



ASEAN-CGIAR
Innovate for Food
and Nutrition Security

Training report

Food safety risk assessment for traditional value chains under a One Health perspective

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**Intervention Package No. 4: Enhancing Value Chains and
Regional Trade and No. 5: Transboundary Pests and Diseases**

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Summary

The training on “Food safety risk assessment for traditional value chains under a One Health perspective” was conducted on 23–24 September 2025 at the Faculty of Veterinary Medicine, Khon Kaen University (KKU), Thailand. Organized by the International Livestock Research Institute (ILRI) in collaboration with KKU and Rakuno Gakuen University (RGU), the workshop brought together approximately 40 participants from diverse professional backgrounds, including food safety authorities, researchers, veterinarians, and academic staff from Malaysia, Japan, China, Lao PDR, the Philippines, Vietnam, Indonesia, and Thailand.

Over two days, the training provided a comprehensive combination of theoretical and practical knowledge on food safety hazards, risk assessment methodologies, and the integration of One Health principles. Sessions included overviews of food safety situations in low- and middle-income countries, principles of risk analysis, Codex-based risk assessment approaches, and case studies such as *Salmonella* in pork and the LAWA model for liver fluke control. Participants engaged in interactive group exercises to practice risk assessment, develop value chain models, and interpret results within a One Health framework.

At the end of the training, participants had acquired practical skills to conduct food safety risk assessments, analyze and interpret results, and apply One Health solutions within their national contexts. The workshop also promoted regional collaboration and knowledge exchange, identifying future priorities for capacity building, network development, and the integration of One Health concepts into national food safety systems and curricula. This event reinforced the importance of multidisciplinary approaches and cross-country learning in strengthening food safety in traditional value chains across the region.

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Abbreviations

ALOP	Appropriate Level of Protection
ASEAN	Association of Southeast Asian Nations
CAC	Codex Alimentarius Commission
CCP	Critical Control Point
FS	Food safety
ILRI	International Livestock Research Institute
KKU	Khon Kaen University
LMICs	Low- and middle-income countries
OH	One Health
QMRA	Quantitative Microbial Risk Assessment
RGU	Rakuno Gakuen University
WHO	World Health Organization
WOAH	World Organisation for Animal Health



Background and objectives

Food safety is a priority area of the Association of Southeast Asian Nations (ASEAN), which ensures the safety of food products from production to consumption for consumers. Under the ASEAN CGIAR Innovate for Food and Nutrition Security program, the International Livestock Research Institute (ILRI), in collaboration with the Faculty of Veterinary Medicine, Khon Kaen University (KKU), Thailand, and the WOAAH collaborating centers consortium for food safety, Rakuno Gakuen University (FS-RGU), Japan, organized a training on “Food Safety Risk Assessment for Traditional Value Chains under a One Health (OH) Perspective.” The training aimed to strengthen the capacity of relevant food safety authorities and researchers from selected ASEAN countries and China in food safety research and management.

The two-day training comprised different sections on food safety situations in LMICs, introduced a risk analysis framework (risk assessment, risk communication, and management) in food safety, and provided practical exercises on food safety risk assessments of selected food commodities and hazards from traditional (informal) value chains. In addition, OH aspects were incorporated into the training, where suitable, in the form of case studies or discussion sessions. After the training, the participants were expected to (i) describe and explain the differences between hazards and risks, (ii) understand and apply the risk analysis framework and risk assessment, and (iii) be exposed to OH solutions for safer food in their work.

The training was co-organized by ILRI in collaboration with the Faculty of Veterinary Medicine, KKU, Thailand, and the WOAAH collaborating centers consortium for food safety, FS-RGU, Japan.

The objectives of the two-day training were to:

1. Increase knowledge on the basics of hazards, risk assessment, management, and communication.
2. Practice qualitative/semi-quantitative risk assessments of prioritized hazards in selected food.
3. Enable participants to become more familiar with different frameworks for risk assessment and to build national networks for implementation (with a focus on Codex).
4. Provide examples for the successful integration of One Health into risk assessment.

Training proceedings

Opening remarks

Fred Unger (ILRI) began the training by welcoming the participants, faculty, and organizers on behalf of ILRI, KKU, and RGU. He highlighted the global importance of food safety as a priority in ASEAN and emphasized the relevance of One Health approaches in managing foodborne hazards across human, animal, and environmental health domains. Unger introduced ILRI as the only CGIAR center entirely dedicated to livestock research, emphasizing its mission to improve livelihoods in the Global South through evidence-based animal health and food safety interventions.

He outlined the objectives of the training, noting that participants from seven ASEAN countries and China would enhance their capacity in food safety research and management, focusing particularly on traditional value chains. Unger emphasized that the two-day program would combine theory and practice, with sessions on the regional food safety situation, risk analysis frameworks, risk assessment methods, and hands-on group exercises.

He also highlighted the inclusion of One Health approaches in the training, stressing that these methods would provide participants with a broader understanding of integrated food safety solutions. Unger concluded by acknowledging the Faculty of Veterinary Medicine at KKU for hosting the event and facilitating preparations, and he encouraged participants to actively engage, ask questions, and share experiences to maximize the benefits of the training.

Part 1: Food safety and the principles of risk assessment

Unger presented the findings of ILRI studies on food safety in traditional markets in Southeast Asia, focusing on Vietnam, Cambodia, and Laos. He explained that urbanization and population growth had significantly increased demand for animal-sourced foods, posing challenges for food safety. Traditional wet markets, which supply most of fresh foods, remain culturally preferred and accessible but carry both risk-amplifying and risk-mitigating practices. The studies showed that *Salmonella* contamination is a major public health concern in pork and chicken, resulting in considerable health costs. Interventions such as targeted communication campaigns, capacity-building training, and One Health platforms have led to measurable improvements in food safety. Unger emphasized that while pork in both traditional and modern retail settings could not yet be considered fully safe, low-cost interventions and risk-based approaches are essential for meaningful improvements.

Sinh Dang-Xuan (ILRI) provided an overview of the conceptual distinction between hazards and risks. Hazards refer to the potential sources of harm, such as contamination of food, whereas risk combines the likelihood of an adverse health outcome with its severity. He introduced the risk analysis framework, composed of risk assessment, risk management, and risk communication, and emphasized the need to align perception with actual risk. Dang outlined the Codex Alimentarius framework, highlighting four steps in risk assessment: hazard identification, hazard characterization, exposure assessment, and risk characterization.

Kohei Makita (Rakuno Gakuen University, Japan) explained the processes of risk management and risk communication, illustrating how risk management involves the selection and implementation of control measures based on the results of risk assessments. He described the steps involved in risk management, including the evaluation of options, implementation, and continuous monitoring. The Appropriate Level of Protection (ALOP) concept was introduced to illustrate the balance between risk magnitude and economic and social considerations. Makita highlighted risk communication as a transparent, two-way process that fostered trust and aligned actions among stakeholders, using the example of coordinated efforts in Japan to reduce colistin resistance in livestock.

Makita further elaborated on international risk assessment frameworks, contrasting the WOAH import risk analysis framework, which focused on animal health, zoonoses, and welfare, with the Codex framework, which is science-based and particularly structured to address microbiological hazards in trade. He explained each of the four steps in the Codex framework, providing examples of how hazard identification, hazard characterization, exposure

assessment, and risk characterization could be applied to ensure safer food along informal and formal value chains.

Part 2: Conducting food safety risk assessments

Makita described risk pathways and hazard identification, explaining how logical or biological pathways, such as fault tree analysis, illustrate how hazards progress from contamination to illness. He also highlighted value chain pathways that map the movement of food through producers, traders, and consumers in real-world settings. Fault tree analysis helps identify critical nodes comparable to Critical Control Points (CCPs) and guides study design, data collection, and interventions in informal markets. Techniques such as rapid rural appraisal, surveys, and tracing were described for mapping actors and behaviors along food chains. Hazard identification was discussed within the Codex framework, including sources from literature, reports, and preliminary studies.

Hazard characterization was presented by Makita as an essential step to describe the severity and duration of adverse health effects. He highlighted the importance of dose-response assessments that link the magnitude of exposure to illness outcomes, taking into account both microbial characteristics and host susceptibility. Fault tree analysis was used as an example to illustrate contamination of milk with *Staphylococcus aureus*, showing how bacterial multiplication and toxin production are influenced by handling practices or mastitis in cows.

Sinh Dang-Xuan presented dose-response models, which describe the relationship between pathogen ingestion and the probability of illness. He explained threshold and non-threshold models, including exponential and Beta-Poisson equations, using examples such as *Salmonella*, *Campylobacter*, *E. coli* O157, *Cryptosporidium*, and *Giardia*. He emphasized the importance of selecting appropriate parameters for quantitative microbial risk assessments.

Exposure assessment was discussed as the step to quantify the extent to which humans are exposed to hazards through food. Dang-Xuan explained that this involves measuring pathogen counts, changes in prevalence and concentration, and food consumption data, varying by demographic factors. The formula $\text{Dose} = \text{concentration} \times \text{amount consumed}$ was introduced to estimate pathogen intake, linking directly to dose–response models for risk characterization.

Risk characterization, as the final step in the Codex framework, was presented by Makita. It involves providing qualitative or quantitative estimates of the likelihood and severity of adverse effects while accounting for uncertainty. Methods include qualitative ratings, deterministic calculations, and stochastic simulations. Sensitivity analyses were highlighted as tools to identify influential factors and guide effective interventions, such as hygienic milking, mastitis control, and temperature management.

Part 3: Application in practice

Kohei Makita introduced basic epidemiology concepts relevant for risk analysis, including measures of disease frequency, association, variability, and uncertainty. Participants were guided to understand incidence, prevalence, rates, proportions, and ratios as fundamental tools for interpreting food safety data.

Case studies provided practical illustrations of risk assessment. Sinh Dang-Xuan presented findings from the assessment of *Salmonella* contamination in smallholder pork chains in Hung Yen and Nghe An, Vietnam. High prevalence was reported at farms and slaughterhouses (19–

39%) and in markets (25–45%), with *S. Typhimurium* as the most common serotype. Cross-contamination in households, such as using the same knife or cutting board for raw and cooked pork, was shown to significantly increase risks. Quantitative microbial risk assessment (QMRA) estimates suggested that 1–2 in 10 consumers may contract salmonellosis annually, with higher incidence among men and the elderly.

Sirikachorn Tangkawattana (Khon Kaen University, Thailand) introduced the LAWA model, a community-based One Health approach for controlling liver fluke in Khon Kaen, Thailand. The model integrates health, environment, and food systems, leveraging community health volunteers for risk communication and promoting safe food preparation practices. The approach has been recognized internationally and scaled to other endemic areas, demonstrating the effectiveness of community engagement and One Health principles in food safety interventions.

Part 4: Risk assessment and One Health – future needs

Representatives from National University of Laos highlighted that the integration of One Health and risk analysis enhances participants' capacity to apply risk assessment in practice and make informed decisions. Yunnan Agricultural University, China, noted plans to incorporate interactive approaches from the workshop into teaching and learning, using shared experiences as a tool for both education and practical application. Khon Kaen University emphasized the importance of risk analysis for tackling food safety challenges and described ongoing development of a new course integrating One Health into undergraduate education. A representative from Vietnam expressed the need for a social network or platform to facilitate the sharing of research, case studies, and experiences for continued learning and collaboration across the region.

Group discussion summary

During the group work session, participants explored qualitative and basic quantitative risk assessment for zoonotic and foodborne diseases through four case studies from across Southeast and East Asia. Each group presented their hazard, mapped exposure pathways along the value chain, assessed risk levels, and proposed practical interventions, followed by facilitator feedback.

Group 1 assessed *Salmonella* in chicken, comparing high-standard vs. low-standard farms and processing facilities. They found key risks at convenience stores and during consumer handling—especially poor temperature control and incomplete reheating. Recommended actions focused on hygiene improvements across the chain and stricter temperature/holding-time control in retail.

Group 2 looked at brucellosis from raw milk consumption (China). Using simple calculations, they estimated exposure from raw milk, noting significant morbidity despite relatively low mortality. Suggested interventions included discouraging raw milk consumption, improving farm biosecurity, and tailoring vaccination policies. Facilitators reminded participants that dose–response data for brucellosis are limited and risk communication must translate technical results into clear messages.

Group 3 examined *E. coli* in the traditional pork value chain in Lao PDR. They highlighted high contamination at farms and markets, with risk strongly shaped by cooking practices—raw and fermented pork posing the highest risk. The group emphasized improving hygiene in traditional

markets and promoting safer household food practices. Facilitators noted the importance of sensitivity analysis to identify impactful interventions and guide government decisions.

Group 4 discussed human anthrax linked to sick cattle, traditional slaughter practices, and raw meat consumption in Thailand/Malaysia/Indonesia. Despite sporadic outbreaks, anthrax remains severe, especially where PPE and meat inspection are lacking. The group recommended stronger farm-level biosecurity, improved slaughterhouse hygiene, and community education. Facilitators stressed environmental persistence of anthrax spores and the importance of One Health surveillance.

Across all discussions, facilitators emphasized sensitivity analysis, cost-effective control points, One Health linkages, and the need for culturally sensitive risk communication, especially where raw or fermented animal products are part of local traditions.

Annex 1 – Lecturers’ biographies

Fred Unger, a veterinary epidemiologist from Germany, joined ILRI in December 2007 and is based in ILRI's Regional Office for South, East, and Southeast Asia in Hanoi, Vietnam. He graduated from veterinary school at Humboldt Universität Berlin in 1990 and obtained a diploma in Animal Health Management (1995) and a PhD in Epidemiology (2000) from the Free University Berlin. He has nearly three decades of experience in epidemiology research on animal health, zoonoses, and foodborne disease control in developing countries of East/Southeast Asia (18 years), Africa (12 years), and Germany (2 years). His current research in East and Southeast Asia focuses on animal health and food safety, including antimicrobial resistance and zoonoses management in livestock systems. Since March 2024, he has served as the Regional Representative for ILRI in South, East, and Southeast Asia.

Kohei Makita is a veterinary epidemiologist at Rakuno Gakuen University, Japan, and head of the Preventive Veterinary Medicine Extension-Network, a WOAHA Collaborating Centre for Food Safety. He holds a PhD from the University of Edinburgh and has worked with the Japan Overseas Cooperation Volunteers, ILRI, and various public health institutions. His expertise includes zoonoses, food safety, infectious disease control, and One Health. He leads research and training in risk analysis, antimicrobial resistance, and farm-to-fork safety. Makita has contributed to global efforts such as FAO's risk profiling for Group B Streptococcus and disease control strategies in Asia and Africa, supporting veterinary public health through regional capacity-building and technical collaboration.

Sinh Dang is a scientist at ILRI in Hanoi, Vietnam, with over 15 years of experience in health, agriculture, food safety, and infectious diseases. He focuses on One Health and coordinates international projects on animal health, zoonoses, and food safety in Southeast Asia. He has authored more than 35 peer-reviewed publications in areas including antimicrobial resistance, zoonotic diseases, and public health. He holds a PhD in Veterinary Science from Rakuno Gakuen University (2018), a joint MVPH from Chiang Mai University and the Free University of Berlin (2013), and a DVM from Vietnam National University of Agriculture (2006).

Sirikachorn Tangkawattana is a veterinary pathologist at Khon Kaen University, Thailand, and a key researcher at the WHO Collaborating Centre for Research and Control of Opisthorchiasis. She holds a DVM, MSc, PhD, and DTBVP, specializing in liver fluke infection (*Opisthorchis viverrini*), zoonoses, and cholangiocarcinoma. She leads the “Lawa Model,” an internationally recognized One Health approach for opisthorchiasis control. Her research integrates pathology, parasitology, and public health. She has served as president of the Thai Board of Veterinary Pathology and received a SEARCA Professorial Chair for her regional contributions to health science.

Annex 2 – Training agenda

Time	Topics	Persons
Day 1 (23/09/2025)- Part 1: Food safety and the principles of risk assessment		
08:30 - 09:00	Registration	Course organizers
09:00 - 09:20	Opening remarks: <i>Representatives from KKU, ILRI and RGU-MC</i> Workshop overview (ILRI) Welcome (RGU and KKU) Open remark (KKU) Introduction of participants (ice break)	Course organizers Fred Unger Kohei Makita Naruepon Kampa (Dean FVM-KKU) Vice President for Research and Innovation, KKU Sirikachorn Tangkawattana (KKU)
09:20 - 09:35	Food safety and traditional markets: Findings from ILRI studies in the region	Fred Unger (ILRI)
09:35 - 10:10	Open discussion: Food safety situation from One Health perspectives in the region - KKU, ILRI, RGU (5 min each and discussion)	All participants
10:10 - 10:30	Group photo and coffee break	All participants
10:30 - 10:45	<i>Pre-course evaluation</i> and group division (5 groups)	Course organizers
10:45 - 11:05	Introduction to food safety hazards vs. risk, and risk analysis	Sinh Dang (ILRI)
11:05 - 11:25	Food safety risk management and risk communication	Kohei Makita (RGU)
11:25 - 11:45	Risk assessment frameworks with emphasis on CODEX framework	Fred Unger (ILRI)
11:45 – 12:15	Open discussions (perspective of participant countries on Risk assessment and how to use it)	All participants (Kohei Makita and Fred Unger)
12:15 - 13:30	Lunch	All participants
Part 2: How to conduct a food safety risk assessment		
13:30 – 13:45	Risk pathways and hazard identification	Kohei Makita (RGU)
13:45 – 14:00	Hazard characterization	Kohei Makita (RGU)
14:00 – 15:00	Group exercise (5groups)	All participants
15:00 - 15:15	Coffee break	All participants
15:15 - 15:30	Dose-response model	Sinh Dang (ILRI)
15:30 - 15:45	Exposure assessment	Sinh Dang (ILRI)
15:45 – 16:00	Risk characterization (Point estimate, Stochastic...)	Kohei Makita (RGU)
16:00 - 17:00	Group exercise, including building a value chain model for food safety risk assessment	All participants

Time	Topics	Persons
	Group feedback (3 min each)	
18:00	Group dinner	All participants
Day 2 (24/9/2025)- Part 3: Application of food safety risk assessment in practice		
09:00 - 09:20	Recap Day 1 & reflections	Sirikachorn Tangkawattana (KKU)
09:20 – 9:40	Basic epidemiology to understand risk analysis	Kohei Makita (RGU)
9:40 – 10:20	How does it work in practice: case studies of risk assessments? - <i>Salmonella</i> in pork/Staph aureus in milk - <i>Lawa model</i> KKU	Sinh Dang (ILRI) Sirikachorn Tangkawattana (KKU)
10:20 – 10:40	Coffee break	All participants
10:40 – 12:15	Group exercise (practice on qualitative and semi-quantitative/quantitative food safety risk assessment)	All participants
12:15 - 13:30	Lunch	All participants
Part 4: Risk assessment and One Health - future needs and opportunities		
13:30 – 14:00	Group presentations (5 groups)	All participants
14:00 – 15:00	Future education needs/capacity development in food safety risk assessment - Academic institutions (KKU, RGU, NUoL, YAU) - Open discussion	(will inform KKU, RGU, NUoL, YAU to prepare)
15:00 – 15:20	Coffee break	All participants
15:20 – 15:35	<i>Post-course evaluation</i>	<i>Course organizers</i>
15:35 - 16:00	Reflections from participants Course certificates	All participants
16:00 – 16:20	Closing remarks	Representatives of KKU, ILRI and RGU

Annex 3 – Participant list

No	Full Name	Position	Organization	Based City / Country
1	Nuurul Hidayah Binti Sharipan	Secretariat	ASEAN Risk Assessment Centre for Food Safety (ARAC), Food Safety and Quality Programme, Ministry of Health Malaysia	Malaysia
2	Kohei Makita	Professor	Head, WOAHA Collaborating Centre for Food Safety, Rakuno Gakuen University	Japan
3	Shunyu Yang	Veterinarian	College of Veterinary Medicine, Yunnan Agricultural University	Kunming, China
4	Xinxian Wang	Veterinarian	College of Veterinary Medicine, Yunnan Agricultural University	Kunming, China
5	Wengui Li	Veterinarian	College of Veterinary Medicine, Yunnan Agricultural University	Kunming, China
6	Jiehong Zhou	Professor	Center for Agricultural and Rural Development (CARD)	Hangzhou, China
7	Soulasack Vannamahaxay	Head, Veterinary Medicine Division	Faculty of Agriculture, National University of Laos	Vientiane, Lao PDR
8	Latsamy Soulivongsa	–	Faculty of Agriculture, National University of Laos	Vientiane, Lao PDR
9	Dethaloun Meunsene	–	Faculty of Agriculture, National University of Laos	Vientiane, Lao PDR
10	Vannaphone Putthana	Veterinarian	Faculty of Agriculture, National University of Laos	Vientiane, Lao PDR
11	Francisco Tiu Laurel Jr	Secretary	Department of Agriculture, Bureau of Agricultural Research	Manila, Philippines
12	Joell H. Lales	Director	Department of Agriculture, Bureau of Agricultural Research	Manila, Philippines
13	Nguyen Thanh Trung	Head, Laboratory of Food Microbiology & GMO	National Institute for Food Control	Hanoi, Vietnam

No	Full Name	Position	Organization	Based City / Country
14	Tran Thi Thanh Thao	MSc Student	National Institute of Animal Sciences	Hanoi, Vietnam
15	Vu Thi Thu Tra	Lecturer	Vietnam National University of Agriculture	Hanoi, Vietnam
16	Petcharat Chompo	PhD Student, Veterinarian	Faculty of Veterinary Medicine, Khon Kaen University	Nakhon Ratchasima, Thailand
17	Fred Unger	Principal Investigator, IP5 ASEAN-CGIAR program	International Livestock Research Institute (ILRI)	Hanoi, Vietnam
18	Dang Xuan Sinh	Scientist	International Livestock Research Institute (ILRI)	Hanoi, Vietnam
19	Nguyen Le Thanh	Regional Operations Manager	International Livestock Research Institute (ILRI)	Hanoi, Vietnam
20	Le My Hanh	Finance & Admin Associate	International Livestock Research Institute (ILRI)	Hanoi, Vietnam
21	Le Thi Huyen Trang	PhD Fellow	International Livestock Research Institute (ILRI)	Hanoi, Vietnam
22	Supaporn Wongsrichai	Veterinarian	Bureau of Quality Control of Livestock Products, Department of Livestock Development (DLD)	Bangkok, Thailand
23	Nutcharnart Tipmongkolsilp	Veterinarian	Bureau of Livestock Standards and Certification, DLD	Bangkok, Thailand
24	Chonlada Thongdee	Veterinarian	Veterinary Research and Development Center (Northeastern Region), DLD	Khon Kaen, Thailand
25	Julaluk Manijsin	Veterinarian	Veterinary Research and Development Center (Northeastern Region), DLD	Khon Kaen, Thailand
26	Pasika Sukkasem	Veterinarian	Veterinary Research and Development Center (Northeastern Region), DLD	Khon Kaen, Thailand

No	Full Name	Position	Organization	Based City / Country
27	Sukanya Leethongdee	Assist. Prof	Faculty of Veterinary Sciences, Mahasarakham University	Mahasarakham, Thailand
28	Natapol Pumipuntu	Assoc. Prof	Faculty of Veterinary Sciences, Mahasarakham University	Mahasarakham, Thailand
29	Phaphatsanant Phongsarmsuan	Veterinarian	Khon Kaen Animal Quarantine Station	Khon Kaen, Thailand
30	Patchara Phuektes	Assist. Prof	Faculty of Veterinary Medicine, Khon Kaen University	Khon Kaen, Thailand
31	Sirikachorn Tangkawattana	Assoc. Prof	Faculty of Veterinary Medicine, Khon Kaen University	Khon Kaen, Thailand
32	Sunpetch Angkititrakul	Assoc. Prof	Faculty of Veterinary Medicine, Khon Kaen University	Khon Kaen, Thailand
33	Guojun Wang	Veterinarian	KKU Chinese PhD Student	Khon Kaen, Thailand
34	Weiwu Mu	Veterinarian	KKU Chinese PhD Student	Khon Kaen, Thailand
35	Ling Wu	Veterinarian	KKU Chinese PhD Student	Khon Kaen, Thailand
36	Ni Yang	Veterinarian	KKU Chinese PhD Student	Khon Kaen, Thailand
37	Peiyong Zhu	Veterinarian	KKU Chinese PhD Student	Khon Kaen, Thailand
38	Galih Aji Kuncoro Jati	Veterinarian	KKU Indonesian PhD Student	Khon Kaen, Thailand



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The **ASEAN-CGIAR Innovate for Food and Nutrition Security Regional Program** is a research collaboration among the ASEAN Member States, ASEAN Secretariat, and CGIAR Centers, with funding support from the government of Australia and the United Kingdom. The program's vision for the next 10 years is to scale up and out bold integrated innovations that will enhance the resilience of ASEAN's agri-food systems to climate change. This ambitious endeavor aims to deliver better livelihoods for food producers and other stakeholders along the value chain. It also seeks to ensure more affordable, nutritious, and healthy food for consumers while fostering a healthier natural environment for all.

For more information on the ASEAN-CGIAR Innovate for Food and Nutrition Security Regional Program, please contact:

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