nutrient digestibility, and weight gain compared with conventional roughage-based diets, while manipulated starch degradability and non-forage fiber sources can improve feed efficiency and lean tissue deposition by enhancing post-ruminal starch digestion and nutrient utilization. Feed additives and specific supplements, including live yeast (*Saccharomyces cerevisiae*), mulberry leaves, and fermented roughages, have been shown to stimulate average daily gain and feed efficiency by modulating rumen fermentation, antioxidant capacity, immune status, and gut microbiota, particularly under thermal stress. In young goats, early-life feeding strategies that support rumen development—through appropriate liquid feeding, concentrate and roughage management, and functional additives—have lasting benefits on growth and health after weaning (Abdelsattar et al., 2025). Collectively, these findings highlight that growth performance in goats depends not only on nutrient level but also on feeding frequency, physical form of the diet, forage combinations, and the inclusion of targeted functional ingredients.

Building on this growing body of evidence, the present study on "Feeding Strategies for Improving Growth Performance in Goats" aims to systematically evaluate and integrate practical dietary interventions that can be implemented in commercial and smallholder contexts. The specific objectives are to: (i) summarize and compare the effects of different feeding systems (extensive grazing, semi-intensive, and intensive stall-feeding) and ration structures on growth rate, feed efficiency, and carcass-related traits in goats; (ii) assess how key ration design variables—such as energy and protein density, forage–concentrate ratio, starch degradability, forage species combinations, and physical form of the diet—modulate nutrient intake, rumen function, and growth outcomes; (iii) review and, where possible, quantify the contribution of selected nutritional strategies and feed additives (e.g., yeast, hydroponic fodder, functional forages, and plant-based supplements) to improving growth performance under heat stress and other challenging conditions; and (iv) identify feeding strategies that are both biologically effective and economically feasible across diverse production environments, with particular attention to hot climates and resource-limited systems. By integrating controlled trials, meta-analyses, and recent updates on nutrient requirements, the study seeks to provide a framework for designing context-appropriate feeding programs that enhance average daily gain, shorten finishing time, and improve overall productivity in goat enterprises. Ultimately, this work is intended to support producers, nutritionists, and policymakers in adopting feeding strategies that align improved growth performance with sustainability and resilience in goat production systems.

2 Evaluation System of Goat Growth Performance

A comprehensive evaluation system for goat growth performance integrates productive, nutritional, and health–immune indicators to assess feeding strategies effectively. Key productive traits, such as body weight and average daily gain, reflect growth capacity, while nutritional efficiency indicators like feed conversion ratio and digestibility measure how well feed is utilized. Health and immune parameters, including antioxidant status and blood indices, ensure that growth improvements do not compromise animal welfare. This integrated framework enables comparison of feeding systems, diet composition, and management practices, while also providing mechanistic insights through metabolic and rumen-related measurements, supporting the optimization of sustainable goat production.

2.1 Growth rate and body weight gain indicators

Growth rate and body weight gain are primary outcomes for evaluating feeding strategies in goats, because they integrate nutrient intake, metabolic status, and environmental conditions over time. On-farm evaluations and experimental trials typically record live weight at standardized ages (e.g. birth, 3, 6, 9, and 12 months) and compute period-specific ADG to describe growth trajectories and identify sensitive phases. For example, Arsi-Bale kids reached mean weights of 2.0, 7.6, 13.0 and 19.3 kg at birth, 3, 6 and 12 months, respectively, with corresponding daily gains between 40 and 125 g depending on age, agroecology and sex (Guyo et al., 2023). Crossbred Boer × Central Highland goats showed birth to yearling weights from 2.52 to 20.5 kg, with phase-specific gains of 31–80 g/day that were strongly influenced by Boer blood level, birth type and season (Tesema et al., 2021). Such data provide a baseline against which nutritional interventions can be judged.

Controlled feeding trials use ADG and final body weight to quantify the response to diet formulation, feeding level, feed form or supplementation. Raising Saanen dairy kids at 40, 70 or 100% of ad libitum intake produced a