Greater Mekong Subregion Sustainable Agriculture & Food Security Program

Landell Mills

landell-mills.com

DEMONSTRATION CLOSURE REPORT:

Livestock Traceability Demonstration – Output 2.2

TA 9916-REG: Greater Mekong Subregion Sustainable Agriculture and Food Security Program

JUNE 2026

In association with Berkeley Economic Advising and Research

BEAR BERKELEY ECONOMIC ADVISING AND RESEARCH

Report submitted by:

Landell Mills Ltd in association with Berkeley Economic Advising and Research

This report was prepared at the request and with the financial support of the Asian Development Bank (ADB). The views expressed are those of the consultants and do not necessarily reflect those of the National Governments, or ADB.

Key Data

Name of the project	TA 9916-REG: Greater Mekong Subregion Sustainable Agriculture and Food Security Project
Contractor	Landell Mills Limited, Bryer-Ash Business Park, Bradford Road, Trowbridge, Wiltshire, BA14 8HE, UK Tel: +44 1225 763777 / Fax: +44 1225 753678 www.landell-mills.com
Contracting Authority	Asian Development Bank
Start / End Date	14 July 2023 – 31 December 2025

Distribution List

Recipient	Copies	Format
	N/A	Softcopy

Quality Assurance Statement and Version Monitoring

Version	Date	Originator	Review by	Approved by	Description
1	24/02/2026	David Roland-Holst, UC Berkeley / BEAR	Stewart Pittaway, TA 9916 Team Leader	Megan Turner, Project Executive, Landell Mills	First issue

Contents

Acronyms

ADB	Asian Development Bank
BEAR	Berkeley Economic Advising and Research
DLF	Department of Livestock and Fisheries (Lao PDR)
ER	Electronic Animal Health Records
GMS	Greater Mekong Sub-region
KoboToolbox	Open-source mobile data collection platform
LTD	Livestock Traceability Demonstration
MoU	Memorandum of Understanding
PRC	People's Republic of China
SAFSP	Sustainable Agriculture and Food Security Program
SPS	Sanitary and Phytosanitary Standards
TA	Technical Assistance

List of Tables

List of Figures

Executive Summary

1. "Enhancing Smallholder Cattle Value Chains through Digital Livestock Traceability (Output 2.2)" was implemented under ADB TA-9916 from 2023 to February 2026 in Lao PDR, covering a 730 km demonstration corridor spanning three northern provinces – Xayaboury, Oudomxay, and Luang Namtha – and six districts. The demonstration was implemented by Landell Mills Ltd in association with Berkeley Economic Advising and Research (BEAR), with the Department of Livestock and Fisheries (DLF) as the primary national implementing partner.

2. The Livestock Traceability Demonstration (LTD) assigns each animal a globally unique 13-digit ID, recorded via ear tag and mobile-phone scanning at key points in the supply chain: birth/registration, farm departure, market arrival and departure, border crossing, and slaughter. This trace-and-scan pathway feeds into a central livestock database accessible by value chain stakeholders.

3. The fourth and final phase of the LTD was directed toward an inclusive ex-post assessment of the current state of the traceability system. A direct, mobile-phone-based survey was conducted by DLF staff targeting all 110 value chain participants registered in the LTD database, with 78 completed responses recorded between November 2025 and February 2026.

4. Despite near-universal smartphone ownership (95% of respondents), adoption of Electronic Animal Health Records (ER) – the core technology of the LTD system – remained very low at 5%. This highlights a critical gap between registration in the system and active ongoing use, and points to the need for economic incentives rather than administrative mandates to drive adoption.

5. Despite low current ER use, over 60% of surveyed stakeholders across all service categories expressed strong willingness to use an expanded digital cattle network for buying and selling, trade and transport, veterinary and extension services, and financial services. This consistent support across categories indicates broad demand for a multi-purpose platform, rather than narrow interest in a single function.

6. Financial inclusion is a major structural constraint: 64% of respondents lack formal financial accounts and 90% have no loans of any type, indicating substantial unmet demand for financial services. Combined with 83% identifying livestock as a primary or secondary income source, this points to the high stakes associated with improving value chain performance for smallholder livelihoods.

7. Based on these findings, the project team has developed a detailed proposal for an expanded social network platform for smallholder cattle producers in Lao PDR, leveraging the existing LTD infrastructure. Core recommended next steps are: (i) develop and launch a mobile-first digital cattle network; (ii) design incentive mechanisms linking market price premiums to ER adoption; (iii) engage financial institutions to offer livestock-linked financial services through the platform; and (iv) invest in gender-inclusive outreach to increase women's participation.

I. INTRODUCTION

Purpose of the Report

8. This closure report documents the full implementation of Output 2.2 – Livestock Traceability Demonstration across its four phases, with particular focus on the Phase 4 ex-post stakeholder survey and the resulting proposal for an expanded digital platform. The specific purposes of the report are to: (i) assess the overall performance of the demonstration including its effectiveness in achieving its objectives; (ii) document the key findings of the Phase 4 value chain survey; (iii) describe the technical and institutional arrangements underpinning the LTD system; (iv) identify constraints and lessons learnt; and (v) provide actionable recommendations for future programming.

Implementation Arrangement

9. A Memorandum of Understanding was signed between Landell Mills and the Department of Livestock and Fisheries (DLF) of Lao PDR for the implementation of the demonstration. DLF served as the primary national implementing partner, with Dr. Thansamay Vorlaphim (DLF) leading national coordination and survey administration. Technical guidance and survey design were provided by Dr. David Roland-Holst and Dr. Jonathan Chang of the University of California, Berkeley / Berkeley Economic Advising and Research (BEAR).

10. The demonstration was implemented across a corridor spanning three provinces and six districts in northern Lao PDR (see Figure 1). Two border crossings are active within the corridor: Nam Hueang (Thai-Lao border) and Panghai (Lao-PRC border), both of which are central to the LTD's purpose of facilitating efficient and compliant cross-border livestock trade.

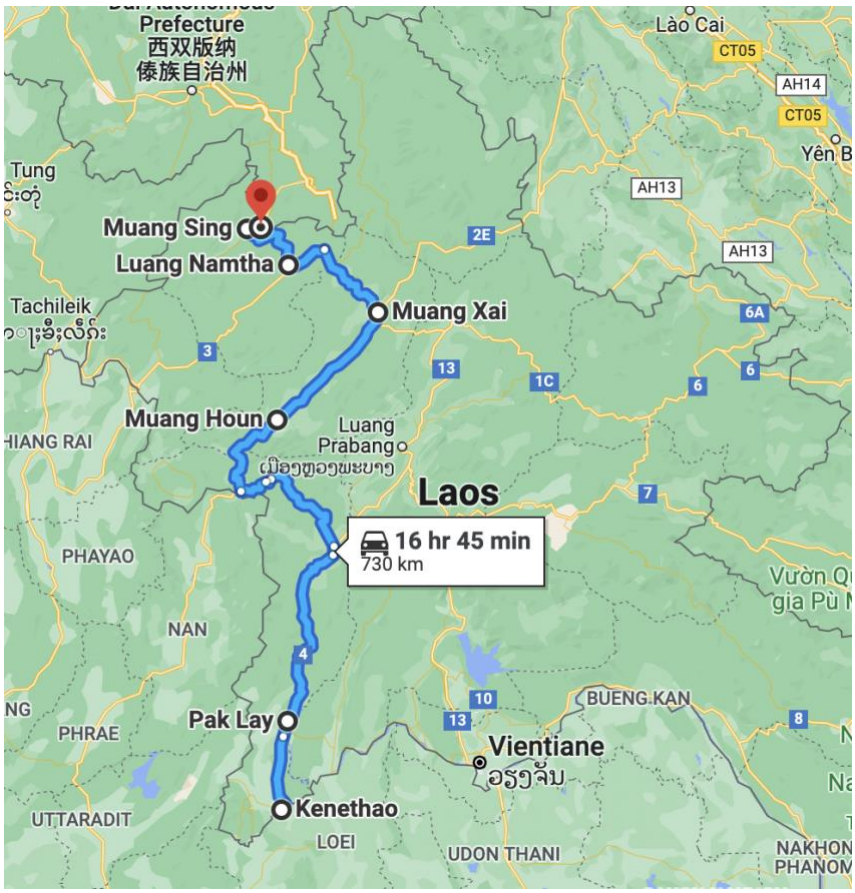

Figure 1: Demonstration Corridor (3 Provinces, 6 Districts)

11. The demonstration corridor spans a one-way distance of 730 km (984 km including Vientiane), passing through the districts of Kenethao and Pak Lay (Xayaboury Province), Muang Houn and Muang Xai (Oudomxay Province), and Luang Namtha and Muang Sing (Luang Namtha Province).

II. DEMONSTRATION OBJECTIVE AND EXPECTED RESULTS

Objectives

12. The main objective of the demonstration was to pilot a digitization strategy for agrifood modernization that would improve livestock product quality and safety, and expand market access and improve livelihoods for smallholder cattle producers across the GMS. The LTD system was designed to create a verifiable, tamper-resistant record of each animal's life history, enabling downstream buyers, processors, and regulators to access provenance information that underpins food safety certification and quality premiums. The specific objectives included:

- Establish a livestock traceability database linking producers, traders, transporters, quarantine officers, and border crossing facilities along the demonstration corridor.
- Demonstrate the viability of mobile-phone-based livestock identification and tracking for smallholder farmers in a low-resource setting.
- Assess value chain stakeholder attitudes and needs with regard to digital services, and develop a proposal for expanding the LTD infrastructure into a broader social network platform.

Expected Results

13. The successful implementation of the LTD was designed to deliver three categories of benefit for participating value chain actors:

- Disease Risk Reduction through Improved Surveillance Capacity: Traceability enables rapid identification and response to disease events, giving producers an incentive to maintain and document animal health status to avoid market penalties.
- Product Quality and Value Creation through Improved Market Access, Extended Animal Custody, and Producer Identification: Documented animal history supports quality premiums, incentivizing investment in better breeds, husbandry, and feed.
- Livelihood Improvement for Smallholder Producers and Lower Income Value Chain Actors: Traceable animals can access larger, more advanced domestic and cross-border supply chains, expanding income opportunities for smallholder cattle producers and intermediaries.

III. DEMONSTRATION RESULTS AND SURVEY FINDINGS

14. Table 1 summarizes the performance of the demonstration against baseline indicators and key performance targets across all four phases.

Table 1: Demonstration Baseline Indicators and Key Performance Targets

Indicator	Baseline	Target	Achievement
Value chain participants registered in LTD database	0	110	110 registered; 78 survey responses received
Animals tagged with unique 13-digit ID	0	—	Multiple tagging events across 4 phases
Provinces covered by demonstration corridor	0	3	3 (Xayaboury, Oudomxay, Luang Namtha)
Stakeholders with smartphone and internet access	—	—	95% of survey respondents
Electronic Animal Health Record (ER) adoption among registered stakeholders	0%	>50%	5.13% (4 respondents)
Stakeholders willing to use expanded digital cattle network	—	—	>62% across all service categories
Stakeholders with formal financial accounts	—	—	35.9% (64.1% have no account)

Phase 4 Survey Design and Administration

15. The Phase 4 ex-post evaluation was conducted as a direct, mobile-phone-based survey of all 110 value chain participants registered in the LTD database. The survey was implemented by DLF staff using respondents' own mobile phones, enabling direct, verified contact with registered stakeholders. The instrument was administered via the KoboToolbox platform, a standardized open-source data collection tool designed for field surveys in low-resource settings.

16. The questionnaire comprised 20–40 questions covering respondent demographics, herd characteristics, value chain roles, technology adoption, financial inclusion, and attitudes toward a proposed digital cattle network. Data collection ran from February 18, 2025 through early 2026, with the bulk of interviews conducted in November and December 2025. Three interviewers administered the survey: DLF Interviewer 1 (71 responses, 91%), DLF Interviewer 2 (4 responses, 5%), and a BEAR developer (3 responses, 4%). A total of 78 completed responses were recorded.

Figure 4: Survey Response Timeline (by Month)

Survey Sample Characteristics

17. The 78 respondents represent a subset of the 110 value chain participants registered in the LTD system. Table 2 summarizes key sample characteristics.

Table 2: Survey Sample Characteristics

Characteristic	Value
Total respondents	78
Male	69 (88.46%)
Female	9 (11.54%)
Majority age cohort (year of birth)	1965–1985 (ages ~40–60)
Primary survey period	November–December 2025

18. The dominant male representation in the sample (88%) reflects the structure of cattle ownership and trading in the region. However, it also flags a need to engage women – who play important roles in herd management – in future programming.

Respondent Profiles and Value Chain Roles

19. Survey respondents occupy multiple roles within the cattle value chain, reflecting the integrated nature of smallholder livestock livelihoods in Lao PDR. Rather than occupying a single fixed role, most participants combine farming with trading activity. Table 3 summarizes respondent roles.

Table 3: Respondent Value Chain Roles

Role	% of Respondents
Farmer	92.31% (72 respondents)
Trader	70.51% (55 respondents)
Transporter	5.13% (4 respondents)
Quarantine manager	2.56% (2 respondents)
Official / Other	2.56% (2 respondents)

20. The high overlap between farmer and trader roles – with 70% of respondents identifying as traders in addition to farmers – is a structurally important finding. It indicates that many smallholders are not passive price-takers at the farm gate but actively participate in local cattle markets. This dual role means that improvements to trading infrastructure and information access would have a direct and amplified impact on household incomes.

Cattle Ownership and Herd Characteristics

21. Herd sizes among respondents span a wide range, from zero to 1,240 head, but the distribution is heavily concentrated at the smallholder end. The most common reported herd sizes are 10 head (12.82% of respondents) and 15 head (10.26%), with a large majority of respondents holding between 5 and 30 animals. Local breeds dominate the production system, with 92% of respondents keeping indigenous Lao cattle. Crossbreeds are present in 35% of herds, reflecting some producer interest in productivity improvement.

Livelihoods, Financial Inclusion, and Digital Access

22. Livestock is the dominant income source for the survey population, reported by 83% of respondents as a primary or secondary source of income. Agricultural crops are the second most common source (63%). Table 4 presents the key financial inclusion indicators from the survey.

Table 4: Financial Inclusion of Registered Stakeholders

Indicator	Value
No formal financial account	64.1% of respondents
Have a financial account	35.9%
Of account holders: deposit account only	94.87%
Of account holders: loans/borrowings	6.41%
No loans of any type	89.74%
Smartphone and internet access	95%

23. This combination of very low formal financial inclusion and near-universal smartphone penetration defines both the opportunity and the design challenge for next-generation programming. Figure 5 illustrates the high rates of digital asset ownership and app usage among surveyed stakeholders.

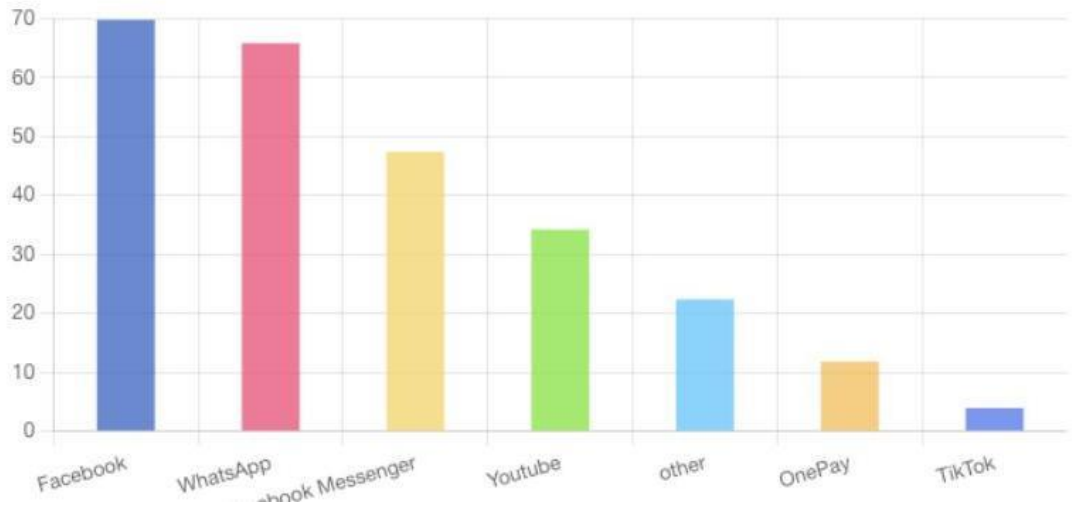

Figure 5: Respondent Asset Ownership and Internet App Usage

Technology Adoption and Attitudes Toward a Digital Cattle Network

24. Current adoption of Electronic Animal Health Records (ER) – the core technology of the LTD system – is extremely low across the sample. Only 4 respondents (5.13%) report currently using ER, while 95% do not. This finding is important context: the LTD demonstration has succeeded in registering participants and demonstrating the technology, but widespread habitual use has not yet been established.

25. Despite very low current ER adoption, a clear majority of respondents expressed willingness to use a government-sponsored digital cattle network for a range of specific purposes. More than 60% of respondents across all service categories expressed willingness to use such a platform: buy and sell (62.8%), trade and transport (60.3%), veterinary and extension services (62.8%), and financial services (62.8%). The consistency of support across service types indicates that respondents are broadly open to a multi-purpose platform, rather than endorsing a single favored use case.

26. The apparent paradox between very low current ER use (5%) and strong stated willingness to use a digital cattle network (>60%) is both a challenge and an opportunity. It signals that the current LTD system has not yet delivered sufficiently compelling benefits to drive habitual adoption, but that the underlying demand for digital services – particularly for commercial purposes such as buying, selling, and accessing finance – is real and substantial.

IV. TECHNICAL ARRANGEMENTS

The Trace and Scan System

27. The LTD system assigns each animal a globally unique 13-digit ID at birth or registration. This ID is encoded in an ear tag and linked to the animal's core registration data: breed, birthplace, date of birth, and owner name. The ID can be scanned at any point in the supply chain using a mobile phone, with each scan event recorded in the central livestock database. Figure 2 illustrates the full trace and scan pathway from farm registration to consumer.

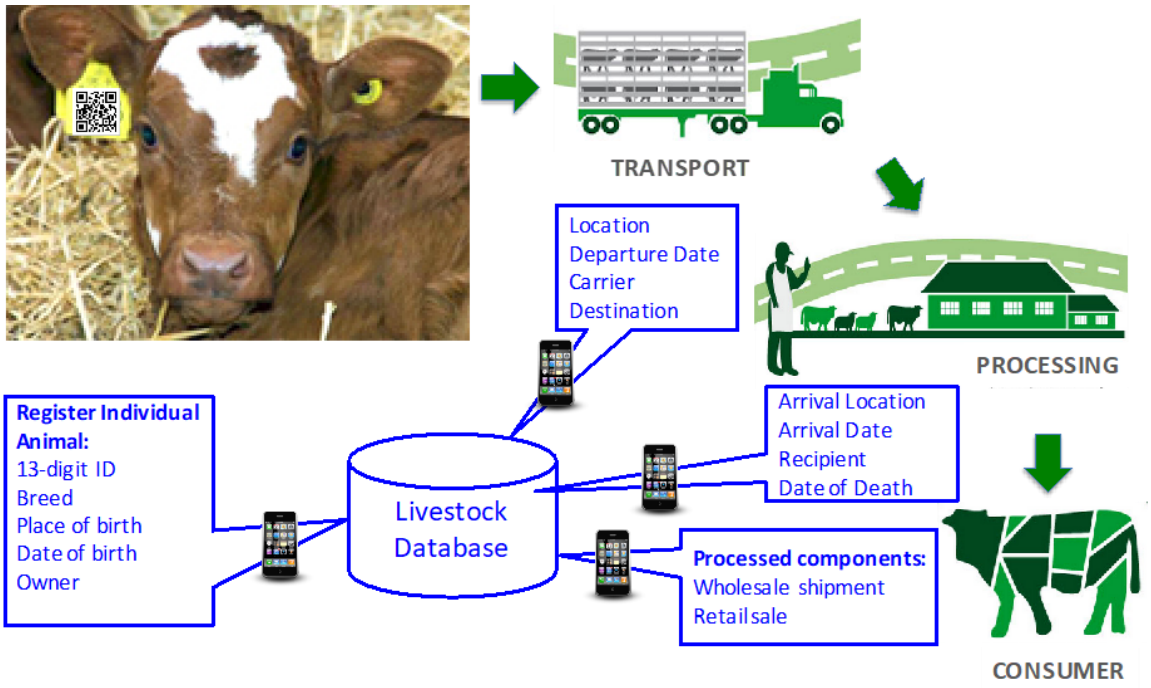

Figure 2: Livestock Traceability – Trace and Scan Pathway

28. Scan events recorded in the system include: Farm Departure, Market Arrival and Departure, Transit, Vaccines administered, Veterinary Inspection, Border Crossing, and Slaughter. All data is synced to the central livestock database, which is accessible to authorized value chain stakeholders. This creates an auditable, tamper-resistant record of each animal's movement and health history.

LTD Mobile Application

29. The LTD mobile application was developed to enable scanning and data entry in the field with minimal connectivity requirements. Figure 3 illustrates the animal information interface, showing the display of core registration data (13-digit ID, breed, species, birthplace, date of birth, owner name) alongside a scan event trigger for recording new supply chain events.

Figure 3: LTD Mobile App – Animal Information Interface

Proposed Social Network Extension

30. Building on the survey findings and the existing LTD infrastructure, the project team developed a detailed proposal for an expanded social network platform for smallholder cattle producers. The proposal is grounded in the principle that a fully developed traceability scheme is not merely a logistical tool, but a social network that can transform the livelihoods of smallholders and other low-income value chain actors by improving their access to information, technology, and financial services.

31. The proposed platform is designed for full implementation on mobile handsets and includes the following core feature areas: (i) Communication Tools – instant messaging, topic-based discussion forums, and a calendar of local events and training workshops; (ii) Market Access – a moderated livestock marketplace with buyer ratings and market price intelligence; (iii) Extension Services – a virtual extension services clearinghouse connecting producers with public and private agricultural experts; (iv) Financial Services – loan information and application capabilities, financial literacy training, and connections to agricultural insurance providers; and (v) Improved Inputs and Technology – a moderated supplier directory for seeds, veterinary products, feed, and technology.

V. IDENTIFIED CONSTRAINTS AND LESSONS LEARNED

Major Constraints

32. Progress in the early phases of the LTD was significantly limited by the near-cessation of live animal flows to the People's Republic of China following COVID-19. This disruption removed the primary commercial incentive for cross-border traceability compliance, reducing the demonstrated value of the system to registered participants during the critical early adoption period.

33. Current ER adoption among registered stakeholders remains at just 5.13%, despite the system being operational and all 110 participants having been registered and trained. This gap between registration and active use is a common challenge in technology adoption programs and highlights that awareness and access to the system are not, by themselves, sufficient to drive habitual adoption. The absence of compelling direct economic benefits – such as a price premium specifically linked to ER certification – is a central factor.

34. Financial exclusion is a structural constraint on livestock sector development. Without access to working capital, smallholders cannot expand herd sizes, purchase improved inputs, or bridge income gaps between cattle sales. The proposed digital network represents a potential channel for connecting producers with appropriate financial products, but the 64% of respondents lacking any formal financial account represents a significant onboarding challenge.

35. Gender representation in the LTD database and survey sample is limited, with women comprising only 11.54% of respondents. This underrepresentation is significant given women's important roles in herd management and household financial decision-making in the region.

Lessons Learned

36. Direct economic benefits, not administrative compliance, drive technology adoption: The survey results demonstrate that registered participants are ready and willing to use digital platforms when they deliver direct commercial value. The low current ER adoption rate, despite high willingness to use a broader digital network, strongly suggests that the current system's compliance-focused design has not generated the direct economic benefits needed to change behavior at scale.

37. Smartphone penetration is not the binding constraint: With 95% of surveyed stakeholders owning smartphones with internet access, the digital divide – a critical barrier in many rural development technology programs – is not the primary obstacle here. The challenge is rather one of incentive design and platform usability.

38. The farmer-trader overlap creates a higher-value target for platform design: The finding that 70% of respondents combine farming with active trading roles means that platforms delivering commercial benefits (market access, price information, buyer connections) will reach a population that can leverage those benefits more intensively than pure subsistence producers.

39. Financial inclusion gaps represent both a constraint and an opportunity: The very low levels of formal financial inclusion identified in the survey mean that traditional financial institution channels will not reach this population. However, the combination of universal smartphone access and strong stated interest in financial services through a digital cattle network suggests that the network platform could serve as the critical intermediary connecting smallholders to financial products for the first time.

VI. PROPOSED SOCIAL NETWORK FOR SMALLHOLDER CATTLE PRODUCERS

Building on the survey findings and the existing LTD infrastructure, the project team has developed a detailed proposal for an expanded social network platform for smallholder cattle producers in Lao PDR. The proposal, documented in the Phase 4 workplan, is grounded in the principle that a fully developed traceability scheme is not merely a logistical tool but a social network that can transform the livelihoods of smallholders and other low-income value chain actors.

Institutional Rationale

Smallholder value chains in Lao PDR face three interrelated institutional failures that a digital network can help address:

- Information Failures (Adverse Selection): Without credible information on animal health, provenance, and quality, buyers cannot distinguish good from poor quality animals, suppressing prices and investment incentives for all producers.
- Access Barriers: Remote location limits smallholders' access to markets, inputs, financial services, and extension information – all of which can be delivered digitally.
- Low Bargaining Power (Scale Bias): Individual smallholders face structural disadvantages when negotiating with traders and processors. Cooperative structures enabled by the network can counteract this.

The network can support three fundamental institutional innovations: horizontal coordination (cooperative conduct among producers), certification and traceability (connecting consumers directly to producers), and vertical coordination through contracting (creating more stable, reliable supply relationships with downstream buyers).

Proposed Network Features

The proposed platform is designed for full implementation on mobile handsets, addressing the literacy and connectivity profile of the target population. Core features include:

- Communication Tools: Instant messaging, topic-based discussion forums, and a calendar of local events and training workshops, enabling real-time peer-to-peer information sharing.
- Market Access: A moderated livestock marketplace with listing access for buyers, processors, and other value chain intermediaries; buyer ratings and reviews; and regular market price and demand intelligence.
- Extension Services: A virtual extension services clearinghouse connecting producers with public and private agricultural experts, with a curated resource library of articles, videos, and guides in local languages.

- Downstream Processing and Marketing Services: Facilitated links to local and regional processing facilities; marketing support tools; and networking opportunities for cooperative marketing.
- Financial Services: Loan information and application capabilities; financial literacy training; and connections to agricultural insurance providers.
- Improved Inputs and Technology: A moderated supplier directory for seeds, veterinary products, feed, and technology; user reviews; and innovation case studies.
- Online Learning Resources: Curated training materials on livestock husbandry, business management, financial literacy, and general education, available 24/7 in local language.

User Profiles

The primary users of the proposed network would be pastoral smallholder cattle-producing households, beginning with the regions covered by the LTD demonstration. Secondary user groups include agricultural extension officers, market participants (buyers, retailers, processors), financial institutions, and technology/input suppliers.

Technical Specifications and Implementation

The platform would be designed with a responsive interface accessible across mobile and desktop devices, cloud-based infrastructure for scalability, and robust security protocols including user authentication and data encryption. Implementation is planned in five phases: Needs Assessment, Development, Testing, Official Launch, and Ongoing Support and Evaluation. Monitoring and evaluation would track user engagement metrics, user satisfaction, and economic outcomes such as sales volumes, per capita income, and access to services.

VII. CONCLUSIONS AND RECOMMENDATIONS

40. The four phases of the Livestock Traceability Demonstration have established a functioning digital infrastructure – a central database, a mobile scanning application, and a registered stakeholder network – that represents a significant public good for the Lao cattle sector. The Phase 4 survey confirms both the limitations of the current system in its compliance-focused form and the substantial latent demand for an expanded, service-rich digital platform.

41. The survey results strongly validate the case for evolving the LTD from a data registration system into a comprehensive digital services platform for smallholder livestock producers. The combination of high smartphone access and strong stated willingness to use digital services across multiple categories – against a backdrop of very low formal financial inclusion and minimal current ER adoption – defines both the opportunity and the design challenge for next-generation programming.

42. A platform that offers direct, tangible economic benefits – particularly in market access, price information, and financial services – is likely to drive adoption in ways that a purely administrative traceability system has not. Based on the survey findings, the following actions are recommended:

- Develop and launch an expanded social network platform for smallholder cattle producers, prioritizing a mobile-first design with voice-activated pathways to address literacy constraints among older farmers. The platform should be built on the existing LTD digital infrastructure.
- Design targeted incentive mechanisms to drive active ER adoption – for example, direct market price premiums for traceable animals, facilitated through buyer engagement programs with downstream traders and processors.
- Engage financial institutions and agricultural insurers to populate the network's financial services offering from the outset, addressing the large unmet demand for financial services identified in the survey.
- Invest in gender-inclusive outreach to increase women's participation in both the LTD registration base and the proposed network, given their central role in herd management and household finance.
- Establish a monitoring and evaluation framework tracking both platform engagement metrics and downstream economic outcomes (prices received, sales volumes, service access) to demonstrate impact and attract continued investment.
- Present findings and recommendations to the GMS Working Group on Agriculture and the relevant national authorities, with a view to securing government commitment to the network's long-term operation and funding.

APPENDIX: Survey Instrument Overview

A. Objective of the Survey

The main objective of the Phase 4 ex-post survey was to evaluate the current state of the Livestock Traceability Demonstration, assess stakeholder attitudes toward and interest in an expanded digital cattle network, and identify key financial inclusion and technology adoption indicators among registered value chain participants. The data collected was used to inform the design of the proposed social network platform and to provide evidence for reporting and future programming purposes.

B. Survey Platform and Administration

The survey was administered by the KoboToolbox platform (https://kf.kobotoolbox.org), an open-source data collection tool designed for field surveys in low-resource settings. Interviews were conducted by DLF staff on the respondents' own mobile phones. All survey data were collected between February 18, 2025 and February 2026, with the majority of responses recorded in November–December 2025.

C. Survey Thematic Areas

The questionnaire (ADB9916_Demo 2.2: Smallholder Cattle Value Chain Survey) covered the following thematic areas:

- Respondent identification: name, mobile number, sex, date of birth
- Value chain role(s): farmer, trader, transporter, quarantine manager, official (select all that apply)
- Landholding: land area in hectares
- Network adoption intent: willingness to join and use network for selling cattle, buying and selling, trade/transport services, veterinary/extension services, and financial services
- Herd characteristics: number of cattle owned; types and breeds kept
- Electronic records: current use of ER; knowledge of peer use; trader willingness to pay premium for ER-certified cattle
- Network knowledge: number of farmers, traders, aggregators, and quarantiners known; ER adoption among known contacts
- Labor: number of men and women in household managing cattle
- Income: average annual income from all sources; main income source categories
- Financial inclusion: whether respondent has a financial account; type of account(s); loans outstanding; average interest rates
- Assets and connectivity: car, tractor, smartphone ownership; internet apps used