

Comparative Cattle Producer Challenges (U.S. vs. Zimbabwe): Opportunities for AI-Enabled Extension

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Introduction

Cattle producers in both Zimbabwe and the United States report challenges across three core domains: disease/health, feed–water–drought risk, and markets/logistics. This study addresses a practical gap: how similar domains present through different constraints (scale, infrastructure, information access) and what that implies for ai-enabled extension and digital decision support.

Aim: Compare producer-reported pain points and decision stress across countries, triangulate with open-ended “farmer voices,” and find context-appropriate opportunities for decision support that farmers can realistically adopt.

Methods



Design & Participants: Zimbabwe (n=135) and United States (n=41) cattle producers. Participants were recruited via producer networks and partner referrals. Zimbabwe responses were collected through online links plus manually entered paper forms to reduce coverage gaps. Participation was voluntary and analyzed at the respondent level.



Measures/Tools: Survey measured herd and operation profile, outcomes/constraints across health, drought/feed, and markets, plus information stress and technology feasibility/adoption (phone type, connectivity barriers, peer influence). Included yes/no, Likert, and open-ended responses (English/Shona/Ndebele).



Procedure: Three source files were merged into one analysis-ready dataset. Non-US/non-Zimbabwe responses were excluded, and key variables were harmonized across file versions. Data quality flags included skip-logic inconsistencies in some paper forms and ambiguity where “AI” may be interpreted as artificial insemination in Zimbabwe.



Analysis Plan: Descriptive statistics summarized prevalence/barriers by country. Group differences used chi-square ($\alpha=0.05$). Two logistic models predicted (1) high information stress and (2) willingness to try a peer-recommended tool. Open-ended responses were language-tagged, translated, and thematically coded (multi-coding allowed). All respondents participated voluntarily.

Results

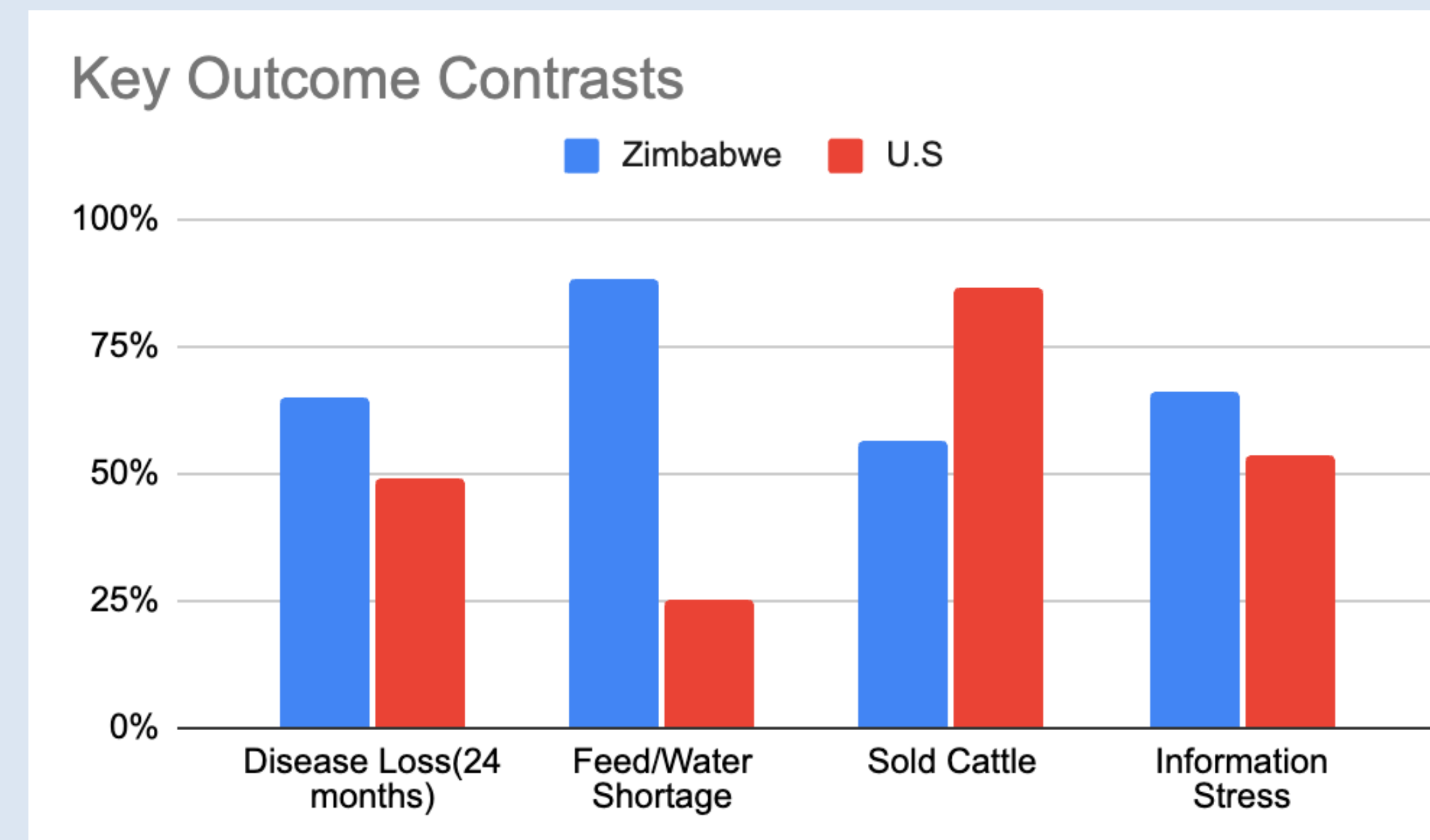


Figure 1. Country-level prevalence comparisons for four core indicators—Zimbabwe reports higher drought/feed stress and higher information stress, while the U.S. reports higher market participation; disease loss is substantial in both countries.

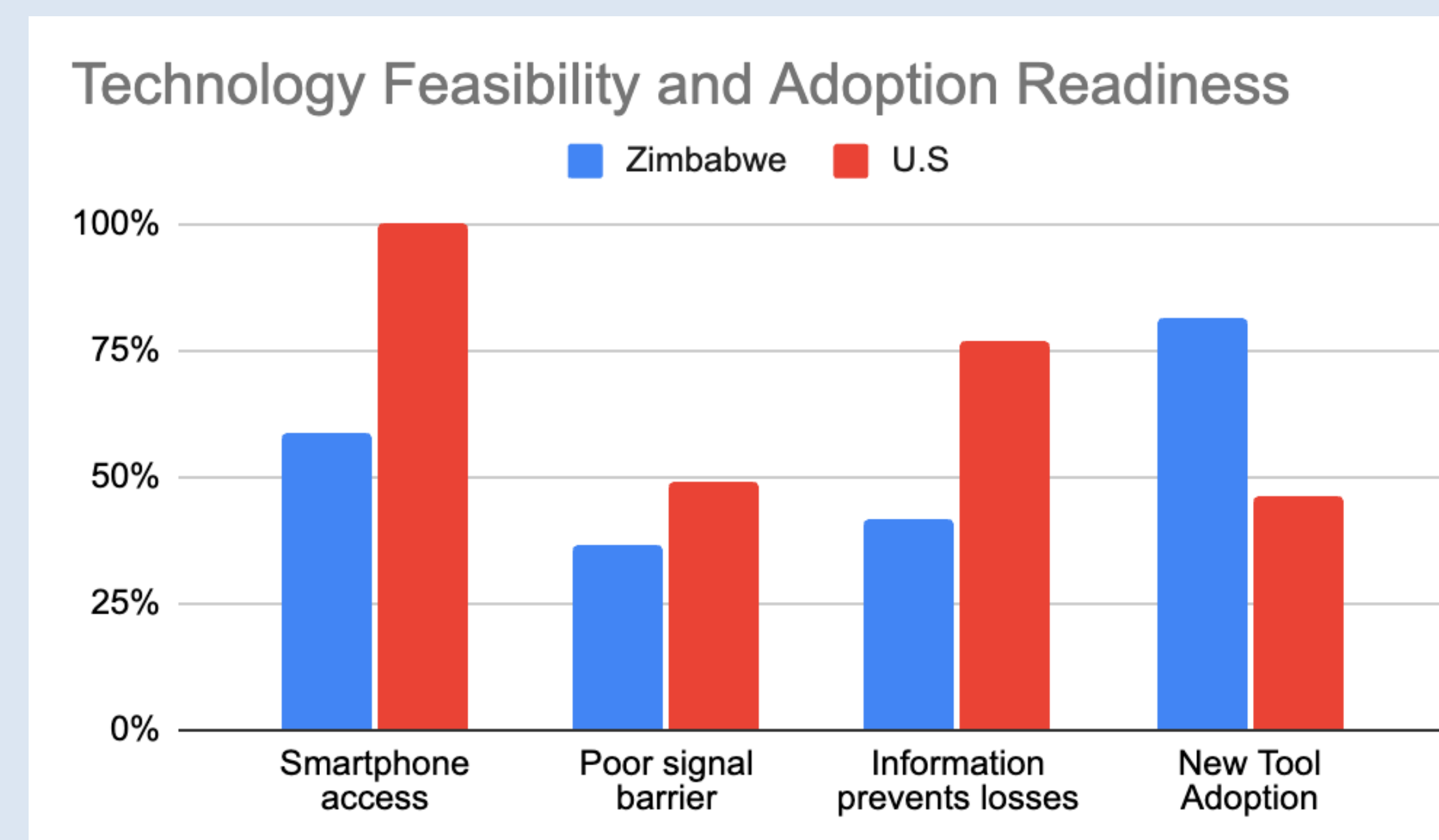


Figure 2. Zimbabwe shows higher adoption readiness (information value + peer influence), but lower smartphone access; the U.S. shows universal smartphone access but higher adoption skepticism. Poor network signal is a leading barrier in both settings.

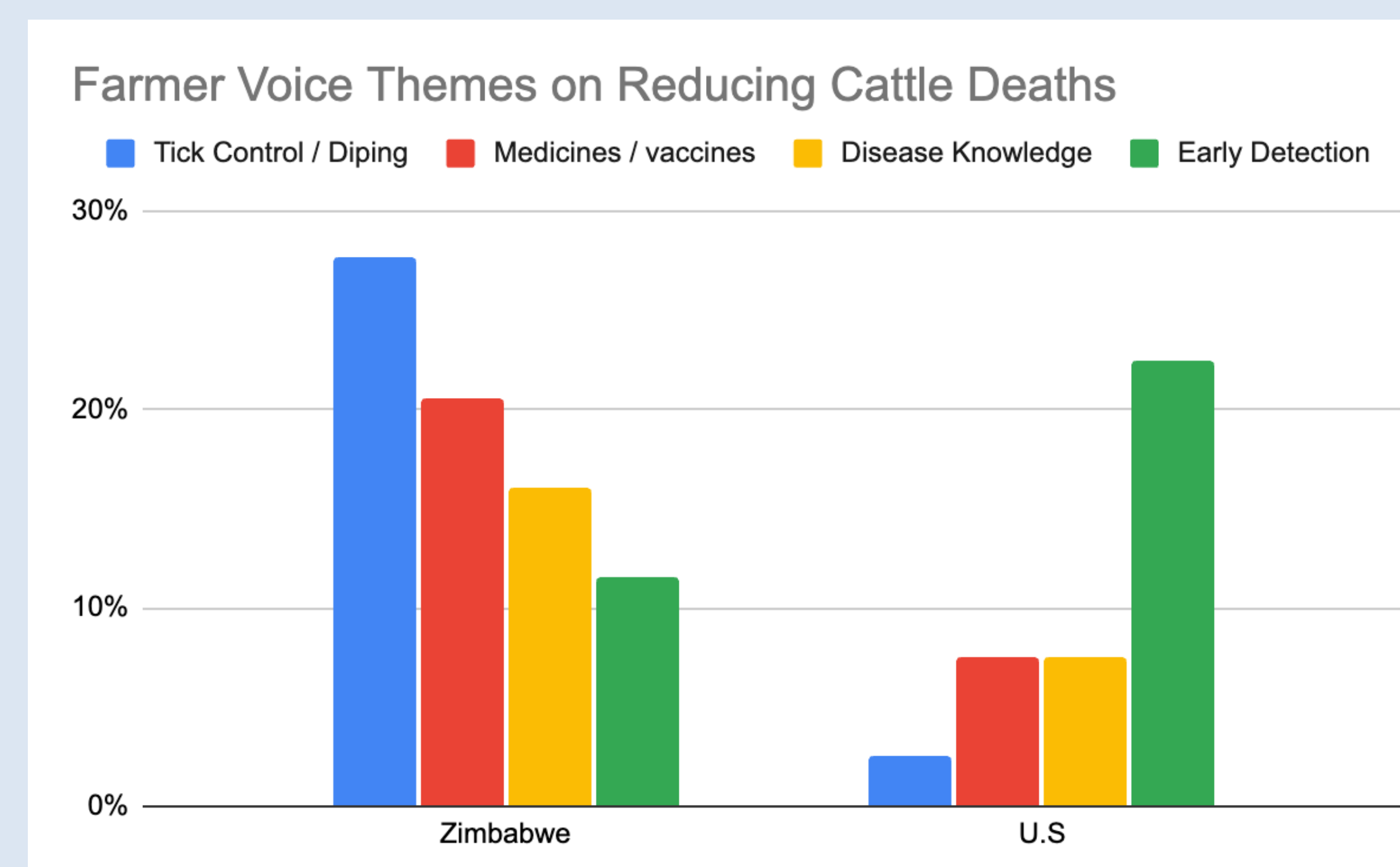


Figure 3. Farmer voice themes show different priorities— Zimbabwe emphasizes tick control/dipping reliability and access to medicines, while U.S. producers more often emphasize early detection and monitoring.

Conclusions

This study compared cattle producers in Zimbabwe (n=135) and the U.S. (n=41) to identify opportunities for AI-enabled extension and digital decision support.

- **Shared domains:** Producers in both countries report major challenges in disease/health, drought/feed, and markets/logistics.
- **Different bottlenecks:**
 - U.S: Disease challenges are driven more by early detection/monitoring in large, dispersed herds.
 - Zimbabwe: Disease challenges more often reflect diagnostic uncertainty + execution constraints (dipping reliability, input/service access).
- **Drought/feed:** Serious feed/water shortages are substantially higher in the Zimbabwe subsample that received this item, reinforcing structural vulnerability.
- **Information stress & readiness:** Zimbabwe reports higher information stress, yet stronger openness to peer-endorsed tools despite access constraints (device mix, connectivity, cost).

Limitations: Uneven item coverage across survey versions; small U.S. subsamples for some items; skip-logic inconsistencies in some manual forms; “AI” terminology ambiguity in Zimbabwe.

Recommendations: Standardize instruments and expand samples; pilot context-specific decision-support workflows with extension and supply-chain partners and evaluate impact/ROI.

Acknowledgements

- Professors Erik Wennerod and Joseph Panzarella, Katz School of Science and Health.
- Minister Donald Charumbira, Permanent Mission of Zimbabwe to the United Nations in New York City.
- Zimbabwe Ministry of Lands, Agriculture, Fisheries, Water and Rural Development (MLAFWRD), and participating producers and stakeholders.
- Cassidy Johnstone, JRC Ranch Management & Consulting (U.S.), and participating producers and reviewers.

References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340.
- Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). Free Press.
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 27(3), 425–478.