

ANIMAL WELFARE AND CULTURAL HERITAGE IN ALPINE TRANSHUMANT DAIRY SYSTEMS OF VALTELLINA (ITALY)

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This study examines five family operated dairy farms in the upper Valtellina region to assess how animal based welfare outcomes, farmer perceptions and territorial indicators interact within contemporary alpeggio systems.

Alpine dairy farming in Valtellina (Italy) reflects a long cultural continuity shaped by **transhumance** and the communal management of high-altitude pastures. Of the 68 alpine pastures historically documented in Valmalenco, only 27 remain active today.

Triangulated methodology:

- Adapted Welfare Quality® animal based measures
- Structured farmer satisfaction survey
- Field based territorial metrics



Data collected during the summers of 2022–2025

Farms and animals

Five commercial dairy farms (n = 5) practicing seasonal transhumance

250 cows, herd sizes ranging from 50 to 90 heads

Brown Swiss predominant breed across 75% of the sites, remaining herds: Holstein and Red Pied crosses

Extensive **grazing phase** of 90.0 ± 14.7 days. Nutritional management during this period combined **high altitude forage** with **targeted supplementation** for lactating individuals.

Valle-monte transhumance system

livestock are moved from valley floor settlements to high altitude communal or municipal pastures during the summer months

Animal Welfare Assessment

Standardized animal based measures (ABMs) adapted from the Welfare Quality® protocol. Four principles:

- Good Feeding
- Good Housing
- Good Health
- Appropriate Behavior

Farmer Satisfaction and Perception

Structured survey on:

- Management practices
- Perceived animal trust
- Perceived influence of alpine grazing on milk quality

Socio-Ecological Indicators

Traditional management practices to evaluate the ecological role of herds within the landscape.

Two complementary instruments were applied:
1. Animal-level measures 2. Management and infrastructure measures

Transhumant dairy systems in the upper Valtellina region combine **strong traditional ecological knowledge, adaptive management, and high quality human-animal relationships** with structural vulnerabilities that threaten their long term sustainability. Across five alpine sites, **welfare indicators** were generally **positive**: alpine grazing environments can support favourable welfare outcomes when **transitions, nutrition, and management** are carefully coordinated.

Heterogeneity observed among sites—especially in **water infrastructure, pasture condition, and labour availability**—reflects broader socio economic pressures. Producers expressed deep **cultural attachment** to transhumance and cheesemaking traditions, yet voiced **concerns** about **labour shortages, rising costs, and bureaucratic constraints**.

Integrating **welfare oriented monitoring** with the **preservation of pastoral heritage** offers a promising pathway for sustaining these systems. Supporting transhumant dairy systems will require **policies that recognize their multifunctional value**—ecological, cultural, and social—and that address the structural challenges faced by mountain farmers. Without such support, the **risk of abandonment** may accelerate.