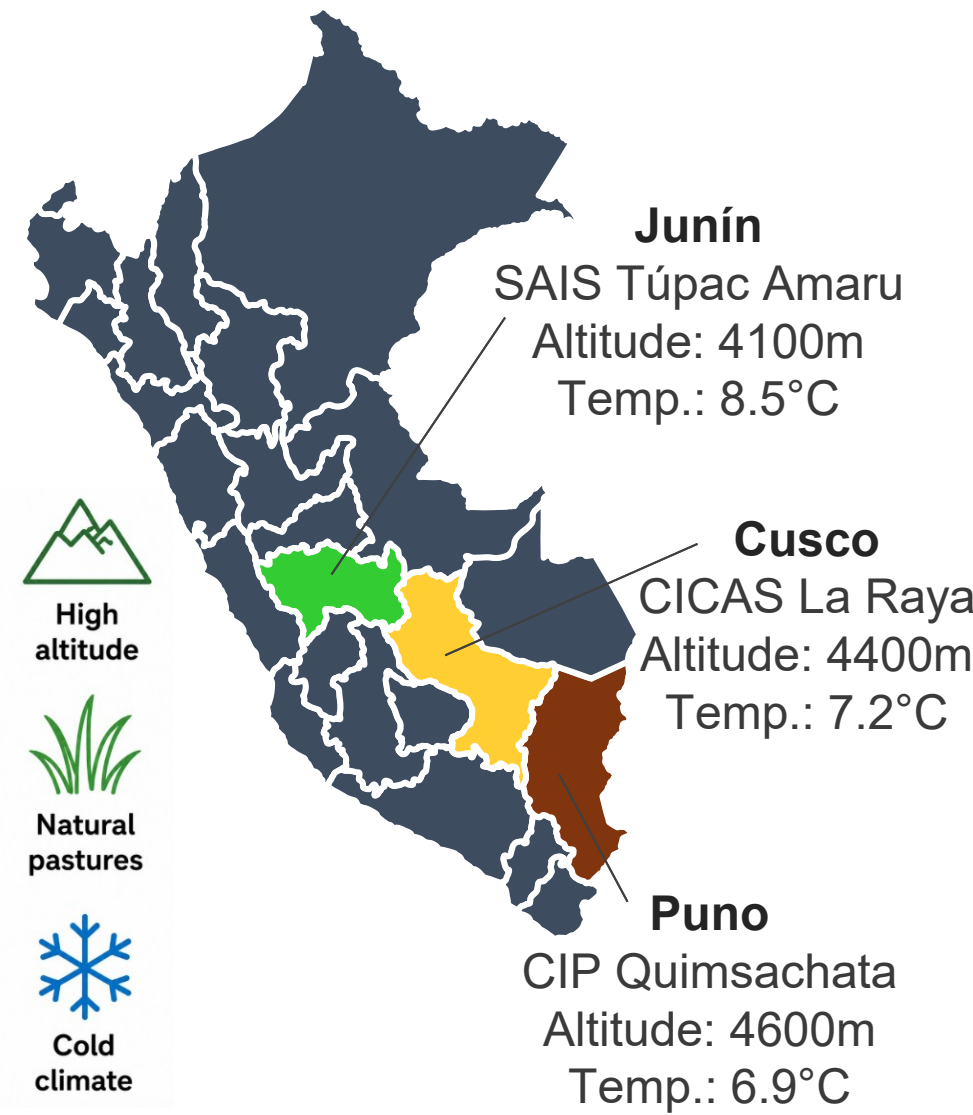


Biological consequence:
Dam-cria dyad

Poor maternal nutrition leads to:
↓ Neonatal performance
↑ Neonatal mortality³



III. METHODOLOGY



150 pregnant Huacaya alpacas (50 per region), fed on natural pastures, were evaluated.



1. Animal selection
25 primiparous and 25 multiparous females



2. Sample collection
Maternal blood
Blood from offspring - 48h
Colostrum



3. Data Collection
Maternal body weight and body condition
Cria birth weight
Time to first suckling



4. Manual grazing simulation
Obtaining diets



5. Sample Processing
Colostrum → Determination of IgG, viscosity, and Brix refractometry (manual and digital)
Blood → Determination of IgG, Brix refractometry (digital), and serum metabolites
Diets → Proximate analysis (CP and NDF)

6. Cria follow-up
Monthly cria weight recording (0–6 months)
Survival recorded up to 60 days

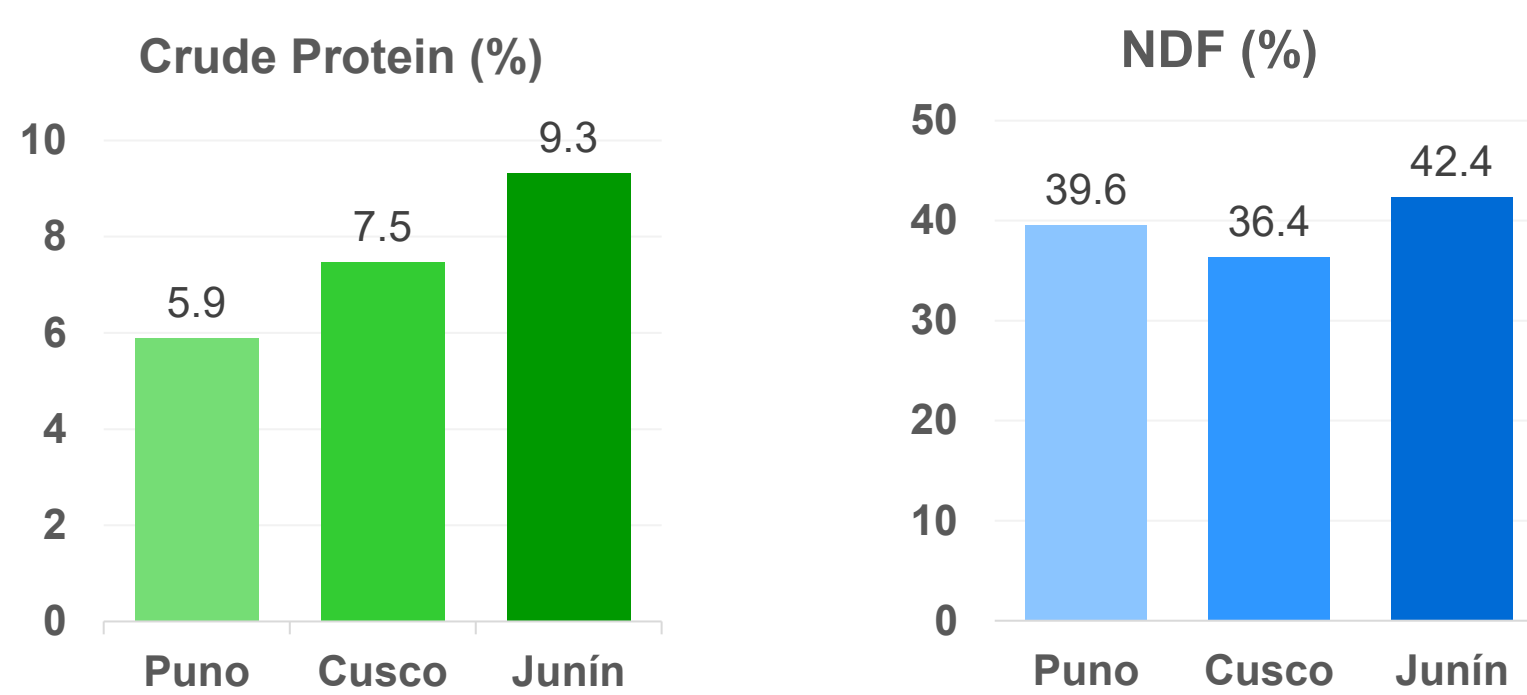
II. OBJECTIVE

To evaluate the relationship between protein nutrition from natural pastures, colostral immunity, and dam-cria performance in primiparous and multiparous alpacas from three regions of Peru.

IV. RESULTS

4.1 Nutritional quality of natural pastures

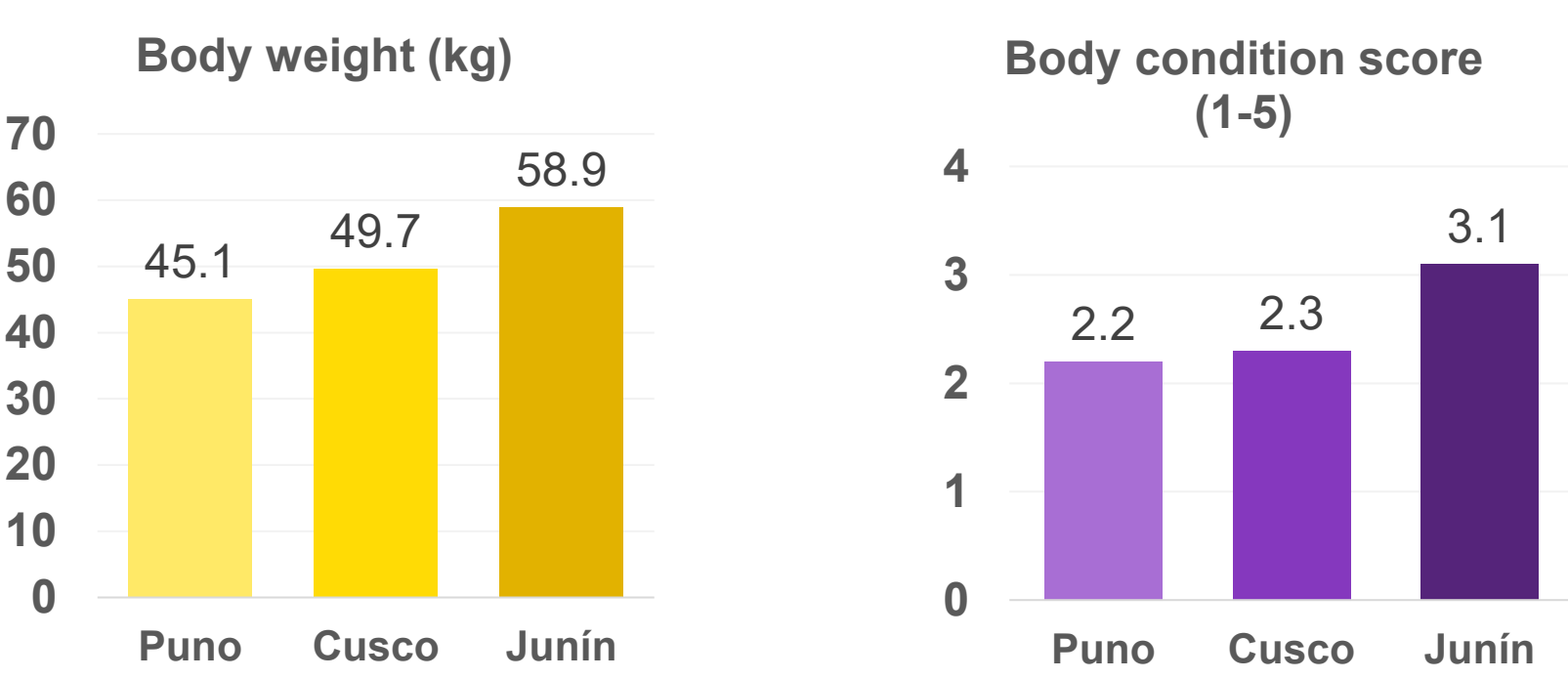
Crude Protein (CP) and Neutral Detergent Fiber (NDF) in diet (simulated grazing)



→ Junín pastures showed the highest crude protein content, indicating superior nutritional quality.

4.2 Maternal nutritional status

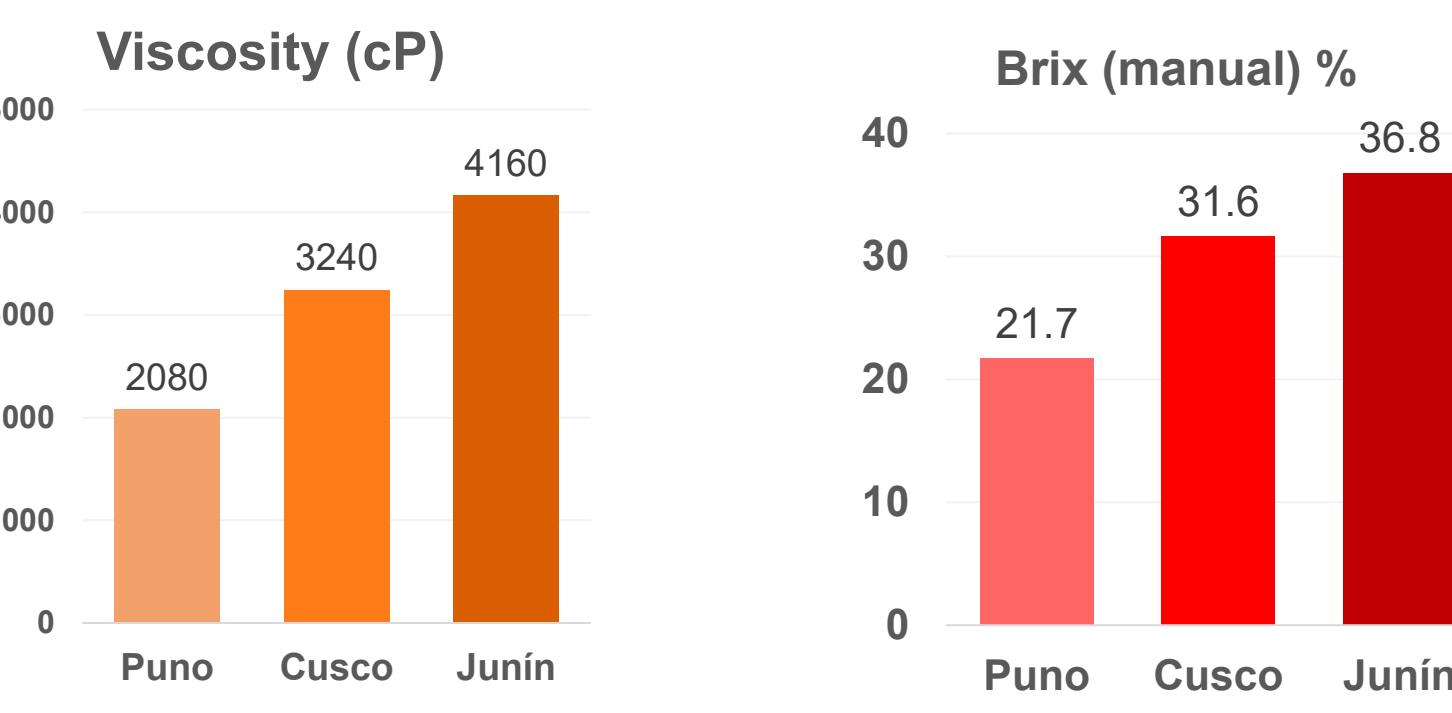
Maternal nutritional status by region (multiparous alpacas)



→ Multiparous alpacas from Junín showed greater body weight and the highest body condition score compared with the other regions.

4.3 Colostrum quality

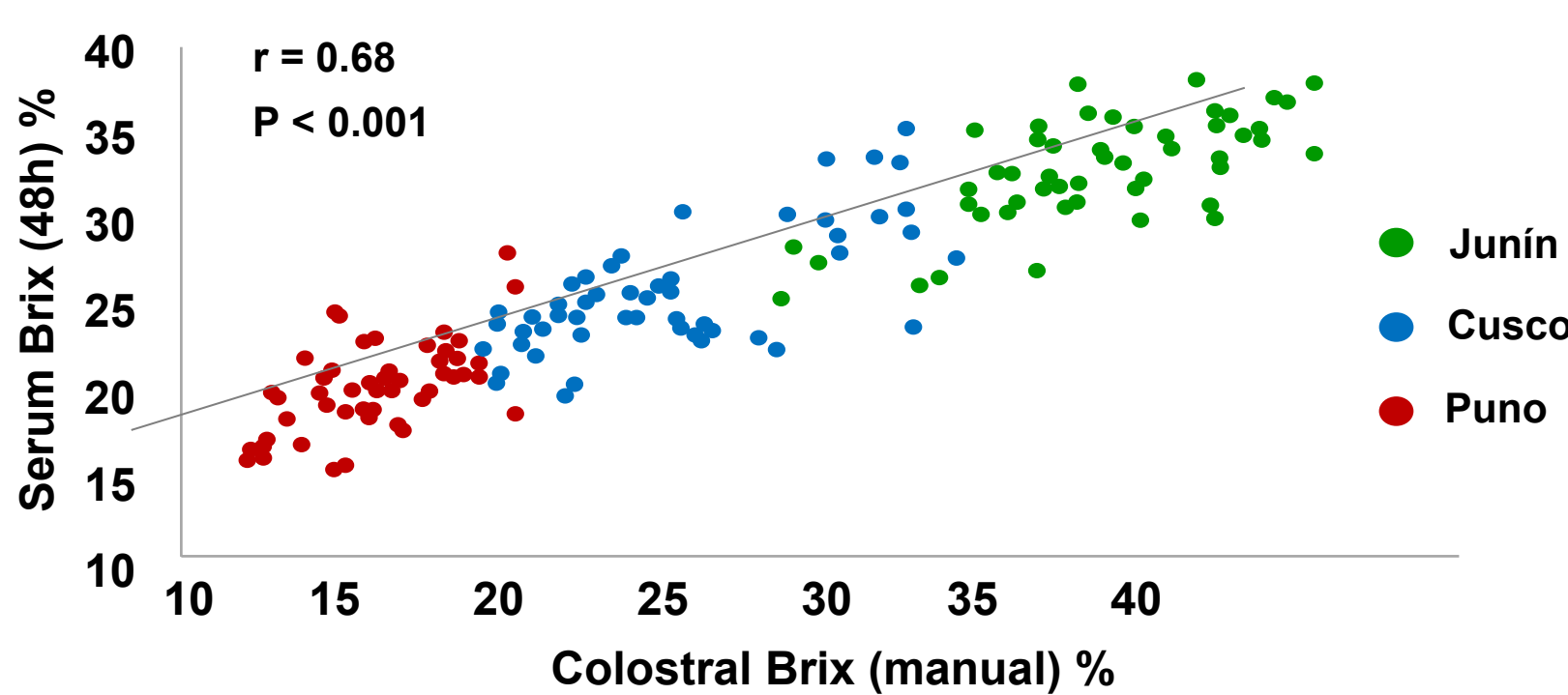
Colostrum quality (0-6 h postpartum) by region (multiparous alpacas)



→ Junín colostrum showed higher Brix and viscosity, indicating greater immunoglobulin concentration.

4.4 Passive immunity transfer

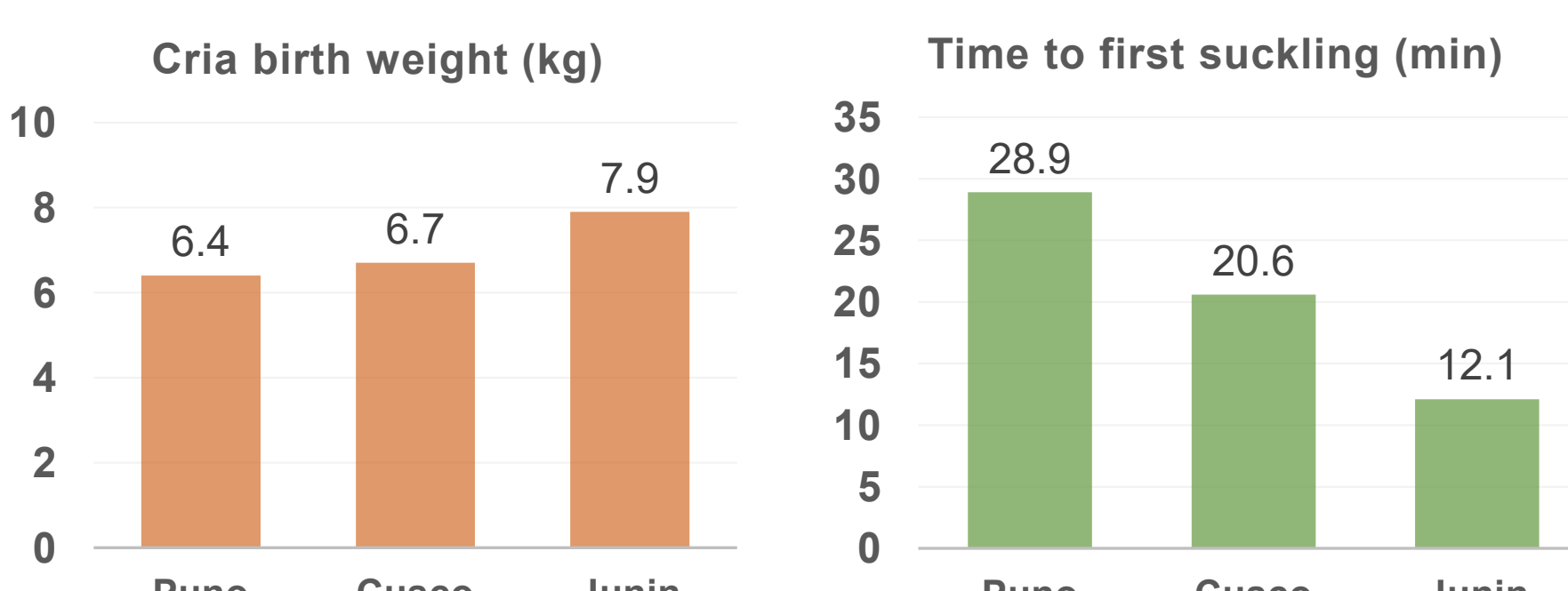
Colostrum Brix vs Serum Brix (48h)



→ Higher colostrum Brix was associated with greater serum Brix (better passive transfer).

4.5 Early neonatal performance

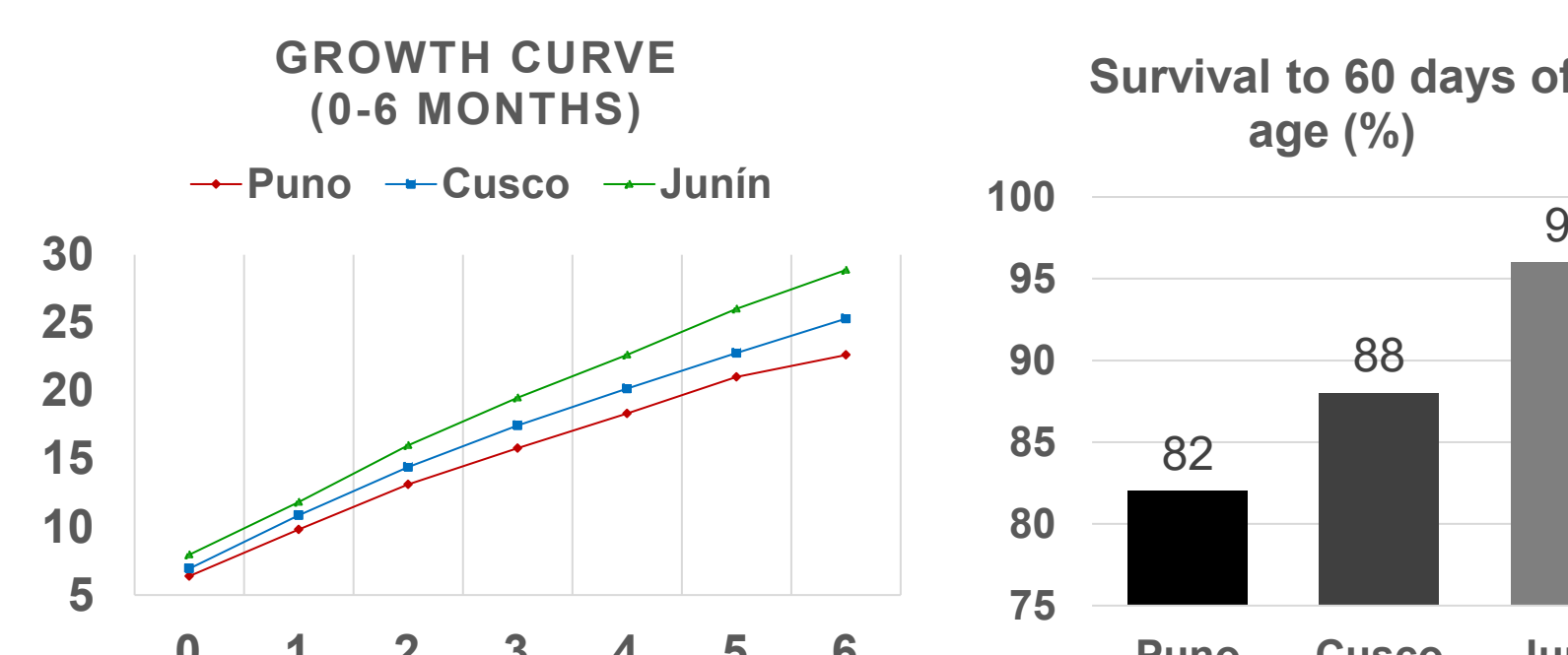
Neonatal performance by region (multiparous alpacas)



→ Crias from Junín showed greater neonatal vigour, reflected in higher birth weight and shorter time to first suckling.

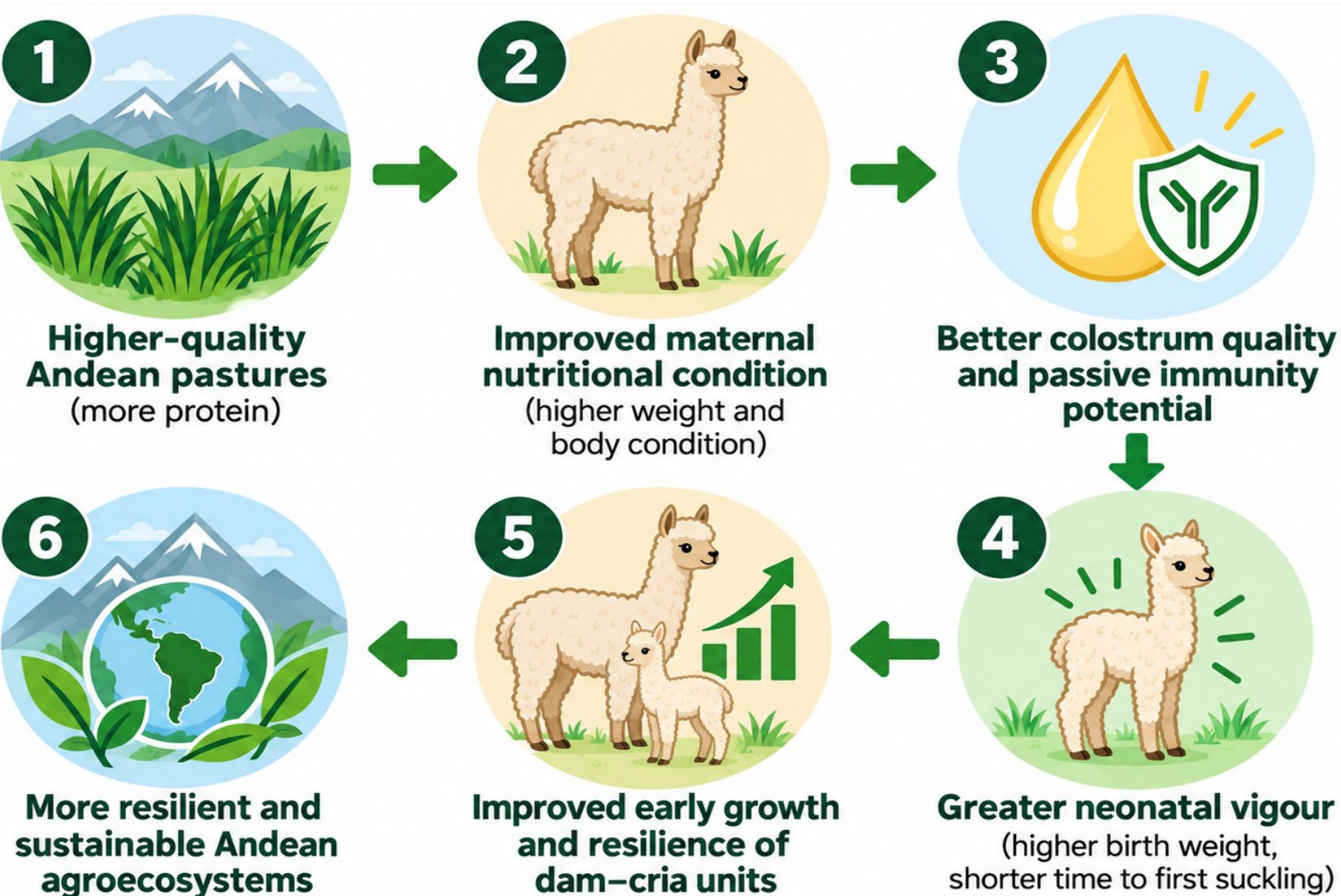
4.6 Early postnatal performance

Postnatal growth and survival by region



→ Crias from Junín showed greater postnatal growth and higher survival to 60 days.

V. BIOLOGICAL INTERPRETATION



TAKE-HOME MESSAGE



Improved maternal nutrition under higher-quality Andean pastures was associated with **better maternal condition, neonatal vigour and early cria performance**, supporting nutrition as a key component of **resilient alpaca production systems**.

VI. CONCLUSIONS

- Natural pasture quality varied among regions, with Junín showing the most favourable nutritional conditions.
- Better maternal nutritional status was associated with greater neonatal vigour and improved early cria performance.
- These findings highlight maternal nutrition as a key factor for the resilience of extensive alpaca production systems.

ACKNOWLEDGMENTS

This study was funded by the National Program for Scientific Research and Advanced Studies (PROCIENCIA), within the framework of the Interinstitutional Alliances for Doctoral Programs project – Phase II: Nutrition. Contract No. PE501084302-2023-PROCIENCIA-BM.

REFERENCES

- [1] Flores O, *et al.* (2025). Diversity 17:353.
- [2] O'Neill AK, *et al.* (2024). Vet Res Commun 48:1563–1572.
- [3] Witte T, *et al.* (2024). World Buiatrics Congress Proceedings.

