

Figure S1. Top 10 metabolites in beef tallow prepared from muscle tissue.

The metabolites were quantified using gas chromatography-mass spectrometry.

The water-soluble fraction was extracted from beef tallow and subjected to GC/MS analysis (GCMS-QP2010 Ultra, Shimadzu Corporation, Kyoto, Japan) using conventional methods [1].

Quantification using the peak area ratio (peak height ratio) of the internal standard (5 μg sinapic acid). Data represent the mean \pm Standard deviation (n = 3).

No.	Metabolites	Concentration ($\mu\text{g}/\text{mL}$)	Standard deviation
1	Glycerol	39.8	\pm 3.11
2	Pyrophosphoric acid	19.3	\pm 1.84
3	Lactic acid	16.2	\pm 1.31
4	Oxalic acid	11.8	\pm 1.33
5	Inositol	9.4	\pm 0.88
6	Glycine	9.2	\pm 0.66
7	Urea	7.5	\pm 0.50
8	Pyroglutamic acid	3.6	\pm 0.42
9	Alanine	3.4	\pm 0.33
10	Glutamic acid	3.1	\pm 0.51

1. Ueda, S.; Iwamoto, E.; Kato, Y.; Shinohara, M.; Shirai, Y.; Yamanoue, M. Comparative metabolomics of Japanese Black cattle beef and other meats using gas chromatography-mass spectrometry. *Biosci Biotechnol Biochem* **2019**, *83*, 137-147, doi:10.1080/09168451.2018.1528139.

Figure S2. Composition of saturated aliphatic acids volatilized by dynamic headspace.

The composition of saturated aliphatic acids was detected using a gas chromatograph-mass spectrometer. Beef tallow was heated in dynamic headspace and analyzed by thermal desorption unit-gas chromatography-mass spectrometry using an Agilent 7890B gas chromatograph-5977B mass spectrometer equipped with a DB-WAX capillary column.

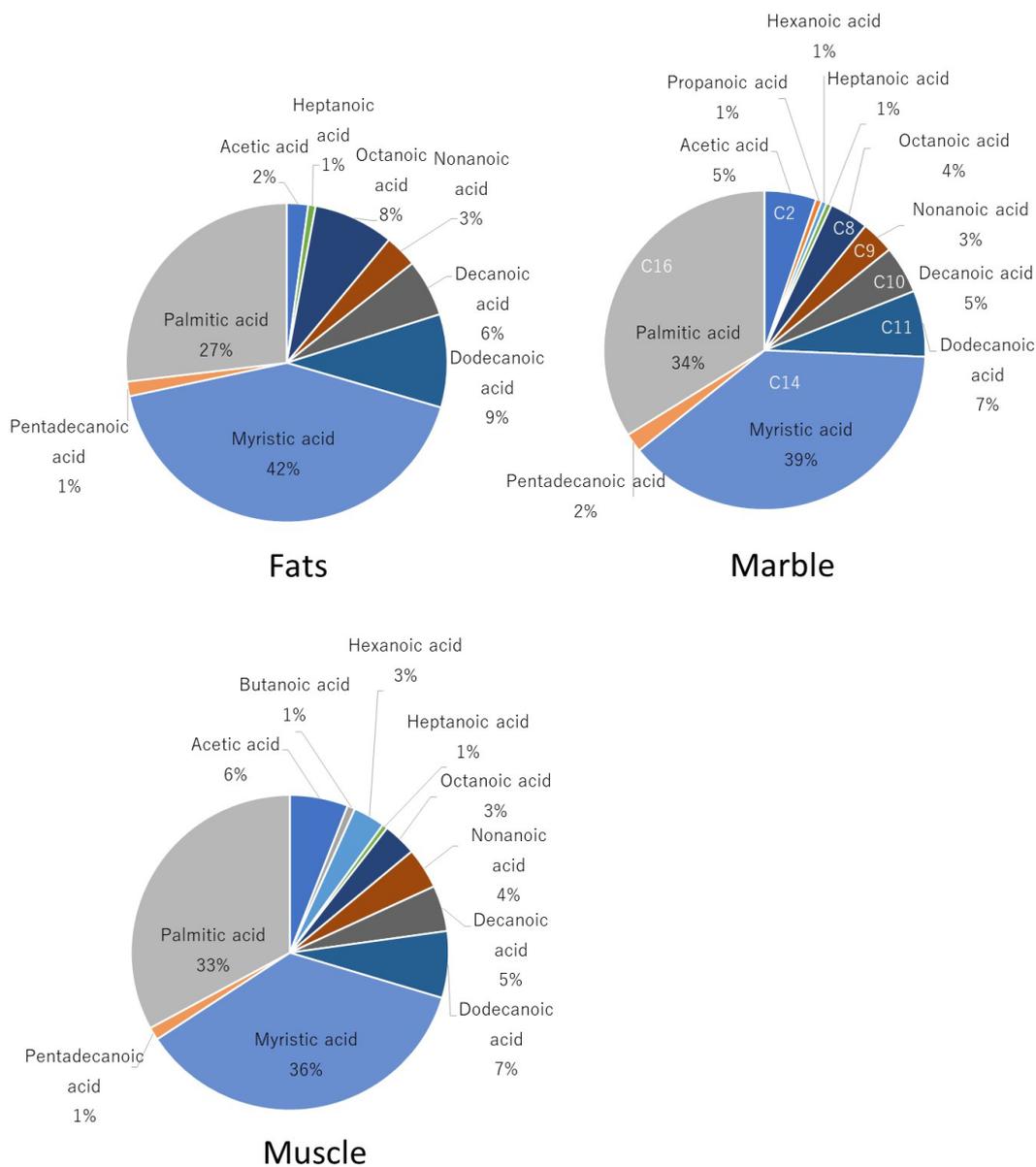


Figure S3. Composition of saturated aldehydes volatilized by dynamic headspace.

The composition of saturated aldehydes was detected using a gas chromatograph-mass spectrometer. Beef tallow was heated in dynamic headspace and analyzed by thermal desorption unit-gas chromatography-mass spectrometry using an Agilent 7890B gas chromatograph-5977B mass spectrometer equipped with a DB-WAX capillary column.

