

## KEY POINTS

- Moringa based chicken feed a potential agro-ecology practice that can increase the production of indigenous and broiler chickens
- Moringa based feed gave above normal expected growth curve for broilers
- Biochar natural fertiliser increased the growth and yield of cereals and oil crops
- Tephrosia tick control showed its effectiveness in reducing the number of ticks compared to current dipping regimes.
- Tephrosia vogelii showed its effectiveness in reducing the number of ticks compared to current dipping regimes.



## On-farm Moringa based chicken feed, Biochar based natural fertilizer, Erthnovet tick and theileriosis control in Zimbabwe

### 1. Introduction

Climate change has severe negative impacts on livelihoods and food systems worldwide, with future projections, seriously undermining current efforts to improve the state of food security and nutrition (Strohmaier *et al.*, 2016). In Zimbabwe, current food systems contribute to the degradation of ecosystems, biodiversity losses, and high greenhouse gas emissions which accelerate climate change. As a result they are failing to provide sustainable food for everyone. Zimbabwe has lost cattle at alarming rate due to January disease hence there is need to find sustainable ways of managing the ticks which are carriers of the disease. Whilst indigenous chickens are the most reared in rural areas, their keeping has been hampered by expensive feeds. To meet the food requirements, Zimbabwe needs a fundamental shift in food production towards a highly adaptive, low carbon, resource-preserving type of agriculture that benefits also the smallholder farmers through improved access to food.

Smallholder farmers already often struggle to grow enough food because of depleted soils, water scarcity, crop and animal diseases and pests. These challenges are greater for smallholder food producers. Production of crops has been hit by climate change related drought and floods. Soil fertility has emerged as one of the biggest problems faced by farmers in crop production. Most fields have been over cultivated and are characterised by acidic pH in sandy soils.

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Zimbabwe produced a National Agricultural Policy Framework (NAPF) that requires intervention that directly respond to enhance the flow of investments to those areas that are critical to generating and sustaining the growth of the agricultural sector with a decided focus on increasing agricultural productivity and production. The NAPF discusses the emerging challenges under nine pillars of which the project targeted pillar 8 which focuses on sustainable green agriculture. Pillar 8 recognises the vulnerability of farmers to weather shocks and emerging shocks and emerging pests and diseases due to dependence on rain (World Bank, 2020, GOZ, 2020). There is an urgent need for a transformational change of our food systems towards more sustainability and resilience and agro-ecology practices offer the opportunity. According to Lieppert et al., (2020) agro-ecological approaches favour the use of natural processes, limit the use of synthetic inputs, promote closed cycles with minimal negative externalities and stress the importance of local knowledge and participatory processes that develop knowledge and practice through experience as well as conventional scientific methods and address social inequalities. These approaches are uniquely placed to help countries deliver their goals and the 2030 agenda for sustainable development.

Agro-ecology provides a feasible alternative towards more socially just, economically viable, and environmentally sustainable agriculture and food systems that improve the livelihoods and build the resilience of smallholder farmers. It is a holistic approach to integrated agriculture, based on ecological principles, as well as food and nutrition security, food sovereignty and food justice.

## 2. Data and Methods

The project was done in three provinces where Livelihoods and Food Security Programme's (LFSP) Programmes were implemented. The provinces were Manicaland (Makoni district, Mutasa district, Mutare district), Midlands (Kwekwe district, Shurugwi district, Gokwe South district and Gokwe North district) and Mashonaland Central (Guruve district, Mt Darwin district, Bindura district).

The project was implemented in three stages namely; 1) pre-project scoping consultation (background, challenges, of the indigenous and broiler feed sources in the targeted districts; identification of interested/motivated farmers), 2) Training 15 participants within each focal point including Agritex and lead farmers and 3) One hundred agro-ecology demo-sites were set (ten demo-sites per district which included- agro-feed, biochar and ethnovet extraction unit).

Chickens were divided into three groups: day old chicks, grower pullers and point of lay. Five chicks were put under *Moringa* feed and the other five under the farmer's normal feeding practice across the three groups of chickens. A fowl run was divided according to the three groups to identify them and note any difference that was seen on the performance of the chickens.

Each demo site was composed of 4 plots of 10\*10m each. One plot was for maize or sorghum with biochar whilst the other one will have either of the same cereals with cattle manure. The third plot will have a protein source such as cowpeas or sunflower on Biochar natural fertiliser whilst the last demonstration plot was having the same protein source but fertilised with cattle manure.

For tick control, farmers selected three cows across ages and apply Tephrosia above the normal dips that cattle receive to a set of cattle under Tephrosia. The other three cattle selected across the ages had no extra tick control method applied to them except the normal dips. The farmers were also taught on data collection to make proper comparison between those on Tephrosia and those not on Tephrosia.

### 3. Results and Discussion

The scoping results showed that farming was the main source of income followed by formal employment and remittances was the least sources of income. The diversity of animals that were kept by the farmers included cattle, donkeys, goats and sheep with goats having the highest number in livestock ownership. Most farmers indicated that they prepared their own feed to feed their indigenous chickens. The scoping exercise found that farmers used mainly sorghum, rapoko, millet and maize for feeding the indigenous chickens. On fertilizer usage, the most common source of natural fertiliser used was cattle manure. On tick control, farmers had wide knowledge of different botanicals but were not using them to control ticks.

Demonstration trial results showed that *Moringa* based chicken feed gave significantly higher chicken weights for the indigenous chicks, grower pullets and layers as compared to conventional farmers' feeding. From broilers, the results showed that conventional feeding using industrially manufactured feeds gave significantly higher broiler weights compared to *Moringa* based chicken feeds due to growth promoters. The *Moringa* fed chickens maintained growth above expected normal growth curve for broilers. Farmers also reported that *Moringa* fed chickens were more active, had reduced mortality and produced better tasting meat.

In terms of natural fertilizer usage, it was found that most common source of natural fertiliser used by farmers was cattle manure. None of the farmers used biochar before in the surveyed districts. The knowledge on biochar was not found amongst the farmers. Very few farmers indicated that they had some knowledge on biochar.

For biochar based natural fertilizer, the results indicated that biochar based natural fertilizer gave significantly higher growth, chlorophyll content, nitrates retainance against leaching and higher yields compared to farmer practice across all the crops included in the study: maize sorghum sunflower and cowpeas.

The results showed that the main method used for the control of ticks was the use of acaricides. Farmers reported that they do not use ethno-veterinary products for tick control. All the farmers who participated in the survey indicated that they were willing to participate in the demonstration plots set up.

For supplementing tick control using *Tephrosia vogelii*, the result showed that supplementing *Tephrosia* significantly reduced tick numbers on the cattle compared to farmers' conventional dipping which is inconsistent and not done on regular basis.

### 4. Conclusions

- The most common feed that they used to feed their chickens was sorghum, millets and crushed maize which was inadequate to meet the nutritional needs of the chickens.
- Generally the farmers had no knowledge of *Moringa* based chicken feed
- *Moringa* outperformed the farmers' feeds for all the three groups of indigenous chickens
- *Moringa* based feed gave above normal expected growth curve for broilers
- The most common source of organic fertiliser used by farmers was cattle manure
- None of the farmers used biochar before in the surveyed districts hence it became a new type of fertiliser to them.
- There was an immense potential for biochar based fertiliser given the expenses of fertiliser purchase.

- Biochar based natural fertilizer outperformed the manure that the farmers used in terms of growth, chlorophyll content, soil water holding capacity and nitrate retainance and yield.
- The main method used for the control of ticks in ten districts was the use of acaricides
- *Tephrosia* grow well in warm and moist soil conditions
- *Tephrosia* tick control proved more superior compared to conventional tick control through irregular dipping.
- *Moringa* based chicken feed is a potential agro-ecology practice that can increase the production of indigenous and broiler chickens
- Biochar based natural fertilizer is a natural fertilizer that increased the growth and yield of cereals and oil crops
- *Tephrosia vogelii* showed its effectiveness in reducing the number of ticks compared to current dipping regimes.

## 5. References

Government of Zimbabwe, 2020. Zimbabwe: Acute Food Insecurity Situation October - December 2020 and Projection for January - March

2021 <http://www.ipcinfo.org/ipc-country-analysis/details-map/en/c/1152928/>

Leippert, F., Darmaun, M., Bernoux, M. and Mpheshea, M. 2020. *The potential of agroecology to build climate-resilient livelihoods and food systems*. Rome. FAO and Biovision.

<https://doi.org/10.4060/cb0438en>

Strohmaier, R., Rioux, J., Seggel, A., Meybeck, A., Bernoux, M., Salvatore, M., Miranda, J. & Agostini, A. 2016. *The agriculture sectors in the Intended Nationally Determined Contributions: Analysis*. FAO Environment and Natural Resources Management Working Paper No. 62. Rome, FAO. (also available at <http://www.fao.org/3/a-i5687e.pdf>).

World Bank. 2020. *The World Bank: Agriculture and Food*. Washington, DC: World Bank. © World bank. <https://www.worldbank.org/en/topic/food-security>

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#### ABOUT LFSP:

- The Zimbabwe Livelihoods and Food Security Programme (LFSP), Agriculture Productivity and Nutrition Component (APN) is managed by the Food and Agriculture Organisation of the United Nations (FAO), with the aim of contribute to poverty reduction through increased incomes for a target 250,000 smallholder farming households. The programme is being implemented in four provinces covering 12 districts as follows: Mutasa, Mutare, and Makoni in Manicaland; Guruve, Bindura, Mazowe and Mt Darwin in Mashonaland Central; Kwekwe, Gokwe North, Gokwe South and Shurugwi in Midlands and Zvimba in Mashonaland West provinces. FAO is in partnership with three NGO consortia led by Practical Action, Welthungerhilfe and World Vision International, two Strategic Technical partners i.e. **IAPRI** for policy influence, HarvestPlus for biofortification, three Commercial Banks, 1 Wholesale Facility - the Zimbabwe Microfinance Fund (ZMF), 5 Microfinance Institutions (MFIs) and the USAID managed DCA Facility. To date the LFSP is funded for two phases to the tune of £72.4m.

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