

E-BOOK OF EXTENDED ABSTRACT

THE 14TH INTERNATIONAL INVENTION, INNOVATION & DESIGN COMPETITION 2025



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ECOSYSTEM LIVESTOCK FOR AN EFFICIENT CATTLE SUPPLY CHAIN

Elbo Shindi Pangestu¹, Hari Setiaji¹, Irving Vitra Paputungan¹, Anggriawan N.T.P²

Faculty of Industrial Technology, Universitas Islam Indonesia¹

Jl. Kaliurang km. 14,5 Sleman, Yogyakarta 55584 Indonesia

Faculty of Agriculture, Universitas Sriwijaya²

Jl. Palembang-Prabumulih km. 32 Inderalaya, Kabupaten Ogan Ilir, Sumatera

Selatan 30662 Indonesia

23917041@students.uui.ac.id,

hari.setiaji@uui.ac.id,

irving@uui.ac.id,

anggriawan@fp.unsri.ac.id

ABSTRACT

The cattle supply chain is vital for protein consumption but suffers inefficiencies and disease risks, with manual records and incomplete identification hindering production, meeting only 65% of demand in Indonesia. We propose the E-LI digital platform coupled with PiTag smart ear-tags integrating RFID, NFC, QR codes, and unique IDs for real-time animal tracking. E-LI centralizes livestock data, enables health monitoring, connects farmers to markets, and serves stakeholders from extension workers to consumers. Pilot results suggest 40% time savings, 98% data accuracy, 50% disease reduction, and up to 20% income gains, supporting sustainable and traceable livestock management.

Keywords: Cattle Supply Chain, Food Security, E-LI Platform, PiTag Technology.

1. INTRODUCTION

The global cattle supply chain serves as a foundational element of the world's food system, delivering essential protein and supporting the livelihoods of an estimated 1.3 billion people, furthermore, it should serve all people, which is around 7 billion people. Its intricate network, however, faces mounting pressures that bear significant implications for global food security, particularly concerning the availability, accessibility, and stability of food supplies, especially when confronted by systemic shocks such as widespread disease or the escalating impacts of climate change (World Bank, 2022). Agricultural trade flows, including those for livestock and their products, are critical to various stakeholders, from primary producers to international policymakers. Global demand dynamics, international trade agreements, technological advancements, and geopolitical currents continually shape them.

Livestock is a critical component of its agricultural economy and faces persistent challenges that hinder its growth and sustainability (Agus & Widi, 2018). For example, in Indonesia, over 16 million beef and 1.2 million dairy cattle, a significant portion of farmers (over 60%) still rely on manual record-keeping, leading to inefficiencies and high data error rates (Agus & Widi, 2018). This inefficiency contributes to the nation's struggle to achieve meat self-sufficiency, with domestic beef production meeting only 65% of the national demand (Agus & Widi, 2018; YUSDJA et al., 2018). Furthermore, issues such as difficulties in accessing livestock markets, unguaranteed livestock quality, and incomplete animal identification plague the industry. Animal diseases, like Foot-and-Mouth Disease (FMD), also pose a major threat, with tens of thousands of cattle affected (U.S. Department of Agriculture, Animal and Plant Health Inspection Service, 2025; World Organisation for Animal Health, n.d.). Smallholder farmers often operate under suboptimal economic conditions,

and a lack of data integration among stakeholders, including 10,000 livestock extension workers, results in information delays and affects decision-making. Addressing these multifaceted problems requires a comprehensive, technology-driven approach to enhance efficiency, improve animal health and food safety, support farmer welfare, and align with national goals for digital transformation and sustainable livestock production (Irdiana & Ulim, 2022).

2. METHODOLOGY

The E-LI platform is a digital solution centered around a user-friendly mobile and web-based application, integrated with the innovative PiTag smart ear-tag. This approach facilitates a holistic digital transformation of livestock management. The PiTag is a multifunctional ear-tag replacing traditional identification methods. Each PiTag incorporates multiple reading methods: a unique ID, QR Code, Near Field Communication (NFC), and Radio-Frequency Identification (RFID). This ensures high accuracy in data recording and allows for real-time monitoring and traceability of individual animals throughout their lifecycle.



Figure 1 E-LI platform integrates with PiTag technology.

The E-LI application offers a suite of features designed to address the core challenges in livestock management:

- **Digital Recording & Centralized Management:** Automates livestock data recording (birth, health, vaccination, movement, sales), storing all information on a centralized platform accessible to authorized stakeholders. This system is designed to reduce recording time by 40% and increase data accuracy by up to 98%.
- **Marketplace Integration:** Connects farmers directly with buyers (consumers, slaughterhouses), improving market access and potentially increasing farmers' income by up to 20%, as seen in similar digital adoption cases (Farming First, 2025; Harsanto & Purnomo, 2024).
- **Health Monitoring & Disease Control:** Facilitates real-time monitoring of livestock health, enabling early detection of diseases and centralized tracking, which can reduce disease spread by up to 50% (World Organization for Animal Health).
- **Stakeholder Collaboration:** Provides specific interfaces and benefits for farmers (efficiency, financing access, marketing), extension workers (integrated data, direct interaction), slaughterhouses (supply chain transparency, data for processing), government (supervision, food security data, policy development), and consumers (confidence, premium product access).

3. FINDINGS

The E-LI platform and PiTag technology are projected to deliver significant improvements across the global livestock sector. Initial research and comparative studies on similar technologies indicate substantial benefits. The automation of data recording via RFID and NFC is proven to reduce recording time by 40% and enhance data accuracy to 98%. Digital systems for monitoring livestock growth can potentially increase production output by up to 30%. For disease management, real-time health monitoring and centralized tracking are expected to reduce the spread of diseases by up to 50%, mitigating economic losses (World Organisation for Animal Health, n.d.). The integrated marketplace feature aims to improve farmers' market access and selling prices, with potential income increases of up to 20%, drawing parallels from digital adoption in other agricultural economies (Farming First, 2025).

4. CONCLUSION

The E-Livestock (E-LI) platform, coupled with PiTag technology, represents a significant innovation for sustainable agriculture. By addressing critical inefficiencies in livestock management, data accuracy, market access, and disease control, E-LI offers a pathway to increased productivity, improved farmer welfare, and enhanced national food security. The system's comprehensive features, multi-stakeholder approach, and modern technologies like RFID, NFC, and AI-powered analytics position it as a transformative solution. The projected impacts, including substantial gains in efficiency, production, and disease mitigation, alongside improved income for farmers, underscore the potential of E-LI. As we move towards broader implementation, the E-LI platform is poised to contribute significantly to the digital transformation of the agricultural sector, ultimately fostering a more sustainable, traceable, and resilient livestock sector that provides safe, healthy, whole, and halal meat for the nation.

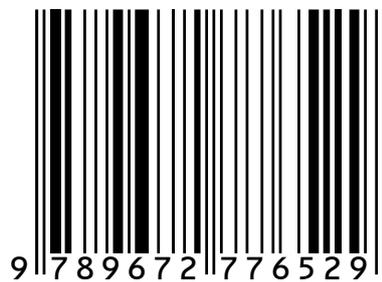
REFERENCES

- Agus, A., & Widi, T. S. M. (2018). Current situation and prospect of beef cattle production in Indonesia — A review. *Asian-Australasian Journal of Animal Sciences*, 31(7), 976–983. <https://doi.org/10.5713/ajas.18.0233>
- CRIF Asia. (2025, July 4). *Driving growth and food security: A new direction for Indonesia's livestock industry 2025–2027*. <https://www.id.crifasia.com/resources/industry-insights/driving-growth-and-food-security-a-new-direction-for-indonesia-s-livestock-industry-2025-2027/>
- Farming First. (2025, March 18). *How digital marketplaces are empowering small-scale farmers and rural communities*. <https://farmingfirst.org/2025/03/how-digital-marketplaces-are-empowering-small-farmers/>
- Harsanto, P. B., & Purnomo, S. H. (2024). Efficiency of beef cattle supply chain management using digital marketing. *TEFA*, 1(1), 22–31. <https://publikasi.poliije.ac.id/tefa/article/download/5542/3040>
- Irdiana, W., & Ulim, S. (2022). *Progressing Indonesia's agriculture 4.0 through research and application towards ASEAN digitalization initiatives* (Policy Brief No. 27). ASEAN Climate Resilience Network. https://asean-crn.org/wp-content/uploads/2021/12/2021_Policy-Brief-Progressing-Indonesia-Agriculture-Research-Application-ASEAN-Digitalization-Covid19.pdf
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service. (2025, May 22). *Animal disease traceability*. <https://www.aphis.usda.gov/livestock-poultry-disease/traceability>

- World Bank. (2022, September 9). *The World Bank supports Indonesia's agriculture sector to become more resilient and inclusive* [Press release]. <https://www.worldbank.org/en/news/press-release/2022/09/09/the-world-bank-supports-indonesia-agriculture-sector-to-become-more-resilient-and-inclusive>
- World Organisation for Animal Health. (n.d.). *Home*. Retrieved July 12, 2025, from <https://www.woah.org/>
- Yusdja, Y., Ilham, N., & Saptana. (2018). *Beef supply and demand projection 2015 through 2024 (metric tonnes/yr)*[Figure]. ResearchGate. https://www.researchgate.net/figure/Beef-supply-and-demand-projection-2015-through-2024-metric-tonnes-yr-6_fig1_325358147

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