Abstract

Disclosed is a region-adaptive dairy platform that generates milk fortified with pathogen-specific secretory immunoglobulin A (sIgA) to strengthen mucosal immunity, especially in immunocompromised, pediatric and elderly populations. An analytics module continuously ingests public-health, clinical-laboratory and wastewater data to rank regional pathogens; antigens exceeding defined thresholds are formulated into a polyvalent vaccine. Dairy animals are primed and boosted on a scheduled or emergency basis with Alum + CpG adjuvants, inducing ≥0.2 g L^{-1} functional sIgA in the resulting milk. Gentle HTST or lyophilization preserves antibody activity for ≥21 days (liquid) or 18 months (powder). A rapid IgA diagnostic identifies consumers with low endogenous IgA who benefit most. The integrated system, compositions and methods provide scalable, low-cost, dynamically updated passive immunization and are claimed herein.

Pending processing