## Index

2-DE see two-dimensional gel electrophoresis

16S rRNA, crustacean species 332

a

AAS see atomic absorption spectroscopy

accelerated solvent extraction (ASE) 461

dehydrinase for sample digestion 95–97

acousto-optic tunable filters (AOTF) 281

activation, consumer ethnocentrism and product choice 37

adulteration 423–429

Beech-nut apple juice incident, 1987 427–428

bootleg liquor, India, 2015 425

ConAgra incident, USA, 1997 427

definitions 4–5

EU horse meat scandal, 2013 66–68, 425–427

historical perspectives 424–425

honey 235–238, 258

MALDI-TOF-MS 397–402

melamine, China, 2007–8 427

olive oils 182, 306

AE-FPLC see anion-exchange fast protein liquid chromatography

agave syrup 238

alcoholic beverages see also wines

bootleg liquor, India, 2015 425

fluorescence spectroscopy 313–315

aleurone 311

alkali metals 139

alkaline earth metals 139

\( \alpha \)-lactalbumin 400–401

alum, bread adulteration 429

ambient mass spectrometry 468

amino acids

blueberries 188–189

kiwifruit growth 185–187

transgenic tomatoes 191

amylose content of rice 288

analytical techniques

core concepts 20–21

organic foods 433, 434–439

animal tissues see also meat

elemental fingerprinting 100

anion-exchange fast protein liquid chromatography (AE-FPLC) 241

ANN see artificial neural networks

AOTF see artificial neural networks

apple juices 120–121, 313, 427–428

apples, chlorophyll fluorescence kinetics 313

aromas 379–380, 381–382

arsenic, beer contamination 428

art, authenticity 29–30

artificial neural networks (ANN) 508–513

ASE see accelerated solvent extraction

Asia, consumer attitudes to sustainability 44–50

assessing model dimensionality 495

Atlantic cod and salmon 126

atomic absorption spectroscopy (AAS) 86, 93–94, 103–104

ATR see attenuated total reflectance

attenuated total reflectance (ATR)

cells 282

authentic, definition 3

---

authentication by numbers 19–25
analytical techniques 20–21
countries 22–24
journals 24
research trends 19–20
authenticity
in a business context 75–77
challeng of 27–30
consumers 27–82
core concepts 3
marketing relevance 27–29
philosophy of 29–30
authorship 29–30, 50–62

b
basils, organic assessment 445
BBD see Beta Binomial Distributions
Beech-nut apple juice incident, USA, 1987 427–428
beef 66–68, 106, 126–127
beer 34–41, 428
beetroots, organic assessment 445
Beta Binomial Distributions (BBD) 70–74
β-decay of rubidium 134–136
β-lactoglobulins 400–401
beverages
Beech-nut incident, USA, 1987 427–428
bootleg liquor, India, 2015 425
chromatography 238–240, 257
elemental fingerprinting 97–98, 103, 107
fluorescence spectroscopy 313–315
vibrational spectroscopy 285–288
bias compensation, mass spectrometry 138–141
biochemical markers of organic foods 432–433
biocrystallisation of organic foods 443
bioinformatics 481–518
artificial neural networks 508–513
class-modelling techniques 491–495
data fusion 506–508
exploratory data analysis 484–489
feature relevance 500–506
linear/quadratic discriminant analysis 491
methodology 483–513
model dimensionality assessment 495
multiway techniques 497–500
PARAFAC 303, 304–305, 497–499
PLS-DA 491, 492–493, 503–506
principal component analysis 484–489, 500–503
role in authentication 481–483
SIMCA 491, 493–495, 506
Tucker3 497–500
biological methods
irradiation detection 418
organic food assessment 447
biosensors, multi-contaminant detection 469
blueberry metabolomics 188–189
bootleg liquor, India, 2015 425
bottom-up approach, proteomics 336
branding
consumer loyalty 69–75
country-of-origin effects 30–41
ethnocentric beliefs in product choices 34–41
historical origins 28–29
Mediterranean Diet 42–43
origin of authenticity 27–29
philosophy of authenticity 29–30
place branding
consumer loyalty 69–75
industry responses 62–75
new products launched 64–65
regulation 50–62
positioning claims 62, 65
quality assurance labels 69–75
reputation of countries 30–31
bread, alum adulteration, London, 1839 429
buffalo mozzarella, LC-MS 212–213
business context and authenticity 75–77
c
C₃ sugars, isotopic fingerprinting 120–121
C₄ sugars, isotopic fingerprinting 120–121
CAD see charged aerosol detector
cadmium 91–92
Café de Colombia 32
calcium replacement by strontium 136, 141–142
cane sugar 120–121
carbohydrates see also sugars
c romatography 233–240
carbon-13 nuclear magnetic resonance (C¹³ NMR) spectroscopy, olive oils 182
carbon dioxide
mineral waters 123
photosynthetic assimilation 120–121
sparkling wines 122
carbon isotopes
beef 127
fish 126
fruit juices 120–121, 258
milk 442
mineral waters 123
natural abundances 119
olive oils 182
organic foods 442–443
species identification 120–121
spices 125
vanilla 124–125
wines 121–122
caseins, MALDI-TOF-MS 400–401
Caviar, fluorescence spectroscopy 309
CBOL see Consortium for the Barcode of Life
CCSWA see common component and specific weights analysis
CDs see cyclodextrins
cELISA see competitive ELISA
cereals
chemometrics 311
chromatography 246
elemental fingerprinting 98, 105, 110–111
fluorescence spectroscopy 311
near-infrared spectroscopy 287–288
challenge of authenticity 27–30
charged aerosol detectors (CAD) 204
cheeses
chromatography 212–213, 242–243, 244
elemental fingerprinting 106
ethnocentric effects in decisions to purchase 34–41
fluorescence spectroscopy 309–311
liquid chromatography–mass spectrometry 212–213
chemical ionization (CI), GC-MS 223
chemical methods of irradiation detection 418
chemometrics 481–518
artificial neural networks 508–513
cereals 311
classification and discrimination 489–497
class-modelling techniques 491–495
dairy products 309–311
data fusion 506–508
decomposition 497–500
edible oils 305–307
eggs 309
elemental fingerprinting 109–111
exploratory data analysis 484–489
extra virgin olive oils 305–307, 496–497, 512–513
feature relevance 500–506
fish and fish products 308–309
fluorescence spectroscopy 303–305
fruits 313
honey 289–291, 312–313
linear/quadratic discriminant analysis 491
meat and meat products 307–308
methodology 483–513
model dimensionality assessment 495
multiway techniques 497–500
PARAFAC 303, 304–305, 497–499
PLS-DA 491, 492–493, 503–506
chemometrics (contd.)
  principal component analysis 484–489, 500–503
  role in authentication 481–483
  SIMCA 491, 493–495, 506
  sugars 312–313
  syrups 312–313
  Tucker3 497–500
  wheat 288
  wines 313–315
China
  consumer attitudes to sustainability 44–50
  melamine adulteration, 2007–8 427
Chios mastic gum 53–54
chiral separation, gas chromatography 217
chlorophylls
  fruits 313
  olive oils 306
chromatography 199–275
  agave syrup 238
  applications 205–208, 219–222, 233–275
  beverages 238–240
  carbohydrates 233–240
  cereals 246
  dairy products 212–213, 241–243, 244, 246
  eggs 245
  fatty acids 246–248
  fish 243–244
  food proteins and peptides 240–246
  fruit juices 238–240, 257–258
  fundamentals 202–203
  GC 215–224
  honey 214, 235–238, 249–256, 257, 258
  HPLC 203–215
  maple syrup 238
  mass spectrometry-coupled 210–215, 223–224
  meat 244–245
  multidimensional techniques 210, 218, 223
  organic acids 258
  phenolic compounds 256–258
  techniques 200–232
  triacylglycerols 246–248
  ultra-high-performance liquid chromatography 209–210
  volatile compounds 249–256
CI see chemical ionization
CID see collision-induced dissociation classification, bioinformatics 489–497
class-modelling techniques 491–495
clean-up, multi-contaminant 462–464
cod 126
coffee 107, 240
COI see cytochrome C oxidase 1 gene
  collagen 308
  collision cell systems 91
  collision-induced dissociation (CID) 212
columns, gas chromatography 216–217
common component and specific weights analysis (CCSWA) 303–304
competitive ELISA (cELISA) 363, 468–469
components, inductively coupled plasma-mass spectrometry 87
compound-specific isotope analysis (CSIA) 442
ConAgra incident, USA, 1997 427
conducting polymer sensors 381
Consortium for the Barcode of Life (CBOL) 331
consumers 27–82
  attitudes to sustainable production 44–50
  authenticity in marketing 27–29
  country equity 31–41
  country name impacts 33–41
  country-of-origin branding effects 30–41
  ethnocentric beliefs in product choices 34–41
  geographical indications as a factor in choice 42–43
  loyalty 69–75
  Mediterranean Diet 42–43
personal values and behaviour case study 54–62
philosophy of authenticity 29–30
quality assurance labelling effects 69–75
reputation of countries 30–31
COO see country-of-origin
Corn Flakes 28
Council Regulation (EC) 479/2008 10–11
countries as brands 31–33
evolution of food authentication 22–24
marketing and brand effects 30–41
number of geographically indicated products 7–8
reputation 30–31
country equity branding 31–33
consumer choice impacts 33–41
country-of-origin (COO) branding
countries as brands 31–33
country equity 31–41
ethnocentric beliefs case study 34–41
product choice effects 30–41
reputation 30–31
research areas 34
CP see conducting polymer sensors
crabmeat 284
cryoprobes 178
CSIA see compound-specific isotope analysis
cyclodextrins (CDs) 217
cytochrome B (cytb) gene 327, 334
cytochrome C oxidase 1 gene (COI), species discrimination 327
MALDI-TOF-MS 399–402
multiplex PCR 331
organic assessment 442–443
proteomics 341–342
DART-HRMS see direct analysis in real-time high-resolution mass spectrometry
data analysis see also chemometrics
instrumental sensory analysis 384–385
organic foods 447–448
data fusion (DF) 506–508
decomposition, chemometrics 497–500
definitions food origin, label, adulteration and fraud 4–5
derivatization, carbohydrates 234
Designation of Origin Labelling (DOL)
consumer behaviour 54–62
consumer loyalty 69–75
new products launched 63
regulation 50–62
destination branding see place branding
detection limits, ICP-MS 87
detectors, HPLC 204, 209
deuterium see hydrogen isotopes
DF see data fusion
DIC see dissolved inorganic carbon
digestion 95–97, 151–152
dimensions of sustainability 54
diode array detectors (DAD) 209
direct analysis in real-time high-resolution mass spectrometry (DART-HRMS) 446–447, 468
directed approaches, proteomics 342–343
Directive 93/43 (1993) 4
direct solid sampling analysis 97
Dirichlet Multinomial Distributions (DMD) 70–74
discriminant power 506
discrimination, bioinformatics 489–497, 503–513
dispersive solid-phase extraction (d-SPE) 463–464
dissociation, inductively coupled plasma 86–87
dissolved inorganic carbon (DIC) 123
DMD see Dirichlet Multinomial Distributions
DNA barcoding 331
DNA-based methods see genomics
DNA fingerprinting 447
DNA hybridization 335
DNA microarrays 335
DNA sequencing 330–331
DOL see Designation of Origin Labelling
drivers of loyalty 69–75
d-SPE see dispersive solid-phase extraction
dynamic reaction cell (DRC) systems 91

e
EA-IRMS see elemental analysis isotope ratio mass spectrometry
ECD see electron capture detectors
economically motivated adulteration (EMA) 5
edible oils
see also extra virgin olive oils
fluorescence spectroscopy 305–307
eggs 245, 309
EI see electron impact ionization
electrochemical electronic tongues 383
electron capture detectors (ECD) 218, 464
electronic noses 286, 381–382
electronic tongues 382–384
electron impact (EI) ionization 223
electron spin resonance (ESR) 417
electrospray ionization (ESI) 466
electrothermal atomic absorption spectroscopy (ETAAS) 86, 93–94, 107
electrothermal vaporization (ETV) 96, 97
elemental analysis isotope ratio mass spectrometry (EA-IRMS) 442
elemental fingerprinting 85–116
applications 99–111
authentication methods 101–109
beverages 97–98, 103
cereals 98, 105, 110–111
chemometrics 109–111
coffee 107
dairy products 99, 105–106
digestion 95–97
direct solid sampling analysis 97
fats 98
food waste water 98
fruits 98, 103–104
honey 99, 107
ICP-AES 86, 93–94
ICP-MS 86–94
interferences 89, 90–92
mass analyzers 87–90
operational principles 86–87
versus other techniques 92–94
meat 99, 100, 105–106
microwave-assisted digestion 95–97
mushrooms 98
oils 98, 104–105
organic foods 108–109
powdered samples 96, 97
rare earth elements 100–101, 110–111
rationale 99–101
sample preparation 95–99
sampling methods 97–99
seafood 99, 106–107
spices 108
tea 107
techniques 86–94
trends 99–101
vegetables 98, 103–104
wines 97–98, 103
ELISA see enzyme linked immunosorbent assays
EMA see economically motivated adulteration
emission spectra 298–299, 301
enantioselective gas chromatography (Es-GC) 217, 250, 256
endosperm fluorescence 311
enzyme linked immunosorbent assays (ELISA) 356–357, 361, 363, 468–469
Eschericia coli, MALDI-TOF-MS 403–404
Es-GC see enantioselective gas chromatography
ESR see electron spin resonance
ETAAS see electrothermal atomic absorption spectroscopy
ethnocentric beliefs and country-of-origin effects 34–41
ETV see electrothermal vaporization
EU see European Union
European Union (EU)
    Common Agricultural Policy 6
    consumer attitudes to sustainability 44–50
Designation of Origin
    Labelling 50–62
geographical indications 5–11
horsemeat scandal 66–68, 425–427
meat pricing 67–68
organic product regulation 11–14
Regulation (EU) No. 1151/2012 6–8
standard methods for irradiation detection 417
wine regulation 8–11
evolution of food authentication by country 22–24
EVOO see extra virgin olive oils
excitation spectra 301
exploratory data analysis 484–489, 508–513
exponential model, mass bias 139
extraction of organic food samples 440–441
extra virgin olive oils (EVOO)
    $^1$H NMR spectroscopy 180–182
    adulteration, NMR 182
    chemometrics 305–307, 496–497, 512–513
    chromatography 247
    fluorescence spectroscopy 305–307
    genomics 327
    MALDI-TOF-MS 397–399
    metabolomics 179–182
    oxidation 305, 306–307
    phenolic compounds 257
    strontium isotopes 147–155

f
FA see fatty acids
FAAS see flame atomic absorption spectroscopy
FAST see fluorescence of advanced Maillard products and soluble tryptophan
fats
    see also oils
    chromatography 246–248
    elemental fingerprinting 98
    MALDI-TOF-MS 397
fatty acids (FA) 246–248
Fava Santorinis 105, 110–111
feature relevance in chemometrics 500–506
FFFS see front-face fluorescence spectroscopy
FINS see flame-ionization detectors
FID see flame-ionization detectors
fish by-products, vibrational spectroscopy 284–285
fish see also seafood
    chromatography 243–244
    DNA microarrays 335
    elemental fingerprinting 106–107
    fluorescence spectroscopy 308–309
    immunoassays 362–364
    isotopic fingerprinting 125–126
    organic assessment 443
    vibrational spectroscopy 284
flammable
flame atomic absorption spectroscopy (FAAS) 94, 107
flame-ionization detectors (FID) 218, 464
flame photometric detectors (FPD) 218, 464
flavonoids
    blueberries 188–189
    honey 257
    kiwifruit 185–187
    transgenic tomatoes 191–192
    flavoured strawberry foods 442–443
flavours
    electronic noses 381–382
    electronic tongues 382–384
    gas
        chromatography-olfactometry 379–380
        fluorescence of advanced Maillard products and soluble tryptophan (FAST) 310
        fluorescence mechanisms 298–299
fluorescence spectroscopy 298–324
applications 305–315
beverages 313–315
caviar 309
cereals 311
chemometrics 303–305
dairy products 309–311
edible oils 305–307
eggs 309
emission/excitation spectra 301
fish and fish products 308–309
food fluorophores 300
fruits 313
honey 312–313
instrumentation 299–301
intensity 302–303
meat and meat products 307–308
principles 298–299
quenching 303
scatter 303
spectra types 301–302
Stoke’s shifts 299
synchronous scanning 301–302,
303–304
wines 313–315
fluorophores
emission mechanisms 298–299
in food 300
food extension, ConAgra incident, USA, 1997 427
food fluorophores 300
food industry and place
branding 62–75
food origin
definitions 4–5
geographical indications
concepts 5–11
food processing technique
detection 413–422
freezing–thawing 414–415
heating techniques 419–420
irradiation 415–418
food traceability
isotopic fingerprinting 131–176
extra virgin olive oils 147–155
Lambrusco wines 155–165
literature 143–145
methodology 134–141
strontium isotopes 141–156
thermal ionization mass
spectrometry 136–137
traceability models 136–137,
146–147
food waste water elemental
fingerprinting 98
forensically informative nucleotide
sequencing (FINS) 330–331
Fourier transform (FT)
spectrophotometers 280–281
FPD see flame photometric detectors
fraud 4–5
see also adulteration
freezing–thawing detection 414–415
front-face fluorescence spectroscopy
(FFFS) 301
caviar 309
cereals 311
eggs 309
honey, sugars and syrups 312–313
meat products 307–308
olive oils 307
wines 314
fruit juices
see also extra virgin olive oils
Beech-nut incident, USA, 1987 427–428
carbon isotopes 258
chromatography 238–240, 257–258
fluorescence spectroscopy 313
GC-MS 464–465
immunoassays 364–365
stable isotope ratios 119–120
fruits
chemometrics 313
elemental fingerprinting 98, 103–104
fluorescence spectroscopy 313
metabolomics 182–189
transgenic metabolomic
studies 190–193
FT see Fourier transform
galactose (GAL) 185–187
gas chromatography (GC) 215–224
applications 219–222
carbohydrates 233–240
columns 216–217
detectors 218
enantioselective 217, 444–445
fatty acids and triacylglycerols 246–248
high-speed 218
honey 249–256
injection systems 215
mass spectrometry-coupled 223–224
multi-contaminant methods 464–465
multidimensional techniques 218, 223
phenolic compounds 256
sensory analysis 379–380
volatile compounds 249–256
gas chromatography olfactometry (GC-O) 218, 379–380
GC see gas chromatography
GC-MS see gas chromatography–mass spectrometry
GC-O see gas chromatography olfactometry
GE see genetically engineered
gel permeation chromatography (GPC) 463
genetically modified (GM) crops see also transgenic foods
genomics 326–327, 335
immunoassays 366, 368–369
NMR metabolomics 190–193
peptide nucleic acid methods 335
genomics 326–335
applications 329–330
dairy products 331
DNA barcoding 331
DNA microarrays 335
DNA sequencing 330–331
future trends 343–344
GM crops 326–327
meat 327, 331–333, 334
multiplex PCR 331
olive oils 327
PCR-RFLP 333–334
PCR-SSCP 333
peptide nucleic acids 335
real-time PCR 331–333
restriction fragment-length polymorphisms 333–334
simple sequence repeats 328–330
single-strand conformation polymorphisms 333
species discrimination 327
geographical indications (GI)
carbon isotopes 120–127
core concepts 5–11
Designation of Origin Labelling 50–62
elemental fingerprinting 99–101, 104–108
EU wine registrations 11
extra virgin olive oils 147–155, 180–182
food choice effects 42–43
isotopic fingerprinting 120–121
Lambrusco wines 155–165
Ligurian region strontium mapping 148–155
Modena region strontium mapping 155–165
nuclear magnetic resonance 180–182
number of registered EU products 7–8
protected designation of origin 6–8
proteomics 336–344
registered products and foodstuffs per category 7–9
Regulation (EU) No. 1151/2012 6–8
strontium isotope literature 143–145
strontium ratios 131–176
traditional speciality guaranteed 7–8
geological features, strontium isotope ratios 161–165
GFAAS see graphite furnace atomic absorption spectroscopy
GI see geographical indications
gilthead sea bream 126
glucose syrups see also honeys; sugars
carbon isotopes 120–121
goat milk, cows milk detection 399–402
GPC see gel permeation chromatography
graphite furnace atomic absorption spectroscopy (GFAAS) 86, 93–94
Greek people case studies 34–41, 54–62

h

$^1$H nuclear magnetic resonance ($^1$H NMR) spectroscopy
blueberries 188–189
extra virgin olive oils 180–182
fundamentals 178
kiwifruit 183–188
$^2$H site-specific natural isotope fractionation (SNIF) 178–179
HACCP see hazard analysis and critical control point plans
HADH see β-hydroxyacyl-CoA-dehydrogenase
half-life of rubidium 135
ham 34–41, 69–75, 307–308
hard red spring (HRS) wheat 287
hard red winter (HRW) wheat 287
hazard analysis and critical control point (HACCP) plans 4
hazelnut oil 306, 397–399
hazelnuts 105, 306, 397–399
headspace (HS) injection 215, 286
heating during food preparation 419–420
heavy isotopes
bioavailability 141–142
fingerprinting 131–176
literature 143–145
quality versus traceability 132–133
strontium isotopes 141–156
high-performance anion exchange chromatography (HPAEC) 234–240
high-performance liquid chromatography (HPLC) 203–215
applications 205–208
carbohydrates 233–240
detectors 204, 209
mass spectrometry-coupled 210–215
multi-contaminant methods 466–467
solvent immiscibility 210
high-resolution magic-angle spinning (HR-MAS) nuclear magnetic resonance spectroscopy 178
high silicon vegetable matrix digestion 95
high-speed gas chromatography (HSGC) 218
HILIC see hydrophilic liquid chromatography
hills, strontium isotope ratios 161–165
historical origins of authenticity 28–29
historical perspectives on adulteration 424–425
honey
chemometrics 289–291, 312–313
chromatography 235–238, 249–256, 257, 258
elemental fingerprinting 99, 107
enantioselective gas chromatography 250, 256
fluorescence spectroscopy 312–313
immunoassays 365–366
liquid chromatography–mass spectrometry 214, 249–256
organic acids 258
phenolic compounds 257
proteomics 341
unifloral varieties 249–256
vibrational spectroscopy 288–291
volatile compound analysis 249–256
horse meat 66–68, 425–427
hot-injector vaporization 216
HPAEC see high-performance anion exchange chromatography
HPLC see high-performance liquid chromatography
HRMS see high-resolution mass spectrometry
HRS see hard red spring wheat
HRW see hard red winter wheat
HS see headspace
HSGC see high-speed gas chromatography
human sensory panels 378
hydrofluoric acid 95
hydrogen isotopes
fruit juice 119–120
mineral waters 123–124
natural abundances 119
organic foods 442
spices 125
hydrophilic liquid chromatography (HILIC) 234–235, 466
β-hydroxyacyl-CoA-dehydrogenase (HADH) 414–415
hypopharyngeal gland secretions 365

i
IA see immunoassays
ICP-AES see inductively coupled plasma–atomic emission spectroscopy
ICP-MS see inductively coupled plasma–mass spectrometry
ICP-TOF-MS see inductively coupled plasma–time of flight–mass spectrometry
IEF see isoelectric focusing
iELISA see indirect ELISA
IGO see indications of geographical origin
illegal mixture detection, MALDI-TOF-MS 397–402

immunoassays (IA)
fish 362–364
fruit juices 364–365
GM crops 366, 368–369
honey 365–366
irradiated foods 366–368
meat speciation 358–360
multi-contaminant methods 468–469
principles 356–357
shellfish 362–364

immunological techniques 355–375
see also immunoassays
INAA see instrumental neutron activation analysis
India, bootleg liquor, 2015 425
indications of geographical origin (IGO)
see also geographical indications
core concepts 5–11
indirect ELISA (iELISA) 361
inductively coupled plasma–atomic emission spectroscopy (ICP-AES) 86, 93–94
inductively coupled plasma–mass spectrometry (ICP-MS)
bias compensation 138–141
food authentication 103–104
interferences 89, 90–92
isotopic fingerprinting 137–141, 146–147
mass analyzers 87–90
mass bias 137–141
operational principles 86–87
quadrupole analyzers 86, 89
sector field analyzers 89
time-of-flight analyzers 89–90
versus other techniques 92–94
inductively coupled plasma–time of flight–mass spectrometry (ICP-TOF-MS) 89–90
industry
place branding 62–75
price pressures 67–68
injection systems for gas chromatography 215
inner filter effect 302
inorganic colours, sweet contamination, UK, 1858 428–429
in-plane areas, strontium isotope ratios 161–165
instrumental analysis of organic foods 441–447
instrumental neutron activation analysis (INAA) 107
instrumental sensory analysis 378–385
electronic noses 381–382
electronic tongues 382–384
gas chromatography–olfactometry 379–380
multivariate data analysis 384–385
instrumentation
fluorescence spectroscopy 299–301
vibrational spectroscopy 280–284
intellectual property (IP)
designation of origin labelling 50–62
geographical indications 5–11
marketing and authenticity 28
intensity, fluorescence spectroscopy 302–303
interferences
inductively coupled plasma–atomic emission spectroscopy 94
inductively coupled plasma–mass spectrometry 87–90
quadrupole mass spectrometers 89
internal conversion 299
internal standardization 139–141
ion interferences, mass analyzers 89, 90–92
ionization
  gas chromatography–mass spectrometry 223–224
  inductively coupled plasma–mass spectrometry 86–87
liquid chromatography–mass spectrometry 211
ion optics 87
ion trap (IT) mass analyzers 90, 211–212, 213–214, 465
IRMS see isotope ratio mass spectrometry
irradiation
  biological detection methods 418
  chemical detection methods 418
  detection 415–418
  EU standard methods 417
  immunoassays 366–368
  physical detection methods 417–418
isoelectric focusing (IEF) 340
isotope ratio mass spectrometry (IRMS) 124–125, 126, 442
isotopes
  see also isotopic fingerprinting
detection interference in
  ICP-MS 90–92
  rubidium decay 134–136
  SNIF NMR 178–179
isotopic fingerprinting 117–176
  beef 126–127
  bioavailability 141–142
  extra virgin olive oils 147–155
  fish 125–126
  food traceability 131–176
  fruit juices 119–120
  geological features 161–165
  heavy isotopes 131–176
  ICP-MS 137–141, 146–147
  Lambrusco wines 155–165
  light isotopes 118–130
  mass bias 137–141
  mineral waters 122–124
  natural abundances 119
  organic foods 441–443
rubidium decay 134–136
seafood 125–126
SNIF NMR 178–179
sparkling wines 121–122
strontium isotopes 141–156
TIMS 136–137
traceability models 136–137, 146–147
vanilla 124–125
wines 121–122, 155–165, 178–179
IT see ion trap
j
  Jablonski diagrams 299
journals 24
k
  Kellogg’s Corn Flakes 28
  kiwifruit metabolomics 183–188
  Kramer shear force 284
l
  LA see laser ablation
  labels, definition 4
α-lactalbumin 400–401
β-lactoglobulins 400–401
Lambrusco wines
  isotopic fingerprinting 155–165
  production processes 155–156, 157–159, 161
  sampling 156–160
lanthanide fingerprinting 105
laser ablation (LA) 96, 97
LC see liquid chromatography
LCTF see liquid crystal tunable filter
  instruments
LDA see linear discriminant analysis
lettuce, metabolomic studies 192–193
light isotopes
  fingerprinting 118–130
  organic foods 441–443
Ligurian region strontium
  mapping 148–155
linear discriminant analysis (LDA)
  principles 491
linear model of mass bias
  compensation 139
lipids
  see also extra virgin olive oils; oils
MALDI-TOF-MS 397–399
oxidation in stored meat 307–308
liquid chromatography (LC)
carbohydrates 233–240
dairy products 241–243, 244
fatty acids and triacylglycerols 246–248
fruit juices 257–258
high performance techniques 203–215
phenolic compounds 256–258
liquid chromatography–mass spectrometry (LC-MS) 210–215, 249–256, 445–446, 465–468
liquid crystal tunable filter (LCTF) instruments 281
liquid–liquid extraction (LLE) 461–462
liquid-state high-resolution ¹H nuclear magnetic resonance 178
LLE see liquid–liquid extraction
London, UK, alum adulteration of bread 429
low-molecular-weight compounds 249–256
see also volatile compounds
loyalty and quality assurance labels 69–75

m
MAE see microwave-assisted extraction
magic-angle spinning (MAS) 178
Maillard compounds 310, 419–420
maize glucose syrup 120–121
MALDI see matrix-assisted laser desorption/ionization
MALDI-TOF-MS see matrix-assisted laser desorption/ionization–time-of-flight mass spectrometry
maple syrup 238
markers of organic foods 432–433
MAS see magic-angle spinning
mass analyzers 87–90, 211–215
mass bias 137–141
mass spectrometry (MS)
see also matrix-assisted laser desorption/ionization
ambient 468
DART-HRMS 446–447
detectors 211–215
electronic noses 381–382
extra virgin olive oils 397–399
illegal mixture detection 397–402
ion traps 211–214
LC-MS 210–215, 445–446, 465–468
lipids 397–399
microbial contamination 402–404
milk adulteration 399–402
multi-contaminant methods 464–468
Orbitrap analyzers 214–215
organic foods 444–447
pesticides 464–465, 466
proteins 396–397, 399
proteomics 337, 341–343
proton transfer reaction-type 444
quadrupole analyzers 212–214
veterinary drugs 467–468
mass-to-charge ratios 87–89
mastic gum, Chios 53–54
matrices, MALDI mass spectrometry 395, 396
matrix-assisted laser desorption/ionization (MALDI) mass spectrometry 393–411
extra virgin olive oils 397–399
food proteins and peptides 396–397
illegal mixture detection 397–402
lipids 397–399
matrices 395, 396
microbial contamination 402–404
milk adulteration 399–402
principles 394–396
matrix-assisted laser desorption/ionization–time-of-flight mass spectrometry (MALDI-TOF-MS) 394–404
extra virgin olive oils 397–399
food proteins and peptides 396–397, 399
illegal mixture detection 397–402
lipids 397–399
microbial contamination 402–404
milk adulteration 399–402
proteomics 341–342
matrix solid-phase dispersion extraction (MSPD) 460
MD see Mediterranean Diet
meat
chromatography 244–245
consumer attitudes to sustainability and small-scale pork production 44–50
DNA microarrays 335
elemental fingerprinting 99, 100, 105–106
ethnocentric effects in decisions to purchase 34–41
European horsemeat scandal 66–68, 425–427
fluorescence spectroscopy 307–308
genomics 327, 334
immunoassays 357–361
isotopic fingerprinting 126–127
near-infrared spectroscopy 291
proteomics 342
quality assurance labelling case study 69–75
real-time PCR 331–333
restriction fragment-length polymorphisms 334
meat by-product vibrational spectroscopy 284–285
Mediterranean Diet (MD) 42–43, 64
melamine adulteration, China, 2007–8 427
MEMS see micro-electro-mechanical systems
metabolism, strontium inclusion 136, 141–142
metabolomics
blueberries 188–189
fruit 182–189
kiwifruit 183–188
nuclear magnetic resonance 177–197
olive oils 179–182
transgenic foods 190–193
metal-oxide semiconductors (MOS) 381
methyl jasmonate 191–192
microbial contamination 402–404
micro-electro-mechanical systems (MEMS) 281
microprobes 178
microwave-assisted extraction (MAE) 462
microwave (MW)-assisted digestion 95–97, 151–152
mid-infrared (MIR) spectroscopy 279–281, 285–290
milk
chromatography 241–243, 244
fluorescence spectroscopy 307–311
isotopic analysis 442–443
MALDI-TOF-MS 399–402
powders in liquid detection 401–402
proteomics 341–342
mineral water isotopic fingerprints 122–124
MIR see mid-infrared
mixed acids in sample digestion 95–96
mobile phases 202–203, 215
model dimensionality assessment 495
modelling power 506
Modena region Strontium mapping 155–165
molecular environment and fluorescence intensity 303
molecular techniques 325–354
genomics 326–335
proteomics 336–343
monochromators 280, 299, 301
monoclonal antibodies (mAbs)
fish assays 362–364
immunoassays 356
meat speciation 357–361
MOS see metal-oxide semiconductors
motivational value domains, Schwartz’s taxonomy 55
mountain products, definition 8
mozzarella 212–213
MRM see multiple reaction monitoring
MRMs see multi-residue methods
MSPD see matrix solid-phase dispersion extraction
multi-contaminant measures see multi-residue methods
multidimensional chromatography 210, 212–213, 218, 223, 464–465
multi-elemental stable isotope ratio analysis (SIRA) 126–127
multi-element analysis, interferences 89, 90–92
multiple reaction monitoring (MRM) 212–213
multiplex PCR 331
multi-residue methods (MRMs) 453–479
  applications 455–459
  biosensors 469
gas chromatography methods 464–465
immunoassays 468–469
liquid chromatography 465–468
mass spectrometry 464–468
recent advances 455–459
sample clean-up 462–464
sample extraction 454–462
sample preparation 454–464
multivariate analysis (MVA)
  instrumental sensory analysis 384–385
  vibrational spectroscopy 279–280
multiway techniques,
  bioinformatics 497–500
mushrooms, elemental fingerprinting 98
mussel proteomics 341
MVA see multivariate analysis
MW see microwave
mycotoxins 467–469

NADH 308–309, 414–415
National Organic Program (NOP), USA 12, 14
natural abundances of stable isotopes 119
NCGA see neochlorogenic acid
NDK B see nucleoside diphosphate kinase B
near-infrared spectroscopy (NIRS)
cereals 287–288
  fish and meat by-products 284–285
  fish and seafood 284
  honey 288–291
  meat and meat products 291
  organic foods 443
  vibrational 279–281
  wine 285
neochlorogenic acid (NCGA) 185
new products launched with Designation of Origin Labelling 63
NIRS see near-infrared spectroscopy
nitric acid 95–96
nitrogen isotopes

beef 127
fish 126
natural abundances 119
organic foods 442–443
spices 125
nitrogen/phosphorous detectors (NPD) 218, 464
NMR see nuclear magnetic resonance spectroscopy
NOP see National Organic Program
NP see nitrogen/phosphorous detectors
nuclear magnetic resonance (NMR) spectroscopy
  blueberries 188–189
  fruit metabolomics 182–189
  fundamentals 177–179
  metabolomics 177–197
  olive oils 179–182
  transgenic foods 190–193
nucleoside diphosphate kinase B (NDK B) 342

O
OAV see odour aroma values
odour aroma values (OAV) 380
OFPA see Organic Foods Production Act
oils
  see also fats; olive oils
  chemometrics 496–497, 512–513
  chromatography 246–248
  DNA microarrays 335
  elemental fingerprinting 98, 104–105
  fluorescence spectroscopy 305–307
  isotopic fingerprinting 147–155
  MALDI-TOF-MS 397–399
  metabolomics, NMR 179–182
  NMR 179–182
  oxidation 305, 306–307
olfactometry, gas chromatography 218, 379–380
olive oils
  chemometrics 305–307, 496–497, 512–513
  chromatography 247
  DNA microarrays 335
  elemental fingerprinting 98, 104–105
  fluorescence spectroscopy 305–307
olive oils (contd.)
genomics 327
liquid chromatography–mass
spectrometry 213
MALDI-TOF-MS 397–399
metabolomics 179–182
NMR spectroscopy 179–182
oxidation 305, 306–307
phenolic compounds 213, 257
strontium isotopes 147–155
on-column injection 216
open tubular systems for gas
cromatography 216–217
optional quality terms, Regulation (EU)
No. 1151/2012 8
orange juice 239–240
Orbitrap analyzers 214–215, 467–468
organic acids, chromatography 258
organic foods 431–451
analytical platforms 433, 434–439
biochemical markers 432–433
biocrystallisation 443
biological methods 447
core concepts 11–13
DART-HRMS 446–447
data analysis 447–448
DNA fingerprinting 447
elemental fingerprinting 108–109
future trends 448–449
GC-MS 444–445
instrumental analysis 441–447
isotopic analysis 441–443
LC-MS 445–446
mass spectrometry 444–447
personal values and consumer
behaviour 54–62
PTR-MS 444
sample preparation 440–441
sampling 433, 440
Organic Foods Production Act
(OFPA) 12, 14
Organic Trade Association (OTA) 11–12
organoleptic evaluation 377–378
origin
definition 4
geographical indications concepts 5–11
originality and authenticity 28
OTA see Organic Trade Association
oxidation
edible oils 305, 306–307
lipids in stored meat 307–308
oxygen isotopes 123–124
beef 127
fruit juice 119–120
natural abundances 119
organic foods 442
wines 121–122
p
PAHs see polycyclic aromatic hydrocarbons
Pandalus borealis 284
parallel factor analysis (PARAFAC) 303,
304–305, 497–499
partial least squares discriminate analysis
(PLS-DA) 491, 492–493, 503–506
parvalbumins 342
pathogens, MALDI-TOF-MS 402–404
PCA see principal component analysis
PCR see polymerase chain reaction
PCR-DGGE see polymer chain reaction
amplification and denaturing
gradient gel electrophoresis
PCR-RFLP see polymerase chain reaction
with restriction fragment-length
polymorphism
PCR-SSCP see polymerase chain reaction
with single-strand conformation
polymorphism detection
PDA see photodiode array
PDO see protected designation of origin
pear juice chromatography 238–239
peptide mass fingerprinting (PMF) 341
peptide nucleic acids (PNAs) 335
peptides
chromatography 240–246
MALDI-TOF-MS 396–397, 399
perception of authenticity 28–29
pericarp fluorescence 311
periodic table 88
personal values
consumer behaviour 54–62
Schwartz’s taxonomy 55
pesticides 464–465, 466, 468
PGI see protected geographical indication
phenolic compounds
  blueberries 188–189
  chromatography 256–258
  extra virgin olive oil 213, 257
  kiwifruit 185–187
  olive oils 213, 257
pheophytins in olive oils 306
philosophy of authenticity 29–30
phosphorescence 299
photodiode array (PDA) spectrophotometers 281
photosynthetic carbon dioxide assimilation 120–121
phylogenetic trees, crustacean species 16S rRNA 332
physical detection methods of irradiation 417–418
phytanic acid 444–445
Piedmont hazelnuts 105
place branding
  industry responses 62–75
  new products launched 64–65
  quality assurance labels 69–75
  regulation 50–62
plant oils, chromatography 246–248
plasma torches, inductively coupled plasma–mass spectrometry 86–87
plastids, single-strand conformation polymorphisms 333
PLS-DA see partial least squares discriminant analysis
PMF see peptide mass fingerprinting
PNAs see peptide nucleic acids
polar compounds, gas chromatography 215
polarization scores 70–74
polyatomic ionic species, inductively coupled plasma–mass spectrometry 91
polyclonal antibodies (pAbs)
  fish assays 362–364
  fruit juice assays 364–365
  honey immunoassays 365–366
  immunoassays 356
  meat speciation 357–361
  shellfish assays 363
polymerase chain reaction (PCR)
  classifications 327–328
  GMO detection 326–327
  multiplex 331
  real-time 326–327, 331–333
  restriction fragment-length polymorphisms 333–334
  single-strand conformation polymorphisms 333
  species discrimination 327
  species specific primers 331
polymerase chain reaction with restriction fragment-length polymorphism (PCR-RFLP) detection 333–334
polymerase chain reaction with single-strand conformation polymorphism (PCR-SSCP) detection 333
polymer chain reaction amplification and denaturing gradient gel electrophoresis (PCR-DGGE) 447
polymerase chain reaction with restriction fragment-length polymorphism (PCR-RFLP) detection 333–334
pomegranate juice, chromatography 258
POPs see persistent organochlorine pollutants
pork 44–50, 307–308
Portrait Value Questionnaires (PVQ) 54–62
positioning claims 62, 65
potentiometric systems, electronic tongues 383
poultry, elemental fingerprinting 106
powdered milk 401–402
power model, mass bias 139
preparation of Lambrusco wines 155–156, 157–159
pretreatment
  see also sample preparation
  elemental fingerprinting 95–99
  price pressures, meat pricing 67–68
primers, species specific 331
principal component analysis (PCA) 484–489, 500–503
probes, NMR 178
processed meat product chromatography 245
production systems
  European horsemeat scandal 66–68
  pork 44–50
product of island farming 8
promoter sequences, GMO
detection 326
protected designation of origin (PDO)
see also Designation of Origin Labelling
consumer effects 50–62
core concepts 6–8, 51
elemental fingerprinting 104–108
extra virgin olive oils 147–155,
179–182
genomics 327
isotopic fingerprinting 147–165
Lambrusco wines 155–165
personal values and behaviour 54–62
protected geographical indication (PGI)
see also Designation of Origin Labelling
consumer effects 50–62
core concepts 6–8, 51
genomics 327
proteins
see also proteomics
chromatography 240–246
MALDI-TOF-MS 396–397, 399
mass spectrometry 396–397, 399
proteomics 336–344
2-DE 340–341
applications 338–339
approaches 336
directed approaches 342–343
future trends 343–344
IEF 340
MALDI-TOF-MS 396–397, 399
mass spectrometry 337, 341–343
SDS-PAGE 337–339
proton transfer reaction mass spectrometry
(PTR-MS) 444
PTR-MS see proton transfer reaction mass spectrometry
publications
by analytical techniques 21
journals 24
strontium isotopes and geographical
origin 143–145
trends in research 19–20
pulses, elemental fingerprinting 105,
110–111
pyrene, fish fluorescence 309

q
QDA see quadratic discriminant analysis
QqQ see triple quadrupole detectors
quadratic discriminant analysis (QDA),
principles 491
quadrupole mass spectrometry 86, 89,
212–213
quality assurance labels 69–75
QuEChERS 461–462
quenching, fluorescence 303

r
radioactive decay of rubidium 134–136
Raman spectroscopy, principles 282–283
randomly amplified polymorphic DNA
(RAPD) 327–328
Rapid Alert System for Food and Feed
(RASFF) 5
rare earth elements (REEs) 100–101,
110–111
RASFF see Rapid Alert System for Food and Feed
rationale of elemental
fingerprinting 99–101
real-time PCR 326–327, 331–333
redilution of fruit juices 119
REEs see rare earth elements
reflectance, vibrational
spectroscopy 280
regulations
EU No. 1151/2012 6–8
European horsemeat scandal 66–68
place branding 50–62
reinforcing brands 70–74
reputation, country-of-origin
branding 30–31
research trends 19–20
resolution
inductively coupled plasma–atomic
emission spectroscopy 94
inductively coupled plasma–mass
spectrometry 89, 90
mass analyzers 89, 90
restriction fragment-length polymorphisms
(RFLP) 333–334
reverse phase liquid chromatography
(RPLC) of dairy products 241–243
Index

RFLP see restriction fragment-length polymorphisms
ribosomal DNA 327, 332
rice, vibrational spectroscopy 288
ripening fruits, fluorescence spectroscopy 313
RPLC see reverse phase liquid chromatography
rubidium, radioactive decay 134–136
s
saccharides see carbohydrates; sugars
saithe 126
saffron 108, 125
salmon 126, 443
salted saithe 126
sample clean-up, multi-contaminant analysis 462–464
sample extraction, multi-contaminant analysis 454–462
sample preparation
see also pretreatment
beverages 97–98
carbohydrates 234
cereals 98
dairy products 99
digestion 95–97
elemental fingerprinting 95–99
fats and oils 98
food waste water 98
fruits 98
honey 99
meat 99
multi-contaminant methods 454–464
mushrooms 98
organic foods 440–441
seafood 99
soils 149–150
strontium isotope analysis 148–152, 156–159
vegetables 98
wines 97–98
sampling
Lambrusco wines 156–160
Ligurian region 148–150
organic foods 433, 440
sandwich ELISA (sELISA) 361
SBATR see single bounce-attenuated total reflectance
Schwartz’s taxonomy of motivational value domains 55
SDS-PAGE see sodium dodecyl sulfate polyacrylamide gel electrophoresis
sea bream 126
seafood see also fish
chromatography 243–244
elemental fingerprinting 99, 106–107
isotopic fingerprinting 125–126
proteomics 341, 342
vibrational spectroscopy 284
sector field (SF) mass spectrometers 89
seed oil chromatography 247–248
selected ion monitoring (SIM) 342–343
self-organizing Kohonen maps (SOM) 510–513
sELISA see sandwich ELISA
sensitivity
fluorescence spectroscopy 299
nuclear magnetic resonance spectroscopy 178
sensory analysis 377–391
electronic noses 381–382
electronic tongues 382–384
future trends 386
gas chromatography-olfactometry 379–380
instrumental 378–385
multivariate data analysis 384–385
organoleptic evaluation 377–378
panels 378
sensory panels 378
sequencing of DNA 330–331
SF see sector field
SFE see supercritical fluid extraction
sheep milk, cows milk detection 399–402
shellfish immunoassays 362–364
shrimp 284
SIM see selected ion monitoring
simple sequence repeats (SSR) 328–330
single bounce-attenuated total reflectance (SBATR) cells 282
single-strand conformation polymorphisms (SSCP) 333
SIRA see multi-elemental stable isotope ratio analysis
$^3$H site-specific natural isotope fractionation (SNIF) 178–179
SLE see solid–liquid extraction
small and medium enterprises (SMEs) country-of-origin effects 30
designation of origin labelling 50–54, 62–75
sustainability in pig farming 44–50
smell emulation 381–382
see also electronic noses
SNIF NMR see $^2$H site-specific natural isotope fractionation
sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE), proteomics 337–339
soft independent modelling of class analogies (SIMCA) 491, 493–495, 506
software, vibrational spectroscopy 283–284
soils
Ligurian region 148–155
Modena region 159–165
sample preparation 149–150, 160
solid foods, powdered samples 96, 97
solid–liquid extraction (SLE) 461
solid-phase extraction (SPE) 463
solid-phase micro-extraction (SPME) 249–256, 454
solvent immiscibilty 210
SOM see self-organizing Kohonen maps
space charge effects 137
sparkling wine isotope ratios 121–122
Sparus aurata 126
SPE see solid-phase extraction
species discrimination
carbon isotopes 120–121
DNA barcoding 331
DNA microarrays 335
fish 362–364
fruit juices 364–365
genomics 327
GM crops 366, 368–369
honey immunoassays 365
immunoassays 357–366, 368–369
MALDI-TOF-MS 399–401
meat 357–361
milk 241–243
multiplex PCR 331
proteomics 336–344
real-time PCR 331–333
restriction fragment-length polymorphisms 333–334
shellfish 362–364
single-strand conformation polymorphisms 333
species specific primers, multiplex PCR 331
spectral interferences, ICP-MS 89, 90–92
spices 108, 125
SPME see solid-phase micro-extraction
SSCP see single-strand conformation polymorphisms
SSFS see synchronous scanning
fluorescence spectroscopy
SSR see simple sequence repeats
stable isotopes
beef 126–127
beverages 119–124, 155–165
bioavailability 141–142
every virgin olive oils 147–155
fish 125–126
food control applications 119–127
food traceability 131–176
fruit juices 119–120, 258
Lambrusco wines 155–165
mineral waters 122–124
natural abundances 119
oils 147–155
organic foods 441–443
ratio determination 118–119
sparkling wines 121–122
spices 125
vanilla 124–125
wines 121–122, 155–165
Staphylococcus aureus,
MALDI-TOF-MS 403–404
stationary phases 203, 204
stir-bar sorptive extraction (SBSE) 454
Stoke’s shifts 299
strawberries, chromatography 257–258
strontium isotopes

calcium replacement 136, 141–142
determination 150–155

food traceability 134–156

geological features 161–165

Lambrusco wines 155–165

Ligurian region mapping 148–152

literature on geographical origins 143–145

mass bias compensation 139–141

olive oil 147–155

rubidium decay 134–136

traceability models 136–137, 146–147

sugars

blueberries 188–189

chromatography 233–240

fluorescence spectroscopy 312–313

kiwifruit 183–188

transgenic lettuces 193

sulfur isotopes, natural abundances 119

supercritical fluid extraction (SFE) 460

supply chains, European horsemeat scandal 66–68

sustainability

consumer attitudes to pork farming 44–50

dimensions of 54

sweets, poisonous inorganic colours, UK, 1858 428–429

synchronous scanning fluorescence spectroscopy (SSFS)

chemometrics 303–304

meat products 308

olive oils 306

principles 301–302

wines 314–315

syrups, fluorescence spectroscopy 312–313

TAG see triacylglycerols

taste emulation 382

see also electronic tongues

te, elemental fingerprinting 107

temperature of cooking 419–420

terpenes in honey 250, 256

TFPs see traditional food products

thawing–freezing detection 414–415

thermal ionization mass spectrometry (TIMS) 136–137

thermoluminescence (TL), irradiation detection 417–418

time-of-flight (TOF) mass spectrometry

see also matrix-assisted laser desorption/ionization–time-of-flight mass spectrometry

inductively coupled plasma-type liquid

chromatography-coupled 213–214

matrix-assisted laser desorption/ionization 341–342, 394–404

TIMS see thermal ionization mass spectrometry

tissue-specific assays, fruit juices 364–365

TL see thermoluminescence

tomatoes, transgenic metabolomic studies 190–193

top-down approach, proteomics 336

traceability models

extra virgin olive oils 147–155

Lambrusco wines 155–165

strontium isotopes 136–137, 146–147

trade-related aspects of intellectual property rights (TRIPS) 51

traditional food products (TFPs)

see also traditional speciality guaranteed new products launched 63–65

quality assurance labels 69–75

traditional speciality guaranteed (TSG)

see also Designation of Origin Labelling

consumer effects 50–62

core concepts 7–8, 51

new products launched 63–65

transgenic foods

see also genetically modified crops

immunoassays 366, 368–369

NMR metabolomics 190–193

transmittance, vibrational spectroscopy 280

treaties, geographical indications regulation 6

trends

elemental fingerprinting 99–101

in research 19–20
Index

triacylglycerols (TAG), 246–256
chromatography 246–256
triple quadrupole detectors (TSQ) 212–214, 465, 467
TRIPS see trade-related aspects of intellectual property rights
tryptophan, fluorescence spectroscopy 308–310
TSG see traditional speciality guaranteed
TSQ see triple quadrupole detectors
Tucker3 497–500
two-dimensional gel electrophoresis (2-DE) 340–341

U
UK see United Kingdom
ultra-high-performance liquid chromatography (UHPLC) 209–210, 467
ultra-high-temperature processed (UHT) milks 310, 401–402
ultra-trace elements analysis 86–94, 99–101
unifloral honeys, volatile compounds 249–256
United Kingdom (UK), adulteration 428–429
United States of America (USA) adulteration 427–428
organic product regulation 12, 14
United States Department of Agriculture (USDA) 12, 14
UPLC see ultra-high-performance liquid chromatography
USA see United States of America
USDA see United States Department of Agriculture

V
Values Theory 55–62
vanilla 124–125
vegetables 98, 103–104, 192–193, 445–446, 464–468
veterinary drug contamination 467–468
vibrational spectroscopy 278–297
beverages 285–288
cereals 287–288
chemometrics 288–291
fish 284–285
honey 288–291
infrared bands 279
instrumentation 280–284
meat and meat products 291
multivariate analysis 279–280
seafood 284–285
software 283–285
wine 285–288
volatile compounds chromatography 249–256
gas chromatography 215–224
mid-infrared spectroscopy 285–286
unifloral honeys 249–256
wines 285–288
voltammetric systems, electronic tongues 383

W
waxy wheat kernels, vibrational spectroscopy 287
wet digestion 95–97
wheat 287, 288, 311, 445
white cabbage 445–446
wines carbon isotopes 121–122
chemometrics 313–315
elemental fingerprinting 97–98, 103
EU GI registrations 11
fluorescence spectroscopy 313–315
geographical indications, core concepts 8–11
isotopic fingerprinting 121–122, 155–165, 178–179
Lambrusco traceability 155–165
oxygen isotopes 121–122
production process effects 155–156, 157–159, 161
sample preparation, elemental fingerprinting 97–98
SNIF NMR 178–179
vibrational spectroscopy 285–288
volatile compounds 285–288
World Trade Organization (WTO) 6–8, 51

Y
yellow cheese 34–41