

# Index

---

- 2-year rotation, 12  
 95% outcrossing, 9
- Acidification potential, 134–5  
 Acidification, 118  
 Advances  
   in maize, 8–9  
   in rice, 7–8  
   in wheat, 5–7
- Agricultural antibiotic use, 146  
 Agricultural export industry, 14–16  
 Agricultural inputs, 194–5  
 Agricultural production, xiii–xiv  
 Agricultural raw materials, 23  
 Agriculture, technical research, 4–14  
 Air emissions inventories, 37–9  
 Air transport, 75  
 American Trucking Association, 76  
 Anaerobic digesters, 44  
 Anaerobic digestion, 44  
 Animal husbandry systems, 195  
 Antibiotic resistant genes, 149  
 Area-based indicators, 115  
 Article 11 of the Council Regulation  
   (EEC) No. 2092/91, 170  
 Asia  
   organic foods, 166–7  
 Automatic turn-off faucets, 234
- BBMG conscious consumer report, 159  
 Beer production, 37  
 Biobased packaging, 104–5  
 Biodiesel, 44  
 Biodiversity, 192  
 Biofuels, 44–5
- Biological oxygen demand (BOD), 36–7  
 Biomass-derived packaging materials, 104  
 Biomimicry, 247  
 Bovine spongiform encephalopathy, 147  
 Breweries, 26  
 Brewery  
   effluents, pollutant load, 36  
   processes, 46
- Capitalistic economics, 512  
 Carbon footprint of food products, 181  
 Carbon labeling, 181–2  
 Carbon Trust, 182  
 Case study  
   Adina For Life, Inc., 71–4  
   CSA Food Miles, 88–89  
   General Mills Inc., 246–7  
   Good Nutured Family Farms (GNFF),  
     89–92  
   Kraft Foods, 200–11  
   Organic Valley Family of Farms, 82–4  
   Organically Grown Cooperative (OGC),  
     93–4  
   Pizza Fusion, 236–7  
   Sierra Nevada Brewing Company, 185–8  
   SYSCO (Systems and Services  
     Company) Corporation, 79–82  
   Unilever, 188–99 (bis)
- Categorization step, 138  
 Category 1: 100% organic, 173  
 Category 2: Organic, 173  
 Category 3: Made with organic, 174  
 Cellulosic materials, 44  
 Centralization, 68  
 Centralized distribution, 68

- Certification, 161
  - and labelling, 152–3
  - of organic foodstuffs in developing countries, 169
- Certified products, 161
- Chemical fertilizers, 10–11
- Chemical oxygen demand (COD), 36
- Chemical pesticides, 11–12
- Chicken eggshells, 42
- Chlorofluorocarbons (CFC)-free refrigeration, 214
- Clean in place (CIP), 209
- Closed-loop recycling, 108
- CO<sub>2</sub>, 117
- Cochrane, Willard, 15
- Codex Alimentarius Commission, 169
- Coffee grounds as fuel, 42–3
- Combustion products, 39
- Common fish production processes, energy consumption, 47
- Community supported agriculture (CSA) enterprises, 85
- Compact fluorescent lamps (CFLs), 234
- Complex global food situation, 17
- Composting, 110–1
- Confinement grain feeding, 12
- Consumer education and programs, 216
- Consumer insight and green marketing, 160–1
- Consumer transport to purchase food, 241
- Consumers Union, 161
- Contribution
  - from energy used in the stable, 132
  - from manure application field, 132
  - from slaughterhouse, 132
- Conventional commodity crops, 15
- Corn sweeteners, 150
- Crop rotation, 8
- Crop varieties, genetic improvement, 5
- CSA distribution models, 87–8
  
- Dairy food plant wastes, 35
- Dairy processing facilities, 47
- Deep-rooting crops, 196
- Denmark
  - organic products' state inspection and certification services, 170–1
- Direct marketing, 85
- Direct oil burning, 45
- Disposable service ware, use of, 235
- Disposal of animal waste, 147
- Distribution, 61
  
- ecoFridge*, 78
- Economic indicators, 64
- Eco-profile, 138–40, 140f
- Edible packaging, 111–12
- Efficient distribution, 242
- Emerging pathogens, 147
- Emissions
  - nuisance impacts, 39
- Energy balance of agricultural systems, 193–4
- Energy consumption, 64
  - of efficient dairy processing facilities, 47f
  - of efficient food and beverage processing, 48f
- Energy efficiencies, 48
- Energy Star program, 48
- Energy use, 45–9
  - total impact, 47–8
- Environmental assessment tools, 115
- Environmental hot spots, 135
- Environmental impacts
  - agricultural production, 18
    - of food products, 119–21
    - fish, 124–5
    - grain, 126
    - individual product, 127
    - meat, 121–4
    - milk and dairy, 125–6
    - of different meals, 127–35
    - sugar and oils, 127
    - vegetables, 126–7
- Environmental indicators, 64
- Environmental sustainability indicators, 64
- European Organic Standards and Certification, 169–71
- European Union
  - Council Regulation (EEC) No. 2092/91 of June 24, 1991, 168–9
- Europe
  - organic foods, 163–4

- Eutrophication, 118
  - potential, 133–4
- Fairtrade, 174
  - label, 174
  - labelling, 174–5
    - initiatives, 178t
    - system, 178
  - mark, 177
  - producer standards, 177
  - product markets, 176t
  - products, production of, 175
  - Standards and Certification, 177
- Fairtrade Labelling Organisation (FLO), 177
- Farm support programs, consolidation, 15–16
- Farmer and market effects, 152–4
- Farming systems, simplification of, 12
- Fibrous residues and pulp from tapioca production, 42
- Field-grown vegetables, 128–9
- Final foodwaste, 215–6
- First-tier indicators, 61, 95
- Fish by-products segment, 39
- Fish meal driers, 39
- Fish processing, 36
  - industries, 37
- (FLO-Cert), 177
- Food additives, 150
- Food Alliance, 180–1
  - certification program, 181
- Food conservation and preservation techniques, 188
- Food distribution, 63. *See* Global food distribution.
- Food distributors, environmental issues, 79
- Food localization movement, 86–7
- Food manufacturing businesses, 189
- Food miles, 64, 67, 78
- Food packaging, 105
  - solid waste, 106
- Food preparation and service operations, 233–5
- Food processing, 23
- Food processing industry
  - air emission, 40t
  - solid waste generation, 38t
  - zero waste industrial ecosystem, 50f, 51f
- Food processors, 185
- Food production
  - increases in, 5
- Food products
  - sustainability principles, 241–2
- Food retailers, 216
- Food retailing spans, 213
- Food retailing, life cycle impacts, 214
- Food safety, 145–9, 235
- Food service operations, 225
- Food services, 225
- Food storage, 232–3
- Food supply chain, xiii
  - life cycle assessment, 115–6
  - life cycle impacts, 241
  - social aspects, 145–9
- Food waste, 24–5, 215
  - environmental impact, 36
- Food-borne pathogens, 145
- Fraction of waste from food, 215
- Fruit guidelines, 229
- FTC Act, 160
- Functional unit (FU), 116
- Genetically encoded changes, 146
- Genetically modified organisms (GMOs), 9
- Global ecosystem, fragility of, 4
- Global food distribution. *See* Food distribution.
  - infrastructure, 70
  - policy and trade, 70
  - sustainability, 70–1
  - technology innovation, 69
- Global Organic Standards and Regulations, 168–74
- Global warming potential, 116, 131–3
  - per kg pork, 115
- Good housekeeping, 41
- Green Chemistry, 240
- Green chill advanced refrigeration partnership, 215
- Green Engineering, 239–40
- Green marketing guides, 161

- Greenhouse gas (GHG) emissions,  
17–18  
per kg barley, 132  
per kg pork, 131
- Greenhouse-grown tomatoes, 128
- Greenwashing, 160
- Grocery Manufacturers Association  
(GMA), 213
- Grocery stores, 68
- Gross domestic product (GDP), 23
- Growth-promoting antibiotics in animal  
agriculture, 146
- GWP. *See* Global warming potential.
- Harvesting, 12–13
- Health and nutrition, 149–52
- Heart disease, 151
- Heavier packages, transport costs, 103
- Heavy industrial sector, 25
- High-density lipoprotein (HDL)  
cholesterol levels, **151–2**
- High-density polyethylene (HDPE), 248
- Human activities, consequences of, 4
- Human population, 3
- Hyperactivity or attention-deficit  
hyperactivity disorder (ADHD),  
**150–1**
- Idea-to-market (I2M) process, 208
- IFOAM-accredited certifiers, 168
- Ikerd, John, 15
- Inbred lines of maize, 8–9
- Industrial production activities, 23
- Industrial wastes, 24–5
- Innovation based on how nature solves the  
problems, 247
- Integrated heat recovery systems, 49
- International distribution, 67–74
- International Organic Federation of  
Agriculture Movements (IFOAM),  
168, 171
- Inventive approach to product  
development, 245f
- Kitchen exhaust hoods, 233–4
- Kraft-owned transportation vehicles,  
206
- Lack of biodiversity, 17
- Land application, 45
- Land grant system, 15
- LCA inventories on pork, 130–1
- LCA. *See* life cycle assessment.
- Leading fairtrade products, 176t
- Life cycle analysis, 136–41
- Life cycle assessment, 116  
innovation, 247–8
- Life cycle–based claims, 160
- Light-emitting diodes (LEDs), 234
- Livestock, 18
- Local and regional food supply chains, 87
- Local distribution issues, 73–4
- Local marketing, 85–6
- Losses to pests, 17
- Low-density lipoprotein (LDL) cholesterol  
levels, 151–2
- Low-flow faucets, 234
- Low-flow toilets, 234
- Mangoes, 44
- Manure/slurry from the pigs, 132
- Marine Stewardship Council (MSC), 178–9
- Market and consumer interest  
fairtrade, 175–7  
organic foods, 162–8
- Marks and Spencer, 221–2
- Mass efficiency, 203
- McCain Foods, 49
- Meat and poultry guidelines, 229
- Meat products manufacturing industries,  
waste stream, 26
- Membrane filtration, 44
- Menu planning, 230–2
- Methane, 117
- Methicillin-resistant *Staphylococcus  
aureus* (MRSA), 147
- Molasses, 41–42
- Monoculture agricultural practices, 147
- Multifunctional rural landscapes,  
importance of, 16
- Multilayer packaging, 103
- Municipal solid waste (MSW), 105
- Nature's Services: Societal Dependence on  
Natural Ecosystems*, 16

- Nitrous oxide, 117
- North America
  - mass market grocery stores, 165
  - organic foods, 164–6
- North American Free Trade Agreement, 14
- Nutrients, 192
  - per unit of harvested yield, 11
- Nutritional value of food, 64
- Oceania
  - organic foods, 167–8
- Official Journal Reference L198 of July 22, 1991, 169
- One-stop shopping, 227
- Organic agriculture, industrialization of, 13–14
- Organic dairy systems, 125
- Organic farmers, 13
- Organic farming, 13–14
- Organic farms, 13
- Organic foods, 162
  - consumer awareness in Asia, 167
- Organic livestock standards, 162
- Organic Monitor, 162
- Organic pig production, 131
- Organic producers, 169
- Ozone-depleting substances (ODS), 214
- Package light-weighting, 102–4
- Packaging capacities, 227
- Packaging, 101, 215
  - energy use, 112
  - environmental considerations, 101–12
  - waste and waste reduction, 105–12
- Partially hydrogenated fat, 151
- Particulate matter (dust), 39
- Patent US 7037547, 245
- Pectin, 44
- Per capita solid waste, 105–6
- Pest management, 192
- Pesticides, 148
- Pig stable, 134
- PLA-packaged food and food service applications, 105
- Plastic pallets, 215
- Pollution swapping, 115–16
- Pollutants of holding pens, 26, 35
- Poly(hydroxyalkanoates) (PHA), 104
- Poly(lactic acid) (PLA), 104–5
- Pork production, environmental improvement, 135
- Pork, production chain, 129–30
- Postharvest loss, 12–13
- Prime farmland to urban development, rapid conversion, 17
- Private infrastructure, 70
- Process heating and cooling systems, 46
- Processed food, 150
- Processing food with minimal inputs, 242
- Producer-consumer relationships, 87
- Product-based indicators, 115
- Production of food and animal feeds, 118
- Product-Related Emissions
  - Communications Guidance (PECG), 182
- Product-Related Emissions Reduction Framework (PERF), 182
- Products with less than 70% organic ingredients, 174
- Programmable thermostats or sensory-based thermostats with “night setback” modes, 234
- Proper storage and handling, 62
- Prototyping and bench-top development, 243
- Railroads, 76
- Rainforest Alliance agriculture standard, 180
- Rainforest Alliance, 179–80
- Recovered heat, 49
- Recovering/recycling food packaging, 108
- Recovery and reuse of resources in waste, 43
- Recycling, 107–12
  - aluminium, 109
  - food packaging plastic, 109–10
  - paper and paperboard, 108–9
  - postconsumer glass, 109
  - recovery, and reuse of materials, 41
- Refinery sugar production, 26
- Refrigerated mobile containers/*reefers*, 69
- Refrigeration, 62–63

- Regulation (EC) No. 834/2007, 170
- Rendering, 43
- Reproductive and endocrine system disorders, 148
- Residues in the environment, 15
- Resource use, 102
- Retail food industry, 76
- Reusable containers, 215
- Reusable packages, 232
- Reusable packaging, 107
- Reusable plastic and corrugated fiberboard bulk packaging, 107
- Rising incomes, 69–70
- Rural communities, 154
- Safeway ‘O Organics’, 165
- SAI Platform (Sustainable Agriculture Initiative Platform), 195–96
- Scoping phase, 136
- Secondary packaging, 215
- Second-tier indicators, 61, 95
- Sections 601–607 of the Clean Air Act, 232–3
- Self-distribution, 76–7
- Self-pollinated cereals, genetic selection techniques, 5
- Sharing genes, 147
- Shipping containers, 69
- Silent Spring*, 11
- Slaughtering operations, major pollutant, 35
- Small farms, 153–4
- Social indicators, 64
- Social/human capital, 194
- Soil fertility, 6–7
- Soil fertility/health, 191
- Soil loss, 191–2
- Solid organic waste in dairy processing facilities, 37
- Solid waste, 37
- Source reduction, 102
- Spring wheat, 6
- Starter fertilizers, 10
- Stichting Max Havelaar, 174
- Stock-keeping units (SKUs), 79
- Stop & Shop Supermarket Company, LLC, 214
- Sugarcane processing industry potential emission sources, 39
- Supermarkets, 68–70
- SUPERVALU, 218–9
- Suppliers structure, 77
- Supply chain supply chain sustainability model, 202, 203f
- Supply chain sustainability, 204–11 focus areas, 204, 204f
- Supplying needed nutrients to high-demand crops, 10
- Sustainability, 64
  - U.S. food distribution system, 77–79 efforts, 67
  - goals and business goals, overlap designing, 245–7
  - indicators, 65t–6t
  - lens, 201f
  - principles, 190–1
    - innovating around the challenges, 244–5
  - programs and tools, 207
  - wheel, 201, 202f
- Sustainable
  - agriculture indicators, 191–5
  - development, xiii
  - distribution initiatives, 96
  - farming, 196
  - food chain, key principles, xiv
  - food program, 230–1
  - operation, 226
  - food supply, xiii
    - chains, 189
  - innovation, 244–8
    - and product development, 239
  - operations, 235–7
  - packaging, 112–13
  - practices, xiv–xv
  - product development, 243–4
- Third-tier indicators, 62, 95
- Total suspended particulate (TSP), 37, 39
- Transgenic hybrids/ genetically engineered foods, 9, 148–9
- of maize, 9
- Transparency in the supply chain, 72

- Transport
  - after slaughterhouse, 134
  - and storage methods, 63
  - from slaughterhouse, 132
  - fuels, 62
  - modes and impacts of consolidation, 75–7
- Truck transport, 75–6
- U.K.
  - Food Standards Agency (FSA), 151
  - Strategy for Sustainable Farming and Food, xiv
- U.S. 1990 Farm Bill, 171
- U.S.
  - Department of Agriculture's Economic Research Service, 74
  - Department of Energy, 49
  - Environmental Protection Agency (EPA), 11, 148, 206
    - energy star leader award, 214
  - Federal Trade Commission (FTC), 160
  - Food and Agriculture Organization (FAO), 12
  - food service industry, 225–37
  - food wholesalers, 77
  - hybrid maize industry, 8
  - National distribution, 74–84
  - National food retail system, 77
  - National Organic Program (NOP), 165
  - National Organic Standards Board (NOSB), 172
  - Organic Agriculture Regulations, 162
  - Organic Foods Production Act (OFPA), 171–2
  - organic foods, 164–6
  - Organic Standards and Certification, 171–4
  - organic standards, 173
    - labelling options, 173–4
    - regional/local food distribution, 84–94
    - transportation modes and impacts of consolidation, 75–7
    - transportation network, 75t
- U.S. economy
  - transportation, 74
- Unilever's Lead Agriculture Programmes, 195–7
- USDA Organic seal, 166
- Value chain, 193
- Vegetable guidelines, 228
- Vegetable oil processing wastewater, 36
- Volatile organic compounds (VOC), 37, 39
- Wal-Mart Stores, Inc., 217–8
- Waste from food retailers, 215
- Waste generation from food processing, 25–6
- Waste management, 39–45
- Wasted fruits and vegetables, 42
- Waste-out, 203
- Wastewater, 26–37
  - flows from fruit and vegetable plants, 36
  - from dairy plant operations, 35
  - from food processing industry, 27t–34t
  - loads from fruit and vegetable processing industries, 36
- Water conservation, 45
- Water use for agricultural systems, 194
- Weed control through herbicides, 11
- Weighted average source distance (WASD), 78–9
- Western Corn Belt, 15–16
- Whole Foods Market, Inc., 220–1
- Zero waste industrial ecosystem, 50
  - food processing industrial subsectors, 51f