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Using the Techfit tool to prioritize feed technologies in Gebrekidan, Atsbi-Wonberta District, Tigray, Ethiopia

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Introduction

A farming and livestock production system assessment was carried out in Gebrekidan *kebele* of Atsbi-Wonberta District in Tigray region using the Feed Assessment Tool (FEAST). The study indicated that feed is one of the major constraints in livestock production in the *kebele.* Hence, identifying appropriate feed technologies and promotion of the technologies for the area is imperative. The Techfit tool was used to identify and recommend appropriate feed technologies. Techfit is a tool developed to prioritize and select best fit technologies from wide range of options potentially available for farmers. The tool is used for scoring and ranking of different feed technologies taking into consideration the existing situation of the farming system of the area. It enables the identification and prioritization of appropriate technologies for a given situation within a short period of time. Therefore, the objective of this work was to rank and prioritize best fit feed technologies from a basket of options for Gebrekidan *kebele* of Atsbi-Wonberta district.

Study site

Gebrekidan *kebele* is located 14^{o}00'06.03''N, 39^{o}43'30.55''E at an altitude of 2855 meters above sea level (m.a.s.l). It is 83 km from Mekelle town and 18 km from Atsbi town. The average rainfall of the *kebele* is 668 mm per annum and the average temperature is 18^{o}C. The total area coverage of the *kebele* is estimated at 117.554 sq km (ILRI- IPMS report, 2004) and is known by its erratic rainfall which starts at the end of June and ends in mid-August. This *kebele* is one of the drought prone *kebele*s of the *woreda*. There are five administration villages in Gebrekidan *kebele* namely Barka, Atsgebet, Wukro, Hichean and Ketema-Dera with a total human population of 10,148 human populations, 4502 males and 5646 females.

Sampling method

Farmers were selected based on gender (men and women household head), land size (landless, below average, average and above average), and age group (youth, middle age and elders). Twenty participants were selected. The survey was undertaken on 22-23rd December, 2013.

Data collection

Scoring the context attributes

The participatory rural appraisal approach and the Techfit tool were used to collect information. A checklist was used to collect information about the context attributes of the technologies. Farmers gave values from 1 to 4 for availability of or access to land, labour, credit/cash, input delivery and farmers' knowledge and skills. Highest availability of each attribute scored a value of 4 whereas lowest availability scored 1. They were encouraged to discuss and debate on the scores they gave for each attribute. Context scores were also made by experts to assess whether the score conformed to that of the farmers. The different issues that farmers raised during discussions were recorded and used as inputs for the scoring made by the researchers on context relevance and scope for improvement. Those technologies with high total score for context relevance and impact potential were carried forward to the main filter.

Pre-filtering of technologies

Technologies which were not applicable to the *kebele* were pre-filtered. Pre-filtering was done based on context relevance and impact potential of the technologies scores (product of the two scores). The context relevance refers to the relevance of the technology to the study area. Relevant technology that can address the identified feed issues within the existing production conditions was given a score of 4 while the one with lowest relevance was given a score of 1. The impact potential of the technologies was about the potential of the identified technology in addressing the feed issue in the area. This was developed by a team of feed experts and the scales ranged from 1-4 (1 least impact, 4 highest impact).

Main-filter of the technologies

Technologies that passed the pre-filtering process were further assessed in main filtering based on context attribute and technology attribute scores and score for scope for improvement. The context attribute scores (scores for availability of land, labour, cash/credit, inputs and knowledge) were given by the selected farmers from the kebele, whereas the technology attribute scores (requirement of each potential feed technology for land, labour, cash/credit, inputs and knowledge) had already been set in the Techfit tool by a group of experts. The context attribute scores were multiplied by the technology attribute scores for each of the five attributes considered. Finally, total scores were determined by adding the scores for the five attributes plus the score for the scope for improvement. The technologies were ranked based on this total score.

Results and Discussion

According to results from the Techfit tool analysis, the preferred technologies ranked by farmers in order of 1st, 2nd and 3rd were feeding of home grown legume residues, use of weeds, cut grass and tree leaves and rethreshing and mixing of crop residues before storage and feeding respectively. Other rankings are shown in Table 1.

Table 1: Prioritization of technologies in Gebrekidan using Techfit analysis

Technology options to address quantity, quality, seasonality issues	Total Score	Rank
Improvements of crop residues		
Machine chopping of residues	37	5
Hand chopping of residues	39	4
Generous feeding of CRs	40	3
Treatment of crop residues (e.g. urea treatment)	24	15
Feeding of home grown legume residues	42	1
Feeding of bought in legume residues	0	17
Rethreshing and mixing of crop residues before storage and feeding		3
Supplementation		
Supplement with home-produced local brewers waste	40	3
Supplement with bought in local brewers waste	32	9
Supplement with UMMB	34	8
Supplement with agro-industrial by-products (wheat bran, wheat middlings, oilseed cakes, pulse crop milling by-products such as lentil bran and hulls, etc.)	36	6
Use leaves and/or pods of farm trees (e.g. acacias, milletia etc)	0	16
Use of oats grain and hulls for supplementary feeding	29	11
Feed conservation		
Feed conservation of private natural pasture (surplus) (HaY)	30	10
Making hay from cultivated annual fodder with readily available seed (e.g. oats/vetch)	25	14
Making hay from cultivated perennial fodder with specialist seed (e.g. alfalfa, Rhodes)	17	16
Fodder tree leaf meal	25	14
Improved forages		
Fodder beet for cooler highlands	25	14
Improved forage grasses (Napier grass, Rhodes grass)	26	14
Improved forage legumes (alfalfa, desmodium sp.)	25	14
Fodder trees (sesbania, leucaena, tagasaste, gliricidia)	28	12
Use of improved annual grass-legume mixture (e.g. oat-vetch forage or hay)	30	10
Use of improved perennial grass-legume mixture (e.g. rhodes-alfalfa forage or hay)	25	14
Feeds from cropping systems		
Use of weeds, cut grass, tree leaves	41	2
Vegetable waste	40	3
Balancing feeds		
Smart feeding (targeted use of bought-in concentrates to target productive animals)	35	7
Complete feed-TMR (mash, block, pellet)	29	11

Technologies which were less applicable under the real situations of Geberekidan for feed improvement intervention were dropped out prior to carrying out of the Techfit analysis. Some of the inappropriate technologies as perceived by farmers are shown in Table 2.

Table 2: Inapplicable technologies in Gebrekidan for feed improvement interventions

	Technologies
1	Commercial dairy supplements
2	Poultry litter
3	Buying baled day (e.g. oats/vetch, Rhodes grass, meadow etc.)
4	Feed conservation (silage)
5	Fodder trees - dual purpose (Pigeon pea)
6	Thinning (e.g. maize and/or sorghum - cutting green at knee height)
7	Use of tops, leaf strips (e.g. maize or sorghum)
8	Use of enset and/or banana leaves and by-products
9	Crop/forage intercropping (sorghum/cowpea for dry areas and maize/lablab for wetter areas)
10	Root and tubers - dedicated use
11	Root and tubers - use of byproducts

Conclusions

Most of the preferred technologies relate to the use of crop residues and improvement of the nutritive value using various methods. Interventions targeting use of crop residues should therefore be encouraged. The use of both cereal and legume crop residues should be taken into consideration.