End of Project Evaluation and Beneficiary Assessment - Final Report

Livestock Development and Animal Health Project
Ministry of Fisheries and Livestock

The World Bank Group

Submitted by

October 2018

Contents

ACRONYMS/ABBREVIATIONS

APPIP	Agricultural Production and Productivity Improvement Programme
AU	African Union
CBO	Community Based Organization
CSO	Central Statistical Office
FGD	Focus Group Discussion
FRA	Food Reserve Agency
FISP	Farmer Input Support Project
GDP	Gross Domestic Product
GRZ	Government Republic of Zambia
KPI	Key Performance Indicator
KII	Key Informant Interview
R-SNDP	Revised Sixth National Development Plan
RT	Review Team
PD	Project Document
LDAHP	The Livestock Development and Animal Health Project
M&E	Monitoring and Evaluation
MFLD	Ministry of Fisheries and Livestock Development
MTR	Mid-Term Review
NAIP	National Agricultural Investment Plan
NGO	Non-Governmental Organization
IDA	International Development Agency
OECD	Organization for Economic Cooperation and Development
PDO	Project Development Objective

ACKNOWLEDGEMENTS

The Endline Review Team (ERT) would like to sincerely thank the Ministry of Fisheries and Livestock Development (MFLD) for according RuralNet Associates the opportunity to undertake this interesting assignment. Special thanks go to the Permanent Secretary of MFLD and his entire management. The project team worked hard to provide the necessary direction and guidance to the ERT throughout the assignment. The Ministry staff at provincial, district, and community levels are appreciated for their valuable contribution in providing information to the ERT. Last but not the least, all the farmer groups and individual farmers are greatly thanked for the valuable information provided to the ERT.

The Review Team
RuralNet Associates[1]

[1] The key staff that constituted the Review Team were: Rhoda Chiwele, Data Analyst and Supervisors who also performed the function of qualitative researchers. These were: Barbara Katongo; Dalitso Tembo; Patrick Nkhata; Taonga Mwale. Kelvin Munjile was the Field Operations Coordinator for the assignment. Overall team leadership and coordination was provided by Mr. Stephen Tembo

EXUCUTIVE SUMMARY

The endline evaluation was undertaken just before the project closure in June. The evaluation employed mixed methods (quantitative and qualitative approaches). Most of the findings regarding design, relevance, efficiency and sustainability were very similar to the findings during the midline evaluation.

The following were the key findings:

1. Project management and coordination had a number of challenges which contributed to the limited project performance. The challenges included: (a) An absence of baseline data at the beginning of the project implementation upon which to base the assessment of the impact of the project on disease control and livestock productivity; (b) Poor communication between the provincial office and the district office, and; (c) The district focal points reported excessive delays in receiving feed-back from the coordination office in Lusaka.

2. Most sub-projects have performed below expectation for various reasons including: (a) Funding was largely late on average by 1 year after application; (b) Stakeholders at subnational level (provincial and district) were not adequately involved in the implementation of project activities (Ministry of Livestock players); (c) There was inadequate cooperative management skills: the concept of a cooperative was not well understood.

3. The process of accessing matching grants was generally a challenge for the majority of farmer groups: (a) The proposal forms were too difficult for the groups; (b) Those groups who were successful, a number of them failed to perform to expectation because they did not have the pre-requisite knowledge in livestock, and; (c) Communities liked the matching grant model because they were able to access funding which they would not have managed to access from commercial banks due to collateral requirements and the model assisted them to have ownership of sub-community project activities.

4. Sustainability is premised on a weak foundation. Most of the groups do not have sufficient benefits to sustain or propel going forward. A considerable proportion of groups were still waiting for animals to come to their community.

5. There are a few success stories which underscore the fact that given more time, the project would have delivered considerable benefits to communities and consequently to the beneficiary households. For such projects to be clearly notable, a three year no cost extension would have been ideal.

6. The matching grant model through farmer groups is a good model. However, for it to be successful it needs a number of parameters to be in place including: strong farmer groups; and effective M&E system; adequate technical training and timely disbursement of funds.

PART I: INTRODUCTORY

1. INTRODUCTION

1.1 Background

The implementation of the Livestock Development and Animal Health Project (LDAHP) started in August 2012 in: Eastern, Southern and Western provinces and the Disease Free Zone areas comprising Central, Lusaka and parts of Copperbelt provinces. LDAHP funding is from three sources, namely; (i) the Government of Zambia (GRZ) through the Ministry of Fisheries and Livestock (MFL); (ii) the World Bank through the International Development Agency (IDA) and; (iii) beneficiary community contributions. Improvement of the productivity of key livestock production systems for targeted female and male smallholder producers in focus provinces is the project development objective (PDO). The PDO was to be realized through the implementation of three (3) distinct components namely: (i) Livestock Services Provision, (ii) Productive On-Farm Investments and (iii) Project Management.

1.2 Main Objectives of LDAHP

The key objectives of the project were to:

(i) prioritize the introduction of technologies that reduce livestock mortality particularly in young stock,

(ii) improve reproductive efficiency so as to enable animals quickly reach optimum slaughter weight leading to an overall improvement in productivity in the smallholder livestock sector;

(iii) support rehabilitation of animal production and veterinary services through provision of equipment, rehabilitation or construction of critical public and community infrastructure, and skills training of front line animal production and veterinary staff, and;

(iv) improve producers' access to services by encouraging formation of groups, providing essential livestock infrastructure, and delivery of improved technology packages by Ministry field staff augmented by Community Livestock/Animal Health Workers and private service providers.

1.3 Main objectives of the End of Project Evaluation

The End of Project Evaluation and Beneficiary Assessment (EPEBA) primarily dealt with the following:

(i) Assess the extent to which the project core outcomes and objectives have been realized (delivery at the Project Development Objective and intermediate results levels);
(ii) Assess the relevance of the project in the context of Zambian sector priorities and needs, including project design elements, project results framework and its key indicators (component and activity level delivery), effectiveness of project implementation arrangements as well as service delivery systems;
(iii) Verify the beneficiaries (by gender) reached through the project and assess the effectiveness of project results. Furthermore, the evaluation should determine any emerging effects (unintended, good or bad) of the project on beneficiaries. These may include but not limited to aspects on household income generation and assets acquisition due to project interventions;
(iv) Assess and learn how the beneficiary farmers appreciated the extension work in order to improve the quality of future services;
(v) Assess cost-effectiveness of project strategies and interventions (cost-benefit analysis of selected activities/ components), and by also giving specific examples where possible;
(vi) Assess the performance of the project with particular reference to the LDAHP Matching grants model and approach/design concepts including:

- Mechanisms for the submission and approval of demand driven proposals, and;
- National Project Coordination Office/Provincial Coordination Office application of the procedures for the selection of participant farmer organizations/cooperatives and the provision of technical assistance in the different stages of the sub-granting process;

(vii) Identify factors and constraints which have affected project implementation including technical, managerial, organizational, institutional and socio-economic policy issues in addition to other external factors unforeseen during the project design;
(viii) Assess sustainability options for key project benefits beyond project duration;
(ix) Identify significant lessons learnt and good or bad practices (general lessons at GRZ/World Bank financing level and by component and/or sub-component) in terms of effectiveness, efficiency, sustainability and networking, and;
(x) Produce a set of recommendations to the World Bank, MFL and other stakeholders with a view to improve relevance, effectiveness, efficiency, impact and sustainability of such future projects.

1.4 Direct beneficiaries

LDAHP had two main categories of beneficiaries. *First*, the project was ear-marked to target more than 390,000 male and female households in the 35 targeted districts of Eastern, Southern and Western provinces as well as the Disease Free Zone covering Central, Lusaka and parts of Copperbelt provinces. Many of the targeted households are members of producer organizations. At project appraisal stage, the targeted provinces comprised nearly 70% of the country's total population of 13 million, had a cattle population of 1.44 million and a population of 480,000 small ruminants. The female group members of these organizations were to be

particularly targeted. *Second,* LDAHP was ear-marked to benefit 560 members of staff of the MFL through training using funds provided by the project.

2. METHODOLOGY

2.1 Alignment to the Theory of Change

The evaluation method was aligned to the Project's Theory of Change (ToC) summarized in **Figure 1**.

"In order to raise the productivity of smallholder livestock production systems, the project identified three specific routes. The first one focused on reducing mortality and morbidity. This was achieved through disease control by regular vaccinations. This became the most significant activity under this project and this was expected to lead to increased milk, meat and eggs production and productivity. Cattle numbers were expected to increase due to reduced mortality and improved calving rates. Additionally, due to rising numbers of cattle, crop production would increase through increased animal draught power. The second route is improved access to services. This would be achieved through construction of new or rehabilitation of existing livestock services infrastructure, training extension workers and farmers in a number of areas such as artificial insemination and animal nutrition. This would lead to improved animal husbandry, better, resilient and more productive animal breeds. The third route was, improved access to markets leading to larger sales volumes and increased incomes."

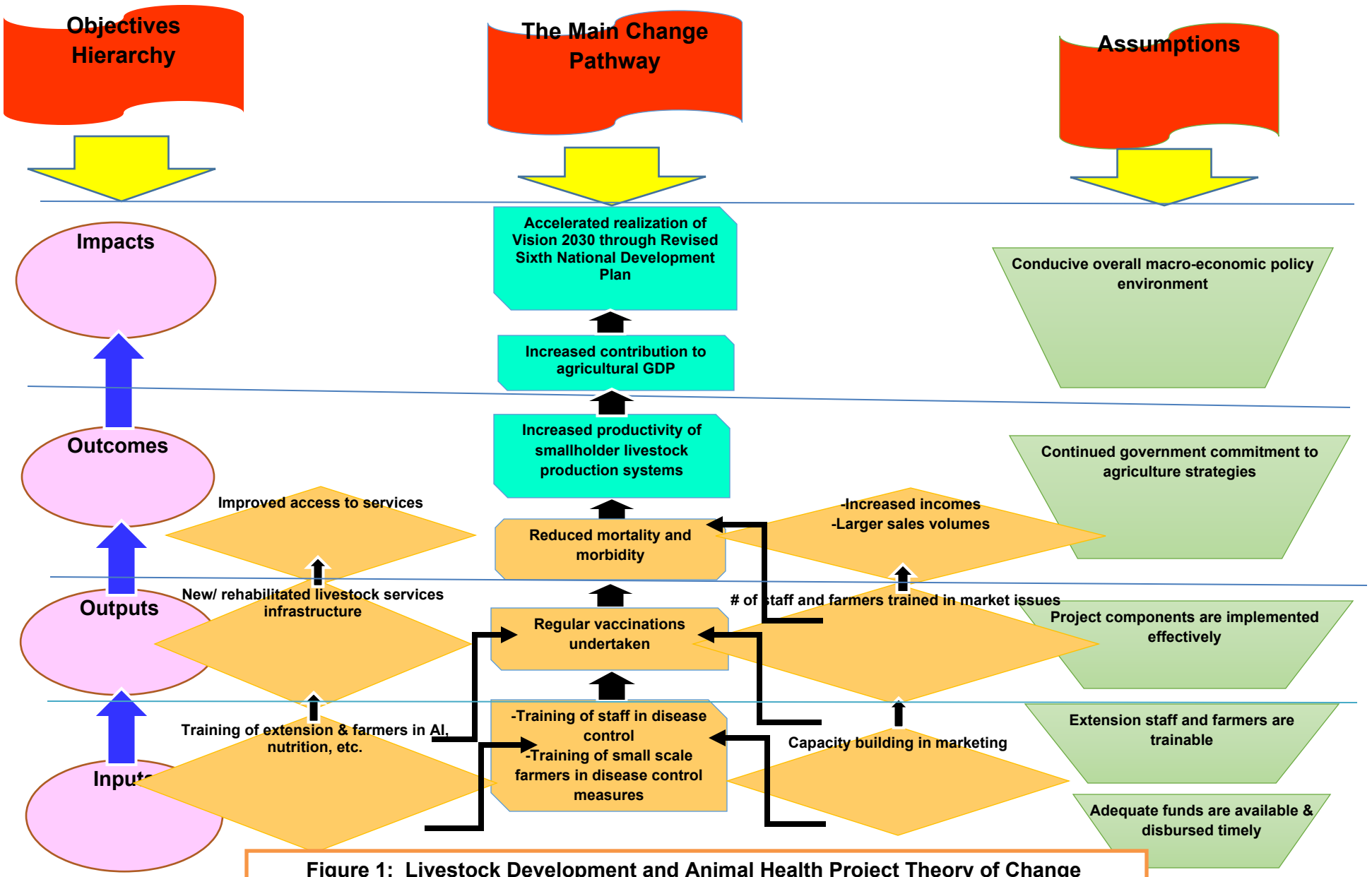

Figure 1: Livestock Development and Animal Health Project Theory of Change

2.2 PDO and Intermediate Results Indicators

The expected results of this Project relate to "*Improved productivity of key smallholder production systems by targeting; cattle, small ruminants, pigs and village poultry…".* These results were to be measured by the following Project Development Objective (PDO) and Intermediate Results Indicators presented below:

2.2.1 PDO Indicators

There are three major categories of PDO indicators that were assessed as presented below in **Table 1**: Reduction in the disease prevalence rate in the project areas; Increase in livestock productivity in project areas, and; Project beneficiaries broken down into government staff, livestock farmers and producer organizations members – disaggregated by type of beneficiary (government staff, livestock producers and producer organization member) and by gender.

2.2.2 Intermediate Indicators

Seven (7) major categories of intermediate indicators were assessed during the End of Project Evaluation and Beneficiary Assessment (EPEBA): Vaccination coverage in project risk areas against major diseases; Disease specimen samples tested in laboratories supported by the project; Smallholder livestock owners satisfied by the quality of veterinary services supported by the project; Training delivered to Ministry of Agriculture staff; Livestock infrastructure constructed and rehabilitated by the project; Smallholder livestock owners adopting at least one project recommended improved animal husbandry practice in the project area, and; Utilization rate of the livestock improvement grant facility recipients that have implemented the project (see **Table 1** for intermediate indicators summary).

Table 1: PDO and Intermediate Indicators that were assessed

PDO Indicators	Intermediate Indicators
There are three major categories of PDO indicators as presented below: 1. Reduction in the prevalence rate in the project areas of: i) Newcastle disease in village poultry; ii) CBPP in cattle; and iii) FMD in cattle. 2. Increase in livestock productivity in project areas measured by: i) Reduced hen mortality; ii) Reduced kid (young goats 0-6 months	Seven Intermediate Indicators were assessed: 1. Vaccination coverage in project risk areas against: i) Newcastle disease in village poultry; ii) CBPP in cattle; and iii) FMD in cattle. 2. Disease specimen samples tested in laboratories supported by the project of NCD, CBPP and FMD.[2] 3. Smallholder livestock owners satisfied by the quality of veterinary services supported by the project.

[2] At restructuring in March 2017, this indicator was revised by dropping the word "Disease".

old) mortality per year; iii) Increased weaned piglets per sow per year; and iv) Increased milk per cow per day. 3. Project beneficiaries broken down into government staff, livestock farmers and producer organization members. This was disaggregated by type of beneficiary (government staff, livestock producers and producer organization member) and by gender	4. Training delivered to Ministry of Agriculture and Livestock staff. 5. Livestock infrastructure constructed and rehabilitated by the project. 6. Smallholder livestock owners adopting at least one project recommended improved animal husbandry practice in the project area. 7. Utilization rate of the livestock improvement grant facility recipients that have implemented the project.

2.3 Mixed Methods and Control Sample

Mixed methods (quantitative and qualitative) were used for data collection which took place in the second half of August 2018. The use of the mixed data collection methods was meant to promote complementarity and completeness of the data collected. The two approaches were used concurrently in order to enhance efficiency in the use of resources. The Key Performance Indicators (KPIs) presented in **Table 1** were the main variables tracked. In order to improve data analysis, a control sample was part of the survey design.

2.4 Sampling Details

2.4.1 Quantitative Sample

A total of 12 districts were purposefully sampled. These are districts where the mid-term evaluation was undertaken. In each district, two camps were selected, one representing treatment and the other control – the same ones that were surveyed during the mid-term review. An average of 58 beneficiary households were randomly sampled from each camp, giving a total of 704 households under treatment. On the other hand, an average of 54 non-beneficiary households were randomly selected under control conditions giving a total control sample size of 468. The total sample size for both treatment and control was 1,352 (see **Table 2** below for details).

Table 2: Quantitative sampling details

SRN	Province/ Area	District	Sample size	
			Treatment	Control
1	Disease free zone	Kabwe	63	56
		Ndola	62	50
		Kafue	61	71
2	Eastern	Petauke	78	50
		Chipata	64	50
		Katete	59	56
3	Southern	Mazabuka	56	50

		Kazungula	66	51
		Sinazongwe	55	49
4	Western	Mongu	41	38
		Sesheke	55	68
		Kaoma	44	59
	Total		**704**	**648**
	Grand Total	**12**	**1,352**	

2.4.2 Qualitative sampling

A total of 111 Key Informant Interviews (KIIs) were conducted, 8 per district except the national level (Lusaka) where 15 were ear-marked. These were the same numbers of KIIs that were conducted during the Mid-Term Evaluation (MTE). Similarly, there were a total of 96 FGDs as was the case at MTE, representing 8 FGDs per district (4 male and 4 female). Effectively, there were 2 FGDs per camp (one male and the other female). **Table 3** below presents details.

Table 3: Qualitative sampling details

Province/Area	**District**	**Qualitative data collection sessions by tool**		
		Key Informant Interviews	**Focus Group Discussions**	
			Male	**Female**
Disease free zone	Kabwe	8	4	4
	Ndola	8	4	4
	Kafue	8	4	4
Eastern	Petauke	8	4	4
	Chipata	8	4	4
	Katete	8	4	4
Southern	Mazabuka	8	4	4
	Kazungula	8	4	4
	Sinazongwe	8	4	4
Western	Mongu	8	4	4
	Sesheke	8	4	4
	Kaoma	8	4	4
Lusaka/National level	Lusaka	15	0	0
Total	**13**	**111**	**48**	**48**
			96	

2.5 Use of OECD Evaluation Criteria

The endline used the OECD evaluation criteria of design, relevance, effectiveness, efficiency and sustainability. Except for effectiveness, the endline findings on the other criteria are particularly similar to those at midline. Consequently the reader is advised to refer to the midline report for detailed findings on such.

PART II: KEY FINDINGS

3. DESIGN

3.1 Alignment to Widely Acceptable Principles

The design of the Livestock Development and Animal Health Project (LDAHP) was well-thought through and followed the internationally accepted principles. The key ones are highlighted below. *First*, a situation analysis was undertaken which included a consideration of the country's economic performance and the place of agriculture in the country's economic development agenda. *Second*, an analysis was undertaken that underscores the importance of agriculture with respect to its contribution to the livelihoods of the country's population and consequently the sector's contribution to the Gross Domestic Product (GDP). The livestock sub-sector's contribution to the agriculture GDP was also analyzed. *Third,* the overall goal, objectives and strategies that needed to be implemented towards the realization of the objectives were developed. These were based on the Logical Framework Approach, with a clear demonstration of the flow of logic in the results frame. *Forth,* implied in the third point, the Key Performance Indicators (KPIs) to measure implementation performance as well as the achievement of the project objectives were identified and developed.

3.2 Linkage to Country Policies and Development Frameworks

The design of the LDAHP adequately took into account the country's major policies and development frameworks. The cases in point are:

(i) The Vision 2030 which emphasizes an agricultural led economic development (December 2006);
(ii) The Revised Sixth National Development Plan (R-SNDP, August 2013);
(iii) The National Agriculture Investment Plan (NAIP–May 2013) under the Comprehensive Africa Agriculture Development Programme (CAADP) of the African Union (AU), and;
(iv) The Draft National Livestock Policy (January 2012).

Table 4 below presents a summary of the linkages between LDAHP and the country's selected important policy and development frameworks.

Table 4: Linkages between LDAHP and Selected Key Country Policies and Development Frameworks

Policy/ Dev'pment	Selected Key Areas of Focus	Link to LDAHP Main Objectives and Strategies

Framework		
Vision 2013	• An efficient, competitive, sustainable and export-led agriculture sector that assures food security and increased income by 2030	• The Project Development Objective (PDO) is to improve the productivity of key livestock production systems for targeted female and male smallholder producers in focus provinces • To improve reproductive efficiency so as to enable animals quickly reach optimum slaughter weight leading to an overall improvement in productivity in the smallholder livestock sector
	• Increase livestock population to 6,000,000 by 2030	• To prioritize the introduction of technologies that reduce livestock mortality particularly in young stock; • To support rehabilitation of animal production and veterinary services through provision of equipment, rehabilitation or construction of critical public and community infrastructure, and skills training of front line animal production and veterinary staff
Revised Sixth National Development Plan (R-SNDP, August 2013)	• Promote Increased Livestock Productivity and Production by enhancing livestock extension services	• Improve access to advisory and extension services for producers and their organizations • Benefit livestock industry service providers, including private extension agents and veterinarians, sellers of other inputs, including veterinary medicines.
	• Strengthen Animal health and Disease Control through the zoometric and contagious animal disease surveillance	• Strengthen the zoonotic and contagious animal diseases surveillance and control systems, including laboratory diagnostic capacities; • Build institutional capacity within the Ministry to improve service delivery • Improve the capacity to monitor food safety of facilities (slaughterhouses, milk collection centers, etc.)
	• Ensure adequate livestock infrastructure for enhanced livestock production and productivity	• Support the establishment or rehabilitation of essential livestock infrastructure (e.g., Livestock Service Centers (LSCs), markets, slaughter facilities, etc.) in agreed locations subject to an Infrastructure Inventory and Needs Assessment.
The National Agriculture Investment Plan (NAIP–May 2013)	• Ensure Animal Health and Disease Control	• Strengthen the zoonotic and contagious animal diseases surveillance and control systems, including laboratory diagnostic capacities; • Build institutional capacity within the Ministry to improve service delivery • Improve the capacity to monitor food safety of facilities (slaughterhouses, milk collection centers, etc.)
	• Promote increased Livestock productivity and Production	• The Project Development Objective (PDO) is to improve the productivity of key livestock production systems for targeted female and male smallholder producers in focus provinces • To improve reproductive efficiency so as to enable animals quickly reach optimum slaughter weight leading to an overall improvement in productivity in the smallholder livestock sector
	• Ensure adequate Livestock Infrastructure	• Support the establishment or rehabilitation of essential livestock infrastructure (e.g., Livestock Service Centers (LSCs), markets, slaughter facilities, etc.) in agreed locations subject to an Infrastructure Inventory and Needs Assessment.
Draft Livestock Development Policy (January 2012)	• To promote increased and sustainable livestock production, productivity and management in order to ensure food security, income generation, creation of employment opportunities and a reduction in poverty levels.	• The Project Development Objective (PDO) is to improve the productivity of key livestock production systems for targeted female and male smallholder producers in focus provinces • To improve reproductive efficiency so as to enable animals quickly reach optimum slaughter weight leading to an overall improvement in productivity in the smallholder livestock sector • Strengthen the zoonotic and contagious animal diseases surveillance and control systems, including laboratory diagnostic capacities;

4. RELEVANCE

4.1 Extent of validity of objectives

An assessment of the extent to which the objectives of the project are still valid is presented in **Table 5** below in summary form.

Table 5: An assessment of the validity of objectives

Objective	Extent to which objective is valid
To prioritize the introduction of technologies that reduce livestock mortality particularly in young stock	• Statistics show that though considerably high proportions of smallholder farmers rear livestock (65% in case of local chickens and 35% in case of goats), the growth in proportion in productivity levels is still low on account of high mortality levels of young stock. • The dire need for smallholder farmers to diversify away from the traditional cropping sub-sector to the livestock sub-sector (which has a higher potential) demands that the farmers be assisted to increase their productivity levels. • Clearly, this objective is still highly valid to-date.
To improve reproductive efficiency so as to enable animals quickly reach optimum slaughter weight leading to an overall improvement in productivity in the smallholder livestock sector	• Linked to the point above, the diversification away from the crop sub-sector to the livestock-subsector demands that smallholder farmers be assisted with ways and means of heightening reproductive efficiency of livestock. This will help facilitate increased productivity leading to greater sales. This in turn has a positive impact on household income and food security. • This objective highly valid to-date.
To support rehabilitation of animal production and veterinary services through provision of equipment, rehabilitation or construction of critical public and community infrastructure, and skills training of front line animal production and veterinary staff	• The country still has a weak infrastructural base that is crucial to supporting smallholder livestock productivity and production. The equipment is either in a state of disrepair or non-existent altogether. • Frontline animal and veterinary staff have inadequate skills to support an accelerated increase in productivity and production of smallholder livestock sub-sector; • This objective is highly valid to-date.
To improve producers' access to services by encouraging formation of groups, providing essential livestock infrastructure, and delivery of improved technology packages by Ministry field staff augmented by Community Livestock/Animal Health Workers and private service providers	• To-date, a number producer groups are considerably weak. This pauses a serious challenge for them to be a means through which extension and other services could be effectively delivered to member households. • The weak nature of the producer groups has compromised the extent to which they can effectively support development and rehabilitation of community livestock infrastructure.

4.2 Alignment of activities and outputs to project effects

The Endline Review Team observed that the activities and outputs are generally aligned to project effects and impacts. However, the implementation pace of the activities and the realization of the outputs is far much slower than originally anticipated. Nonetheless, the Endline Review Team has also noted gaps in the project design which have slowed down the

implementation of the intended activities and the realization of their respective outputs. For instance, the project had no provision for logistical support to the Focal Point Person (Veterinary Officer) to accompany members of cooperatives/farmer groups when they are procuring animals to ensure that correct animals are bought and that the correct husbandry measures are followed. As a consequence of this gap, farmer groups have purchased wrong livestock breeds and there has been serious lapses by smallholder farmers in the provision of critical husbandry practices leading to losses of animals in some cases.

5. EFFECTIVENESS - PROGRESS TOWARDS REALIZATION OF KEY INDICATORS

This chapter discusses progress made towards the implementation of the Project Development Objective (PDO) indicators and the Intermediate indicators. Two main approaches have been used for analysis. *First,* the difference in difference (DiD) approach, where the effect of the LDAHP interventions or average change on the treatment population has been compared with the average change on the control population between the Mid-Term and End-Term evaluations. *Second,* a cross-section estimate of the treatment effect where we have measured the difference between treatment and control groups.

As noted in **Table 1**, the ***PDO indicators*** are: (i) Increase in productivity in project areas (ii) Reduction in the disease prevalence rate in the project areas, and; (iii) Project beneficiaries broken down into government staff; livestock producers, and producer organization members.

On the other hand, the seven (7) ***intermediate indicators*** are: (i) Vaccination coverage in project risk areas; (ii) Disease specimen samples tested in laboratories supported by the project of NCD, CBPP and FMD; (iii) Smallholder livestock owners satisfied by the quality of veterinary services supported by the project; (iv) Training delivered to Ministry of Agriculture and Livestock staff; (v) Livestock infrastructure constructed and rehabilitated by the project; (vi) Smallholder livestock owners adopting at least one project recommended improved animal husbandry practice in the project area, and; (vii) Utilization rate of the livestock improvement grant facility recipients that have implemented the project.

The POD and Intermediate indicators for which data was available are discussed below in sequence.

5.1 Realization of PDO Indicators

The increase in productivity, reduction in disease prevalence, and project beneficiaries are dealt with in this section.

5.1.1 Increase in Productivity

The main indicator of consideration regarding productivity is the average milk production per animal per day. Using the Difference in Difference (DiD) analysis, the average milk produced per animal per day reduced for both the treatment and control samples (see **Table 6**). However, the reduction in milk production per animal per day was more than double in the control sample compared to that in the treatment sample. This suggests that the lower level of reduction in milk production per day per animal in the treatment population compared to the control population may be attributed to LDAHP interventions.

Table 6: Average Milk Production per Animal per Day (liters)

Target		Control		Current (Endline)	
Midline (2016)	Endline (2018)	Midline (2016)	Endline (2018)	Target (2018)	Control (2018)
3.1	2.1	5.2	1.8	2.1	1.9

The general reduction in milk production per animal per day between the midline and endline may be attributed to the lower rainfall at endline compared to the midline which was almost half (37 mm per annum at endline compared to 73 mm at midline). For at least 8 months, there was more rainfall at midline than endline (see **Figure 1** for details). Reduced amount of rain at endline compared to midline negatively impacted the quantity of pasture available as well as water for dairy animals.

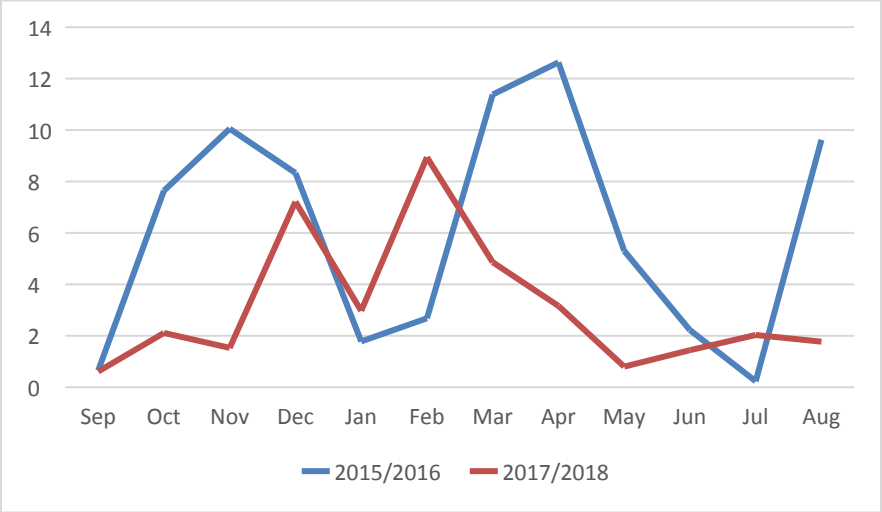

Figure 1: Rainfall (mm)[3] – 2015/2016 and 2017/2018

A cross-section estimate of the treatment effect analysis of milk production per animal per day shows a slightly better performance in favour of treatment at endline, namely 2.1 liters for the treatment population compared to 1.9 liters for the control population (**Table 6**).

5.1.2 Reduction in Disease Prevalence

Table 7 presents an analysis based on DiD and a cross-section estimate of the treatment effect regarding reduction in disease prevalence. The focus was on the percentage of households interviewed who reported prevalence of new castle, FMD and CBPP. Using the DiD approach, the other two diseases are showing poorer performance for the target population compared to the control sample (see **Table 7**). The cross-section analysis shows a better performance for

[3] https://etweather.tamu.edu/rainhistory/

the treatment than the control population, given that two of the diseases (FMD and CBPP) had less proportion of the target population reporting occurrence of the diseases than the control – i.e. 20.9% and 13.8% target population compared to 23.5% and 20.7% control population respectively (see **Table 7** for details).

Table 7: Percentage of Population Reporting Disease Prevalence

Livestock disease	Target		Control		Current (Endline)	
	Midline (2016)	Endline (2018)	Midline (2016)	Endline (2018)	Target (2018)	Control (2018)
New castle	68.2%	75.0%	71.2%	70.3%	75.0%	70.3%
FMD	27.6%	20.9%	26.8%	23.5%	20.9%	23.5%
CBPP	11.3%	13.8%	11.7%	20.7%	13.8%	20.7%

Findings from qualitative research show that the vaccination schedule for the control of livestock diseases was predominantly not followed. For instance, New Castle should have been vaccinated against every 6 months but they would largely do it only once a year in January. In Mazabuka, the vaccination schedule was followed in 2016, in 2017 the vaccination was only done once while in 2018, no vaccination against New Castle has been done so far. In Kaoma, the vaccination schedule was not followed at all. It was "as vaccination was available". This may account for the unfavourable results against the target population regarding both DiD and the cross-section analysis (see **Table 7**). In case of Mazabuka, the impact of the vaccination practice that was followed is that in 2016, the population of chickens increased, in 2017 it remained stable while in 2018 the population has decreased due to deaths arising from New Castle.

5.2 Realization of Intermediate Indicators

The section below discusses, in sequence, intermediate indicators for which data was available.

5.2.1 Vaccination Coverage in Project Risk Areas

East Coast Fever

Vaccination coverage dealt with in this section relate to three disease types; East Coast Fever immunization coverage; New Castle Disease in village poultry; CPBB in cattle, and; FMD in cattle. The analysis targets particular districts for which data was available. However, it is important to underscore the point that the situation in these areas of focus present a generic picture of what obtained in the other project areas.

For Mazabuka, immunization details for East Coast Fever are presented in **Table 8** for the nine (9) Veterinary Camps; the total targets and what was actually received for the targeted population of calves (based on National Livestock Census data). For the year 2017, the

estimated number of calves (target population) in the Mazabuka district in the traditional sectors, based on the national census data was 13,036. With this target population, there was need to achieve at least 75% (n=9770) vaccination coverage to ensure disease suppression. This agrees well with the planned vaccination target of 10,550 calves in this particular year.

However, the archived vaccination coverage was lower (7,793) than planned (n=10,500) indicating that there was a risk of not securing herd protection against ECF. It is not clear the assumption behind the planned target of 6,733 and 5,000 calves for 2015 and 2016, respectively. Assuming a stable calf population in the district, with a stable birth rate, we could project that there would about 13,000 calves requiring vaccination each year. This indicates that the vaccination coverage achieved in the Mazabuka in the three project years was not sufficient to grant disease suppression.

Table 8: East Coast Fever Immunization Coverage, Mazabuka, 2017

Vet Camp	*Target Pop. (Calves)	1st Round		2nd Round		Total Targets	Achieved	% Achieved
		Vaccination Targets	Done	Target	Done			
Kalambabakali	5,979	2,000	1,628	1,200	414	3,200	2,042	64
Chalimbana	958	750	927	650	166	1,400	1,093	78
Naluama	-	250	242	200	31	450	273	61
Nega-Nega	1,399	400	285	300	78	700	363	52
Lubombo	758	400	512	300	88	700	600	86
Ngwezi	2,126	850	1,179	700	407	1,550	1,586	102
Hanjalika	474	500	617	400	173	900	790	88
Mazabuka Central	205	50	18	50	-	100	18	18
Konkola	1,127	800	860	700	168	1,500	1,028	69
TOTAL	13,026	**6,000**	**6,268**	**4,500**	**1,525**	**10,500**	**7,793**	74

New Castle Disease

The vaccination coverage for NCD using the i2 thermal stable vaccine in Mazabuka district, was 97.3%, 87.7%; 96.0% for 2015, 2016 and 2017, respectively. This represents a good coverage given what was planned and what was actually achieved. Although the vaccination frequency was planned for three vaccination rounds per year, in most cases this was done only once. This was the case in Luanshya which did not cover the planed vaccination birds and thus experienced annual NCD outbreaks. Mpongwe district conducted one round and two rounds of NCD vaccination in 2015 and 2016, respectively. For each vaccination round, they received 22,000 doses against the projected 25,000. In other districts such Mazabuka and Kalabo circumstantial evidence indicated that the vaccination programme was effective as testified to by the farmers who reported reduced NCD outbreaks and increased flock sizes. Kalabo never experienced NDC outbreak in 2017.

The traders in village chickens from the cities also attested to the ready availability of poultry during their purchase missions during the project period. However, in 2018, there were no

vaccinations done in all the districts and since then, there has been several NCD outbreaks country wide, including project areas such Kalabo Mazabuka, Kaoma and Mongu. This implies that the gains accrued during the project period have been washed under the drain as far as securing increased flock sizes is concerned. There are several challenges that characterised the NCD vaccination programmes encountered in almost all the districts visited:

(i) Untimely delivery of vaccines;
(ii) Limited number of doses against what was required, resulting in reduced vaccination coverage;
(iii) Lack of adherence to the vaccination schedules, vaccination was done when vaccines were available, and;
(iv) Absence of an exit strategy to ensure continuity of the vaccination programme

Foot and Mount Disease

FMD vaccination outbreaks were controlled in all the areas where vaccinations where conducted during the project periods. A new threat, however, emerged in Kaoma district, where new outbreaks were reported but this was controlled by ring vaccination. In Mazabuka district, it was reported that there was a big reduction in the FMD outbreaks among traditional farmers after 2016. However, FMD outbreaks were reported among commercial farmers who did not participate in the Project, an indication that vaccinations had an impact on FMD control among the small scale farmers that benefited from the FMD vaccinations of 2015. The last FMD outbreak in Mazabuka district was reported in 2015/2016.

The 2015 FMD vaccinations were conducted as a result of the disease outbreak occurrence in the district in the month of November where one camp was affected. The strategy for the vaccination was to stop the wide spread of the disease, so 5 camps were identified for this activity; parts of Tungi, Kaama, Siwito, Namushakende and parts of Mongu central. A total of 21,864 (54.7%) cattle were vaccinated out of a targeted population of 40,000 cattle, indicating inadequate coverage.

In the second round of FMD vaccinations of August 2017 supported by LDAHP 16,325 (40.8%) cattle were vaccinated due to limited resources. These vaccinations were part of a ring vaccination in response to an outbreak in Lukulu and Limulunga districts and as a booster. In third round of FMD vaccinations of May 2018 FMD, a total of 21,649 cattle were vaccinated against a target of 23,000 cattle. In 2015 and 2017 the target was 40,000 while in 2018 the target was reduced to 23,000. This was as a result of dwindling resources.

CBPP Vaccinations in Western Province

The CBPP vaccination coverage in Western province for selected districts was at 86.4% on average in 2017. This ranged from 69.9% (Sikongo) to 104.5% (Limlunga). The number of animals that was targeted was 274,300 against 236,989 that were actually vaccinated. This involved a total number of 3,936 male farmers and only 29 female farmers as beneficiaries (see **Table 9**).

Table 9: CBPP 2017 Vaccination Coverage by District

S/N	District Name	Target(A)	Achieved(B)	Coverage (%)- (B/A)X100%	# of farmers who benefited	
					Male	Female
1.	Limulunga	15,000	15,677	104.5	205	-
2.	Mongu	36,200	33,303	92.0	385	-
3.	Nalolo	52,500	48,337	92.1	642	-
4	Senanga	21,000	20,219	96.3	562	-
5	Sioma	39,300	33,807	86.0	672	8
6	Shang'ombo	42,500	32,596	76.7	862	14
7	Sikongo	17,500	12,228	69.9	247	2
8	Kalabo	50,300	40,822	81.2	361	5
	Total	274,300	236,989	86.4	3,936	29

Table 10 presents details of CBPP vaccination coverage in Mongu district in 2016. The CBPP vaccination campaign in Mongu was conducted towards the end of the year when most of the feeder roads were impassable. A total of 45,509 cattle were vaccinated out of 50,000 doses of vaccine which were received (see **Table 10**). The overall district coverage was 91.0% above 2015's 83.7%.

Eight hundred sixteen (816) farmers were registered in 2016 as beneficiaries of CBPP vaccinations which was higher compared to 2015 where 674 farmers were registered. However, the registered number does not reflect the actual number of beneficiaries as most farmers tended to rear their animals communally and only register under one name. The number of farmers per registration may vary from 2 to 6 farmers.

Table 10: CBPP Vaccination Coverage by Veterinary Camp in Mongu District, 2016

S/N	Camp Name	Target(A)	Achieved(B)	Coverage (%)-(B/A)X100%	# of farmers who benefited	
					Male	Female
1	Luatembo	5,500	4,763	86.6	126	-
2	Litawa	4,500	3,429	76.2	85	-
3	Luandui	5,000	3,997	79.9	103	-
4	Mongu central	2,500	2,125	85.0	59	-
5	Namushakende	8,500	8,312	97.9	157	-
6	Tungi	5,500	5,040	91.6	54	-
7	Siwito	10,000	9,450	94.5	113	-
8	Kama	8,500	8,393	98.7	119	-
Total		50,000	45,509	91.0	816	-

Challenges

The vaccine was sent to Mongu district without accompanying vaccination equipment/tools including lack of solar fridges in the camps to maintain the cold-chain.

CBPP Sero-surveillance

In 2016 CBPP Sero-surveillance was conducted in Mongu district in November. Altogether 5,429 cattle were sampled compared to 3,499 in 2015. These samples were collected from the same 4 camps; Litawa, Luandui, Luatembo and Mongu central. One crush pen was also covered from Namushakende camp. This number of samples involved 290 kraals in 2016 as compared to 222 kraals in 2015. The increase in the number of cattle sampled and the number of kraals was attributed to improved sensitisation delivery coupled with good transport especially the new motorcycles. A total of 404 samples were spoiled representing an increase by 7.4% compared to 2015. The reason for the spoiled samples could be the weather conditions as the exercise was conducted when the temperatures were too high (average temperature 35˚C) in 2016, compared to 2015 when the activity was done in the rainy season.

5.2.2 Smallholder Livestock Farmers' Satisfaction by the Quality of Services

An analysis on satisfaction rating for major livestock services was undertaken based on the target beneficiaries and the control population. Three categories of rating were targeted; not satisfied; moderately satisfied and satisfied. It is interesting to note that under the "satisfied" category the results are in favour of the target population albeit marginally, i.e. 80.4% at endline compared to 79.85% at midline while the corresponding percentage values for the control sample are 80.0% and 73.4% respectively (see **Table 11** for other details).

Table 11: Average Satisfaction Rating for Major Livestock Services (% Respondents)

Rating	Target		Control		Endline	
	Endline	Midline	Endline	Midline	Target	Control
Not satisfied	0.60%	3.10%	3.40%	6.63%	0.60%	3.40%
Moderately satisfied	19%	17.08%	16.60%	76.70%	19%	16.60%
Satisfied	80.40%	79.85%	80.00%	73.45%	80.40%	80.00%

An analysis of respondents' rating of satisfaction regarding various veterinary services by livestock type was undertaken (Table 10). For both target and control populations, the rating across all animals declined between midline and endline. A couple of reasons may explain the decline in the rating of services at endline (compared to the midline) by the target population: (i) Those who are still waiting for animals to arrive may have negatively influenced their fellow community members to have such a rating; (ii) There has been a number of complaints by the beneficiary population regarding veterinary officers and others (veterinary assistants, veterinary officers and Camp Extension Officers) either not visiting at all, or not visiting the farmers enough. These complaints particularly came out strongly in Sinazongwe, Katete, Chipata and Kazungula districts.

Table 12: Percentage respondents who were satisfied with veterinary services - various livestock

Livestock type	Target		Control		Endline	
	Midline	Endline	Midline	Endline	Target	Control
Cattle	80.2	45.1	79.2	41.2	43.2	45.1
Goats	81.1	47.8	74.1	40.4	47.8	40.4
Pigs	80.5	42.1	69.6	22.2	42.1	22.2
Local chickens	77.6	35.6	70.9	33.3	35.6	33.3

On the other hand, the decline in the satisfaction levels expressed by the control sample between midline and endline may be as a result of a general decline in government funding to ministries. The operation budget of the Ministry of Fisheries and Livestock (as well as other ministries) has been severely underfunded, resulting in declining extension service delivery.

Respondents were also asked regarding the extent to which they had adopted selected improved livestock practices, the key ones being: cattle vaccination/immunization and traditional chicken vaccination/immunization. Results for both target and control populations showed a similar trend (see **Table 13**) as is the case in satisfaction rating above for similar reasons.

Table 13: Adoption of Selected Improved Livestock Practices Promoted by the Project

	Target		Control		Endline	
	Midline	Endline	Midline	Endline	Target	Control
Adopted Cattle Vaccination/Immunization	95.7%	90.7%	97.0%	90.8%	90.7%	90.8%
Adopted Traditional Chicken Vaccination/ Immunization	84.4%	81.0%	84.5%	81.3%	81.0%	81.3%

5.2.3 Matching Grants

Matching grants were provided to farming groups to support them undertaken livestock sub-projects in poultry, piggery, dairy and goats. Stakeholder perceptions (recipient groups and key informants) on the performance of matching grants are summarized in **Table 14** and in the sections below. Most of the respondents were aware of the matching grant through various means, the key ones being:

(i) Veterinary Assistants;
(ii) Cooperative/farmer group leaders;
(iii) Radio programmes, and;
(iv) Community meetings.

Table 14: Summary Performance of Matching Grants

Livestock Type	Key Successes	Key Challenges
Poultry	• Some groups whose structures were still under construction started rearing chickens using alternative structures (Nalionwa and Women Christian Association, Mongu)	• Most of the infrastructure projects visited were still under construction (one of them at slab/foundation level – Nalionwa, Kalabo) • The standard designs for poultry houses were too expensive, could have been adapted to local conditions. For instance the slab in Nalionwa cost ZMW 58,460 out of ZMW 67,250 (which was nearly 87% of the total budget). This suggests that the designs and structures were not appropriate which in turn has implications on the level of technical input provided
Piggery	• All piggery sub-projects visited had completed structures and production commenced (Mapalo, Ndola; Chitwi, Luanshya; Chizyamunji, Mazabuka)	• All the groups were struggling to adequately feed their pigs. After the procurement of pigs, there were inadequate resources for feed. Pigs were found emaciated. This suggests that cash flows were not properly planned nor managed • Poor animal husbandry as evidenced by dirty piggery pens that were not cleaned (ideally, pens are supposed to be scrubbed clean twice a day); • The criteria used for selection of sub-programmes for funding lacked adequate technical strength. For instance, availability of running water within 100m radius should

		have been one of the criteria for passing a piggery sub-project. • The design of pens were sub-optimal, costly and inefficiently done. For instance, a pen in Mapalo (Ndola) was 3m X 4m instead of the recommended 0.7 m X 2.5 m. The structures did not have a furrowing pen. These points suggest weak monitoring by the technical staff. • High mortality rate was noted. For instance, Mapalo had received ZMW 79,000 for the pig sub-project. At the time of the endline there were only 6 malnourished females, without a boar. Most of the piglets that had been born had died of diseases. All this suggests that farmers either had very poor technical assistance or none at all, before commencing their project. • Poor targeting as evidenced by an individual in Mongu who received ZMW 436,000 though his application was not processed either at the district or provincial level. Poor targeting was also evidenced across the different project areas where some beneficiaries were civil servants.
Dairy	• The dairy sub-projects performed well: ➢ The dairy animals had been procured; some had calved; milk parlours had been built; ➢ The groups were engaged in daily milk sales (Ivmananji, Luanshya; Chamukonda, Mazabuka); A group in Kaoma raised ZMW3 35,000 from milk sales (1 animal) ➢ Some groups had started pass-on to members (Chamukonda) ➢ Resources from milk sales have been re-invested (sewing machine)	• Absence of artificial insemination service. Most of those doing AI are based in Lusaka • High purchase price of dairy animals • Absence of readily available water source • Inadequate feed to allow animals produce according to potential, especially during the dry season • Livestock health was cited as a major challenge. Most complained that veterinary services were expensive and were thus failing to meet the cost of treating the animals. Costs included fuel and cost of drugs. This particularly was a challenge when animals had difficulties in calving (giving birth). • The cooperative model of undertaking business was poorly understood by the recipients of the funds. Most of the members left it to the chairperson to single-handly run the enterprise. • Lack of commitment from cooperative members who didnt see immediate benefits. • Some groups purchased young animals and thus delayed profit making. • Limited grazing lands especially in Luanshya where all the land is placed under the municipal council or most of the land is in private hands
Goats	• Goat structures have been constructed • Training in goat husbandry • Some farmers are consuming goat milk whose taste they prefer	• Some groups did not use the goat houses they constructed, hence goats were loitering around in the night for shelter • At the time of the end-term evaluation, some groups had a several-fold reduction in the goats they had purchased, up to four times • Some groups had problems with diseases, suggesting poor husbandry practices