1. Record Nr. UNINA9910647241803321

Titolo	Recent Advances in OMICs Technologies and Application for Ensuring Meat Quality, Safety and Authenticity / / edited by Brigitte Picard, Mohammed Gagaoua
Pubbl/distr/stampa	[Place of publication not identified] : , : MDPI - Multidisciplinary Digital Publishing Institute, , 2023
ISBN	3-0365-5666-4
Descrizione fisica	1 online resource (220 pages)
Disciplina	576.163
Soggetti	Meat - Microbiology
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	About the Editors vii -- Preface to "Recent Advances in OMICs Technologies and Application for Ensuring Meat Quality, Safety and Authenticity" ix -- Recent Advances in OMICs Technologies and Application for Ensuring Meat Quality, Safety and Authenticity 1 -- Impact of Extraction Method on the Detection of Quality Biomarkers in Normal vs. DFD Meat 5 -- New Insights on the Impact of Cattle Handling on Post-Mortem Myofibrillar Muscle Proteome and Meat Tenderization 21 -- A Proteomic Study for the Discovery of Beef Tenderness Biomarkers and Prediction of Warner-Bratzler Shear Force Measured on Longissimus thoracis Muscles of Young Limousin-Sired Bulls 43 -- Protein Array-Based Approach to Evaluate Biomarkers of Beef Tenderness and Marbling in Cows: Understanding of the Underlying Mechanisms and Prediction 63 -- Proteomic Changes in Sarcoplasmic and Myofibrillar Proteins Associated with Color Stability of Ovine Muscle during Post-Mortem Storage 87 -- Preliminary Results about Lamb Meat Tenderness Based on the Study of Novel Isoforms and Alternative Splicing Regulation Pathways Using Iso-seq, RNA-seq and CTCF ChIP-seq Data 101 -- A Simple and Reliable Single Tube Septuple PCR Assay for Simultaneous Identification of Seven Meat Species 115 -- Interlaboratory Validation of a DNA Metabarcoding Assay for Mammalian and Poultry Species to Detect Food Adulteration 129 -- Development of a Duck Genomic Reference Material by Digital PCR

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Consumers and stakeholders are increasingly demanding that the meat industry guarantees high-quality meat products with stable and acceptable sensory and safety properties. To do this, it is necessary to understand the mechanisms that underlie the conversion of muscle into meat, as well as the impact of pre- and post-harvest procedures on the final quality and safety of meat products. Over the last two decades, sophisticated OMICs technologies-genomics, transcriptomics, proteomics, peptidomics, metabolomics and lipidomics, also known as foodomics-have been powerful approaches that extended the scope of traditional methods and have established impressive possibilities of addressing meat quality issues. Foodomics were further used to elucidate the biological basis/mechanisms of phenotypic variation in the technological and sensory quality traits of meat from different species. Overall, these techniques aimed to comprehensively study the dynamic link(s) between the genome and the quality traits of the meat that we eat compared to traditional methods, hence improving both the accuracy and sensitivity thanks to the large quantities of data that can be generated. This Special Issue focused on the cutting-edge research applications of OMICs tools to characterize or manage the quality of muscle foods. The research papers applied transcriptomics, targeted and untargeted proteomics, metabolomics, and genomics, among others, to evaluate meat quality, determine the molecular profiles of meat and meat products, discover and/or evaluate biomarkers of meat quality traits, and to characterize the safety, adulteration, and authenticity of meat and meat products.