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Canned Complementary Porridges Based on African Indigenous Crops; Nutritious, Affordable, and Convenient Food for Infants

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Abstract

Introduction: The lack of high-quality and affordable complementary food causes malnutrition in African infants. The aim of this study was to develop canned complementary infant porridges based on African indigenous crops, such as orange fleshed sweet potato (OFSP), cowpea, bambara groundnut, teff, maize, finger millet (FM), and amaranth, in an industrial pilot scale focusing on Protein/Energy content, oral processing, sensory, and affordability. The African cereal crops are rich in minerals and vitamins, whereas cowpea and bambara groundnut are oil- and protein-rich, and OFSP is rich in β-carotene and provitamin A. Thus, it may be beneficial to combine them in commercial complementary infant meals to achieve nutritious diets from a food-to-food fortification perspective.

Method: Six prototype porridges were prepared in water with combinations of flours, and amended with skimmed milk powder (SMP), boiled and filled in 100 g cans which were sterilized to F0=12. Reference porridges (maize and FM, with SMP) were cooked for comparison. Prototypes and references were designed with a solids content of ~12.5 % to achieve a defined recommended low viscosity to ensure oral processability in infants. Flow properties of porridges were determined using a hybrid rheometer (Discovery HR-2) at 40 °C at shear rates 1, 10 and 50 s-1. Sensory analysis was performed by a Quantitative Descriptive Analysis (ISO 13299:2016) and Temporal Dominance of Sensations. Chemical analysis of main nutrients was performed by standard methods.

Results and Discussion: All complementary porridges were higher in energy than the FM reference but lower than the Maize reference. Five of the prototypes were higher in protein content than both Maize and FM reference. Viscosity could be considered acceptable for infants with values 1.1-1.9 Pa s at shear rate 10/s. Higher proportions of OFSP and leguminous flour contributed to lower viscosity, but also a more intense vegetable odour/flavour, whereas reducing OFSP and legumes to <20% of total dry weight resulted in sensory profiles more similar to the reference samples.

Conclusions: The proposed prototypes are rich in protein and energy, approaching the recommended limits set by WHO for fortified complementary foods for infants, and with satisfactory rheology and sensory properties.

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Dr. Trond Løvdal is a researcher and project leader at Nofima, Department for Processing Technology, since 2009. He obtained his PhD in Microbiology in 2007 from the University of Bergen. He then worked two years as a Post-Doctoral fellow at the University of Stavanger, Centre for Organelle Research. Dr. Løvdal has special competence in general microbiology, molecular microbiology, and food safety and hygiene. He has also coordinated and participated as WP-leader in several national and international research projects spanning from sustainable vegetable food production, development of novel industrial food processing technologies, Design for Cleaning, validation of novel food processing cleaning systems, development of molecular methods for pathogen detection, etc. Dr. Løvdal has published 40 papers in international peer-reviewed journals, receiving >1900 citations.