

## The Role of Nutrition and Disease on Lamb Survival

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**ABSTRACT:** Juveniles are often the most susceptible demographic to disease, and mothers have a critical influence on the survival of their offspring. Maternal influence on offspring survival can occur through many pathways, including transmission of pathogens, energetic allocation to growth and survival, and behavioral care. One of the greatest conundrums in the conservation of bighorn sheep (*Ovis canadensis*) is why populations dealing with similar suites pneumonia-associated pathogens vary in their ability to recover from outbreaks. To date, the focus on the role of pathogens has overshadowed an understanding of how maternal state and care contribute to recruitment—and ultimately recovery. Using a 5-year dataset of maternal characteristics (pathogens, nutritional condition, immune function), lamb characteristics, pathogen presence and lamb survival in 2 populations of bighorn sheep in Northwest Wyoming, we investigated the relative influence of pathogens and maternal resource allocation on lamb survival. Over the first 6 months of life, the mother's nutritional condition, which reflects the amount of stored energy, was the most influential factor to the survival of her lamb; mothers with more fat reserves have greater probability of raising lambs than mothers with less fat. Energetic resources are first prioritized for the maintenance and survival of the mother; as she gets burdened with increasing energetic demands (i.e., from carrying pathogens, immune function, and reproduction), costs are passed on to her lamb, ultimately coming at the cost of lamb survival. The fundamental role that maternal condition plays on survival of offspring becomes increasingly important in the context of disease.

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