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# A DIET FORMULATION “APP” FOR SMALL/ MEDIUM SCALE DAIRY CATTLE FARMERS IN THE (SUB-)TROPICS

Christian Bateki<sup>1</sup>, Uta Dickhoefer<sup>1\*</sup>

<sup>1</sup>University of Hohenheim, Institute of Agricultural Sciences in the Tropics (Hans-Ruthenberg-Institute), 70599 Stuttgart, Germany

\*Corresponding author: Prof. Dr. Uta Dickhoefer, Fruwirthstraße 31, 70593 Stuttgart, Email: [aninutrop@uni-hohenheim.de](mailto:aninutrop@uni-hohenheim.de), Tel.: + 49 (0) 711 459 23650, Fax: + 49 (0) 711 459 23702

## Keywords

Dairy cattle; small- and medium-scale farmers; diet optimization; energy and protein nutrition; (Sub-)Tropics

## ABSTRACT

Small- and medium-scale (SMS) dairy cattle production plays a key role in meeting the growing demand for animal-based food products in the (Sub-)Tropics. However, limited feed quality and knowledge of SMS dairy cattle farmers on improved cattle feeding hamper cattle reproductive and productive performance in the (Sub-)Tropics. The use of digital tools to provide access to existing knowledge on the nutritional quality of local feed resources and precisely estimate and meet the energy and protein requirements of dairy cattle in the (Sub-)Tropics is proposed to improve productivity.

Therefore, an online-based diet formulation mobile “app” for estimating the energy and protein requirements of three dairy cattle breed categories (i.e. local, cross, and exotic breeds) in the (Sub-)Tropics was developed. The diet formulation tool is composed of three components: (1) a database summarizing the nutritional characteristics and feed specific secondary information such as feed prices of over 230 (sub-)tropical ruminant feedstuffs; (2) a calculator module that estimates the animals’ daily energy and protein requirements; and (3) a solver (i.e. linear program) that optimizes diet composition driven by the energy and protein content required in the diet, the feeding costs, and physiological limits for supply of specific nutrients to the cattle.

Based on this, the diet formulation tool suggests 4 – 5 diets combining the user-defined feedstuffs, each optimized for a different objective (e.g. maximum animal performance, improved rumen health, minimum feeding cost, or improved rumen health and minimum feeding costs).

This diet formulation mobile “app” could help SMS dairy cattle farmers in the (Sub-)Tropics to (1) avoid under- and over-supply of energy and protein to animals of different herd classes; (2) thereby enhance cattle reproductive and productive performance and increase feed conversion efficiency of local feed resources; and (3) secure access to dairy-based foods for own consumption and higher income from sales.

Further research and development is needed to improve farmer usability and validate the equations here developed to estimate the energy and nutrient requirements of different dairy cattle breeds kept in the (Sub-)Tropics.