Supplementary Materials

Table S1. FA calculation formulas.

Formulas

$$X_i = F_i \times \frac{A_i}{A_{C11}} \times \frac{\rho_{C11} \times V_{C11} \times 1.0067}{m} \times 100 \qquad （1）$$

$$F_i = \frac{\rho_{Si} \times A_{11}}{A_{Si} \times \rho_{11}} \qquad （2）$$

$$X_{SFA_i} = X_{FAME_i} \times F_{FAME_i - FA_i} \qquad （3）$$

$$X_{Saturated\ Fat} = \Sigma X_{SFA_i} \qquad （4）$$

$$X_{MUFA_i} = X_{FAME_i} \times F_{FAME_i - FA_i} \qquad （5）$$

$$X_{Mono-Unsaturated\ Fat} = \Sigma X_{MUFA_i} \qquad （6）$$

$$X_{PUFA_i} = X_{FAME_i} \times F_{FAME_i - FA_i} \qquad （7）$$

$$X_{Poly-Unsaturated\ Fat} = \Sigma X_{PUFA_i} \qquad （8）$$

$$F_{FAME_i - FA_i} = \frac{M_{FA_i}}{M_{FAME_i}} \qquad （9）$$

$$X_{Total\ Fat} = \Sigma X_i \times F_{FAME_i - TG_i} \qquad （10）$$

$$F_{FAME_i - TG_i} = \frac{M_{TG_i} \times \frac{1}{3}}{M_{FAME_i}} \qquad （11）$$

Note: Formula (1) X_i is the FAMEi content in the sample, the unit is grams per hectogram (g/100g); F_i is the response factor of FAMEi; A_i is the peak area of FAMEi in the sample; A_{C11} is the peak area of the internal standard substance-methyl undecacarbonate added to the sample; ρ_{C11} is the concentration of triglyceride undecanoate in milligrams per milliliter (mg/ml); V_{C11} is the volume of triglyceride undecacarbonate added to the sample, in milliliters (ml); 1.0067 is the conversion factor of triglyceride undecacarbonate into methyl undecacarbonate; m is the mass of the sample, in milligrams (mg); 100 is a factor to convert the content to the content per 100 g of the sample.

In formula (2), ρ_{Si} is the concentration of each FAMEi in the mixed standard, in milligrams per milliliter (mg/ml); A_{11} and A_{Si} are the peak areas of methyl undecacarbonate and FAMEi, respectively.

In formula (3) and formula (4), $X_{Saturated\ Fat}$ and X_{SFAi} are the SFA content and the single SFA content in the sample, respectively, and the unit is grams per hectogram (g/100g); X_{FAMEi} is the content of SFA methyl ester, in grams per hectogram (g/100g); $_{-FAi}$ is the coefficient for converting FAME to FA.

In formula (5) and formula (6), $X_{Mono-Unsaturated\ Fat}$ and X_{MUFAi} are the MUFA content in the sample and the single MUFA content in the sample, respectively, in grams per hectogram (g/100g); X_{FAMEi} is the content of each MUFA methyl ester, in grams per hectogram (g/100g).

In formula (7) and formula (8), $X_{Poly-Unsaturated\ Fat}$ and X_{PUFAi} are the content of PUFA and single PUFA in the sample, respectively, the unit is grams per hectogram (g/100g); X_{FAMEi} is the content of a single PUFA methyl ester, in grams per hectogram (g/100g).

In formula (9), M_{FAi} and M_{FAMEi} are the molecular weights of FAi and FAMEi, respectively.

In formulas (10) and (11), $X_{Total\ Fat}$ is the total fat content in the sample in grams per hectogram (g/100g); X_i is the content of a single FAMEi in the sample in grams per hectogram (g/100g); $F_{FAMEi-TGi}$ is the coefficient of conversion of FAMEi into triglyceride; M_{TGi} is the molecular mass of FA triglyceride I; M_{FAMEi} is the molecular mass of FAMEi.

Table S2. Formulas for the calculation of TFAs.

Contents	Formulas	
The relative mass fraction of each component tFAME	$\omega_X = \dfrac{A_X \times f_X}{A_t} \times 100\%$	（12）
TFA mass fraction in fat	$\omega_t = \Sigma\omega_x$	（13）
Fat mass fraction in food	$\omega_z = \dfrac{m_1 - m_0}{m_2} \times 100\%$	（14）
TFA mass fraction in food	$\omega = \omega_t \times \omega_z$	（15）
FID correction factor for each component	$f_x = \dfrac{F_X}{F_{16:0}}$	（16）
FID response factor for each component	$F_X = \dfrac{M_X}{(n_X - 1)A_C}$	（17）

Note: Formula (1) Note: Formula (12) x is the relative mass fraction of the TFA component X species of FAME calculated by the normalization method, %; A_x and f_x are the peak area and correction factor of FAME in component x, respectively; A_t is the sum of the calibrated areas of all peaks after removal of the solvent peak.

In formula (13), ω_t is the mass fraction of TFA in fat, %.

Formula (14) ω_z is the mass fraction of fat in the sample, %; m_0 and m_2 are the mass of the round-bottomed flask and the sample, respectively, in grams (g); m_1 is the total mass of the round bottom flask and fat in grams (g).

In formula (15), ω is the mass fraction of TFA in food, %; ω_z is the mass fraction of fat in food, %. In formula (16), f_x is the correction factor of FAME in component X; F_x is the response factor for the FID of FAME in component X; $F_{16:0}$ is the FID response factor for C16:0 (as a reference value, 1.407).

In formula (17), M_x is the relative molar mass of FAME in component X; n_x is the number of carbon atoms contained in FAME in component X; A_C is the relative atomic mass of the carbon atom (12.01).

Table S3. Comparison of FA content of deep-fried dough stick samples from five cities (g/100 g).

Region	Fatty acid content			
	MUFA	**PUFA**	**tFA**	**SFA**
Beijing	6.188±3.921	8.973±3.199	0.209±0.113	4.233±1.942
Shijiazhuang	3.695±1.441*	6.451±2.347	0.222±0.109	4.048±1.998
Hangzhou	4.944±1.993	9.222±3.980	0.275±0.186	4.127±2.045
Guangzhou	7.235±3.518	5.010±3.409*	0.183±0.107	8.638±4.740
Chongqing	6.524±3.685	9.480±2.163	0.247±0.150	3.622±0.696

*It indicates that there is a significant difference compared with Beijing Formation (P<0.05)