Mapping livestock feed resources and targeting technologies: Making the most of FEAST and TechFit

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Feed is a key issue in developing world livestock systems
Potential narrowing of yield gap through improved feeding

Baseline
Buffalo fed cereal straw, native grass + 1.5 kg bran/day

Improved forage
Energy content of straw improved through new crop cultivars

Green feed
Buffalo supplemented with 10 kg (fresh weight) good quality grass

Green feed + bran
Bran increased to 3 kg/day + 8 kg (fresh weight) good quality grass

Increased bran
Bran increased to 5 kg/day

Milk Yield (kg/year)

Researcher driven feed solutions often fall short

Why?

- Not suitable for local context
- Not dealing with the key constraints
- Do not sufficiently involve farmers and other local stakeholder in their selection and design
- Do not take account of wider system constraints such as labour, markets etc.
Complete diet blocks lying unused - India
What is needed to avoid futile feed development?

- A systematic approach to assessing the feeding context
- Looking wider than just feed
- Involving farmers and local stakeholders in the process
- Asking the right questions in a structured way
- Matching feed options with local system
Feed Assessment Tool (FEAST)

Question guide and household survey

Data app

Intervention fact sheets

Global data
How does FEAST work?

1. PRA Exercise
   - Overview of **farming system** and livestock feed aspect
   - **Milk marketing**, veterinary services
   - **Major problems** for livestock production

2. Individual farmer survey
   - Quantitative information on **crop-livestock production**, **feed availability**, feeding rations
   - Qualitative information - **perception on feed quality**

3. Data analysis and developing interventions
   - Enter data in **FEAST template**
   - Based on results develop **ideas for intervention**
   - Look at intervention ranking analysis
Matching feed options to local system

• What are the key elements of the “local system”? 
• Techfit tool
  • Matching feed options to different local conditions
  • Series of expert workshops: Dehra Dun, Hanoi, Addis Ababa
  • Developed spreadsheet-based intervention ranking tool
  • Now incorporated into FEAST
Context attributes

Land
Labour
Credit
Inputs
Knowledge
Water

Photo credits, ILRI and Alan Duncan
Key feed constraint

Seasonality / dry or cool season feed scarcity

Seasonality / growing season feed scarcity

Quality

Quantity
What farming system are we working in?
What is the core commodity?

- Cattle/buffalo breeding (cow-calf)
- Cattle/buffalo fattening
- Dairy cattle / buffalo
- Sheep/goat breeding
- Sheep/goat fattening
- Pig breeding (sow-piglets)
- Pig fattening
To recap – the system can be described by various simple attributes

<table>
<thead>
<tr>
<th>Key context attributes</th>
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<td>Land</td>
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<table>
<thead>
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<th>Key constraint</th>
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<tr>
<td>Quantity, quality, seasonality</td>
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<table>
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<tr>
<th>What is the system?</th>
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<tr>
<td>Mixed intensive, agro-pastoral etc</td>
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<th>What is the commodity?</th>
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<td>Dairy, sheep fattening etc</td>
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<td>Intervention</td>
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Feed interventions

Improved feed troughs to reduce wastage

Description
- There are many different types of containers that farmers use as feed troughs. Unfortunately, many are not well suited resulting in high wastage of feed—up to 25% wastage.

Ideal feed troughs should have the following features:
- Located outside the actual pen and placed off the ground for easy access and cleaning.
- Deep and large enough to hold 3047 kg of dry feed of ruminants (e.g., cows, sheep and goats) that are kept in pens all day, so farmers need to replenish feed only 3 times per day.
- As a rough guide, animals need to eat the equivalent of 3% of their body weight in good quality dry feed per day. For a 300 kg cow this equates to 9 kg of dry matter or approximately 45 kg of fresh feed each day, which requires a large feed trough. For pigs, the calculation of 3% of body weight of high-quality feed per day.
- Feed troughs need a neck bar that encourages the animal to keep its head in the pen while eating.

Key benefits
- Reduces feed wastage, which can be as high as 25%. A well-designed feed trough reduces feed costs and saves feed that would otherwise be needed to grow the ‘wastened’ feed.

Key considerations
- None, unless in situations need to be purchased.

Illustration based on Zambrano et al. (2008)

Concrete feed trough, Almora, Uttarakhand, India.

Photo credit Nils Teufel
### Feed interventions

**Feed Intervention**

**TechSheet 13**

**Hay making**

#### Description

- Hay preserves fodder in a dry form. Nutrients are preserved with minimum loss and in a storable form so they can be available as feed at the time of scarcity.
- Small scale hay making can be done with a sickle/machete and the dried hay can be baled manually using a box bale. This method produces a wide range of rectangular bales usually weighing between 10-20 kg.
- Large scale hay making requires a tractor to cut forages using a rotary disk mower, raking and baling hay using a mechanical baler. This method produces either (a) large round or rectangular bales (6-foot diameter bale) or (b) standard rectangular bales usually weighing between 13-15 kg.

#### Key benefits

- **Manual box baling:**
  - compresses loose hay and increases storage capacity.
  - Although haymaking is labour intensive, baling reduces total costs of handling as compared to loose hay.

- **Baling in general:**
  - Hay is an easily tradable feed and helps alleviate seasonal feed shortages.
  - It helps farmers maintain high milk production throughout the dry season, when feed is in short supply. It thus increases total farm milk production.
  - It may enable farmers to increase herd size and so increase profitability of animal production.

#### Key limitations

- **Depends on sufficiently long dry periods to enable drying and baling.** Hay quality deteriorates quickly if drying is interrupted by rain.
- **Hay must be cut while the forages are not too old** (high amount of leaf and a few stems). Then it must be cut and turned to facilitate fast drying.
- **Hay must be baled at a moisture content of 16-20%.** Baling hay if too wet will spoil the hay.
- **An ideal hay bale should have a high leaf:stem ratio; the mass of leaf content should equal the mass of stem content.**

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**Box baled hay, Rwanda**

Photo credit Ben Lukuyu
Feed interventions

**Oat/vetch annual crop, Ada’a, Ethiopia**

Photo credit Alan Duncan
Feed interventions

**Lucerne trial plot, Almora, Uttarakhand, India**

*Photo credit Alan Duncan*
Feed interventions

Urea treatment of maize stover, Cibitoke, Burundi

Photo credit Alan Duncan
How does Intervention Ranking Analysis work?

Key technology attributes
- Land
- Labour
- Credit
- Input
- Knowledge
- Water

Key context attributes
- Land
- Labour
- Credit
- Input
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Key constraint
- Quantity, quality, seasonality

What is the system?
- Mixed intensive, agro-pastoral etc

What is the commodity?
- Dairy, sheep fattening etc

Scored for each village during FEAST

Scored for each intervention by experts

Key constraint mitigation
- Suitability for system
- Suitability for commodity
- Impact on productivity
How does Intervention Ranking Analysis work?

### Key technology attributes
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### Suitability for system

### Suitability for commodity

### Impact on productivity

### What is the system?
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Score
### Intervention Analysis Report

31/05/2016 central, south east ward sam malaanga dairy, alego usonga

Click icons to sort by individual scores. (Click Here for an explanation of scores.)

Click intervention to view details.

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Mitigate Core Constraint</th>
<th>Relevance to Commodity</th>
<th>Relevance to Farm System</th>
<th>Match Context Attributes</th>
<th>Production Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplementation with energy-rich supplements e.g. molasses,</td>
<td>16</td>
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<td>Use of commercial balanced compounded feeds (e.g. dairy meal)</td>
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<tr>
<td>Supplementation using protein by-products e.g. from meat, blood and bone,</td>
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<td>fish, legume leaf meal, biofuel co-products, oil seed, poultry litter etc.</td>
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<td>Cereal byproducts (rice bran, maize, wheat, etc.)</td>
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<td>Thinnings, tops, leaf strips (e.g. maize, sorghum, cassava, sweet potato,</td>
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<td>wheat, sugarcane etc.) - without sacrificing grain/tuber yield</td>
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Conclusion

• FEAST aims to support more systematic livestock feed intervention strategies
• Has been used in a dozen countries
• Is not a magic bullet but the process does help users to think more systematically about how to intervene
• Still needs development especially on making the scoring system more robust
www.ilri.org/feast