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Effects of Goat Breed Improvement Program on Climate Change Resilience Among Smallholder Farmers in Semi-Arid Zimbabwe

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ABSTRACT

The goat breeding improvement program played a crucial role in addressing the challenges of climate change vulnerability among the smallholder farmers of climate change-vulnerable communities in Gokwe North district, Zimbabwe. Using cross-sectional data from 217 small-scale farmers in four randomly selected wards in the Gokwe North district of Zimbabwe, the study examined the effect of the program on households' climate change adaptation capabilities using proxy variables including food security, asset acquisition, access to affordable credit, and enhanced business management competencies. Primary data were collected using questionnaires. Results show that there were gains in credit access, asset base improvements, food security and income. The evaluation established an excellent potential for sustainability or continued flow of benefits beyond the program's lifetime, given the institutional capacity building implemented under the program. There were impacts regarding the program accruing positive changes in well-being, improved livelihoods, and community adaptation even in the face of climate change and an ever-changing economic policy environment. Gokwe North District can be further transformed, given the level of commercialisation of the goat project among the participating members of the community, if extension support is provided in a way that suits the farmers' capacities to learn.

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Keywords: Climate Change, Resilience, Goat Breeding, Livelihood, Smallholder Goat Farmers.

1. INTRODUCTION

The agriculture sector is one of the most important sources of income and livelihoods for Zimbabwe's rural population (FAO, 2023). In the past decade, small livestock production has emerged strongly as a source of income, food and nutrition in the country's smallholder communities where livelihood options are limited. This is mainly due to these farmers' predominance in geographical locations of the semi-arid regions, where rainfall patterns are erratic, unevenly distributed and generally low at around 300mm/annum, while coupled with high temperatures averaging 30 ^{0}C. Crop production is, therefore, not viable under such agro-climatic conditions, especially in the absence of irrigation water and other supporting modern innovations in the climate-smart agriculture realm. It is worth noting that, given that the twenty-four livelihood zones in Zimbabwe primarily centred on rain-fed agriculture (Frischen *et al.*, 2020), this makes those in the drier areas more susceptible to the impact and implications of climate change. Due to persistent historical exposure to climate change and other limitations such as access to inputs, credit, and training, the poor-resourced smallholder farmers in the semi-arid regions have low resilience and low adaptability capacity (Ndlovu *et al*., 2020). Therefore, they resort to short-term coping mechanisms such as liquidating accumulated assets and adopting changes in behavioural attitudes and practices in consumption and networking, which ultimately undermine trust and their social standing (Tirivangasi, 2019).

Livestock plays a pivotal role as the main livelihood source among farmers living in semi-arid areas, especially goat production, as a source of income, food and a safety net for different households. Different livestock value chains have been affected to varying magnitudes by the implications and impact of climate change. UNDP (2023) emphasised the importance of small livestock production (including goats and sheep) as a key asset among smallholder farmers that helps them cope and adapt. In Zimbabwe, most livestock among the smallholder farmers have suffered due to depleted water table for animal water and deteriorated pasture condition, thus making smallholder farmers vulnerable to future and periodic droughts incidences (FEWS NET, 2023). El-Nino-induced droughts, directly and indirectly, affect livestock production due to reduced availability of grazing pasture, ecosystem degradation, reduced forage, depleted rangeland quality and ultimately reduced nutrient quality available to animals (UNDP, 2023).

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Under such circumstances, animals will succumb to death because of water stress, heat stress and malnutrition due to consumption of low feed conversion rates, hence devastating impacts on rural households, especially Regions IV and V (Gokwe is in that region) that heavily rely on livestock for their livelihoods. As Madzwamuse (2010) and UNFCCC (2022) alluded to, Africa is more susceptible to the impact and vulnerability of climate change, yet it also has widespread poverty and limited coping capacity. Climate change is one of the greatest issues affecting agriculture today, and it's a topical issue. Goats are climate change resilient as they adapt to the vagaries of climate change (Tirivangasi, 2019). Agriculture's sensitivity to climate-induced water stress is likely to intensify the existing problems of declining agricultural outputs, declining economic productivity, poverty, and food insecurity, with smallholder farmers mainly affected will continue to worsen (Chagutar, 2010).

There is a high level of political commitment to support adaptation on a common platform of actors such as government ministries, departments and agencies, development partners, the private sector, civil society and at the household level, with the inclusion of women, youths, and other vulnerable groups (UNFCCC, 2022). Building on these conducive conditions, the goat breeding program where Boer goats were crossbred with the indigenous goats was designed by the Adventist Development Relief Agency (ADRA) to support smallholder goat farmers in vulnerable communities while stressing that adaptation is of principal importance to guarantee the welfare of the people while reducing risks and building resilience. Data from the baseline conducted by the agency shall be used to determine the level of impact of the program in the study area.

1.1. The Role of Extension in Goat Systems

Goat farming is one of the largest agricultural sectors in developing countries, and about 35% of the world's goat population (heads) is found in Africa (Skapetas & Bampidis, 2016). In Burundi, the number of goats is high, with an estimated 3.2 million heads against 3.4 million for poultry, 1.1 for cattle, 0.8 for pigs and 0.5 for sheep (Manirakiza *et al.*, 2020). Statistically, there are over 3.5 million goats in Zimbabwe, of which 98% are indigenous breeds owned by smallholder farmers who depend on subsidised public extension systems (Ndlovu *et al*., 2020). Most are kept in the drier agroecological zones in Natural Ecological Regions IV and V and Tsetse-infested areas (Frischen *et al*., 2020). Natural Region IV has a low rainfall subject to periodic droughts and extended dry spells (Maburutse *et al*., 2012).

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Overall, the importance of goats increases as the rainfall decreases, and so does the need for tailor-made and more responsive extension strategies. Goats are hardy and easier to look after and can survive in harsh environments. Goats are reared under semi-intensive and extensive farming conditions, mainly for meat (chevon), to a lesser extent for milk, leather and wool. To some extent, the productivity of these goats is low due to various factors such as lack of access to extension, high kid mortality and lack of good animal husbandry practices (Monau *et al*., 2020). Goats are browsers and highly selective feeders, a character that enables them to thrive and produce even when feeding resources, except bushes and shrubs, appear to be non-existent (Markos, 2006). According to Maburutse *et al.* (2012), the broad genetic variability of goat breeds enables them to survive under stressful environmental conditions, including high disease incidence, poor nutrition, and high temperatures. However, Ndlovu et al. (2020) reported that even given the goats' desirable traits, extension is still integral in commercialising the goat systems in Zimbabwe. This study, therefore, seeks to explore these dimensions using the ADRA good breeding program as a case and relate the impact to the climate change resilience indicators, including food security, acquisition of assets, improved business management and access to credit.

2. METHODOLOGY

2.1. Description of the Study Area

The study was conducted in communal areas of Gokwe North District in the Midlands Province of Zimbabwe. The district has a total of 36 administrative wards. It is in natural regions III (28%), IV (61%) and V (11%), characterised by moderate to low and erratic rainfall of on average 600–650 mm per annum and a mean annual temperature of 20^0C (FAO, 2010)—geographical location: 18^0 13` 0 South, $28^0$ 15` 0 East. The area is prone to seasonal drought and dry spells during the rainy season. The community rely on rain-fed agriculture (crops and livestock) for their livelihoods and food security (Maburutse *et al*., 2012). The principal grasses are annual grasses such as *Eragrostis curvula, Digitaria* species, *Brachiaria* species and *Chloris* species. Perennial species include *Heteropogon, Cynodon dactylon, and Hyparrhenia* (Maburutse *et al*., 2012). The dominant vegetation type is the bush and woodland savanna dominated by *Combretum* species, *Colophospermum mopane, brachystegia* species, *acacia* species, *Terminalia serrica* and *dichrostachys* species.

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2.2. Data Collection Procedures and Sampling

The study used the embedded paradigm with a bias towards quantitative methods in the Gokwe North community as a case study analysis. Qualitative data collection methods are essential in obtaining more in-depth information about how stakeholders perceive the economic impact and implications of the Boer goats crossbreeding program with the indigenous goats on climate change resilience building. Baseline data were used to compare the program's impact in the Gokwe North district on climate change adaptation practices and outcomes. The project interventions targeted ten wards: 13, 14, 15, 5, 32, 4, 10, 35, 28 and 36. From these wards, simple random sampling was used to select the four wards since the project interventions were homogenous across the locations. The respondents for this study were then randomly selected from the project database. Table 1 shows the farmer composition by location and the proportions chosen for the sample.

According to the ADRA database, the population of beneficiary farmers in the four selected wards is 878. The sample size formula was employed to yield 217 smallholder goat farmers included in the study.

TABLE 1: Farmer Composition by Location

Location	No. of farmers	Farmer proportion	No. in sample
Ward 1	351	40	87
Ward 2	120	14	30
Ward 3	266	30	65
Ward 4	141	16	35
Total	**878**	**100**	**217**

The evaluation determined the extent to which the project achieved the intended effects (positive and negative, planned and unintended) on beneficiaries (extremely poor, women, men, children, and disabled), institutions and the environment. It also sought to determine the extent to which changes can be attributed to program implementation for target groups. The results of the evaluation were presented to answer the major questions:

- What are the intended and unintended, positive and negative effects of the intervention on people, institutions, and the physical environment?

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- What do the beneficiaries and other stakeholders affected by the intervention perceive to be the effects of the intervention on themselves (different subgroups and looked at differential impacts on extremely poor, women, men, children, and disabled?)
- To what extent does the intervention contribute to capacity development and strengthening institutions?
- To what extent can identified changes be attributed to the intervention?

2.3. Conceptual Framework

This study used a framework developed by the authors (Figure 1). Several variations of climate change resilience conceptual frameworks are reported in the literature (Ndlovu *et al*., 2020; Manirakiza *et al*., 2020). The commonality of these frameworks is that climate change resilience is affected by farm-specific (internal) and external factors. Guided by these frameworks, the climate change resilience strategies used to respond to exposure to climate change experienced by the goat farmer were used as the outcome variable. Socio-economic factors (e.g., asset ownership), institutional arrangements (e.g., access to social networks, access to extension), and farm factors (e.g., farm size, goat breeds) were used in the modelling. External factors (e.g., government support and climate conditions) were additional determinants (Musakwa *et al*., 2020). The conceptual framework in Figure 1 shows the relationships among these variables and further borrows principles from the Development Assistance Committee (DAC) evaluation criteria for the program and the Sustainable Livelihood Framework (SLF) to build the integrated hybrid framework. A hybrid Integrated Analytical Framework (IAF) was used in this regard.

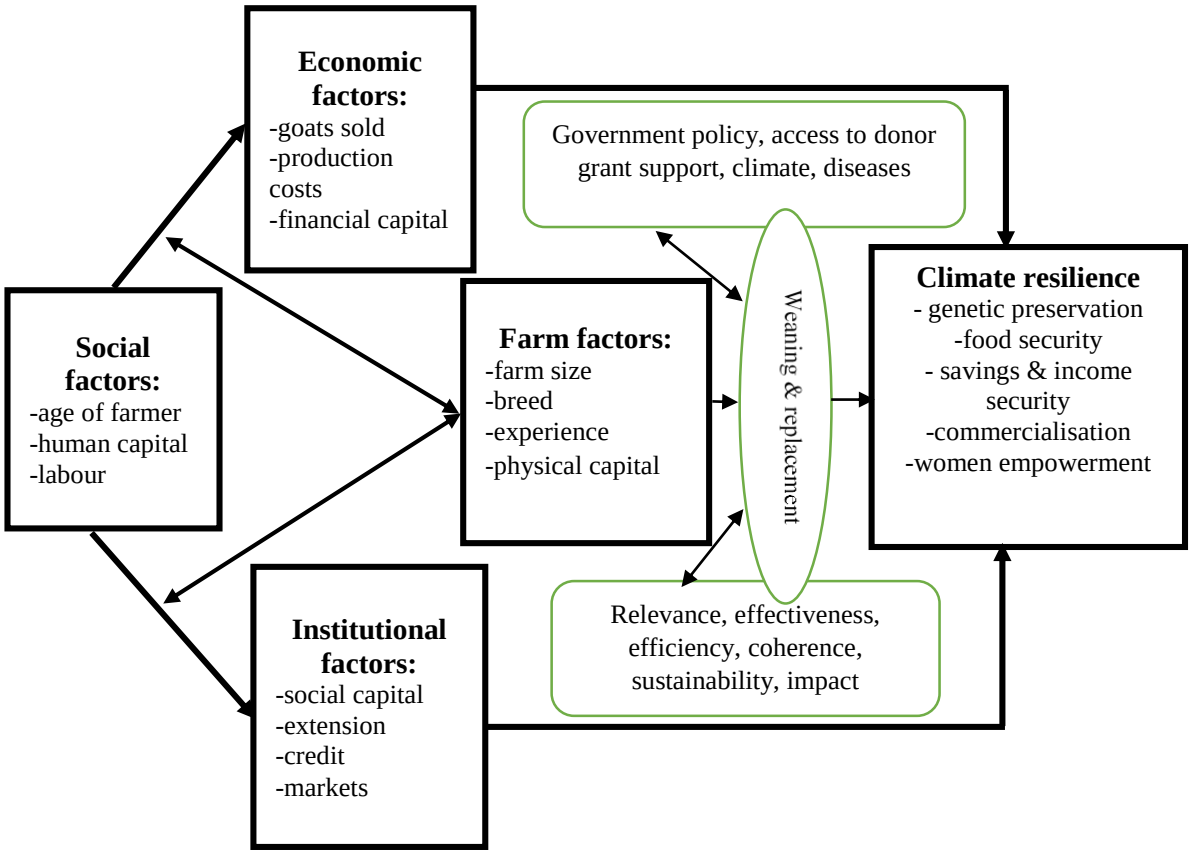

FIGURE 1: Integrated Analytical Framework

It is critical to note that the integrated framework has borrowed three capitals from the sustainable livelihood framework: Social capital, financial capital, and human capital. Furthermore, in the DAC framework, the integrated framework has borrowed the relevance, impact, and sustainability aspects of the framework. The integration framework was important, considering that the integration was to ensure the effective utilisation of the findings by the different stakeholders and as a foundation pillar for the impact evaluation. The integrated framework is a people-centred approach. It works closely in improving and eliminating poverty, strengthening local communities' capacities (Monau *et al*., 2020), building resilience and adaptive capabilities of the smallholder farmers and developing transforming mechanisms to ensure sustainable livelihoods of the smallholder farmers, at the same time, understanding the diversity and dynamic of the livelihood of the rural communities in the semi-arid region and not undermining the contribution made by the goat breed improvement program in upholding the community's living conditions and the genetic traits of crossbreeding of goats.

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The evaluation adopted both quantitative and qualitative methods of enquiry to improve analytical rigour, facilitate technical, sustainability, and socio-economic analysis and impact of the goat improvement program that has been implemented by funding partners, including development partners (DPs) and civil society organisations (CSOs) and Government of Zimbabwe and its agencies such as the veterinary and agricultural extension departments. It is critical to note that the integrated theoretical framework provided a strong scientific basis for the evaluation concerning the problem statement and research questions, as alluded to by Creswell (2012). This was necessitated by the multidimensional approach of the integrated framework, which allowed for tracing various pillars using a systems thinking approach. The framework further illustrates how the program was premised on the changes in identified pillars (social, economic, farm level and exogenous) over the project implementation period. This also helped trace the impact in various aspects such as genetic preservation, commercialisation and food security, among others.

2.4. Data Analysis

Data entry, cleaning and analysis of household survey questionnaires were conducted using the Statistical Package for the Social Sciences (SPSS) Version 17. The collected evaluation data was synthesised, analysed, and presented in user-friendly tables and illustrational charts/graphs. The responses were subjected to descriptive analysis, frequency analysis, cross-tabulations, and significance tests. Data collected were analysed using thematic analysis, which involved theme coding. Data analysis consolidated the research findings in high quality and integrity.

3. RESULTS AND DISCUSSION

The project evaluation results presented in this section established how smallholder farmers under the improved goat program were adapting to the impact of climate change using various mechanisms, including accessing finances, savings, ability to enhance business management and acquiring assets. This section presents results on how the program facilitated the establishment of internal savings and lending, gene preservation, and the commercialisation of the goat program. An Introduction to improving genes was one key aspect that was a game changer in the project, including leguminous fodder production among the farmer groups for goat supplementation and improved adaptation to climate change.

3.1. Improved Household Saving Patterns

Building on the interventions introduced by the goat breeding project, the Village Savings Groups were established to support the financial capital dimension. These generally consist of five to 10 or more self-selected members from within a community who meet regularly (weekly, biweekly, or monthly) to contribute to group savings. The advantage of these arrangements is that the members create a group revolving fund from which they can borrow as needed for transactional and investment demand and repay with interest. These pathways are more resilient and sustainable to multiple shocks, as Tirivangasi (2019) reported. The study identified more than 90 registered and unregistered groups across all the districts among the project participants. These community-based and managed informal savings and loan associations show the extent to which these self-help mechanisms are prevalent among goat farmers, with improved breeding programmes, even beyond the project lifespan, due to savings from excess income. The financial assistance that goat farmers borrowed from internal arrangements with no stringent collateral requirements helped them to access credit to buy stock feeds and drugs, purchase additional productive doers, as well as to acquire farm implements and develop infrastructure, especially for local goat feed formulation. These community-based schemes have provided opportunities for saving and access to quick loans, a benefit indirectly generated by the breeding program structures. According to FAO (2023), these innovations support resilience against climate change shocks in drier areas, where access to credit compromises productivity. A summary of the actors benefitting from VSL is presented in Figure 2 below.

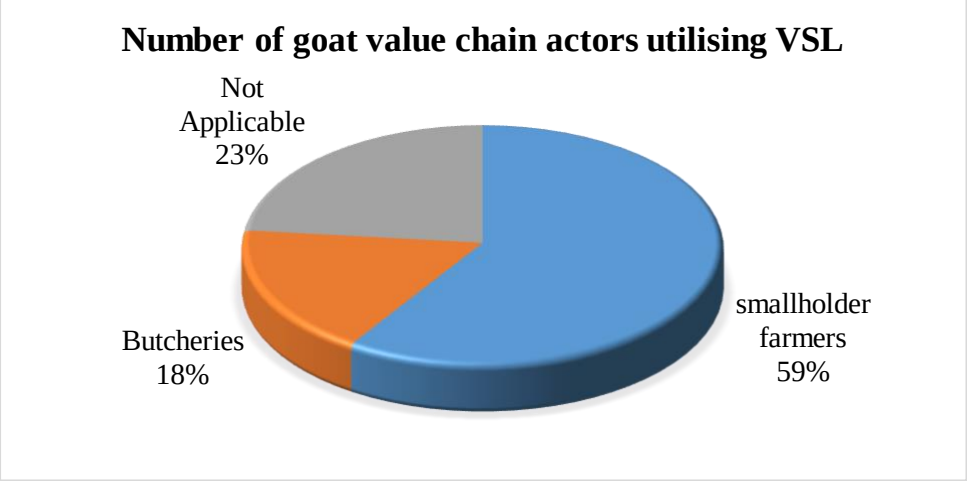

FIGURE 2: Actors Benefiting From VSL

Village Savings and Loans (VSL) established within the framework of the goat breeding program cover the funding and savings gap not accessed by formal financial institutions such as banks and Micro Finance Institutions (MFIs), thus greasing the efficiency of the goat value chain. Some groups charge an interest rate as high as 20% per month, but members are not deterred since they also share the total earnings at the end of the cycle. However, it is noted that even though the village saving and lending groups are bridging the smallholder financial needs, the funding gap is wide, and a substantial number of the actors remain unserved. It was also reported by Oganda *et al*. (2020) in Kenya that the funds from savings groups alone are not enough to cover the funding demands of all farmers, hence the need to link the goat farmer to financial service provision in future programming.

3.2. Relevance of the Goat Improvement to Support Other Livelihoods in the Community

Building on the identified need for goat breed improvement in the district, the baseline study findings also show that it is prudent for any goat breed improvement to include other elements like savings, fodder production and different local feed formulation strategies. These strategies are summarised in Table 2 below.

TABLE 2: Summary of Respondents' Adaptive Strategies

Adaptive strategy	Baseline (%)	Evaluation (%)
Practising climate-smart initiatives initiated and supported within the GBIP project	5.0	57
Adopting the making markets work for the poor approach (linked to inputs and outputs markets)	12	79

Given this set of baseline information gathered about community needs, the program was quite relevant because it focused on the needs identified and prioritised by the communities themselves in their village and ward development plans. The same reasoning is also presented by Monau et al. (2020), who reported innovative goat breeding and utilisation spillover effects. It is inspiring to note that the coherence dimension is also covered since the program further fits well with the Adventist Development Relief Agency (ADRA) goal on sustainable systems of agriculture and natural resource management, which seeks to build on their experience of working with women and men in poor communities to adopt and adapt technologies for small-

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scale, ecologically sustainable food provision. Women's empowerment is also viewed as a strong foundation for supporting resilience, as reported by UNDP (2023).

The overall strategy also focused on two cross-cutting themes: direct climate change adaptation and making markets work for the poor (M4P). Both are central to addressing the challenges facing smallholder farmers in Zimbabwe today. There was strong evidence the program recognised the priority areas for intervention as improvements in aspects of:

1. Goat breed improvement.
2. Fodder production and local feed formulations.
3. Business skills development by supporting the smallholder farmers to work collaboratively.
4. Soft skills development in the form of capacity to enhance negotiation skills, coordinated marketing activities, budgeting and record-keeping skills.
5. The mainstreaming of community peace-building initiatives was also pivotal in the GBIP activities.

Furthermore, the goat breeding program was relevant because its aims and design were well in tandem with the objectives of the national food security policies and the Gokwe community's needs (UNEP, 2023; UNFCCC, 2022). The project, therefore, provided a platform upon which farmers would increase their production, productivity, market engagement, incomes, and food security situation. The project represents a move from emergency relief to a much broader and sustainable recovery following the political, economic, and environmental (climate change) crisis faced by the smallholder farmers. This approach of discouraging an overreliance on aid and supporting smallholder farmers with the confidence, knowledge, and skills to work together to develop a culture of interdependence where they collaborate to make informed choices that promote a sustainable future for them and generations to come is a pillar of climate change resilience (Zuza *et al*., 2021).

The program was also relevant to the Sustainable Development Goals (SDGs), particularly SDG1, "end poverty in all forms everywhere", and SDG2, "end hunger, achieve food security and improved nutrition and promote sustainable agriculture". Overall, this evaluation found that the program was relevant and had a strategic fit in the international, continental, and national development goals and strategies. Furthermore, as alluded to by Ndlovu *et al*. (2020), this approach is a relevant driver of socio-economic and environmentally sustainable

development principles to ensure smallholder farmer resilience and adaptive capacities are built and strengthened at large, especially in the semi-arid regions where farmers heavily rely on livestock for their livelihoods.

3.3. Impact of the Goat Breed Improvement Program

The results show an assessment of the impact of the project activities and involve the systematic analysis of changes brought in the lives of beneficiaries. Key impact areas included food security, commercialisation, and asset ownership.

3.3.1. Food Security

Table 3 shows the household meal consumption patterns. The baseline study established that 31% of the households ate at least three decent meals per day. Still, the evaluation showed that 86.2% of the households now afford to eat at least three decent meals daily (breakfast, lunch, and supper).

TABLE 3: Summary of Number of Meals Per Day for the Sampled Households

Number of meals	Frequency before the program (%)	Frequency after the program (%)
3 meals per day	31%	86.2
2 meals per day	10.6%	12.6%
1 meal per day	2.3%	1.2%

Furthermore, 12.6% of the households are now consuming two (2) meals per day, and 1.2% are still consuming one (1) meal per day. A further probe into the one meal per day indicates that such households are either headed by elderly households or chronically ill household heads. Chronically ill individuals are defined as persons suffering from continued illness or frequent reoccurrence that lasted for six months or longer before the day of the interview. Again, as alluded to by Manirakiza *et al*. (2020) in Burundi, it was crucial to note that there is a great stride in terms of households graduating to three meals per day. The first two years of the program implementation indicated that there were high fluctuations in the number of meals per day, but according to the focus group discussions, the increased production on both dry land farming under conservation agriculture, livestock farmers, and irrigation farmers have managed to sustain the number of meals per day. The findings of this research agreed with the

conclusions from Musakwa et al. (2020) concerning the increase in the number of meals per day as an indication of food availability and accessibility in intensive goat-producing areas.

3.3.2. Commercialisation Through Enhanced Business Management

Figure 3 is a summary of the proportion of technology adoption; thus, 33.6% of the interviewed farmers indicated that they were not practising record keeping and analysing business transactions regularly, and 66.4% indicated that they adopted the practice because of the project.

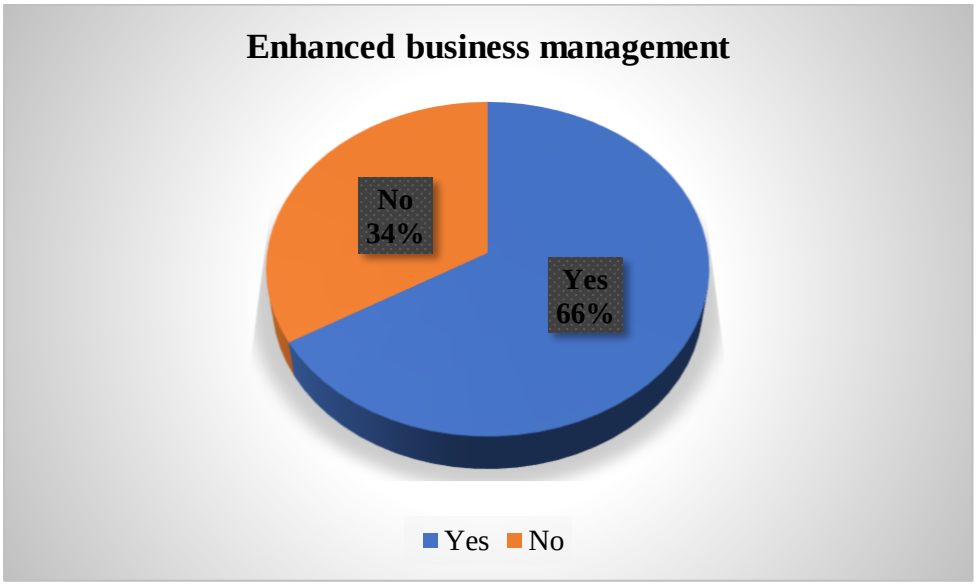

FIGURE 3: Proportion of Households Practicing Business Management Due to the Program

This migration to market-oriented business management due to the backstopping support from the project is a critical step towards commercialising goat systems in the Gokwe communities. If this is sustained, there are prospects of these farmers penetrating high-value markets, including supermarkets, where they will generate higher incomes. The same approach was successfully used in the Matobo district of Zimbabwe, as reported by Assan and Sibanda (2014)

3.3.3. Asset Acquisition

The evaluation also went on to assess the impact of the goat improvement project on asset acquisition by the smallholder farmers and found that the project had a significant impact on

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household acquisition of new assets. Overall, 77.4% of the households indicated that they acquired new assets because of the program, as summarised in Figure 4 below.

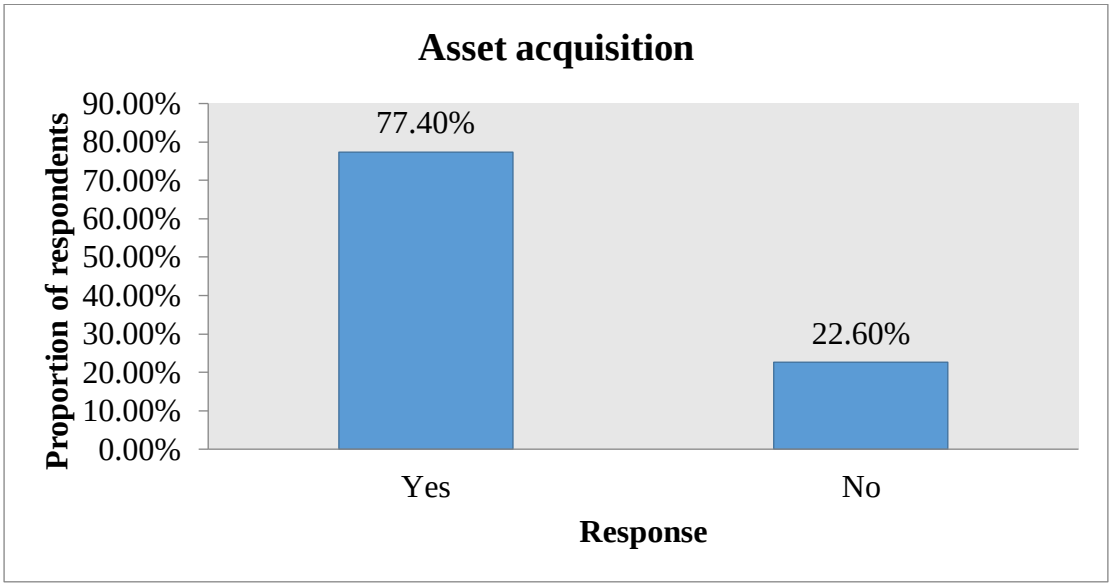

FIGURE 4: Household Indicating Acquiring of New Assets as a Result of the Project

The Word Cloud in Figure 5 indicates the major assets acquired by the households. The most common new assets acquired were livestock, knapsack sprayers, wheelbarrows, ploughs, scotch carts, solar equipment for lightning, irrigation equipment, cultivators, and harrows, among others.

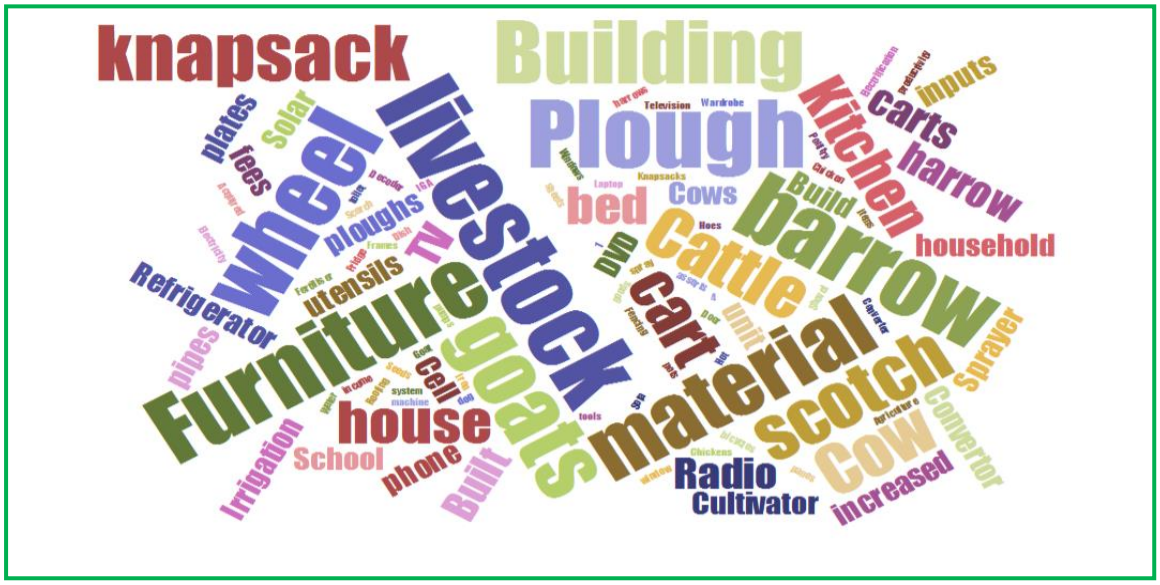

FIGURE 5: Household Assets Acquired as a Result of the Project

These benefits are essential in supporting other household livelihood activities, thus improving resilience towards climate change. FEWS NET (2023) also alluded to these multiplier effects as a source of climate change vulnerability in s45arginalized communities, which also implies food, income and nutrition security.

3.3.4. Perceived General Goat Breed Improvement Program Impacts

The study also sought to explore the farmers' opinions on the overall impact of the project on several key issues; the project interventions were aimed at improving the indigenous goat breeds, improving the livelihood and climate change adaptation of the Gokwe North community and the responses are presented in Table 4.

TABLE 4: Summary Evaluation of the Project Perceived Impact

Impact on improving:	**Very Low (%)**	**Low (%)**	**Null (%)**	**High (%)**	**Very High (%)**
Access to affordable loans	19.1	16.3	14.5	40.4	9.6
Reliable access to inputs	6.4	12.4	6	62.2	13.1
Access to improved markets	7.1	11.8	15.4	53.9	11.8
Goat breeds	1.4	7.1	4.6	70.7	16.3
Household income	2.2	12.9	5	66.7	13.3
Food and nutrition security	1.4	6.5	4.3	72.7	15.1
Goat Collective marketing	4	15.7	12.8	57.3	10.2
Management of shared resources and infrastructure	1.1	2.9	8.7	68.8	18.5
Capacity of goat breeding committees	1.1	2.5	5	73.7	17.6
Diversification of livelihoods	1.4	3.9	7.5	72.8	14.3
Cross cutting capacity building	1.8	3.6	5.3	72.2	17.1
Access to effective extension	3.5	1.8	4.3	59.9	30.5
Overall assessment	4.2	8.5	7.7	64.0	15.6

Overall, the farmers perceived that the project had significantly impacted all key areas addressed by the interventions. Fifty percent of the respondents perceived the impact of the

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program in improving access to loans to be high to very high impact on improving access to loans, 87% perceived the impact to be high to very high on improving the management of shared resources and infrastructure, 89% perceived the impact to be high to very high on capacity building of farmers and local institutions, 91% perceived the impact to be high to very high on improving access to extension services by farmers, and 86% perceived the impact to be high to very high on diversification livelihoods. On improved access to markets, inputs, goat breeds, improving food security and nutrition and improving household incomes, 66%, 75%, 87%, 88%, and 80%, respectively, perceived the impact to be high to very high. Frischen et al. (2020) reported this array of cross-cutting benefits as a building block in managing climate change shocks due to their diversity and complementarity. It, therefore, becomes imperative to enhance support in these strategic areas for sustainability.

The overall assessment showed that the project managed to build the resilience and adaptive capacity of the smallholder farmers regarding sustainable goat breed improvement, sustainable livelihoods, and climate change. Thus, in general terms, the program positively impacted the Gokwe North community. The farmers had a high-value attachment they now give to their bucks. It was interesting to note from the FGDs that each household now owns a Boer cross or pure genetic breed. Furthermore, from the sampled households, the average head size was 35 per household, with some households keeping more than 250 goats improved. The findings aligned with the results established by Oganda *et al.* (2020) under the Uganda smallholder farmers' adaptation to climate change and goat breed improvement.

It can be established from Table 4 that breed improvement, resilience and adaptation building need a holistic approach and integration of different stakeholders from the project's design stage. Furthermore, advocacy initiatives at all levels for the transformation of agriculture climate-smart policies to strengthen and up-scaling the goat improvement programs for smallholder farmers, considering that it is one of their primary livelihood sources. The findings aligned with the recommendations UNEP gave (2023). Hence, there is a need for a strong public-private partnership, financial service provision, and a sustainable strategy in building and funding the capacity of the smallholder farmers both in terms of the breeding capacity and their financial muscles through linking them to financial institutions, input, and outputs markets.

Figure 6 reflects on the possibilities of any negative impacts brought by the project. It can be reported that 92% of the respondents indicated that the Goat Improvement Program (GIP) has not brought any negative impacts. The 8% who indicated that the project had brought about negative impacts cited their reason as community conflicts created by farmers unwilling to share bucks at the introduction stage of the program.

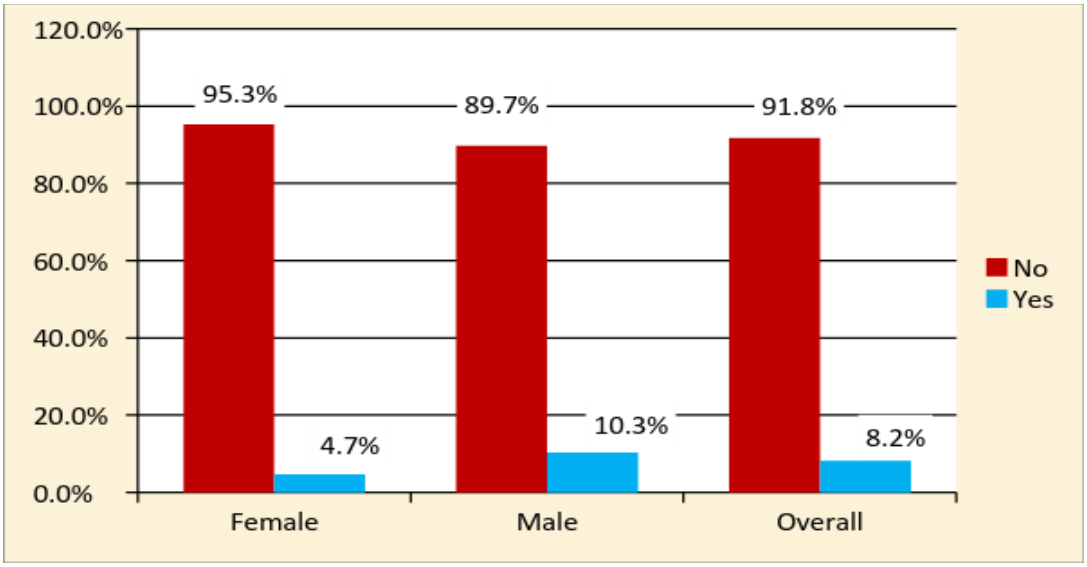

FIGURE 6: Farmers Perception on Whether the Program Brought Negative Impact by Gender

According to Table 5, the project's positive impact can also be seen from the satisfaction the beneficiaries had with the project. Overall, 83.6% of the respondents indicated they were very satisfied with the support of the goat breeding program (Table 5).

TABLE 5: Household Satisfaction Scores with Support Received from the Program

	Not at all satisfied	Slightly satisfied	Moderately satisfied	Very satisfied	Extremely satisfied
CFSLPP	0.8%	1.6%	0.8%	13.1%	83.6%
Overall	0.8%	1.6%	0.8%	13.1%	83.6%

Overall, according to the farmers, the project (CFSLPP) managed to build resilience and adaptive capacity of the smallholder farmers concerning sustainable goat breed improvement, sustainable livelihoods and climate change. Thus, in general terms, the program positively

impacted the Gokwe North community; the farmers had a high-value attachment they now give to their bucks. It was interesting to note from the FGDs that each household now owns a Boer cross or pure genetic breed. Furthermore, from the sampled households, the average head size was 35 per household, with some households keeping more than 250 goats improved. The findings aligned with the results established by Chisango *et al*. (2015) under the smallholder farmers' adaptation to climate change and goat breed improvement initiatives in Zimbabwe.

4. CONCLUSIONS AND IMPLICATIONS FOR POLICY

The research established the impact of the goat improvement program with regards to addressing challenges of food insecurity, establishing mechanisms to transform smallholder farmers' livelihoods by enhancing business management competencies and access to credit and how the program builds resilience and adaptive capacity to the negative impact of climate change taking into consideration the over-reliance on agriculture as the main source of livelihoods. The program did relevantly well at household and community levels in addressing food insecurity, improving access to affordable credit through village savings clubs and diversifying livelihood options due to accruing assets. There is a need to strengthen the national-level influence of policy direction in financing goat livestock value chain by mainly bridging the gaps left by the village savings clubs. It is also essential for extension services pillars to be aligned with the competitive advantages such as goat production and enhance food, income and nutrition security. Supporting programs for infrastructure development in alignment with the farmers' asset accumulation prospects is essential to improve sustainable livelihoods for the effective transformation of rural goat farming communities and smallholder farmers at large.

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