Subject index

Acceptance sampling plans 48-49 Aflatoxicosis 2.89-90 Aflatoxin B₁ chemical and physical properties of -, 31-32 Aflatoxin B₂ chemical and physical properties of -, 31-32 Aflatoxin G₁ chemical and physical properties of -, 31-32 Aflatoxin G₂ chemical and physical properties of -, 31-32 Aflatoxin M₁ chemical and physical properties of -, 31-32 testing for -, 40-41 Aflatoxins 4-8, 31-32, 62, 88-92, 111 carcinogenicity of -, 88-89, 90 effects in farm animals of -, 71-72.78 formation of -, 6-8 human health effects of -, 89-92 interventions to control -, 135-139 maximum tolerated levels of -, 122-123 mechanisms of action of -, 71, 88-89 occupational exposure to -, 91-92 risk assessment of -, 111 testing for -, 40 toxicokinetics and metabolism of -, 64

Alimentary toxic aleukia (ATA) 2.14 Alternaria arborescens 19 - 20Analytical methods 54 - 58in developed countries, 54 in developing countries, 54-55 in rural areas, 55-56 Animal contributing factors to diseases, 60-63 disease outbreaks, 60-63 diseases, 60-63, 72-74 performance problems, 71, 73, 75, 77, 78 production problems, 61 reproductive effects, 63, 71, 77 Antibody-based methods 56 Aspergillus 3-12 carbonarius, 8, 10-12 flavus, 4-12 japonicus, 11 niger, 8, 10-12, 19-20 ochraceus, 8-12 parasiticus, 4–12 Assessment dose-response -, 107-109 exposure -, 109-110 risk -, 106-112 Average daily dose (ADD) 109-110 Beans 10 Benchmark dose 108 **Biocontrol** 136

Biomarkers 60, 61, 64, 66, 72, 74-76, 88, 96, 97, 110 of exposure to aflatoxins, 72, 88, 89, 91 of exposure to fumonisins, 72, 74.93 Brazil nuts 7.8 Breeding for host plant resistance 19, 135-136, 138, 140-141 Cancer potency factor 108 Carcinogenic effects 108-109 Carcinogenicity of aflatoxins, 88-89, 90 of deoxynivalenol, 97-98 of fumonisins. 93 of ochratoxin A. 96-97 of zearalenone. 99 Case-control studies 106, 107 Cashew nuts 7 Cattle 60, 61, 63, 70, 71, 76-77, 78, 79 Cereals 14 Chickpeas 10 Child growth impairment 91 Chlorophyll 138 Chlorophyllin 138 Chromatographic methods 54-58

Cirrhosis 90 Citreoviridin 3 Citrinin 3 Classification of agents as to carcinogenicity in humans 95, 109, 111-112 Claviceps 4, 23–24 purpurea, 23-24 Clinical signs in farm animals 71-77 Coconuts 7 Coefficient of variation (CV) 41 Coffee beans 10.140 Cohort studies 106 Commodities at risk 6-8 Consumer risk 49 - 50Contributing factors 60-63 Control strategies 131-142 Cost-effectiveness of interventions 126-127 Cost of illness (COI) 124 Costs of mycotoxins in international markets, 122-123 in local and regional markets, 121-122 to society, 120-126 Cottonseed 7 Cyclopiazonic acid 3 Decision trees 23

Deoxynivalenol 34, 62-63, 97-98, 112 carcinogenicity of -, 97-98 chemical and physical properties of -, 34 effects in farm animals of -, 75-76.79 formation of -. 20-22 human health effects of -, 97-98 interventions to control -, 140-142 mechanisms of action of -. 75. 97 occupational exposure to -, 98 risk assessment of -, 112 testing for -, 41-42 toxicokinetics and metabolism of -. 68-69 **Dietary interventions** 137-138 Disability-adjusted life years (DALYs) 124 Dose-response assessment 107-109 Drought 18-19 Drying 10, 132, 136-137 Economic impacts of mycotoxins 125-126 Economics of mycotoxins 119-128 Emericella 4 Environmental stressors 135 Enzyme-linked immunosorbent assay (ELISA) 41-42, 54, 56 Epidemics 2 Equine leukoencephalomalacia (ELEM) 60, 62, 72-74

Ergot alkaloids 23-24, 36, 63 chemical and physical properties of -, 36 effects in farm animals of -, 76-77, 79 poisoning, 63 toxicokinetics and metabolism of -. 70-71 Ergotamine 36 Ergotism 2, 61, 76 Erosion 132 Estrogenic effects 60, 63, 76, 79 Eurotium 4 Export loss 123 Exposure assessment 109-110 F-2 toxin 63 Feasibility of interventions 127-128 Feed refusal 60, 62-63, 75, 79 Fertilizers 132 Fescue foot 63.77 Field outbreaks 59-63, 72 Figs 8, 12 Fish 7, 10 Fluorescence polarization (FP) immunoassay 55 Fluorometric methods 42.54 Forecasting 136, 141 Fumonisin B₁ chemical and physical properties of -, 32-34 Fumonisin B₂ chemical and physical properties of -, 32-34

Fumonisins 32-34, 62, 92-94, 111-112 carcinogenicity of -, 93 effects in farm animals of -, 72-74, 78 formation of -, 19-20 human health effects of -. 93 - 94interventions to control -, 138-139 mechanisms of action of -, 74, 92-93 probable daily intake of -, 113-114 risk assessment of –, 111–112 testing for -, 41 toxicokinetics and metabolism of -. 65-67 Fungicides 141-142 Fusarium 3-4.14-22 crookwellense, 21 culmorum, 21 graminearum, 20-22 proliferatum, 16-19 subglutinans, 18 verticillioides, 16-19 Fusarium head blight, 21-22 kernel rot. 18-19 Gibberella moniliformis 16 Glutathione-S-transferases 138 Good agricultural practice (GAP) 132 Good manufacturing practice (GMP) 132-133 Grain and groundnut dusts occupational exposure to -, 99 Grains 21-22, 140 Grapes 11-12 Green tea polyphenols 138-139 Gross domestic product (GDP) 126-127 Groundnuts 7, 43, 49, 88

Haemorrhagic syndrome 61 Harvesting 132 Hazard analysis and critical control point (HACCP) system, 133-135 identification. 106-107 quotient (HQ), 110-111 Hazelnuts 7 Health economic impacts of mvcotoxins 123-125 Hepatocellular carcinoma (HCC) 88, 90, 93, 111 Hepatotoxicity 71 High-performance liquid chromatography (HPLC) 54 Horses 62, 63, 66, 72-74, 77, 78, 79 Human health effects 87-104 of aflatoxins. 89-92 of deoxynivalenol. 97-98 of fumonisins, 93–94 of ochratoxin A, 96-97 of zearalenone, 98-99 Human health losses 123-125 Immunoaffinity columns (IACs) 54 Immunological methods 54-58 Immunomodulation 90 - 91Individual-level intervention 132-142 Insects 18-19, 132 Interlaboratory collaborative studies 54 International Agency for Research on Cancer (IARC) 90, 93, 95, 109, 111-112 International trade 122-123

Interventions 126-128, 131-142 cost-effectiveness of -. 126-127 dietary -, 137-138 feasibility of -, 127-128 post-harvest -, 139-140, 142 pre-harvest -. 135-136, 138. 140-142 public health -, 126-128 Joint FAO/WHO Expert Committee on Food Additives (JECFA) 66, 92, 111-112, 122 Kidney disease 61.96 Lactic acid bacteria 138-139 Laminitis 63.77 Lateral flow devices 54 Lifetime average daily dose (LADD) 109-110 Lipid metabolism 74 Liver cancer 88, 90, 93, 111 Lowest-observed-effect level (LOEL) 108 Maize 7, 17-19, 62, 72, 88, 89-90, 93 bag stack of -, 42 crib of - cobs, 42 transgenic -, 139, 141 Market costs of mycotoxins, 121-122 impacts of mycotoxins, 120-123 Matrix 54 effects, 56 Meat 10, 14 Mechanisms of action of aflatoxins, 71, 88-89 of deoxynivalenol, 75, 97 of fumonisins, 92-93 of ochratoxin A, 94-96 of zearalenone, 98 Median effective dose (ED₅₀) 108 Median lethal dose (LD₅₀) 89, 108

Metabolism 63-71, 72, 76 Metabolites 68 Methods analytical -, 54-58 antibody-based -, 56 chromatographic -, 54-58 fluorometric -, 42, 54 immunological -, 54-58 Mouldy corn poisoning 62 Mycotoxic nephropathy 62.78 **Mycotoxicoses** 60-63 Mycotoxigenic fungi 2 - 3Mycotoxins analysis of -, 53-58 chemical and physical properties of -, 31-38 control of -, 113-114, 131-142 costs in international markets, 122-123 costs in local and regional markets. 121-122 costs of - to society, 120-126 definition of -, 2 economic impacts of -, 125-126 effects in animals of -, 59-86 fungi producing -, 2-3 health economic impacts of -, 123-125 human health effects of -, 87-89 market impacts of -, 120-123 standards for -, 122-123 testing for -, 40-42 toxicological effects of -, 71-77 trade impacts of -, 120-123 Neosartorya 4 Nephrotoxicity 68.74 Neural tube defects 93-94 Neurological effects 63

Nivalenol 34 - 35chemical and physical properties of -, 34-35 formation of -, 20-22 Nixtamalization 137-138. 139 No-observed-effect level (NOEL) 108 NovaSil clay 137 Occupational exposure to aflatoxins. 91-92 to deoxynivalenol, 98 to grain and groundnut dusts, 99 to ochratoxin A, 96-97 Ochratoxicosis 62 Ochratoxin A 8-14, 32-34, 62, 94-97, 112 carcinogenicity of -, 96-97 chemical and physical properties of -, 32-34 effects in farm animals of -. 74-75.78 formation of -. 8-14 human health effects of -, 96 - 97interventions to control -, 140 mechanisms of action of -. 94 - 96occupational exposure to -, 96-97 risk assessment of -, 112 testing for -, 41 toxicokinetics and metabolism of -, 67-68 Odds ratio (OR) 106 Oesophageal cancer 93-94 Oilseeds 7 Operating characteristic (OC) curve 49 Optical readers 55 Patulin 3 Pecan nuts 10

Penicillium 3-4, 12-14 expansum, 3 verrucosum, 8, 12-14 Penitrem A 3 Phase 2 enzymes 138 Phomopsin 3 Phomopsis leptostromiformis 3 Pigs 60-63, 64, 65, 66-71, 72, 73, 74, 75, 76, 78-79 Pistachio nuts 7-8.10 Pithomyces chartarum 3 Plant breeding, 135-136, 138, 140-141 stress, 132 Population attributable risk (PAR) 126 Population-level intervention 132-142 Porcine pulmonary oedema (PPE) 60, 72–74 Post-harvest interventions 136-140, 142 Poultry 61, 62, 64, 67, 68, 69, 70, 71, 72, 73, 74, 78, 79 Precision spotters 55 Pre-harvest interventions 135-136, 138, 140-142 Probable daily intake (PDI) 92, 113–114 Producer risk 49-50 Product monitoring 39-40 Provisional maximum tolerable daily intake (PMTDI) 92, 108 Public education, 114-115 health interventions, 126-128 Quality-adjusted life years (QALYs) 124-125

Rabbits 66, 67, 68, 74, 78 Rd-toxin 62 Red mould poisoning 62 Reference dose (RfD) 108 Regulations 48-50, 128 Relative risk (RR) 106 Reproductive effects in animals 63.71.77 Resources 132-142 Risk consumer -, 49-50 producer -, 49-50 **Risk assessment** 106-112, 126 of mycotoxins, 111-112 Risk characterization 110-111 of carcinogens, 111 of non-carcinogenic toxins, 110-111 **Risk management** 112-114 strategies, 131-142 Rubratoxin A 3 Sample preparation, 50 preparation variance, 40 size, 43-48 storage, 50 variation, 40 Sampling 48-50 acceptance -, 48-49 in subsistence farming areas, 47-50 methods, 43-48 of processed commodities, 43 of whole kernels, 43 plans, 42-48 variability, 40-42 variance, 40 Sheep 63, 64, 65, 67, 68, 69, 70, 77, 78, 79

Slope factor 108 Sortina 133, 136-137, 139 Species sensitivity 60, 61, 77-79 Spices 7 Sporidesmin 3 Stachybotryotoxicosis 2 Storage 8, 132, 136-137 Structure-activity relationship (SAR) models 107 Subsistence farming 47-50 Sulforaphane 138 Summer slump 63,77 Supply and demand 120-121 Surveillance sampling plans, 43-45 studies, 42-48 Target organ 61 Taxonomy 3 - 4of Aspergillus species, 4-12 of Fusarium species, 14-22 of Penicillium species, 12-14 Tenuazonic acid 3 Testing for mycotoxins 40-42 Thin-layer chromatography (TLC) 54, 55-56 Tolerable daily intake (TDI) 108 **Toxicokinetics** 59, 63-71 **Toxicological effects** 71-77 Toxicology 60

Trade barriers, 122 impacts of mycotoxins, 120-123 Transgenic maize 139, 141 Transportation 128 Trichothecenes 3, 21–22 Turkey "X" disease 62 Ultraviolet light 136 Value chain of crops 121-122 Vomitoxin 62 Walnuts 7 Washing 139 Water supplies 132 Weeds 132 Weight of evidence (WOE) 108 Welfare 120 Wheat 21-22, 41-43, 97-98, 140 Wines 11-12, 140 Zearalenone 35, 63, 98-99, 112 carcinogenicity of -, 99 chemical and physical properties of -, 35 effects in farm animals of -, 76.79 formation of -, 20-22 human health effects of -, 98-99 interventions to control -, 140-142 mechanisms of action of -, 98 risk assessment of –, 112 toxicokinetics and metabolism of -, 69-70