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Antioxidant properties of yoghurt fortified with cocoa powder and the impact of supplementation on the consumer acceptability in Southwest Nigeria

Nwanna Esther Emem¹, Ayo-Omogie H N¹ and Eguavoen Esosa A²¹Federal University of Technology, Nigeria²Olam Nig. Limited, Nigeria

The increasing awareness of the nutritional and functional benefits of cocoa powder requires its adoption into foods to enhance its utilization. This study investigated the possibility of incorporating cocoa powder into milk for yoghurt production and the effect of this incorporation on the nutritional and antioxidant properties, as well as consumer acceptability of the cocoa-milk yoghurt. Skimmed milk was replaced with graded levels of alkalized cocoa powder (10-50%) and used to prepare yoghurt using standard method. The products were thereafter evaluated for their nutritional composition, microbiological quality, antioxidant properties and sensory attributes. Physical evaluation of the products showed that viscosity (which ranged from 0.28-0.35 dpa^s) decreased as cocoa powder supplementation increased; while brix which increased initially, decreased as the inclusion level increased. Although acidity varied, pH was not significantly affected. Proximate chemical composition of the yoghurts ranged from 6.24-6.73%, 0.11-0.24%, 0.74-1.01%, 0.10-0.21% and 8.58-9.81% for crude protein, crude fat, total ash, crude fiber and carbohydrate all of which increased significantly as cocoa powder supplementation increased, while moisture decreased. Ca (50.21-110.21 mg/l), Mg (64.07-164.71 mg/l), K (81.53-711.65 mg/l), Na (22.05-120.70 mg/l), Zn (5.38-17.58 mg/l), Fe (1.47-3.42 mg/l) increased, while P (110.20-120.69 mg/l) and Cu (0.03-0.04 mg/l) were not affected. Vitamins A, B₁, B₂, B₃, C and E contents increased significantly, while D decreased. Significant increase ($p < 0.05$) was observed in the antioxidant properties (total phenols, flavonoids, 1,1-diphenyl-2 picrylhydrazyl (DPPH radical scavenging ability) of the yoghurt with increase in cocoa powder supplementation. Furthermore, supplementation with 10-50% cocoa powder made significant improvement on the flavor and color of yoghurt and panelists preferred the milk-cocoa yoghurt as compared to the conventional plain milk yoghurt for its unique pleasant chocolate characteristics. Increasing inclusion of cocoa powder significantly improved the nutritive value and antioxidant potentials and by extension the health-promoting potentials of yoghurt.

esthernwanna@gmail.com