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This is the author's manuscript

Original Citation:

Availability:

This version is available <http://hdl.handle.net/2318/2028898> since 2024-10-30T10:04:13Z

Publisher:

EAAP, 2024

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Seasonal nutritional values of *Rubus fruticosus* leaves as a sustainable alternative feed for goat in mountain regions

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Rubus fruticosus leaves, renowned for their medicinal and veterinary uses, have been insufficiently studied for their nutritional value. This study investigates the chemical composition and ruminal degradability of *Rubus fruticosus* leaves in goats and across seasons.

Rubus fruticosus leaves were collected from two valleys in the NW Italian Alps at an altitude of 700m, throughout the year (3 samplings/valley/season). Chemical analysis and *in vitro* tests to measure true and apparent dry matter degradability (TDMD, ADMD), and fiber degradability (NDFD) at 48h were conducted using rumen fluid collected from slaughtered goats.

The results revealed the potential of *Rubus fruticosus* leaves as a promising alternative protein feed with high-fiber compound, but limited NDFD. Seasonal variability significantly affects moisture, crude protein content, and degradability. Spring emerged as the optimal season with the highest nutritional value, including the high crude protein content (21.6% dry matter, DM), moisture (76.2% of fresh matter), ADMD (50.3% DM), TDMD (73.2% DM) and NDFD (25.0% neutral detergent fiber, NDF). Conversely, mineral and fiber compounds, such as NDF, acid detergent fiber, and lignin, remained relatively stable across seasons, averaging 6.3, 37.5, 22.4 and 8.4%, respectively.

In conclusion, *Rubus fruticosus* leaves offer a valuable and sustainable alternative feed for goats, particularly in mountain regions, especially during spring. This presents an opportunity to diversify feed resources, reduce reliance on conventional feeds, mitigate the impact of feed shortages in mountain areas and improve the sustainability of the mountain goat production systems.

Keywords: *Rubus fruticosus* leaves; goat nutrition; seasonal variation; innovative alternative feed; mountain region.