

特约专栏介绍

# 粮食产业链数字化和创新技术研究

专栏主持



国家粮食和物资储备局科学研究院

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孙 辉：女，博士，研究员，毕业于中国农业大学。现任国家粮食和物资储备局科学研究院总工程师，兼任国际标准化组织 ISO/TC34（食品技术委员会）/SC4（谷物与豆类分会）主席、全国粮油标准化技术委员会委员、原粮及制品分技术委员会主任委员、中国粮油学会发酵面食分会副会长、《粮油食品科技》主编及第五届编委会副主任委员。

主要从事粮食品质研究及标准化工作，主持各类国家科研项目 10 余项，主持和参与完成国际标准 20 项、国家标准 31 项、行业标准 17 项，发表论文 80 余篇，主（参）编了“十四五规划教材”、“十三五重点规划图书”（中国好粮油科普读物）及《粮食安全保障法释义》等

著作 7 本。获国际谷物科技协会（ICC）“Harald Perten 谷物科学研究杰出贡献奖”，以及“中国标准创新贡献奖”一等奖、中国粮油学会科学技术奖一等奖和河南省科学技术进步奖一等奖等省部级奖励，2010 年“全国粮油优秀科技工作者”、2016 年“九三学社北京市委成立 65 周年先进个人”、2017 年“国家粮食局三八红旗手”、作为主要负责人获 2020 年“全国粮食和物资储备系统先进集体”。

牵头组织了“APEC 粮食产业链数字化和创新技术应用研究与经验交流项目”的申报和实施。

## 专栏介绍

2024年10月21–24日，由国家粮食和物资储备局科学研究院主办的第二届“APEC粮食产业链数字化和创新技术研究与经验交流研讨会”在北京召开。会议深化了APEC经济体在粮食领域的交流合作，对推动粮食供应链的数字化转型起到了重要作用，保障了农业的可持续性、包容性和责任感，促进了APEC区域数字农业的发展。

《粮油食品科技》作为会议的唯一支持媒体，在宣传会议同时，策划了与会议内容呼应的“粮食产业链数字化和创新技术研究”专栏，编辑部在会上组稿多位国内外报告专家，有来自澳大利亚、中国、印度尼西亚、秘鲁等4个APEC经济体24位专家学者共同完成了6篇原创论文，其中有3篇为国际文章（中文出版，英文原文以附件呈现），围绕APEC区域粮食安全、产业升级、减少粮食损失和浪费，以及行业实践展开研究与讨论。

**专栏文章之一：**来自秘鲁利马大学 Christiam Méndez-Lazarte 教授等撰写的《预防家庭食物浪费的全球研究视角》一文，系统梳理预防家庭食物浪费研究领域的发展脉络，通过构建专业化知识图谱，提出预防性策略，以期减少家庭食物浪费提供理论支撑和实践指导。阅读详见 P1–P20。

**专栏文章之二：**由北京大蚯蚓数字科技有限公司首席执行官李迅博士等撰写的《全球先进数字农业技术体系在中国粮食种植的试点实践探索》一文，阐述了全球粮食生产所面临的气候变化挑战和数字化时代的发展机遇，展现了数字农业技术体系的应用效

果，为保障中国粮食安全和培育农业新质生产力提供实例参考。阅读详见 P21–P33。

**专栏文章之三：**由澳大利亚粮食贸易协会贸易与市场准入顾问 Rosemary Richards 撰写的《澳大利亚粮食供应链数字化与创新机遇》一文，通过效率革新、安全强化与绿色发展的三维视角，研判供应链现代化转型的战略机遇，以期提升澳大利亚粮食供应链运行效率、保障产业可持续发展提供新思路。阅读详见 P34–P46。

**专栏文章之四：**来自印度尼西亚国家研究与创新署 Sari Intan Kailaku 高级研究者等人撰写的《印度尼西亚农业产业转型：利用新兴数字技术减少粮食损失》一文，提出了创新智能农业产业框架，以实现数据驱动的农业产业转型，减少粮食损失和环境影响，为其他面临类似粮食安全挑战的发展中经济体提供借鉴。阅读详见 P47–P67。

**专栏文章之五：**来自国家粮食和物资储备局科学研究院李腾飞研究员等人撰写的《粮食产业链数字化技术应用调查研究》一文，针对涉粮政府部门、企业、科研检测机构等在数字化技术应用中所面临的政策、技术和投入供给等问题，提出针对性的改进建议，以期加快推进粮食产业数字化技术应用升级。阅读详见 P68–P73。

**专栏文章之六：**由布勒（中国）投资有限公司数据科学家崔晨昊博士等人撰写的《谷物品质在线检测：基于近红外光谱的建模与迁移》一文，探讨了模型迁移技术在解决仪器间差异、环境变化和样品多样性等问题中的策略、挑战与最新进展，旨在为近红外技术在谷物行业的广泛应用奠定重要基础。阅读详见 P74–P84。

本专栏文章为APEC区域保障粮食安全、推进粮食产业数字化升级、减少家庭食物浪费等方面提供理论支持和实践参考，供本领域专家学者交流探讨。

——孙 辉

于中国·北京

2025年4月

## Introduction of the Special Column for “Researching Digitalization and Innovation in Food Supply Chain”

From October 21 to 24, 2024, “The 2<sup>nd</sup> APEC Seminar on Best Practices and Applications of Digitalization and Innovation in Food Supply Chain” was held in Beijing, hosted by the Academy of National Food and Strategic Reserves Administration of China. The seminar deepened cooperation and exchanges among APEC economies in the food industry, playing a significant role in promoting the digital transformation of the food supply chain, thus ensuring the sustainability, inclusiveness, and responsibility of agriculture and fostering the development of digital agriculture in APEC region.

As the sole supporting media for the seminar, the Journal Science and Technology of Cereals, Oils and Foods not only covered the event but also launched a special column titled “Researching Digitalization and Innovation in Food supply Chain” to align with the seminar’s themes. During the conference, the editorial team invited contributions from multiple domestic and international experts. A total of 24 scholars from 4 APEC economies—including Australia, China, Indonesia and Peru—collaborated on 6 original papers, three of which are international articles published in Chinese with the English originals attached. These articles explore topics such as regional food security, technological upgrading in the industry, reduction of food loss and waste, and practical case studies in APEC region.

**Article 1:** Professor Christiam Méndez-Lazarte from the Universidad de Lima in Peru, along with other researchers, authored “Global Research Perspective on Household Food Waste Prevention”. The article systematically reviews the research development in the field of household food waste prevention, constructs a specialized knowledge map and proposes preventive strategies to provide theoretical support and practical guidance for reducing household food waste. Read more in P1-P20.

**Article 2:** The article “Pilot Exploration of Global Advanced Digital Agricultural Technologies in China’s Grain Production” was authored by Dr. Xun LI, CEO of Beijing Big Earthworm Digital Technology Co., Ltd., and Mr. Chao PAN. It expounds on the challenges of climate change faced by global food production and the development opportunities in the digital era. The article demonstrates the application effects of the digital agricultural technology system, providing practical examples and references for ensuring China’s food security and cultivating new high-quality agricultural productive forces. Read more in P21-P33.

**Article 3:** Rosemary Richards, Director of Grain Trade Australia, authored “Opportunities for Digitalization and Innovation in Australian Grain Supply Chains”. This article analyzes the strategic opportunities for the modern transformation

of the supply chain from the three-dimensional perspectives: efficiency innovation, security enhancement and green development. It provides new ideas for improving the operational efficiency of the Australian grain supply chain and ensuring the sustainable development of the industry. Read more in P34-P46.

**Article 4:** The article “Transforming Agroindustry in Indonesia: Emerging Digital Technologies for Reducing Food Loss” was written by Sari Intan Kailaku, Senior Researcher from the National Research and Innovation Agency of Indonesia, along with other researchers. It presents an innovative smart agricultural industry framework which is designed to drive data-driven transformation within the agricultural sector, reduce food losses and environmental impacts. This study serves as a valuable reference for other developing economies facing similar food security challenges. Read more in P47-P67.

**Article 5:** The article “Research on the Application of Digitalization in Grain Supply Chain” was written by Researcher Tengfei LI and colleagues from the Academy of National Food and Strategic Reserves Administration of China. It investigates the challenges that grain-related government agencies, enterprises, and scientific research and testing institutions et al. face in applying digital technologies, particularly in terms of policies, technologies and input supplies. It offers targeted recommendations to promote the application and upgrading of digital technologies within the grain industry chain. Read more in P68-P73.

**Article 6:** Chenhao CUI, Data Scientist from Bühler (China) Investment Co., Ltd., along with another researcher, authored “Advances in Online Grain Quality Assessment: Near-Infrared Spectroscopic Modeling and Transfer Strategies”. Their study explores the strategies, challenges and latest advancements of model migration technology in addressing issues such as differences between instruments, environmental changes and sample diversity. The purpose is to lay an important foundation for the widespread application of near-infrared technology in the grain industry. Read more in P74-P84.

These articles in this column provide theoretical support and practical references for ensuring food security in the APEC region, promoting the digital upgrading of the grain industry, and reducing household food waste. They aim to facilitate exchanges and discussions with scholars in this field.

——Hui SUN  
In Beijing, China  
April 2025

## 专栏学者

**Christiam Méndez-Lazarte 博士 / 教授**

秘鲁利马大学

**Dr. Christiam Méndez-Lazarte, Professor**

Universidad de Lima, Peru

**Christiam Méndez-Lazarte:** 男，工商管理博士，秘鲁利马大学教授，毕业于西班牙巴勃罗·德·奥拉维德大学，在阿根廷萨米恩托将军国立大学获经济学与产业发展硕士学位，在国际知名市场研究公司拥有13多年的专业经验。

作为伊比利亚-美洲营销集团的创始人兼负责人，受邀在美国、中国、哥伦比亚、阿根廷、秘鲁等国家举办的国际学术会议上发表演讲，参与多个国际研究组织，如西班牙营销协会、国际小企业理事会以及国际食品与肥胖/非传染性疾病研究、监测和行动支持网络组织等。

他是本期专栏文章之一《预防家庭食物浪费的全球研究视角》的第一作者。

*Christiam Méndez-Lazarte*, is a Professor and Researcher at Universidad de Lima, Peru. Holds a Ph.D. in Business Administration and Management from Universidad Pablo de Olavide, Spain, and a Master's in Economics and Industrial Development from Universidad Nacional de General Sarmiento, Argentina. He has over 13 years of professional experience in leading international market research firms.

Founder and leader of the Ibero-American Marketing Group, and regular speaker at international academic conferences held in countries such as Colombia, Argentina, Peru, China, Indonesia, the Dominican Republic, Spain, and the United States. Actively involved in international research networks, including the Spanish Marketing Association, the International Council for Small Business (ICSB), and INFORMAS.

He is the first author of the 1st paper as “Global Research Perspective on Household Food Waste Prevention” in this special column.

**Rosemary Richards 贸易与市场准入顾问**

澳大利亚粮食贸易协会

**Rosemary Richards**

Trade &amp; Market Access Consultant of Grain Trade, Australia

**Rosemary Richards:** 女，工商管理硕士，澳大利亚粮食贸易协会贸易与市场准入顾问，鲍曼·理查兹联合公司（一家专门

*Rosemary Richards*, is the principal of Bowman Richards & Associates (BR+A), a consulting firm specialising in providing strategic support to the agribusiness, food and technology sectors.



向农业综合企业、食品及科技领域提供战略支持的咨询公司)负责人,兼澳大利亚油籽联合会及可持续谷物主席、糖业研究主任。

主要从事粮食和食品行业战略规划、市场分析和贸易政策研究,并主导非关税贸易措施工作。在创新和可持续发展领域中拥有丰富经验,包括制定创新和可持续发展框架、开展影响评估以及推动宣传倡导等。

她是本期专栏文章之三《澳大利亚粮食供应链数字化与创新机遇》的唯一作者。本文借鉴了澳大利亚粮食贸易协会资源,对该协会的首席执行官帕特·奥沙纳西先生所提供的宝贵意见在此表示感谢。

She is the Australian Oilseeds Federation, Chair of Sustainable Grain Australia and a director of Sugar Research Australia.

Rosemary undertakes a range of strategic planning, market analysis and trade policy activities for the grains and food industry and has led work on non-tariff trade measures for both sectors. She also has extensive experience across innovation and sustainability including frameworks, impact evaluation and advocacy.

She is the solo author of the 3rd paper as “Opportunities for Digitalization and Innovation in Australian Grain Supply Chains” in this special column, although the paper draws on Grain Trade Australia resources and the valuable input of Mr. Pat O'Sahannassy CEO GTA is acknowledged.



**Sari Intan Kailaku 博士 / 高级研究者**  
印度尼西亚国家研究与创新署 (BRIN)

**Dr. Sari Intan Kailaku, Senior Researcher**  
National Research and Innovation Agency, Indonesia

**Sari Intan Kailaku:** 女, 博士, 毕业于印度尼西亚茂物农业大学农业工业工程专业。2008年起成为农业工业技术领域研究人员, 2017年作为访问科学家赴韩国国立园艺与草药科学研究所亚洲产后研究中心交流学习, 现任印度尼西亚国家研究与创新署任高级研究者、印度尼西亚农业研究联盟研究者。

研究领域为农产品产后处理与农业工业技术、食品供应链的设计与分析, 应用数字技术提升附加值、提高食品供应链效率并减少食品损耗。

她是本期专栏文章之四《印度尼西亚农业产业转型: 利用新兴数字技术减少粮食损失》的第一作者。

**Sari Intan Kailaku**, earned her doctoral degree from the Agroindustrial Engineering program at IPB University. She started her career as a Researcher in the field of Agroindustrial Technology at the Indonesian Ministry of Agriculture in 2008 and continued as a Senior Researcher at the Indonesian National Research and Innovation Agency (BRIN) since 2022. She had been scientist at the Asia Postharvest Research Center-National Institute of Horticultural and Herbal Science (Rep. of Korea, 2017) and a researcher at the Indonesian Agricultural Research Alliance (APPERTANI).

Her research focus includes postharvest handling and agroindustrial technology, food supply chain design and analysis, and digital technology application to improve added value, food supply chain efficiency, and reduce food loss.

She is the first author of the 4th paper as “Transforming Agroindustry in Indonesia: Emerging Digital Technologies for Reducing Food Loss” in this special column.



**李 迅 博士 / 首席执行官**  
北京大蚯蚓数字科技有限公司

**李 迅：**男，博士毕业于美国爱荷华州立大学，从事病害流行风险和气候变化研究。2017年归国创办北京大蚯蚓数字科技有限公司，任首席执行官，从事数字农业技术产业化应用；兼任湖南农业大学“神农学者”讲座教授、中国农机流通协会智慧农业产教融合专委会产业化首席科学家、中国植物病理学会流行学专委会委员。

主要研究方向为有害生物数值预测预报、气候变化和数字农业，曾针对大豆锈病在全美的发生风险做出了准确评估。2019–2020年与中联重科共建了中国第一个水稻数字农业操作系统并在安徽、湖南大规模推广。

他是本期专栏文章之二《全球先进数字农业技术体系在中国粮食种植的试点实践探索》的第一作者。



**李腾飞 博士 / 研究员 / 副主任**  
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主要从事粮食产业技术经济、粮食流通储备、粮食损失等研究。主持和参与国家重点研发计划、国家社科基金重大、教育部人文社科重大、国家粮食和物资储备局等课题30余项，发表论文30余篇，主（参）编著作11部，参与《粮食安全保障法》《反食品浪费法》《粮食流通管理条例》等重要法规政策起草，撰写多篇专报建议被上级部门采纳。2023年被评为全国粮食和物资储备首届青年拔尖人才。

他是本期专栏文章之五《粮食产业链数字化技术应用调查研究》的通信作者。



**崔晨昊 博士 / 数据科学家**

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**崔晨昊：**男，统计学博士，毕业于英国伦敦大学，在校期间获得院长特别奖学金（全奖）。研究领域为高维度多变量传感器数据建模和食品科学中统计学分析方法，从事且熟悉计算机视觉、自然语言处理与时间序列分析的数学模型。发表 SCI 论文 6 篇，取得国际专利 1 项。2020 年由布勒集团引进回国，现任该集团创新中心数据科学家，负责数字化转型人工智能环节的设计与开发。2021 年被评为江苏省无锡市飞凤人才计划创新领军人才，2023 年被评为江苏省双创博士。

他是本期专栏文章之六《谷物品质在线检测：基于近红外光谱的建模与迁移》的第一作者。



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