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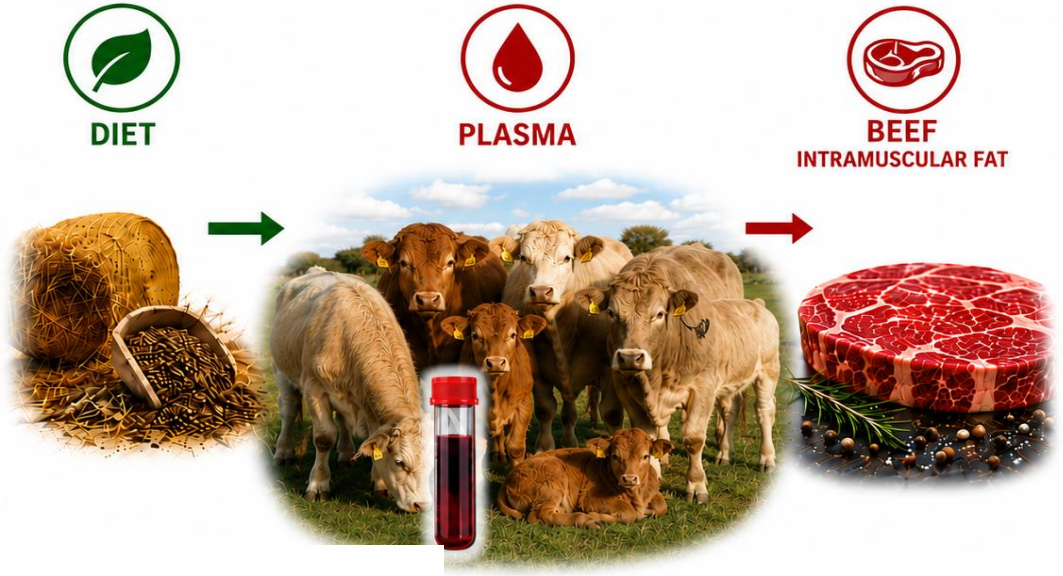
Predicting beef fatty acid composition from diet and plasma profiles using multivariate models

Marco Acciaro, Leonardo Sulas, Gianfranca Carta, Sebastiano Banni, Elisabetta Murru, Claudia Manca, Corrado Dimauro, Myriam Fiori, Andrea Cabiddu, Giovanni Antonio Re, Maria Giovanna Molinu, Giovanna Piluzza and **Valeria Giovanetti**



OBJECTIVES

1. Can diet characteristics explain beef intramuscular fatty acid composition?

2. Can plasma fatty acid profiles predict beef intramuscular fatty acid composition?

Agris Agenzia pro sa chirca in agricultura Agenzia regionale per la ricerca in agricoltura
Consiglio Nazionale delle Ricerche
UNISS UNIVERSITÀ DEGLI STUDI DI SASSARI
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EXPERIMENTAL DESIGN

18 CROSSBRED CATTLE

PASTURE

10 animals

HAY + CONCENTRATE

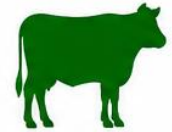
8 animals

DIET SAMPLING

PLASMA SAMPLING

SAMPLING: *Longissimus thoracis* (LT) and *Musculus gluteus maximus* (MGM)

MULTIVARIATE STATISTICAL ANALYSIS
(CCA + PLSR)



Cross-bred beef cattle
(*Limousine* × *Sardo-Bruna*)

3 farms in Sardinia (Italy)
Mediterranean pastoral lowland system

Two finishing systems
(2019, spring)

CCA IDENTIFIED THE MAIN DIETARY DRIVERS OF BEEF FATTY ACID COMPOSITION

LT

(Longissimus thoracis)

DIET DRIVERS

- **ABTS** (antioxidant capacity)
- **Ether extract** (lipid fraction)

ASSOCIATED FATTY ACIDS

↑ **ALA** (α-linolenic acid, n-3)
↑ **CLA** (conjugated linoleic acid)
↑ **n-3/n-6 ratio**
↓ **SFA** (saturated fatty acids)

DIET CHARACTERISTICS

LIPID FRACTION (ETHER EXTRACT)

ANTIOXIDANT CAPACITY (ABTS)

MGM

(Musculus gluteus maximus)

DIET DRIVERS

- **Ether extract** (lipid fraction)

ASSOCIATED FATTY ACIDS

↑ **C18:1** (oleic acid)
↑ **VA** (vaccenic acid)
↑ **n-3/n-6 ratio**
↑ **SFA** (saturated fatty acids)

Dietary lipid fraction and antioxidant capacity were the main factors associated with beef fatty acid composition.

PLASMA FATTY ACID PROFILE ACCURATELY PREDICTS MEAT FATTY ACID COMPOSITION

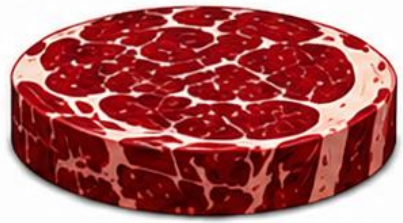
PLASMA FATTY ACID PROFILE

PLSR

LT
(Longissimus thoracis)

$R^2 = 0.94$

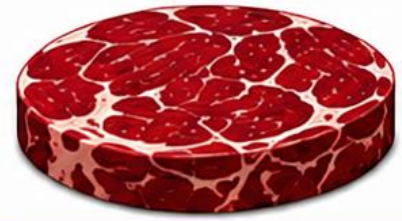
$Q^2 = 0.86$



MGM
(Musculus gluteus maximus)

$R^2 = 0.92$

$Q^2 = 0.85$



R^2 = precision and accuracy
(proportion of variance in meat fatty acids explained by the model)

Q^2 = predictive ability
(proportion of variance that the model can predict in new, independent samples)

TAKE-HOME MESSAGE

Integrating dietary information with plasma biomarkers enables in vivo monitoring of diet-related changes and accurate prediction of beef fatty acid composition, supporting quality-oriented livestock production.