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

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# Introduction

Habess is a peasant association (PA) in Atsbi district. It is located southwestern of Atsbi town in Tigray region. It is dominated by mountainous hillsides, severe soil erosion and land degradation. The availability and landholding of the cultivated farmland per household is very small. Sheep production is the main source of income for the local community although the productivity of sheep is very low. There is very limited information at smallholder farmer level on livestock production improvement. A survey carried out to evaluate the existing farming and livestock production system using the Feed Assessment Tool (FEAST) identified feed shortage as the second most important challenge to livestock productivity. To enable better targeting of interventions to address livestock feed problems in the area, the Techfit tool was used to identify and prioritize feed technology options in Habess. The study was conducted from 27 – 28th December, 2013 by researchers from Mekelle Agricultural Research Center and Tigray Agricultural Research Institute with backstopping from the International Center for Agricultural Research in Dry Areas (ICARDA).

# Methodology

The FEAST survey was conducted in Habess. Habess is located 13$^{o}$48’40.38’’N and 39$^{o}$41’18.01E latitude, at an altitude of 2569 m.a.s.l. The area coverage of the PA is estimated as 18.7379 sq. km (ILRI- IPMS report, 2004). The total human population of Habess is 4047. The proportion of males and females is 49.2% and 50.8% respectively. Habess has 917 households with an average family size of the six persons per household.

## Sampling method

Participating farmers were selected based on the criteria of gender (men and women household head), land size (landless, below average, average and above average) and age group (youth, middle age and elders). Twenty farmers from the PA were selected for a group discussion using the participatory rural appraisal approach.

# Data collection

## Scoring the context attributes

A checklist was used to collect information about the context attributes of farmers. 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. Farmers were encouraged to discuss and debate on the score they gave for each attribute and they gave a score for availability of each attributes. This context score was 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 *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. 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 process based on context attributes, technology attributes scores and scores for the 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 the Techfit analysis results in Habess, feeding of home grown legume residues was ranked first followed by re-threshing and mixing of crop residues before storage and feeding (table 1). The use of weeds, cut grass, tree leaves, generous feeding of crop residues, hand chopping of residues, supplement with home-produced local brewers waste and vegetable waste were other preferred feed technologies. The option of supplementation using agro-industrial by-products and concentrates is also favorable to farmers. Improved feeding strategies, including smart feeding, would be beneficial to livestock farmers in Habess who earn at least 30% of their income from fattening of sheep and goats and cattle, which contribute 23% and 7% respectively according to data from the FEAST survey.

Technologies which were perceived as less beneficial to farmers are listed in Table 2.

**Table 1: Prioritization of technologies in Habess using Techfit analysis**

| Technology options to address quantity, quality, seasonality issues | Score | Rank |
|---|---|---|
| Improvements of crop residues | | |
| Machine chopping of residues | 44 | 4 |
| Hand chopping of residues | 45 | 3 |
| Generous feeding of CRs | 45 | 3 |
| Treatment of crop residues (e.g. urea treatment) | 28 | 13 |
| Feeding of home grown legume residues | 48 | 1 |
| Feeding of bought in legume residues | 0 | 15 |
| Rethreshing and mixing of crop residues before storage and feeding | 46 | 2 |
| Supplementation | | |
| Supplement with home-produced local brewers waste | 45 | 3 |
| Supplement with bought in local brewers waste | 39 | 7 |
| Supplement with urea molasses mineral blocks | 39 | 7 |
| Supplement with agro-industrial by-products (wheat bran, wheat middlings, oilseed cakes, pulse crop milling by-products such as lentil bran and hulls, etc.) | 42 | 5 |
| Use leaves and/or pods of farm trees (e.g. acacias, milletia etc) | 0 | 15 |
| Use of oats grain and hulls for supplementary feeding | 32 | 10 |
| Feed conservation | | |
| Feed conservation of private natural pasture (surplus) (HAY) | 32 | 10 |
| Making hay from cultivated annual fodder with readily available seed (e.g. oats/vetch) | 28 | 13 |
| Making hay from cultivated perennial fodder with specialist seed (e.g. alfalfa, Rhodes) | 19 | 14 |
| Fodder tree leaf meal | 29 | 12 |
| Improved forages | | |
| Fodder beet for cooler highlands | 28 | 13 |
| Improved forage grasses (napier grass, rhodes grass) | 29 | 12 |
| Improved forage legumes (alfalfa, desmodium sp.) | 28 | 13 |
| Fodder trees (sesbania, leucaena, tagasaste, gliricidia) | 32 | 10 |
| Use of improved annual grass-legume mixture (e.g. oat-vetch forage or hay) | 33 | 9 |
| Use of improved perennial grass-legume mixture (e.g. rhodes-alfalfa forage or hay) | 30 | 11 |
| Feeds from cropping systems | | |
| Use of weeds, cut grass, tree leaves | 46 | 2 |
| Vegetable waste | 45 | 3 |
| Balancing feeds | | |
| Smart feeding (targeted use of bought-in concentrates to target productive animals) | 40 | 6 |
| Complete feed-TMR (mash, block, pellet) | 34 | 8 |

**Table 2: Feed technologies perceived as inappropriate by farmers in Habess**

| | 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

The use of crop residues is perceived by farmers in Habess as the most appropriate feed technology. Farmers are aware of the low nutritive value of the crop residues and make various attempts to augment the quality through supplementation. It would be worthwhile to introduce interventions that would support the efforts of farmers in improving the quality of feed resources, namely crop residues, which are available year round for their livestock.