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

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Introduction

Atsbi *woreda* is located in the eastern zone of Tigray Region, on the border with Afar Region. Its topography is dominated by mountainous hill sides and soil erosion. Degradation is one of the agricultural problems. It is suitable for livestock production. Sheep are predominant. Golgolnaele is one of the Peasant Associations (PA) of the *woreda*. This PA is located in Atsbi town, the largest town of the *Woreda*. Livestock sector is one of the major sources of income to small scale farmers. Despite its livestock potential, the production system is still very traditional. Traditionally, ownership of large herds of livestock was considered as expression of status in the rural farming community. The productivity of these livestock is very low due to multifaceted reasons such as feed shortage both in quality and quantity, poor vet service, poor management and limited awareness of the farmers. An assessment of the farming and livestock production system carried out in the PA using the Feed Assessment Tool (FEAST) identified feed as the number one challenge to livestock production in the PA. Hence, identifying appropriate feed technologies and promotion of the technologies for the area is imperative. Techfit is a tool developed to prioritize and select best fit technologies from a 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 Golgolnaele.

Study site

Golgolnaele is located 13^{o}52’50.69’’N, 39^{o}44’07.98’’E at an altitude of the 2727m.a.s.l. It has four villages namely Meargat, Sirean, Beatiearo and Tegahnne. These four villages have a population of 8054 (3597 male and 4457 female) and 1621 households. The land use pattern of the PA is classified as 919.1ha of farmland, 3600ha of non-cultivated area, hillsides and mountains, 590ha of gullies, 562ha of grazing land/pasture land, 2800ha of natural forest and 1011ha of protected area (ILRI IPMS, 2004). It is one of the drought prone areas of the region and is characterized by unimodal erratic rainfall which begins at the end of June to mid-August.

Sampling method

Golgolnaele was selected based on its short distance from Atsbi Town, the capital city of the *woreda*. Farmers were selected based on gender (men and women heads of households), wealth or land size (landless, below average, average and above average), and age group (youth, middle age and elders). The participant farmers were representative of all villages within the PA. The participating women made up 40% of the farmers.

Data collection

Scoring the context attributes

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 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. This 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 input 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 PA were pre-filtered. Pre-filtering was done based on the scoes of the context relevance and impact potential of the technologies (product of the two scores). The context relevance refers to the relevance of the technology to the study area. A 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 PA, 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

The farmers in Golgolnaele ranked their first three preferred technologies as feeding of home grown legume residues, rethreshing and mixing of crop residues before storage and feeding and generous feeding of crop residues. Other preferred technologies included the use of weeds, cut grass, tree leaves and hand chopping of residues. Supplementation using "*atella*", the local brewers' waste and vegetable waste were also preferred as shown in the rankings in Table 1.

Table 1: Prioritization of technologies in Golgolnaele using the Techfit tool

Technology options to address quantity, quality, seasonality issues	Score	Rank
Improvements of crop residues		
Machine chopping of residues	41	5
Hand chopping of residues	47	3
Generous feeding of CRs	47	3
Treatment of crop residues (e.g. urea treatment)	27	16
Feeding of home grown legume residues	49	1
Feeding of bought in legume residues	0	18
Rethreshing and mixing of crop residues before storage and feeding	48	2
Supplementation		
Supplement with home-produced local brewers waste	46	4
Supplement with bought in local brewers waste	38	7
Supplement with UMMB	35	9
Supplement with agro-industrial by-products (wheat bran, wheat middlings, oilseed cakes, pulse crop milling by-products such as lentil bran and hulls, etc.)	39	6
Use leaves and/or pods of farm trees (e.g. acacias, milletia etc)	0	18
Use of oats grain and hulls for supplementary feeding	33	11
Feed conservation		
Feed conservation of private natural pasture (surplus) (HAY)	35	9
Making hay from cultivated annual fodder with readily available seed (e.g. oats/vetch)	30	14
Making hay from cultivated perennial fodder with specialist seed (e.g. alfalfa, rhodes)	19	17
Fodder tree leaf meal	29	15
Improved forages		
Fodder beet for cooler highlands	30	14
Improved forage grasses (napier grass, rhodes grass)	31	13
Improved forage legumes (alfalfa, desmodium sp.)	30	14
Fodder trees (sesbania, leucaena, tagasaste, gliricidia)	32	12
Use of improved annual grass-legume mixture (e.g. oat-vetch forage or hay)	34	10
Use of improved perennial grass-legume mixture (e.g. rhodes-alfalfa forage or hay)	29	15
Feeds from cropping systems		
Use of weeds, cut grass, tree leaves	47	3
Vegetable waste	46	4
Balancing feeds		
Smart feeding (targeted use of bought-in concentrates to target productive animals)	36	8
Complete feed-TMR (mash, block, pellet)	31	13

Technologies which were considered inapplicable under the real situations of Golgolnaele for feed improvement interventions were dropped. They are listed in the following Table 2 below.

Table 2: Inapplicable technologies in Golgolnaele for feed improvement interventions

	Technologies
1	Commercial dairy supplements
2	Poultry litter
3	Buying baled hay (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

The use of crop residues and the improvement of their nutritive value are most preferred technologies. These technologies need to be given priority to other issues like supplementation as crop residues are the most available feed resources to farmers through most of the year and would be potential to improve their immediate needs. It is interesting that the farmers also prefer machine chopping for crop residues. They may be in a position to acquire credit for simple chopping machine. This option needs to be exploited.