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High-Andean Oat (*Altoandina*) as Alternative for Colombia’s High-Altitude Dairy Systems: An Economic Analysis

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Abstract

In the Colombian high-altitude tropics (2200–3000 m.a.s.l.), Kikuyu grass (*Cenchrus clandestinus*) is the main feed source for the dairy system. This grass species has good characteristics regarding adaptability and productivity, but is affected by frost, grass bugs (*Collaria* sp.) and precipitation-related production seasonality. Forage deficits might thus be a problem at several times in a year. As a strategy to maintain production stable, dairy farmers use commercial feed concentrates increasing their production costs. AGROSAVIA, as a response to this, started in 2005 with the evaluation and selection of new forage species for the Colombian high-altitude tropics. The oat *Avena sativa* AV25T was identified as promising alternative to supply the requirements of dry matter in times of deficit and released as cultivar in 2018 under the name *Altoandina* (high-Andean oat). The objective of this study was to evaluate the economic viability of *Altoandina* in Colombia’s high-altitude dairy systems. *Altoandina* (Aa) was provided as silage in two different diets: 35%Aa-65 % Kikuyu grass (yellow diet) and 65%Aa-35 % Kikuyu grass (red diet). The diet for comparison was traditional grazing with 100 % Kikuyu grass (blue diet). All diets were supplemented with 6 kg commercial feed concentrate, 0.5 kg cotton seeds and 0.5 kg Alfalfa flour per cow/day, respectively. To estimate economic indicators, we used a cashflow model and risk assessment under a Montecarlo simulation model. Including *Altoandina* incremented productivity per hectare by 82.3 % and 220 % in the yellow and red diets, respectively. According to the results of our economic model, the yellow diet is the best alternative. Its average NPV was superior in >80 % and showed a lower variability. The indicators Value at Risk (VaR) and probability (NPV<0) show the yellow diet to have the lowest risk for economic loss under different yield/market scenarios. The yellow diet also has the lowest unit production costs and uncertainty of productive parameters. According to our findings, supplementation with *Altoandina* at 35 %, i.e. during critical times, has high potential to improve efficiency and profitability. This information is key to the decision-making process of dairy farmers on whether or not to adopt this technology.

Keywords: Dairy system, forages, Monte-Carlo simulation, oat, silage, sustainability