第13回 CADIC国際シンポジウム

The 13th CADIC International Symposium

食料安全保障と持続可能な畜産のために私たちは何をすべきか？

What should we do for food security and sustainable livestock production?

同時通訳あり

日 時 2023年 **8月29日(火)**

9:50～17:15(受付開始9:20)

開催形式：対面とライブ配信によるハイブリッド

定員 100名 / オンライン(ZOOM) 150名

参加費無料 事前予約制

※事前申し込みはこちらから ▶▶▶

場 所 **宮崎大学330記念交流会館**

開会挨拶：**鮫島 浩** 宮崎大学 学長

1．養豚場への侵入を防止するためのアフリカ豚熱対策：流行地域における私たちの経験

Roman Pogranichniy(カンザス州立大学・アメリカ)

2．エジプトにおける口蹄疫：現状と今後の展望

Abdelfattah Selim(ベンハー大学・エジプト)

3．野生動物が保有する家畜の病原体：その調査のあり方と実際

小林創太(農研機構動物衛生研究部門)

【特別セッション】

地球規模課題対応国際科学技術協力プログラム(SATREPS)

挨拶 *Lerdchai Chintapitaksakul*(タイ国立動物衛生研究所・農業協同組合省畜産開発局)

1．産業動物防疫リサーチセンターが取組むSATREPSプロジェクトの概要について

三澤尚明(宮崎大学)

2．2022年から2023年にタイで分離されたアフリカ豚熱ウイルスの病原性と遺伝的特性

Tapanut Songkasupa(タイ国立動物衛生研究所・タイ)

3．カリフォルニア酪農農場のドライロット牛房における*Mycobacterium avium* subspecies *paratuberculosis*の生物汚染度を評価するための環境サンプリング

Tapakorn Chamchoy(タイ国立動物衛生研究所・タイ)

4．高圧パルスジェットスプレーシステムを用いた鶏肉から食品由来病原体を除去するための新技術

Chanakan Chotiphutthikul(獣医研究開発センター・東部支所・タイ)

閉会挨拶：**吉田彩子** 宮崎大学産業動物防疫リサーチセンター センター長

お問い合わせ先

宮崎大学産業動物防疫リサーチセンター

TEL.0985-58-7674

e-mail：cadic@cc.miyazaki-u.ac.jp

HP：https://www.miyazaki-u.ac.jp/cadic/

主 催：宮崎大学産業動物防疫リサーチセンター

共 催：宮崎大学農学部

特別共催：公益財団法人宮崎県観光協会 MICE推進局

後 援：農林水産省、宮崎県、日本獣医師会、8大学産業動物防疫コンソーシアム、宮崎産業動物教育コンソーシアム委員会(拡幅事業推進検討会)

The 13th CADIC International Symposium

What should we do for food security and sustainable livestock production?

Date 29th August 2023

9:50~17:15 (Reception hours 9:20~)

Venue San San Maru Hall in University of Miyazaki

simultaneous interpretation

Hybrid meeting: Onsite and Online

Onsite capacity 100 / Online capacity (zoom) 150

Free of charge | Reservations required

※Making a reservation from here ▶▶▶

Opening Remarks: **Dr. Hiroshi Sameshima** (President, University of Miyazaki, Japan)

1. Prevention of African Swine Fever from entry into commercial farms: our experience from endemic areas
   Dr. Roman Pogranichniy (Kansas State University, USA)

2. Foot and mouth disease in Egypt: present status and future prospects
   Dr. Abdelfattah Selim (Benha University, Egypt)

3. Livestock pathogens in wildlife: establishment of the surveillance system and overview of its trials
   Dr. Sota Kobayashi (National Institute of Animal Health, NARO, Japan)

【Special session】

Science and Technology Research Partnership for Sustainable Development (SATREPS)

Greeting *Dr. Lerdchai Chintapitaksakul* (Director of National Institute of Animal Health, DLD, Thailand)

1. Overview of the SATREPS project that CADIC has been tackling
   Dr. Naoaki Misawa (University of Miyazaki, Japan)

2. Virulence and genetic characteristic of African swine fever virus isolated from Thailand, 2022–2023
   Dr. Tapanut Songkasupa (National Institute of Animal Health, Thailand)

3. Environmental sampling to assess the bio-burden of *Mycobacterium avium* subspecies *paratuberculosis* in drylot pens on California dairies
   Dr. Tapakorn Chamchoy (National Institute of Animal Health, Thailand)

4. New technology for the elimination of foodborne pathogens from chicken carcasses using a high-pressure pulse jet spray system
   Dr. Chanakan Chotiphutthikul (Veterinary Research and Development Center, Eastern Region, Thailand)

Closing Remarks: **Dr. Ayako Yoshida** (Director, Center for Animal Diseases Control, University of Miyazaki, Japan)

Contact

Center for Animal Diseases Control, University of Miyazaki

1-1 Gakuenkibanadai Nishi, Miyazaki 889-2192 Japan
TEL: +81-985-58-7674
E-mail: cadic@cc.miyazaki-u.ac.jp
HP: https://www.miyazaki-u.ac.jp/cadic/

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趣旨

宮崎大学産業動物防疫リサーチセンター
センター長　吉田 彩子

現在、アジア諸国では口蹄疫やアフリカ豚熱の流行が深刻化し、国内への侵入が懸念されています。また、国内においても本州で豚熱の流行が拡大しており、九州における発生リスクも急激に高まってきています。このような悪性家畜伝染病の発生は、畜産業に甚大な経済的損失をもたらすだけでなく、食糧安全保障の観点からも国民生活に大きな影響を与えることから、産業動物防疫の重要性は今後さらに増大することが予測されます。

宮崎大学産業動物防疫リサーチセンター（CADIC）は、産業動物感染症を専門に扱う国内唯一の研究機関であり、南九州という畜産が盛んな地域に立地し、地域の畜産関係者や行政関係者、市民に産業動物感染症の最新の知見や対策法、課題をわかりやすく提供することを使命の一つとしています。特に、グローバル社会における海外悪性家畜伝染病の情報共有は、伝染病コントロールのための重要課題であると考えています。

本シンポジウム第 1 部では、これらの悪性家畜伝染病に対する世界的な取り組みを紹介し、CADIC が培ってきた防疫研究の成果を、これからの悪性家畜伝染病制御にいかに役立てるのかについて、意見を交換する場を提供します。また、第 2 部では CADIC と共同研究を行なっているタイの動物感染症研究機関から、産業動物防疫に関する研究内容を紹介します。

ご挨拶

国立大学法人　宮崎大学　学長
鮫島　浩

本日、宮崎大学産業動物防疫リサーチセンター主催の第 13 回国際シンポジウム「食料安全保障と持続可能な畜産のために私たちは何をすべきか？」を開催するにあたり、開会のご挨拶を申し上げます。

近年では、異常気象やウクライナ危機を起因とする飼料の高騰を受け、畜産の生産コストが上昇しています。また、近隣諸国では口蹄疫等の重要家畜伝染病の発生が続いており、我が国への侵入リスクが高まっています。国内においては、牛伝染性リンパ腫といった消耗性疾患を引き起こす持続感染症がまん延しています。家畜伝染病の発生は生産性の低下といった直接的な経済損失のみならず、畜産物貿易にも深刻な影響を与えます。このような課題に対し、宮崎大学産業動物防疫リサーチセンターは、病原体に対する基礎研究から、疫学、診断、予防といった応用研究まで幅広く取り扱い、家畜伝染病を多面的なアプローチで解決する実践型の研究に取り組んでいます。また、人材の養成や近隣諸国との情報交換、海外からの研修の受け入れなどを行っています。

今回のシンポジウムでは、口蹄疫はもちろん、病原体を媒介する野生動物に関する調査のあり方、国内ではまだ発生したことのないアフリカ豚熱について、活発な意見交換を行いたいと思っています。また、特別セッションとして、本学が取り組んでいる地球規模課題対応国際科学技術協力プログラム（SATREPS）についてもご紹介させていただきます。

結びに、本日のシンポジウムが、ご参加くださった皆様にとって、有意義なものとなり、家畜防疫について議論を深める機会となることを期待いたしますとともに、皆様の益々のご活躍を祈念して、開会の挨拶といたします。

Program

9:50-10:00
Opening Remarks
Dr. Hiroshi Sameshima, President, University of Miyazaki

Master of the symposium; Dr. Takako Taniguchi, CADIC, UOM

Part I
(10:00-12:00)

Chairperson: Dr. Tamaki Okabayashi, Dr. Hirohisa Mekata, CADIC, UOM

10:00-11:00
Prevention of African Swine Fever from entry into commercial farms: our experience from endemic areas
Dr. Roman Pogranichniy, Kansas State University, USA

11:00-12:00
Foot and mouth disease in Egypt: present status and future prospects
Dr. Abdelfattah Selim, Benha University, Egypt

12:00-13:30
Lunch time (90 min)

Chairperson: Dr. Kentaro Yamada, Dr. Akatsuki Saito, Faculty of Agriculture, UOM

13:30-14:30
Livestock pathogens in wildlife: establishment of surveillance system and overview of its trials
Dr. Sota Kobayashi, National Institute of Animal Health, NARO, Japan

Part II

(14:30-17:15)

14:30
Greeting
Science and Technology Research Partnership for Sustainable Development (SATREPS)
Dr. Lerdchai Chintapitaksakul, Director of National Institute of Animal Health, DLD, Thailand

14:35-14:45
Overview of the SATREPS project that CADIC has been tackling
Dr. Naoaki Misawa, University of Miyazaki, Japan

14:45-15:25
Virulence and genetic characteristic of African swine fever virus isolated from Thailand, 2022–2023
Dr. Tapanut Songkasupa, National Institute of Animal Health, Thailand

15:25-15:45
Coffee break (20 min)

Chairperson: Dr. Atsushi Iguchi, Dr. Ryoko Uemura, Faculty of Agriculture, UOM

15:45-16:25
Environmental sampling to assess the bio-burden of *Mycobacterium avium* subspecies *paratuberculosis* in drylot pens on California dairies
Dr. Tapakorn Chamchoy, National Institute of Animal Health, Thailand

16:25-17:05
New technology for the elimination of foodborne pathogens from chicken carcasses using a high-pressure pulse jet spray system
Dr. Chanakan Chotiphutthikul, Veterinary Research and Development Center, Eastern Region, DLD, Thailand

17:05-17:15
Closing Remarks
Dr. Ayako Yoshida, Director & Professor, Center for Animal Diseases Control, UOM

Prevention of African Swine Fever from entry into commercial farms: our experience from endemic areas

Roman Pogranichniy DVM, PhD
Veterinary Diagnostic Laboratory, Department of Diagnostic Medicine/Pathobiology, College of Veterinary Medicine, Kansas State University, Manhattan, KS, USA
**Corresponding author: rmp1@vet.k-state.edu*

While African swine fever (ASF) prevention is so important for swine producers around the world, customized recommendations based on the situation on each farm are needed. The goal of our studies was to identify biosecurity gaps to reduce outbreaks of ASF in Vietnam and Ukraine. The projects were focused on helping swine producers to prevent ASF entry into farms and identifying risk factors of virus introduction on the farms. This work was done in collaboration with swine farm owners and veterinarians on farms in Vietnam and Ukraine that operate in an endemic area for ASF. We designed surveys for biosecurity on the swine farms to work with interested swine farm owners and veterinarians.

Data was collected via a survey based on questions from the outbreak investigation instrument. Several major categories were examined on an individual production level including swine movement, pickup and deliveries, people movement, pork/food product entry, manure removal, domestic/wild animals and insects, and air/water. Each major category was then broken down into several subcategories, and these subcategories were rated on a scale of 0.00 to 1.00 with 0.00 being areas in which there is least risk and 1.00 being the most vulnerable (high risk) to the introduction of ASFV to the farm. The top ten shared risks to the spread of ASF included the entry of water, replacement animals import and testing, equipment used by on-farm employees, semen testing and handling, and sanitary transportation. These reports were generated only upon full completion of surveys and allow producers to understand the specific practices that are the greatest risk for ASFV introduction into their farms so tailored biosecurity measures can be put in place. We analyzed results from a large number of farms located in endemic areas. A report and analysis was generated and sent back to the person who submitted answers to the questions that we asked in the survey. The subcategory results from completed surveys were then ranked as higher risk (>0.50) and lower risk (≤0.49) and compiled into reports that highlighted areas that would most benefit from specific biosecurity actions to reduce the risk of a farm introducing ASF to its herds.

The top ten shared risks among the 36 completed farm surveys identified to date included feed trucks, replacement breeding animals, semen, entry of water, visitors, tools (both for breeding replacements and cull animals), livestock trailers (for both weaned pigs and replacement pigs) as well as pork and other food entering the premises. It was up to the swine owners and the management team to work on improving the biosecurity on the farm and make improvements to prevent virus entry. Prevention of the spreading of ASF between farms, regions, or countries is a team effort. This work conducted by many collaborators involved in the projects in Ukraine and Vietnam will be presented.

***Keywords*:** *ASF, Biosecurity, Virus prevention*

Foot and mouth disease in Egypt: present status and future prospects

Abdelfattah Selim
Faculty of Veterinary Medicine, Benha University, Egypt
**Corresponding author: abdelfattah.selim@fvtm.bu.edu.eg*

The foot and mouth disease (FMD) virus affects livestock all around the world. Seven distinct serotypes exist, and each has a variety of topotypes, genetic lineages, and strains. FMD is one of the most contagious diseases in cloven hoof animals, and it remains a significant impediment to agricultural growth in endemic nations. Despite the low mortality rate from FMD have been reported in adult animals, immediate losses from poor milk and meat output, treatment costs, and restrictions on the trade in animals and animal products during epidemics have a substantial economic impact. The FMD considered as one of endemic disease in Egypt with three strains A, O, and SAT2 in the last 65 years. The first FMD epidemic was recorded in Egypt in 1950, and it was caused by serotype SAT2. Egypt had several FMD outbreaks during 1958 with serotypes A and O, while serotype O have been reported in 1961, 1964, 1965, 1970, 1974, 1983, 1987, 1989, 1993, and 2000. Serotype A reinvaded again in 1967 and 1972. Also, serotype A caused multiple outbreaks in Egyptian governorates including Ismailia, Alexandria, Behera, Cairo, Dakahlia, Dumyat, Fayum, and Menofia in February 2006. Furthermore, SAT2-Iranian strain was discovered in 2012, followed by SAT2-Libyan strain detection in 2018. Despite the fact that vaccination is mandatory in Egypt, outbreaks of FMD continue to occur throughout the country. The discovery of novel FMD variations in the country has prompted concerns about the genetic variety of these variants, as well as the need for a better understanding of these variants to establish an efficient control program and choose the most reliable vaccine.

Keywords**:** *FMD, Egypt, Epidemiology, Serotype A, Serotype O, Serotype SAT2*

Livestock pathogens in wildlife: establishment of surveillance system and overview of its trials

Sota Kobayashi*
Division of Zoonosis Research, National Institute of Animal Health, NARO, Japan
**Corresponding author: sotaco@affrc.go.jp*

In considering the prevention of various pathogens from entering livestock and poultry farms, the necessity to focus on environmental routes via wildlife, as well as human-caused paths including humans, goods, vehicles, etc. has long been recognized. Therefore, to help promote on-farm infectious disease control, it is becoming increasingly important to know the prevalence of livestock pathogens in wildlife. Moreover, as on-farm Biosecurity Standards mention measures against wildlife, farmers are required to take necessary actions daily. For these reasons, it is desirable to establish and maintain a wildlife surveillance system that can ascertain the situation.

Finding the very first cases of rare diseases in the country and the first case of specific diseases in the season is essential for providing new and early alerts to the livestock industry. However, in the case of endemic and/or chronic diseases, it is also necessary to maintain long-term surveillance to understand the extent to which they are infesting the environment (i.e., how much livestock professionals should be concerned about them) rather than determining their presence. In this respect, some one-off trials have been carried out thus far. However, as most of these trials were conducted in specific small areas, if the results are used in the risk assessment as national data, it will be difficult to obtain valid conclusions due to biases.

Given these conditions, the National Institute of Animal Health has been conducting nationwide surveillance of wild boars and deer for livestock pathogens since 2014 under a project supported by the Ministry of Agriculture, Forestry and Fisheries. This presentation will introduce the establishment and maintenance of the current surveillance system, as well as provide an overview of the results obtained thus far.

***Keywords**: Surveillance , Livestock pathogen, Wildlife*

Overview of the SATREPS project that CADIC has been tackling

Naoaki Misawa
Center for Animal Disease Control, University of Miyazaki, Japan
**Corresponding author: a0d901u@cc.miyazaki-u.ac.jp*

SATREPS is a science and technology diplomacy initiative that promotes international joint research using advanced science and technology from Japan in combination with Official Development Assistance (ODA). The program is a collaboration between JST, the Japan International Cooperation Agency (JICA) and the Japan Agency for Medical Research and Development (AMED) supported by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) and the Ministry of Foreign Affairs (MOFA). Based on the needs of developing countries, JST and JICA cooperate to promote international joint research targeting global issues with the objective of utilization of research outcomes. Implemented through collaboration with ODA, the aim of the program is to acquire new knowledge and technology that lead to the resolution of global issues and the advancement of science and technology, and through this process, to create innovations. Also, SATREPS will actively correspond to the Sustainable Development Goals (SDGs) and contribute to the international community. Based on this concept of the SATREPS, in FY2020, we started a collaborative research project with Thailand, "The Project for the Acceleration of Livestock Revolution in Thailand aiming to be the Kitchen of the World through the Development of Novel Technologies for Stable Livestock Production and Food Safety". Foot-and-mouth disease (FMD) and other major livestock infectious diseases are causing export restrictions and a decline in livestock production. This project, in Thailand who aims to be the Kitchen of the World, applies experiences learned from controlling FMD outbreak in Miyazaki Prefecture. In cooperation with government agencies and veterinary universities, a multi-diagnostic system for major infectious livestock diseases and a food poisoning bacteria elimination technology from the poultry are to be developed, and an epidemic prevention system based on the disease dissemination mathematical model is to be established. Through these research and training programs, this project strives to foster experts who can contribute to livestock epidemic prevention in the globalized era. This project establishes technology for controlling livestock infectious diseases such as FMD in Thailand. Thailand, who plays a leading role in ASEAN, will influence the neighboring countries after implementing this technology which consequently contributes to a stable and safe livestock supply worldwide.

Keywords**:** *FMD, Food safety, New diagnoses, SDGs, Transboundary infectious diseases*

Virulence and genetic characteristic of African swine fever virus isolated from Thailand, 2022 – 2023

○Tapanut Songkasupa[1], Nuttun Pengpetch[1], Kultyarat Bhakha[1], Kanokwan Puangjinda[1], Marutpong Pumpuang[2], Prakit Boonpornprasert[1], Bundit Nuansrichay[1]

[1]*National Institute of Animal Health, Department of Livestock Development, Bangkok, Thailand*
[2]*Bureau of Veterinary Biologics, Department of Livestock Development, Bangkok, Thailand*
**Corresponding author: m.urabe@woah.org*#

African swine fever (ASF) is a deadly viral disease that infects domestic pigs and wild boars. Since 2018, the disease has emerged in China and rapidly spread throughout Asian countries causing tremendous socioeconomic consequences. This study aims to determine the severity, genotype, and genetic characteristics of representative ASF viruses (ASFV) responsible for the outbreaks in 2022–2023 in Thailand. The genome of the ASFV isolated during the first outbreak in Thailand was analyzed. The ASF/Pig/Nakhonprathom/Thailand/NIAH-NPT1/2022 was 189,404 base pairs. To evaluate severity of ASFV, specific-pathogen-free pigs intramuscularly inoculated with different virus dosages at 10^{1}–$10^{6.5}$ HAD50 exhibited high pyrexia, skin discoloration and death. The incubation periods were 2-8 days post inoculation (dpi) and inoculated pigs at 10^{1}–$10^{6.5}$ HAD50 died between 5-19 dpi. Viremia was found at 3dpi. and ASFV genome was detected from nasal and rectal swab samples on 3-5 dpi. For molecular characterization, the amplification and sequencing of the DNA fragments of the putative B646L gene encoding the major capsid protein p72, and intergenic region (IGR) between the l73R and I329L genes were performed. Phylogenetic analysis revealed that all ASFV isolates circulating in Thailand belongs to genotype II, central variable region (CVR) type I and intergenic region (IGR) II. These results indicate that Thai ASFVs are highly virulent and transmissible in domestic pigs. Our study demonstrates the threat of ASFV and emphasizes the need to control and eradicate ASF in Thailand.

Keywords*: ASF, African swine fever, Thailand, Virulence*

Environmental sampling to assess the bio-burden of *Mycobacterium avium* subspecies *paratuberculosis* in drylot pens on California dairies.

Tapakorn Chamchoy
National Institute of Animal Health, Thailand
**Corresponding author: tchamchoy@ucdavis.edu*

Mycobacterium avium subspecies *paratuberculosis* (MAP) is a bacterium that can cause substantial economic losses in infected dairy herds due to reduced milk production and increased cow-replacement costs. In order to control MAP in dairies with drylot pens, a standardized environmental sampling protocol to quantify MAP in fecal slurry was developed based on an existing protocol for freestall pens. Specifically, following a 24-hour hold of the flush, a grab sample of approximately 10ml of fecal slurry was collected every 1 meter along the flush lane of the drylot pens, avoiding individual cow fecal pats. To determine the reliability and repatability of the new environmental sampling protocol for estimation of MAP bioburden at the pen level, two collectors simultaneously collected fecal slurry samples every day for 3 days from six drylot cow pens on two Central California dairies. During the study period no cow movement between pens was allowed with the exception of sick cows. The study herds had MAP seroprevalence of 5.8% and 3.2%, respectively, based on whole pen serum ELISA results. Variance components models for quantitative real-time PCR (qPCR) results showed samples collected from different pens on different dairies accounted for greater variablitiy in MAP concentration (65%), while samples collected by different collectors had the least variability (0.1%). In contrast, variability in MAP concentration in environmental samples collected on different days had 25% variability. The intraclass correlation coefficient (ICC) showed high reliability (93%) of environmental sampling simultaneously by different collectors. In contrast, the reliability of environmental sampling at different days was 65%, which was similar to the reliability for sampling by different collectors on different days. Investigators can expect high reliability when employing the new environmental sampling protocol along with qPCR testing of environmental samples from drylot pens.

Keywords: *Environmental Sampling, Mycobacterium avium subspecies paratuberculosis, Quantitative real-time PCR, Drylot pen, Intraclass correlation coefficient*

New technology for the elimination of foodborne pathogens from chicken carcasses using a high-pressure pulse jet spray system

○Chanakan Chotiphutthikul[1], Saravalee Suphakarn[1], Napatsorn Suwongsaksri[1], Junichiro Soejima[2], Susumu Sugiyam[2], Kanyatip Sangarun[3], Torrung Vetchapitak[4], Pornsawan Pongsawat[4], Naoaki Misawa[4]

[1]Veterinary Research and Development Center, Eastern Region, DLD, Thailand, [2]Kaijo Co. Ltd, Japan, [3]Graduate School of Veterinary Medicine, Hokkaido University, Japan, [4]Center for Animal Disease Control, University of Miyazaki, Japan

**Corresponding author: chanakan.can@gmail.com*

Salmonellosis is a zoonotic infection caused by *Salmonella enterica* subsp. *enterica* is an important substantial public health threat worldwide as one of the most common causes of foodborne infection. It is often associated with the consumption of contaminated poultry products such as chicken. Since chicken carcasses can become contaminated with *Salmonella* during the processing stage at a processing plant due to poor hygiene practices, inadequate sanitation, or cross-contamination. Some disinfectants are widely used in many countries to reduce *Salmonella* contamination of chicken carcasses in processing plants. However, the bactericidal efficacy of *Salmonella* is not significant. In this study, we evaluated an alternative strategy to reduce contaminated bacteria by using a high-pressure pulsed jet spray (HPPJS) which washes out the bacteria attached to a carcass. In a preliminary study, chicken carcasses were artificially inoculated with *Salmonella* Enteritidis (ATCC 13076) and followed by spraying using the HPPJS under various conditions. The treatment groups were divided into two groups, based on exposure time (5 or 15 sec), and treated with tap water or peracetic acid (PAA) with 0.05% or 0.07%. *Salmonella* counts were determined using the most-probable-number (MPN) method. Total Coliform (TC) and Aerobic Plate Count (APC) from the carcass skins were examined by a direct plate count method. The efficacy of HPPJS was evaluated by comparison of the number of bacteria before and after treatment by HPPJS. The present study showed a significant reduction in *Salmonella* only when the chicken carcasses were sprayed with 0.05% PAA for 5 sec. While a significant reduction of APC was observed in most conditions, there was no significant reduction of TC in any conditions. However, further study has already been planned and conducted to improve the efficacy of HPPJS and optimize the conditions for decontamination. Since this technology would effectively remove *Salmonella* from contaminated chicken skin, this research contributes to improving food safety practices in the poultry industry.

Keywords: *Bacterial contamination, Chicken carcass, High-pressure pulsed jet spray (HPPJS), Pathogen reduction, Salmonella, Spraying systems*