Elucidating the origin of production of milk powder commercially distributed on the Chinese market using multi element stable isotope technique

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The economically motivated adulteration of milk powder in the Chinese market has increasingly become a major public concern. The study was done to ascertain the feasibility of utilizing δ2H, δ18O and δ15N stable isotope technique in elucidating the authenticity and origin of milk products on the Chinese market. Milk powder from North America, Oceania and China were analyzed. An elemental analyzer was connected to an isotope ratio mass spectrometer operated in the continuous flow mode was utilized. Statistical analysis was performed using descriptive statistics and one-way ANOVA. The study revealed that both δ2H and δ18O had a wide range of mean values: 13.86 to 22.25‰ and -82.86 to -28.5‰, respectively. There was a significant difference in the δ2H and δ18O composition of the milk samples of (P<0.05; F=20880) and (P<0.05; F=1399.0), respectively. Both the δ2H and δ18O isotopic technique could provide a clear distinction between all the specific regions-of-origins that were evaluated except between the northern part of China (mean=21.63) and New Zealand (mean=21.62), δ18O isotopic could not discriminate. The feasibility of δ2H and δ18O is mainly based on the distinct isotopic signatures of water in different geographic localities. The range of the mean δ15N values of the samples was very close, 3.06 to 5.61‰. The nitrogen stable isotope could not provide a clear distinction for most of the milk products because δ15N of an animal reflects that of the diet. Hence in cases of similar diet, it cannot provide a distinction between the animals using this technique.

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