PALGO JOURNAL OF AGRICULTURE

ISSN 2476-8359
DOI : https://doi.org/10.5281/zenodo.18165060
Volume 9 Issue 4,November 2025. Page 72-78
http://www.palgojournals.org/PJA/Index.html
Corresponding Author's Email:muterovulindhlela@gmail.com

DETERMINANTS OF FARMER RESISTANCE TO DEPARTMENT OF VETERINARY SERVICES INTERVENTIONS IN THEILERIOSIS CONTROL IN MIDLANDS PROVINCE, ZIMBABWE

Dr Oliver Vulindhlela Mutero[1], Dr Madeline Siyazisiwe Sibula[2.], Dr Jenipher Zulu[3], Dr Shadreck Vangana[1], Prof Fashion Phiri[1]

Africa Research University, Lusaka, Zambia[1]
National University of Science and Technology, Bulawayo, Zimbabwe[2]
Levy Mwanawasa Medical University, School of Health Sciences, Lusaka, Zambia[3]

Accepted 20, November, 2025

Theileriosis remains a major constraint to cattle productivity and food security in Zimbabwe despite sustained control efforts by the Department of Veterinary Services (DVS). This study examined the determinants of farmer resistance to DVS-led theileriosis control interventions in Midlands Province during the implementation period of National Development Strategy 1 (2021–2025). A cross-sectional analytical survey was conducted among 390 cattle-owning households in Gweru, Kwekwe and Mvuma districts using structured questionnaires. Descriptive statistics and multivariable logistic regression analysis were employed to identify factors associated with resistance to veterinary interventions. The results indicate that institutional mistrust, perceived acaricide shortages, limited communication with veterinary authorities and previous cattle losses significantly increased the likelihood of farmer resistance, while participation in animal health awareness programs reduced resistance. These findings suggest that resistance is driven primarily by institutional and service delivery constraints rather than farmer unwillingness to control disease. Strengthening trust-based veterinary governance, improving input supply reliability and adopting participatory communication approaches are therefore essential for enhancing compliance, improving theileriosis control outcomes and supporting livestock-driven food security under National Development Strategy 2 (2026–2030).

Keywords: Theileriosis; farmer resistance; veterinary services; livestock governance; food security; Zimbabwe

Introduction

Livestock production is a central pillar of rural livelihoods, food security and agricultural sustainability in sub-Saharan Africa. In Zimbabwe, cattle contribute substantially to household income, draught power, manure supply and socio-cultural systems, particularly within communal and smallholder farming areas. Recognizing this importance, the Government of Zimbabwe prioritized livestock health and productivity under the National Development Strategy 1 (2021–2025) as a pathway towards economic recovery and food security (Government of Zimbabwe, 2021). However, endemic livestock diseases continue to undermine these objectives, with tick-borne diseases remaining among the most economically damaging constraints to cattle production (FAO, 2023).

Theileriosis, caused mainly by *Theileria parva* and transmitted by *Rhipicephalus appendiculatus*, is one of the most devastating tick-borne diseases affecting cattle in eastern and southern Africa. The disease is associated with high morbidity and mortality, reduced productivity and substantial economic losses arising from cattle deaths and treatment costs (Bishop et al., 2020). In Zimbabwe, recurrent theileriosis outbreaks have been reported despite long-standing control programs centered on acaricide dipping, movement control, surveillance and farmer sensitization implemented by the Department of Veterinary Services (DVS) (Latif and Hove, 2021).

The persistence of theileriosis suggests a disconnect between institutional disease control strategies and farmer-level compliance. Increasing evidence from southern Africa indicates that farmer resistance and non-compliance with veterinary interventions are strongly influenced by institutional trust, communication effectiveness and service delivery reliability rather than lack of awareness alone (Ssenyonga et al., 2023). Resistance may manifest through irregular participation in dipping programs, avoidance of movement restrictions or reliance on informal tick control practices, all of which undermine disease control effectiveness.

Understanding the determinants of farmer resistance is therefore essential for strengthening veterinary governance, improving livestock health outcomes and informing policy reform as Zimbabwe transitions from NDS1 to National

Development Strategy 2 (2026–2030). This study examined socio-demographic, informational and institutional factors influencing farmer resistance to DVS-led theileriosis control interventions in Midlands Province.

2. Research Objectives

In response to the identified knowledge and institutional gaps, the overall objective of this study was to examine the determinants of farmer resistance to DVS theileriosis control interventions in Midlands Province, Zimbabwe. The specific objectives were to:

(i) assess farmers' knowledge and recognition of theileriosis control measures;
(ii) examine levels and patterns of compliance and resistance to DVS-led theileriosis control interventions;
(iii) analyze the role of communication channels and institutional engagement in shaping farmer compliance; and
(iv) identify institutional, informational and service delivery factors associated with farmer resistance to veterinary interventions.

Guided by these objectives, the study addressed the following research questions:

(i) What is the level of farmer knowledge regarding theileriosis and its control in Midlands Province?
(ii) To what extent do farmers comply with DVS theileriosis control interventions?
(iii) How do communication practices and institutional interactions influence farmer behavior?
(iv) Which factors independently predict resistance to veterinary disease control programs?

3. Materials and Methods

Data were collected between September 2024 and June 2025.

3.1 Study Area

The study was conducted in Gweru, Kwekwe and Mvuma districts of Midlands Province, Zimbabwe. These districts were purposively selected for this study due to their strategic importance in the epidemiology and control of theileriosis in Midlands Province. The three districts represent areas with a documented history of recurrent theileriosis outbreaks, high cattle densities, and sustained implementation of DVS dipping and surveillance programs. Importantly, the districts exhibit variation in agricultural and ecological conditions, accessibility of veterinary services, and intensity of farmer-veterinary interactions, providing an appropriate context for examining differences in knowledge, compliance and resistance to disease control interventions. The selection of these districts therefore allowed for comparative analysis across settings that are epidemiologically relevant and operationally representative of communal cattle production systems in central Zimbabwe, thereby enhancing the generalizability and policy relevance of the findings.

The province lies predominantly within agriculture ecological regions III and IV and is characterized by mixed crop–livestock production systems and moderate to high tick challenge. Theileriosis is endemic in the area, with periodic outbreaks reported despite routine disease control measures.

3.2 Study Design and Sampling

A cross-sectional analytical design was employed. Within each district, dip tank areas were randomly selected, and farmers registered at the dip tanks were randomly invited to participate until the required sample size was achieved. The study population comprised cattle-owning households registered within DVS operational areas. A sample size of 390 households was determined using Cochran's formula at a 95% confidence level, assuming a 50% prevalence of resistance to veterinary interventions. Proportional stratified random sampling was applied to ensure representation across districts and wards.

3.3 Data Collection

Data were collected using a structured questionnaire administered through face-to-face interviews. The questionnaire captured socio-demographic characteristics, knowledge of theileriosis, perceptions of DVS service delivery, access to acaricides, communication with veterinary officers, history of cattle losses and participation in animal health awareness programs. The instrument was pre-tested among 20 farmers in a neighboring district and refined based on feedback to ensure clarity and cultural appropriateness.

3.3.1 Operational Definitions of Key Variables

For the purposes of this study, key behavioral and institutional variables were operationalized as follows:
Farmer resistance to DVS theileriosis control interventions was measured as a binary outcome variable derived from responses to a set of structured questions assessing participation in compulsory disease control activities. Respondents were classified as "resistant" if they reported irregular or non-participation in at least one of the following: routine cattle dipping, adherence to movement control regulations, or timely reporting of suspected theileriosis cases. Farmers who

reported consistent participation in all prescribed control measures were classified as “compliant”.

Institutional trust was measured using a composite index based on farmers’ agreement with statements relating to confidence in DVS competence, fairness in enforcement, reliability of service delivery, and transparency in communication. Responses were captured on a five-point Likert scale ranging from “strongly disagree” to “strongly agree”, with higher scores indicating greater trust. For regression analysis, the trust index was dichotomized into low and high trust categories on the median score.

Compliance was assessed through self-reported adherence to specific DVS guidelines, including frequency of dip attendance, acceptance of movement restrictions during outbreaks, and engagement with veterinary officers. These items were recorded as categorical responses and used both descriptively and in the construction of the resistance outcome variable.

3.4 Data Analysis

Data were analyzed using SPSS version 26. Descriptive statistics were used to summarize respondent characteristics and levels of resistance. Binary logistic regression analysis was conducted to identify factors associated with farmer resistance to DVS interventions. Variables with p-values below 0.20 in univariable analysis were included in the multivariable model. Adjusted odds ratios, 95% confidence intervals and p-values were reported, and model diagnostics confirmed acceptable goodness of fit and absence of multicollinearity.

Prior to multivariable modelling, univariable logistic regression analyses were conducted to assess the crude association between each explanatory variable and farmer resistance to DVS theileriosis control interventions. Variables with a p-value < 0.20 in univariable analysis were considered for inclusion in the multivariable model in order to avoid premature exclusion of potentially important predictors.

Potential confounding variables considered a priori included farmer age, education level, herd size, farming experience and district of residence, based on existing literature and biological plausibility. These variables were retained in the multivariable model irrespective of statistical significance where their inclusion altered adjusted odds ratios by more than 10% indicating confounding. Multicollinearity was assessed using variance inflation factors, and no evidence of problematic collinearity was observed.

4. Results

4.1 Socio-Demographic Characteristics of Respondents

A total of 390 cattle-owning households participated in the study across the three districts. The socio-demographic characteristics of respondents are presented in Table 1. The sample largely comprised smallholder farmers with diverse educational backgrounds, herd sizes and farming experience, reflecting the heterogeneity of livestock production systems in Midlands Province.

Table 1: Sociodemographic Characteristics of Respondents

Variable	*Category*	*Frequency (n)*	*Percentage (%)*
Gender	Male	255	65.0
	Female	135	35.0
Age	18-30 years	78	20.0
	31-50 years	202	52.0
	>50 years	110	28.0
Education	None	40	10.0
	Primary	160	40.0
	Secondary	140	35.0
	Tertiary	50	15.0
*Herd Size	<10	135	45.0
	10-30	105	35.0
	>30	60	20.0

*Herd size data were available for 300 respondents with complete cattle ownership records.

While socio-demographic variables were analyzed for all respondents (n = 390), herd size information was available for 300 respondents with complete cattle ownership records, and percentages were calculated accordingly.

4.2 Knowledge of Theileriosis and Disease Recognition

Farmer knowledge of theileriosis symptoms varied across districts, as shown in Tables 2 and 3 and illustrated in Figure 1.

While most respondents could identify at least one clinical sign associated with January Disease, comprehensive understanding of disease transmission pathways and regulatory requirements was limited.

Table 2 shows farmers' knowledge of theileriosis symptoms across districts. Most respondents were able to identify fever and swollen lymph nodes, while fewer recognized ocular discharge.

Table 2: Knowledge of January Disease Symptoms

SYMPTOM	KNOWN (%)	UNKNOWN (%)
STAGGERING	85%	15%
SWOLLEN LYMPH NODES	20%	80%

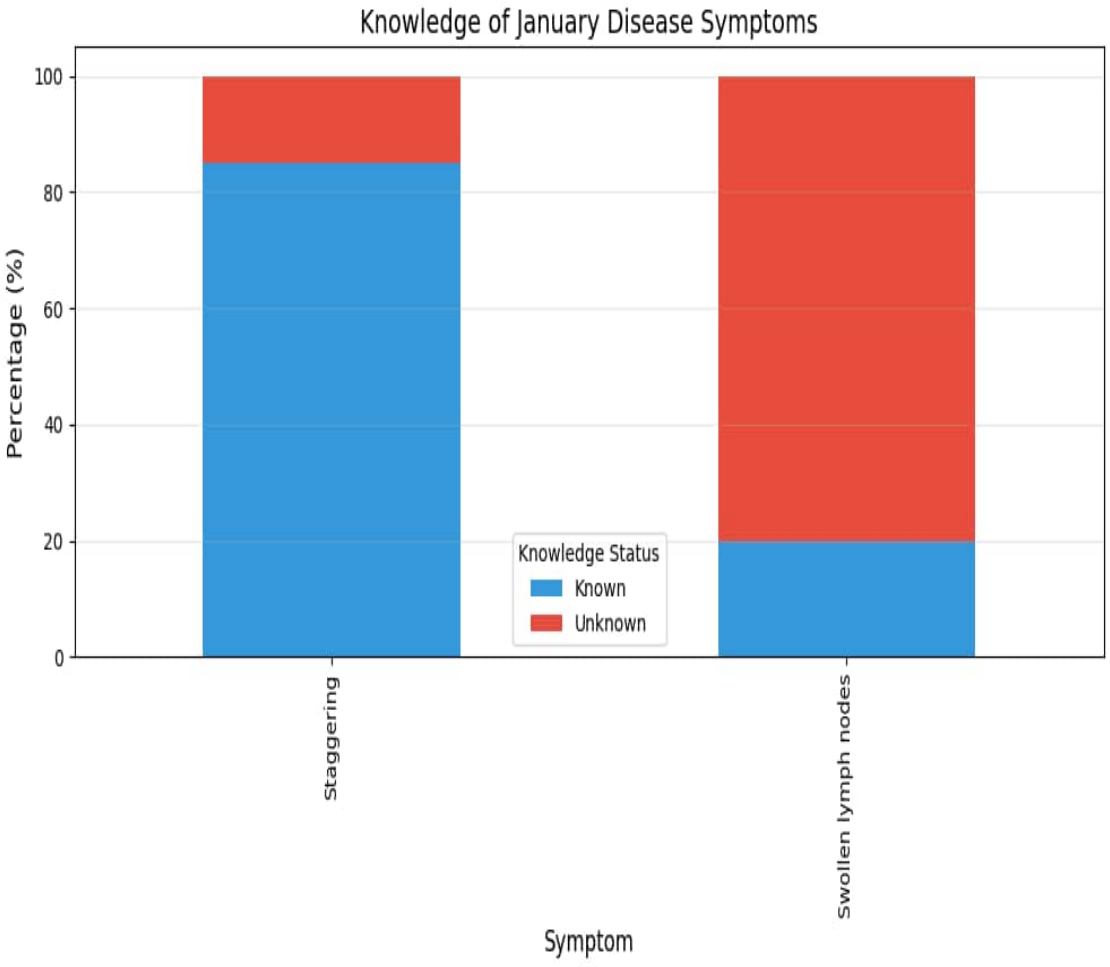

Figure 1: Farmers' recognition of key clinical signs of theileriosis (January Disease) in Midlands Province, Zimbabwe (n = 390)

Figure 1 visually illustrates farmers' recognition of selected January Disease symptoms.

Table 3 presents awareness of DVS roles and communication practices. The majority of farmers reported radio as the main source of information, while fewer relied on direct contact with veterinary officers.

Table 3: Knowledge of Theileriosis Among Farmers

KNOWLEDGE INDICATOR	CORRECT (%)	INCORRECT (%)
KNOWLEDGE OF THEILERIOSIS SIGNS	73	27
AWARENESS OF TICK-BORNE DISEASES	82	18
UNDERSTANDING OF DIPPING SCHEDULES	83	17
AWARENESS OF DVS REGULATIONS	61	39
OVERAL KNOWLEDGE SCORE	75	25

4.3 Levels of Compliance and Resistance to DVS Interventions

Levels of farmer compliance and resistance to DVS theileriosis control interventions varied across districts as summarized in Table 4.

Table 4: Cross-Tabulation of Knowledge Level and Compliance

KNOWLEDGE LEVEL	COMPLIANT	RESISTANT	TOTAL
LOW	38	52	90
MODERATE	94	67	161
HIGH	89	50	139
TOTAL	**221**	**169**	**390**

The chi-square test showed a statistically significant association between knowledge level and compliance, χ^2 (2, N = 390) = 12.84, p = 0.002.

A substantial proportion of respondents reported irregular participation in dipping programs and selective adherence to movement controls. The main reasons for resistance, including perceived acaricide shortages and dissatisfaction with service delivery consistency, are presented in Table 5.

Table 5: Reasons for Farmer Resistance to DVS Regulations

REASON FOR RESISTANCE	FREQUENCY (N)	PERCENTAGE (%)	RANK
LACK OF TRUST	134	62.0	1
POOR COMMUNICATION	112	51.8	2
HIGH DIPPING COSTS	96	44.4	3
DISTANCE TO DIP TANKS	84	38.9	4
POOR DIP TANK CONDITION	60	27.8	5
ACARICIDE SHORTAGES	42	19.4	6
TOTAL	216	*	

*Respondents could select multiple reasons; percentages do not sum to 100%

4.4 Communication and Compliance

The relationship between communication channels and compliance is shown in Table 6.

Table 6: Cross-Tabulation of Communication Channel and Compliance

COMMUNICATION CHANNEL	COMPLIANT	RESISTANT	TOTAL
WHATSAPP/SMS	78	27	105
DIP TANK COMMITTEE	70	50	120
DVS OFFICER	58	42	100
RADIO/OTHER	15	30	45
TOTAL	221	169	390

The chi-square analysis indicated a highly significant association between communication method and compliance, χ^2 (3, N = 390) = 23.41, p < 0.001.

Farmers reporting limited or irregular communication with veterinary officers were more likely to exhibit resistance compared to those engaging through participatory platforms.

4.5 Determinants of Farmer Resistance

Univariable logistic regression analysis identified several factors associated that were associated with farmer resistance to DVS theileriosis control interventions. Farmers reporting low levels of trust in veterinary authorities had higher odds of resistance compared to those expressing higher trust (crude OR > 3.0). Perceived acaricide shortages were also strongly associated with resistance (crude OR approximately 2.5), as was limited communication with veterinary officers (crude OR > 2.0). Previous experience of cattle losses due to theileriosis increased the likelihood of resistance (crude OR approximately 1.8). In contrast, participation in animal health awareness programs was associated with lower odds of resistance (crude OR < 0.5). Variables meeting the screening criterion (p < 0.20) were subsequently included in the multivariable logistic regression model.

Farmer resistance, defined as irregular or non-participation in at least one compulsory DVS theileriosis control measure, was used as the binary outcome variable in the multivariable logistic regression analysis. The multivariable logistic regression model identifying independent predictors of farmer resistance is presented in Table 7.

Table 7: Logistic Regression Predicting High Resistance to DVS Interventions

PREDICTOR	ADJUSTED ODDS RATIO (AOR)	95% CONFIDENCE INTERVAL (CI)	P-VALUE	INTERPRETATION
KNOWLEDGE SCORE	0.78	0.67 – 0.91	0.002	Higher knowledge reduces odds of resistance
COMMUNICATION ACCESS	0.71	0.59 – 0.85	<0.001	Better access lowers resistance
TRUST IN DVS	0.64	0.51 – 0.81	<0.001	Low trust strongly predicts resistance
DISTANCE TO DIP TANK (KM)	1.22	1.07 – 1.40	0.003	Greater distance increases resistance
COST CONSTRAINTS	1.18	1.02 – 1.37	0.026	Higher dipping costs raise resistance
DISTRICT: MVUMA (REF = GWERU)	1.12	0.82 – 1.54	0.468	No significant difference
DISTRICT: KWEKWE (REF = GWERU)	1.09	0.80 – 1.49	0.598	No significant difference

Model Fit Statistics

- *Nagelkerke $R^2 = 0.34$*
- *Model Classification Accuracy = 72.1%*
- *Hosmer–Lemeshow $\chi^2 = 5.27$, $p = .61$*
- *−2 Log Likelihood = 412.5*

Institutional mistrust, perceived acaricide shortages, poor communication and previous cattle losses were positively associated with resistance. Participation in animal health awareness programs was associated with a reduced likelihood of resistance.

5. Discussion

The findings demonstrate that farmer resistance to DVS theileriosis control interventions in Midlands Province is primarily driven by institutional and service delivery factors rather than demographic characteristics. Resistance reflects adaptive responses to perceived governance shortcomings, inconsistent input supply and limited engagement rather than rejection of disease control objectives.

Incomplete disease knowledge, although common, was insufficient on its own to explain resistance. Rather, partial understanding combined with weak communication limited farmers' appreciation of disease risks. Institutional mistrust emerged as the strongest determinant of resistance, underscoring the central role of credibility, transparency and reliability in veterinary service delivery.

Perceived acaricide shortages significantly increased resistance, highlighting the importance of stable input supply chains. Conversely, participation in awareness and training programs reduced resistance, demonstrating the value of participatory and educational approaches. These findings indicate that the persistence of theileriosis during the NDS1 period reflects not only epidemiological challenges but also gaps in the social and institutional design of disease control programs.

Interpretation of these findings should be considered in light of several study limitations. The reliance on self-reported data may have introduced recall or social desirability bias, potentially leading to under-reporting of non-compliant behaviors. In addition, the cross-sectional design limits causal inference, meaning that observed associations between institutional factors and farmer resistance cannot be interpreted as direct causal relationships. Furthermore, the absence of laboratory confirmation of disease status constraints the ability to link reported behaviors directly to epidemiological outcomes. Nevertheless, the consistency of patterns observed across districts and the alignment of findings with existing regional evidence suggest that the identified institutional and service delivery constraints represent meaningful barriers to effective theileriosis control.

Interpretations of these findings should also consider potential sources of bias inherent in the study design. Although proportional stratified sampling was used, the study may be subject to sampling bias arising from differential availability of respondents across wards and reliance on registered cattle-owning households. In addition, data collection relied on interviewer-administered questionnaires, and while efforts were made to use locally appropriate language, subtle language and translation differences may have influenced respondents' understanding of questions. Responses related to compliance with compulsory veterinary interventions may also have been affected by social desirability bias, with some farmers potentially overstating adherence to DVS guidelines. Furthermore, as the study was conducted in three districts within Midlands Province, caution is required when generalizing the findings to other provinces with different agricultural, ecological, institutional or socio-cultural contexts. Despite these limitations, the convergence of findings across districts suggests that the identified institutional and service delivery constraints represent substantive challenges to sustainable theileriosis control.

In summary, farmer resistance to DVS interventions reflects rational responses to institutional and governance shortcomings rather than a lack of farmer responsibility. When interpreted through One Health, veterinary governance, and SDG frameworks, resistance serves as an indicator of misalignment between policy intent and implementation practice. Addressing these institutional drivers is essential for sustainable theileriosis control and resilient livestock systems in Zimbabwe.

6. Conclusion

This study demonstrates that farmer resistance to DVS theileriosis control interventions in Midlands Province is driven largely by institutional mistrust, service delivery constraints and limited communication rather than by unwillingness to control disease. Addressing these factors is essential for improving compliance, strengthening livestock health systems and enhancing food security.

As Zimbabwe transitions to National Development Strategy 2 (2026–2030), veterinary policies should prioritize trust-based governance, reliable input supply and participatory extension approaches. Integrating these principles into disease control strategies will be critical for achieving sustainable theileriosis control and resilient livestock production systems.

Future research should employ longitudinal designs to track changes in farmer-DVS relationships over time and assess the effectiveness of trust -building interventions.

7. Limitations of the Study

Finally, as the study was conducted in three districts within Midlands Province, the generalizability of findings to other regions of Zimbabwe should be approached with caution. Despite these limitations, the study provides robust and policy-relevant insights into institutional and service delivery determinants of farmer resistance to theileriosis control interventions.

The cross-sectional design limits causal inference, and findings reflect conditions during the NDS1 period. Despite these limitations, the study provides robust insights into institutional and service delivery determinants of farmer resistance.

8. Ethical Considerations

Ethical approval for the study was obtained from the relevant institutional ethics committee. Permission to conduct the study was granted by the Department of Veterinary Services. Informed consent was obtained from all participants, and confidentiality was maintained throughout the research.

9. Conflict of Interest

The author declares no conflict of interest.

10. Acknowledgements

The author acknowledges the Department of Veterinary Services, Midlands Province, for logistical support, and the cattle farmers who participated in the study for their time and cooperation.

References

Bishop, R.P., Ssenyonga, W. and Kariuki, E. (2020). Molecular diversity of Theileria parva and implications for disease control in eastern and southern Africa. Parasites & Vectors, 13, 452.

FAO. (2023). Economic impacts of tick-borne diseases in sub-Saharan Africa. Rome: Food and Agriculture Organization of the United Nations.

Government of Zimbabwe. (2021). National Development Strategy 1 (2021–2025). Harare: Government of Zimbabwe.

Latif, A.A. and Hove, T. (2021). Farmer compliance and tick-borne disease control strategies in communal cattle production systems of Zimbabwe. Tropical Animal Health and Production, 53, 211.

Ssenyonga, W., Bishop, R.P. and Mulei, C. (2023). Molecular epidemiology of *Theileria* species in eastern and southern Africa and implications for disease management. Veterinary Parasitology, 315, 109798.