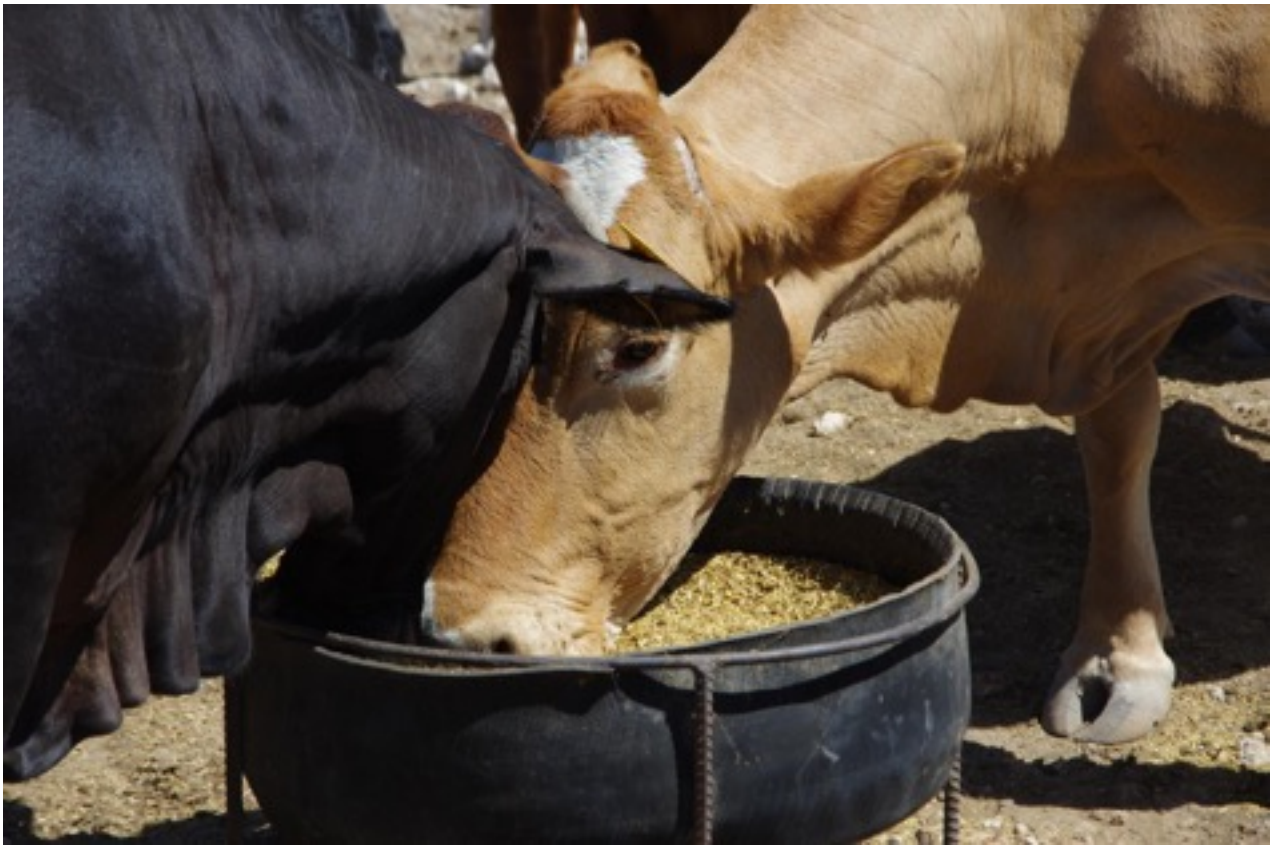
ANIMAL FEED PRODUCTION PILOT



Project Proposal

Prepared for: Support to De-bushing Project, Animal Feed Pilot

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PROJECT OUTLINE

1. Introduction

Namibia is challenged by massive bush encroachment. This phenomenon currently affects 26 – 30 million hectares of farmland in 9 of 14 regions equivalent to app. 30 % of the 824,000m² of rural countryside. Evidence exists that bush encroachment is man-made and the result of overgrazing, preventing natural bush fires and limiting browser game species, thus distorting the natural balance of savanna grass-and woodland vegetation. Decades of unsustainable rangeland management have resulted in a monotonous vegetation type that severely reduces biodiversity of savanna vegetation and prohibits the restoration of groundwater so vital to the semi-arid and arid habitats of Namibia. Economically bush encroachment limits productivity and carrying capacity of farmland by up to two thirds. This in turn creates economic losses of 1.6 billion N$ per year due to reduced meat production alone.

Meanwhile the process of bush encroachment has developed into a large biomass resource equaling 300 million tons of renewable biomass. This situation meets a global demand for biomass with an ever increasing interest in finding alternative, renewable and CO2 neutral energy resources. Measures to repel bush encroachment create unique opportunities for the Namibian economy to turn biomass into a resource to be used for power production and value chain development in other sectors.

Biomass thus offers the possibility of potentially increasing agricultural productivity, economic growth, employment and energy supply without competing with food production.

2. Background

Livestock contributes to over 75% of the total agricultural output in Namibia, with beef production being the most important related activity. However the number of cattle in the country depends highly on the annual rainfall. Namibia is rated to have the driest climate in the whole sub-sahara Africa, with recurrent droughts posing a severe thread to producers and animals. If producers do not opt to sell their cattle in times of droughts, they are forced to import very costly lucerne.

Bush encroachment poses another challenge for cattle producers. Namibia is affected by bush encroachment on a massive scale. The phenomenon currently affects some 26 to 30 million hectares of farmland, amounting to roughly 30 per cent of Namibia's land area. Bush encroachment has lowered the livestock capacity of rangeland by up to two thirds. It further results in severely reduced biodiversity and limits the recharge of groundwater.

Bush based animal feed production is the chance to overcome both problems. Roughly about 50 producers in Namibia are currently producing animal feed from bush material on a trial and error method. The results are remarkable and proof that bush to feed production works as emergency feed, but also as supplement feed during rainy seasons. The local demand for emergency animal feed is tremendously high. The demand for imported lucerne is estimated between 10.000 tons p.a.

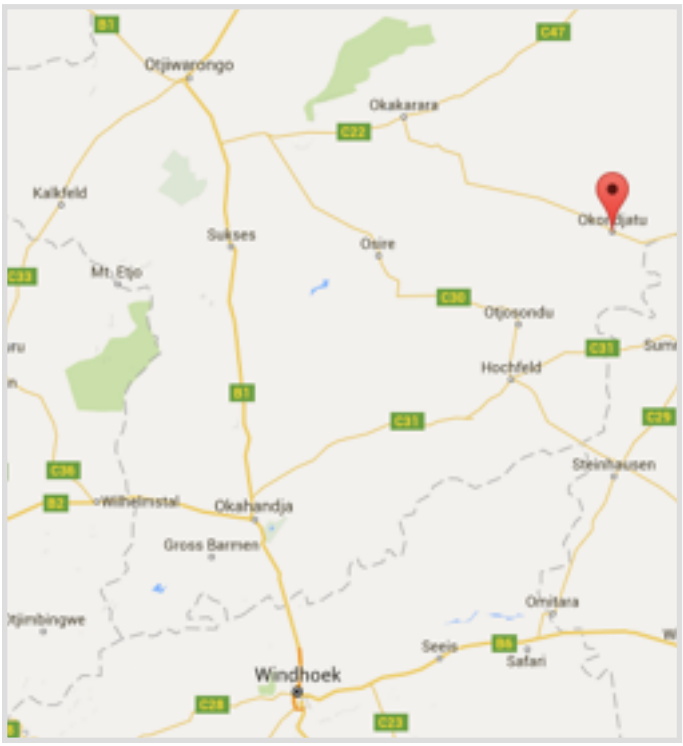
for a normal rainy season to as much as 150.000 p.a. in times of drought. Whereby the imports only partly reflect the local demand, which is by far higher. Even in years with normal rainfall Namibia is often short of enough animal feed, especially in the communal areas.
To produce a healthy and balanced feed producers mix the bush material with supplements, such as molasses (palatability), urea (protein) polyethylene glycol (tanning-binding agent) and sodium hydroxide (NaOH or NaCl). Depending on the bush species and the thickness of the bush, a mixture of up to 85% bush material and 15% supplements is possible.
It is against this background that an animal feed production pilot shall be set up in a communal area to proof the concept and develop a showcase for others to learn.

3. Project Partners

The cooperation involves three partner organisations, namely the Sustainable Management of Namibia's Forested Lands (NAFOLA) Project, Support to De-Bushing Project, and the African Wild Dog Conservancy/Community Forest.

Sustainable Management of Namibia's Forested Lands (NAFOLA) Project
NAFOLA is a five year GEF funded project implemented by the MAWF. The overall objective is to reduce pressures on natural resources from competing land uses in the wider landscape. NAFOLA is doing this by facilitating the formalisation of 9 Community Forests, enhance community ownership and local capacity in the management of community forest resources. Furthermore, NAFOLA aims to increase the uptake of improved agriculture, livestock and forestry management practises to reduce pressure on forest resources This will increase the productivity of the dry lands ecosystem while also reduce deforestation and secure the environmental benefits of forest resources in Namibia.

The Support to De-bushing Project:
The Support to De-bushing Project is a bilateral cooperation between the Namibian Ministry of Agriculture, Water and Forestry (MAWF) and the German Federal Ministry for Economic Cooperation and Development (BMZ). It is implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.
In line with the Fourth National Development Plan (NDP4) and the National Rangeland Management Policy and Strategy of 2012, the Project aims to strengthen the restoration of productive rangeland in Namibia. It identifies biomass value chain opportunities to trigger large-scale de-bushing activities, closely aligned to the National Industrial Policy of 2012 and the Growth at Home Strategy.
It is against this background that the Project supports the upscaling of existing initiatives and fosters the creation of new biomass value chains. The three selected value chains are: animal feed, charcoal, and household energy.



African Wilddog Conservancy/Community Forest

The African Wilddog was registered as a conservancy in 2005 and it is in the process of being declared as a community forest. Legal recognition of the community conservation organization provides opportunities for people in the communal area to actively manage forest and wildlife resources and to generate returns. The conservancy/community forest is located in Otjozondjupa region, covers an area of 3,824km2 with an estimated population of 5,000 inhabitants.

The main geographical features include thornveld savanna and sandy rocky areas. Major wildlife resources are wilddog, kudu, warthog, gemsbok, eland and vultures. The main forest resources include *Acacia mellifera, Terminalia sericea* and *Acacia erioloba*.

The predominant land use in the area is livestock farming. Communities reported that livestock production is challenged by climate variability, increasing human population and bush encroachment.

The conservancy and community forest has one management committee, which is comprised of ten men and nine women. The committee further has an Executive Committee for day-to-day operations. The committee reports to the community through an annual general meeting.

4. Objective and aim

The aim of the animal feed production pilot is to

- proof the concept of bush- based animal feed;
- set up a showcase and develop an implementation guideline on bush-based animal feed production for others to learn and copy;
- provide secure income and overcome droughts in communal areas.

5. Project Description

The project will focus on setting up a pilot on animal feed production in Okondjatu, Otjozondjupa Region in collaboration with the conservancy/community forest called African Wild Dog.

The initial pilot will run for 12 months, starting from April 2016 to April 2017. The support of NAFOLA will continue after the lifeime of the pilot.

The main activity areas are:
A. Technology Introduction
B. Capacity Development
C. Development of an Implementation Guideline
D. Research, Monitoring and Evaluation

The main operational areas are described further in the attached project plan.

A. Technology Introduction

NAFOLA will sponsor the needed equipment for the project. This includes a Bos-to-Kos machine or similar, a generator and the harvesting equipment. The community has not yet introduced any de-bushing activities therefore neither the knowledge nor the equipment is available to them.

The so called “Bos-to-Kos” machine was especially developed to turn bush material into animal feed in one step. This machine or a similar type should be procured. It includes:

- A single hydraulic in-feed roller wood chipper or similar,
- A hammer mill is used to make the material even finer,
- A mixer with a pill machine,
- 5 electric motors,
- 40 KVA generator.

Further the community needs at last 4 cutting machines. Manual and semi mechanised equipment for small scale harvesting activities is needed.

Firstly the community needs to use a standard semi-manual cutting machine such as the Bosvreter machine or other to cut the bush. The bush is then fed into the wood chipper with the ends first. The hammer mill smashes the branches into lengths of 2mm. Supplements such as molasses (palatability), urea (protein) polyethylene glycol (tanning-binding agent) and sodium hydroxide (NaOH or NaCl) or others need to be added. The feed is collected in bags and ready to feed. A mixture of up to 85% bush material and 15% supplements is possible, depending on the species available.

With 4-5 labourers approximately 2 tonnes per day can be produced, feeding 300-600 animals.

The technology needs will be assessed, defined and procured by an expert organised by NAFOLA.

Technology however can never be introduced without the relevant training and mentoring.

B. Capacity Development

The Support to De-Bushing Project will be responsible for the provision of the capacity development and thereby with all below mentioned aspects.

The pilot will start with a Field Trip to a farm, that is already producing animal feed. The community members involved in the production can learn and see how the harvesting of the bush is taking place and how the machine is to be operated.

An external expert will join the project to develop a Business Concept with the community clarifying the location of intervention, cost-analysis, benefit distribution concept, responsible operator for machines and others. The community will keep and manage the income generated. The community could engage a company to run the de-bushing activities and the feed producing activities. The feed will be sold to the community members and the income generated by selling the feed will again pay the company to be hired. A detailed benefit distribution plan will be part of the Business Concept.

An mentor will be facilitating and accompany the implementation of the pilot. The mentor shall be a farmer him or herself, who is engaged in animal feed production since a longer period. He/She will be visiting the community on a monthly basis (at least once per month) to support the community on all operational and technical questions.
The mentors will be accompanied by NAFOLA and MAWF staff. They shall mutually be trained by the mentor to take over the coaching of animal feed production after the project ends.

NAFOLA will counterpart these activities with permanent staff on the ground to ensure project activities are running.

C. Implementation Guideline/ Manual for communal farmers

An International Expert on animal feed production from bush material will visit the pilot at least four (4) times in its overall lifetime. He/she will be hired by GIZ directly and be responsible to turn the pilot into a showcase. This means the pilot is not only proofing the concept, but analysed and documented in such way that others can understand the set up and start a production themselves. The expert will visit the project side and undertake all needed analysis to firstly identify which bushes to use for the fodder, secondly which feed mixture to use and thirdly to proof that the animals fed by the fodder are growing and healthy. He/She will document the pilot in an implementation guideline explaining detailed how to set up an animal feed production. The implementation guideline must be finished by the closer of the project and will be published in all relevant local languages. The focus of the guideline is also to proof the concept of animal feed production in a communal set up. Therefore social aspects on how to run such project as a group is crucial information provided in this guideline.
The guideline shall be used as manual for other communities to set up on-farm animal feed production systems. The manual will include chapters such as:

- General requirements/principles,
- Needed equipment and setting,
- Bush species and best recipes by regions,
- Good production practices on farm (incl. health hazards),
- Communal set up and benefit distribution plan.

NAFOLA will ensure that all needed monitoring data is continuously collected and documented. NAFOLA will also be the main source of expertise on communal based project management.

The final Implementation Guideline will be a joint publication of NAFOLA, African Wild Dog and the Support to De-Bushing Project.

D. Research, Monitoring and Evaluation

An international expert will be hired by GIZ to conduct the needed scientific analysis to proof the concept. He/She will be responsible to produce a research paper outlining:

- the nutritional value of different invader species typically found in the heavily encroached areas in Namibia;
- potential mixtures for large (cattle) and small stock (goats, sheep) animals;
- long term effects on animals (growth, weight, reproduction, others).

All needed field research will be accompanied by a local researcher. NAFOLA will organise and hire the relevant counterpart. If needed controlled experiments and intensive feeding trials can be organised.
The final publication will be a joint publication of NAFOLA and the Support to De-bushing project.

A regular results-based monitoring system will be developed and implemented by NAFOLA.

5. Responsibilities, Contributions, and Outputs

The project is a cooperation between three partners involved, namely African Wild Dog, NAFOLA, and the Support to De-bushing project. Each party will contribute its part to make the pilot a success story.
The main contribution of African Wild Dog is to manage and implement the project itself. Efficient management is crucial for the project to work. Further the community commits to provide all needed man power. They will be responsible to pay an adequate salary to the workers and coordinate their effort. The community is also responsible to cover the running costs. This includes but is not limited to fuel, supplements and labour costs.
NAFOLA will contribute the equipment needed for the project, namely one Animal Feed machine, the harvesting equipment and a generator. Further NAFOLA will provide man power to guide and monitor the project on the ground. They will also be responsible for the continuous data collection. A local researcher will be engaged by the Support to De-bushing project to counterpart the international expert on writing the scientific paper. If possible the researcher shall be seconded from MAWF, Directorate of Research and Development.

The Support to De-bushing project is responsible to provide the needed training and expertise. This includes one field trip to a already established production plant to learn and understand the set up. Further the Support to De-Bushing Project will provide the needed capacities to undertake analysis on relevant species for the trail and support to develop the business concept of the project. The Support to De-Bushing Project will further ensure that a mentor is visiting the project site monthly to coach and guide the project on technical questions. Additionally an international expert will visit the project at least four times throughout the project lifetime to document the process and write an implementation guideline/farmers manual to be published after the project finishes. This expert will also be responsible to produce the research paper documenting the livestock trials.

The following table illustrates the responsibilities, contributions and outputs:

Contributing Party	Responsibility and Contribution	Output
African Wild Dog	• Continuous implementation of the project activities • Maintenance and Repairs of machiney • Contribute to Collection of Monitoring Data • Provision of Supplements • Labour • Provision of Fuel • Other running costs	• Drought Management Plan • Community Based Business Concept • Implementation Guideline for community based animal feed production (Practical knowledge)
NAFOLA	• Bos-To-Kos Machine or similar • Generator • Harvesting Tools • Collection of Monitoring Data • Development and Implementation of Results-Based Monitoring System (RBMS). • Full-time staff based in Okondjatu. • Local research to counterpart scientific publication and implement trials in the field.	• Equipment available and tested. • Results-based monitoring system • Implementation Guideline for community based animal feed production (Community Based Production Management) • Scientific research paper to proof viability of bush based animal feed as a commercial product (Collection of Data, Implementation of Trials)
Support to De-Bushing Project	• Field Trip to experienced animal feed producers • Analysis of invader species • Development of business plan and project concept • Monthly mentoring/technical expert to coach African Wild Dog • Internat expert on animal feed production (up to 4 visits planned in project lifetime) • Internat. expert to publish scientific publication on nutritional value of invader species, feed mixture, long term effect on animals and others.	• Capacity Development provided to ensure sustainable usage of technology • Implementation Guideline for community based animal feed production (Scientific evidence) • Scientific research paper to proof viability of bush based animal feed as a commercial product (Development and coordination of research project, writing and publishing of article in scientific journal)

ANNEX 1

Draft Concept/Table of Content for Baseline and monitoring Report

The "Sustainable Management of Namibia's Forested Lands" (NAFOLA) Project aims to reduce pressure on forest resources by facilitating the gazettement of community forests and increasing the capacity of communities for the uptake of improved agriculture, livestock and forestry management practices in community forests.

The project has several outputs aimed at enhancing productivity of the agriculture sector, within established community forest areas. The outputs include:

a. Increase adoption of rangeland management practices as promoted by the National Rangeland Policy and Strategy
b. Improve livestock health and increased off-take
c. Demonstrate sustainable options for reducing bush encroachment

As a consequence, the NAFOLA Project entered into partnership with the Support to De-Bushing Project to set up a pilot project on bush thickening where the harvested bush material will be used to produce feed for livestock. The two projects will work out a co-management modality with the African Wilddog Conservancy/ community forest. The pilot project will demonstrate that invader bush can be managed sustainably, contribute to income generation of communities in encroached areas, improve forests and range conditions and enhance land productivity. NAFOLA through this pilot project will also explore mechanisms for "aftercare", to support the regeneration of grasses and desired tree species.

In order to demonstrate the impacts of the pilot project in relation to NAFOLA's and the Support to De-Bushing Project outputs, the following research areas/ questions are identified.

1. Environmental issues
    a. Current status of bush encroachment in African Wilddog and its environmental impacts
    b. Impact of the pilot project on the level bush encroachment (area cleared, re-occurance/re-generation) and overall environmental conditions (biodiversity, soil fertility, erosion, grasses)
    c. Effectiveness of different aftercare methods applied, approaches

2. Social issues
    a. Current impacts (positive & negative) of bush encroachment on the community

   b. Current mechanisms/measures in place to deal with bush encroachment
   c. Income generated from the pilot project, distribution of income
   d. Impact of feed on livestock

3. Economics
   a. Investment to set up the project, running costs, labour
   b. Income generation
   c. Distribution of benefits

4. Governance
   a. Community organization, role of conservancy/community forests and other local level institutions
   b. Policy, legal issues to take into consideration
   c. External support

ANNEX 2

Draft Table of Content: Implementation Guideline/ Farmers Manual

The Manual is a tool for farmers to implement a production site on their communal farms. It shall provide hands-on practical information. In a later step it can also be used as training material.

1. General requirements/principles
Introduction

2. Technology
This chapter shall illustrate the needed equipment. Pictures and illustrations shall inform the farmers on needed equipments and information on where to procure it shall be included. Costs must be included.

3. Organisational/ Communal Set Up
For the production to function well, the organisational set up is crucial. This chapter shall highlight the lessons learned from our pilot and inform the farmers about possible institutional arrangements, such as engaging a private company to run the production. Involvement of different authorities shall be suggested as well. Further there shall be information on different benefit distribution concepts.

4. Bush species and best recipes by regions
This chapter shall inform about the different species that are most common sorted by regions. Further it shall give information on the different nutritional values of these species and advice on mixtures/needed supplements. Farmers shall thereby be informed on how to identify the species on their land. Further they shall be able to choose the right/best recipe for their situation.

5. Bush Harvesting Methods
Based on brochures that are available at Support to De-bushing Project already, we can provide a chapter on how to de-bush. Hands-on information shall be provided on how to use the harvesting equipment, needed activities and best practices.

6. Good production practices on farm
This chapter shall provide information on the production of the animal feed itself. It shall provide information on how to use the machine, how to store the supplements, how to store the produced feed, how to overcome health hazards for the animals, etc.

7. Costs

This chapter shall summarise the costs and provide information to the farmers on how to calculate possible benefits/income.
Funding opportunities can be part of this chapter.

8. Further Contacts

This chapter shall provide a readable table with contact details. It shall mention the contact details of companies selling the needed equipment, possible funding agents, De-Bushing Advisory Service, relevant actors in the respective Directorates of MAWF.

ANNEX 3

Draft Table of Content: Research Paper

This research paper shall provide the scientific proof that bush-based animal feed production is working. It covers documentation and analysis of field trials and summarises the lessons learned from the pilot sites.

1. Introduction
Provides information on study and project

2. Literature Review
The review will look mainly at previous use/experience/research on woody matter as a livestock feed, processing techniques, mixtures tested, and effects of live weight gain and any other noted animal health impacts. It is expected that methods of and tested technologies for the processing of cellulose and lignin into feedstuffs would be a main focus, such as ensilage (aerobic vs. anaerobic digestion), effect of different temperatures, effect of different chemical additions (e.g. sodium hydroxide, urea, etc.), and time dependent variables. Other important and related variables would be the composition of the (up to ten) most common tree species that may be included in bush-based fodder (BBF) mixes at the selected sites in Namibia (foliage, fruit, wood and bark), and the components to be used (e.g. all matter up to 2 cm stem diameters, up to 4 cm, etc., i.e. the ratios of woody vs leafy vs pod matter in the mix).
A further level of research will involve a preliminary investigation into locally available low cost feed supplements to add to the bush-based fodder, their composition, and complementary aspects (or otherwise) of possible mixtures. These could include agricultural residues (molasses, cotton seed cake, cereal husks, etc.), industrial by-products (fish meal, blood and bone meal, etc.), or other alternative products (such as prosopis pod meal, etc.).

3. Methodology and approach
This chapter outlines the methodology (literature review, farm trials, chemical analysis, life weight trials, etc.) and the general approach (information on both pilot sites, data collection, etc.).

4. Experimental set- up
This chapter will provide information on the research design and describe the experimental set up in detail.
The experiment will be designed in to stags. The first phase will assess local capacity to undertake feeding trials and data collection, and noting the possibility of producing adequate quantities of suitably consistent feed mixtures. At a minimum, the first phase should comprise of two replicates of 3x12 animals, with two feed mixtures and a control.
The full second phase trials will be much expanded, depending on results and feedback from the first phase, to include more animals from both identified farms, with up to four feed mixtures each being fed to 25 animals.

5. Data collection and results
This chapter will summarise the collected data and results.

6. Biological assessment
Analysis on nutritional input, effects on animals, recommendations on recipes.

7. Technology assessment

Analysis on storage aspects and maybe equipment, impact on bush encroachment

8. Economic evaluation of intervention

Analysis on related costs for supplements, equipment, energy and recommendations on how to make the product viable and competitive.

9. Résumé and recommendations

Final summary and recommendations: Proof of Concept, Impact on Bush Encroachment.