

> *Reprod Domest Anim.* 2026 Apr;61(4):e70200. doi: 10.1111/rda.70200.

Genetic Profiles of Alpaca Seminal Plasma Proteins and Their Association With Sperm Quality During Cryopreservation Processes

Cristhél Yverlín Guillen Palomino^{1,2}, Fidel Rodolfo Mujica Lengua², Mijail Contreras Huamani⁴, Maria Ignacia Carretero⁴, Fabian Leonardo Rueda Alfonso⁵, Harumi Rebeca Orellana Berrocal², Kattery Rossabel Cordero Rúa², Wilfredo Huanca López¹

Affiliations – collapse

Affiliations

- 1 Laboratorio de Reproducción Animal, Facultad de Medicina Veterinaria, Universidad Nacional Mayor de San Marcos (UNMSM), Lima, Peru.
- 2 Laboratorio de Biotecnología Animal, Facultad de Ciencias Biológicas, Universidad Nacional de San Cristóbal de Huamanga (UNSCB), Ayacucho, Peru.
- 3 Laboratorio de Biotecnología Reproductiva, Estación Experimental Agraria Cansán, Instituto Nacional de Innovación Agraria (INIA), Ayacucho, Peru.
- 4 Facultad de Ciencias Veterinarias, Instituto de Investigación y Tecnología en Reproducción Animal (INITRA), Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Universidad de Buenos Aires, Ciudad Autónoma de Buenos Aires, Buenos Aires, Argentina.
- 5 Corporación Colombiana de Investigación Agropecuaria - AGROSAVIA, Centro de Investigación Tibaitatá, Cundinamarca, Colombia.

PMID: 41877460 DOI: 10.1111/rda.70200

Abstract

The aim of the study was to characterize the electrophoretic profiles of alpaca seminal plasma (SP) proteins and establish their association with sperm quality parameters at different cryopreservation stages. Sperm quality was assessed in raw, cooled, and thawed semen from 128 ejaculates collected from 16 Huacaya alpacas, and SP proteins were analysed by SDS-PAGE in raw samples. Statistical associations were determined using Spearman's rank correlation ($p \leq 0.05$). Twenty-three protein bands were identified: 21 bands ranging from 9.23 to 138.38 kDa, and 2 below 6.5 kDa. Notably, the 21.03 kDa protein was absent in six males, five of whom also lacked the 18.88 kDa band. These individuals exhibited superior post-thaw sperm quality, particularly higher motility. The 21.03 kDa protein showed a negative correlation ($p \leq 0.05$) with sperm motility and membrane function in raw, cooled, and thawed semen, and a positive correlation with acrosome integrity in thawed semen. Similarly, the 18.88 kDa protein showed a negative correlation with sperm motility and membrane function, but a positive correlation with acrosome integrity in thawed semen ($p \leq 0.05$). In conclusion, these findings suggest that specific SP proteins may serve as potential biomarkers for sperm quality and cryotolerance in alpacas, reflecting individual variability in response to cryopreservation.

Keywords: SDS-PAGE; alpaca; cryopreservation; proteins; seminal plasma; sperm parameters.