

Justification

Dairy feeding systems in Bangladesh is highly complex and still now mostly unidentified and undefined. The literature review on feeding systems is still far beyond the need for the scientific and practical use at farm level. The justification of this study is grounded on the following points:

- Country wide scarcity of the year-round feed supply.
- Adoption of appropriate feeding systems at farm level using local feed resources might enhance animal productivity.
- This instigates to do adaptive research and modelling on alternative feeding systems.
- Accurate assessments of current and future supplies and demands for livestock feed are needed to meet the need of the dairy cows for enhancing milk production.

Aim and Objectives

To estimate the effect of Alternative Feeding Systems (AFS) on nutrient, economic and environmental optimization of mixed crop dairy production systems

Methodology

This study was conducted applying International Farm Comparison Network (IFCN) methods. This method was used to quantify the nutritional and economic effect of adoption of AFS.

The IFCN method is based on two key pillars:

- Typical Farm Approach (TFA);
- Technology Impact Policy Impact Calculation (TIPICAL) model.

On the other hand, the data collected from the typical farms are analyzed by the TIPI-CAL model which is based on the concept of Farm Level Income and Policy Simulation (FLIPSIM) Model (Richardson et al., 1996). Using the concept of IFCN mathematical programming model, this study has developed a baseline farms, farms operating with current feeding system (CFS) and farms simulated for Alternative Feeding System (AFS) which are depicted in table 1. On this basis of this scenarios, both CFS and AFS were modelled mathematically in order to estimate the milk productivity and profitability.

Table 1: Alternative feeding systems versus current feeding systems

| Particulars | Baseline farms* | Feeding systems | | | |
|---------------------------------|-----------------|-----------------|-------|-------|-------|
| | | CFS 1 | CFS 2 | AFS 1 | AFS 2 |
| Herd size (cows/farm) | 2 | 1 | 3 | 3 | 4 |
| Milk yield (kg ECM***/cow/year) | 734 | 500 | 450 | 900 | 1025 |
| Land (ha) | 0.5 | 0.25 | 0.15 | 0.20 | 1.0 |
| Labour inputs (hr/year) | | | | | |
| -hired labour | - | - | 2400 | - | 2400 |
| -part-time labour | 738 | 500 | 1000 | 738 | 1500 |
| -family labour | 1500 | 2000 | 1200 | 1500 | 2000 |
| DM intake (kg/cow/d) | 6.9 | 6.4 | 7.1 | 6.5 | 6.2 |
| Proportions of farmers (%) | - | 45 | 18 | 26 | 11 |

*Baseline farms: Bangladesh two cow farms which is typical (Hemme, 2000 and Uddin et al., 2010). The typical farm represents 65% of the farms available in the country and this system practices a mixture of two or more feeding systems.
** ECM stands for Energy Corrected Milk (standardized to 4% fat and 3.3% protein)

Results and Discussion

Analysis of current feeding system:

- The bathan system has the lowest cost of milk production (34.7 US-\$/100 kg ECM)
- The highest cost is for the cut and carry (48.8 US-\$/100 kg ECM).
- The benefit-cost ratio was the highest (1.69) for Bathan feeding systems while the lowest was found for Tethering feeding systems (1.23).

Analysis of Alternative Feeding System

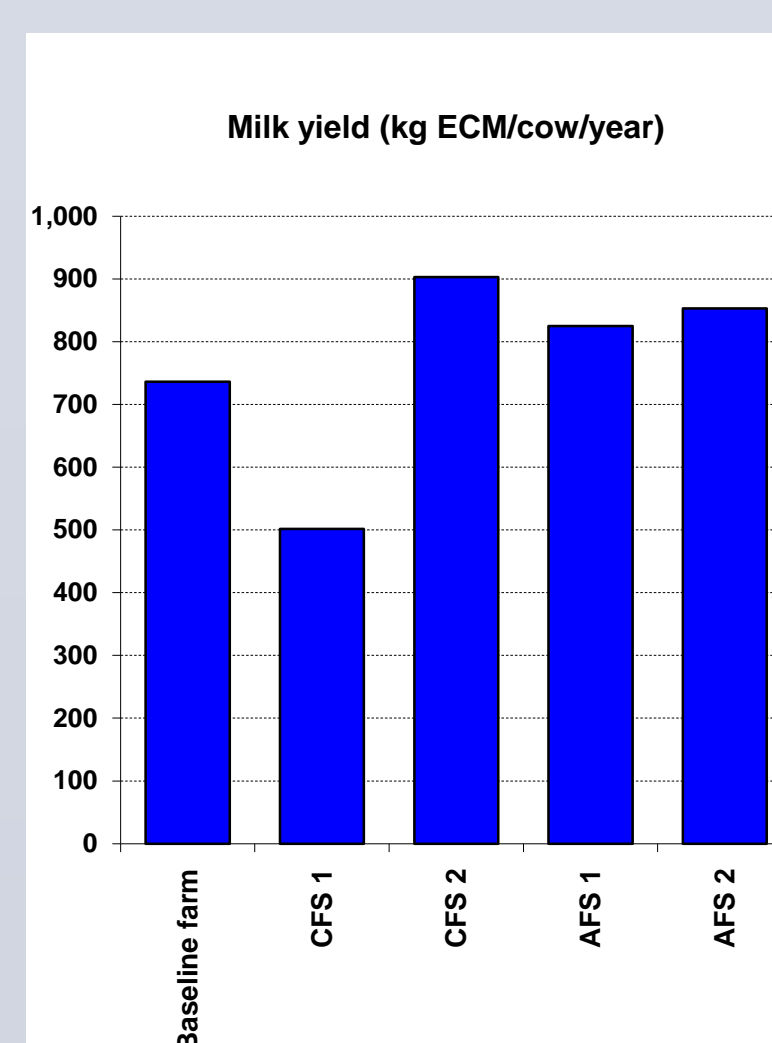


Figure 1. Effect on productivity

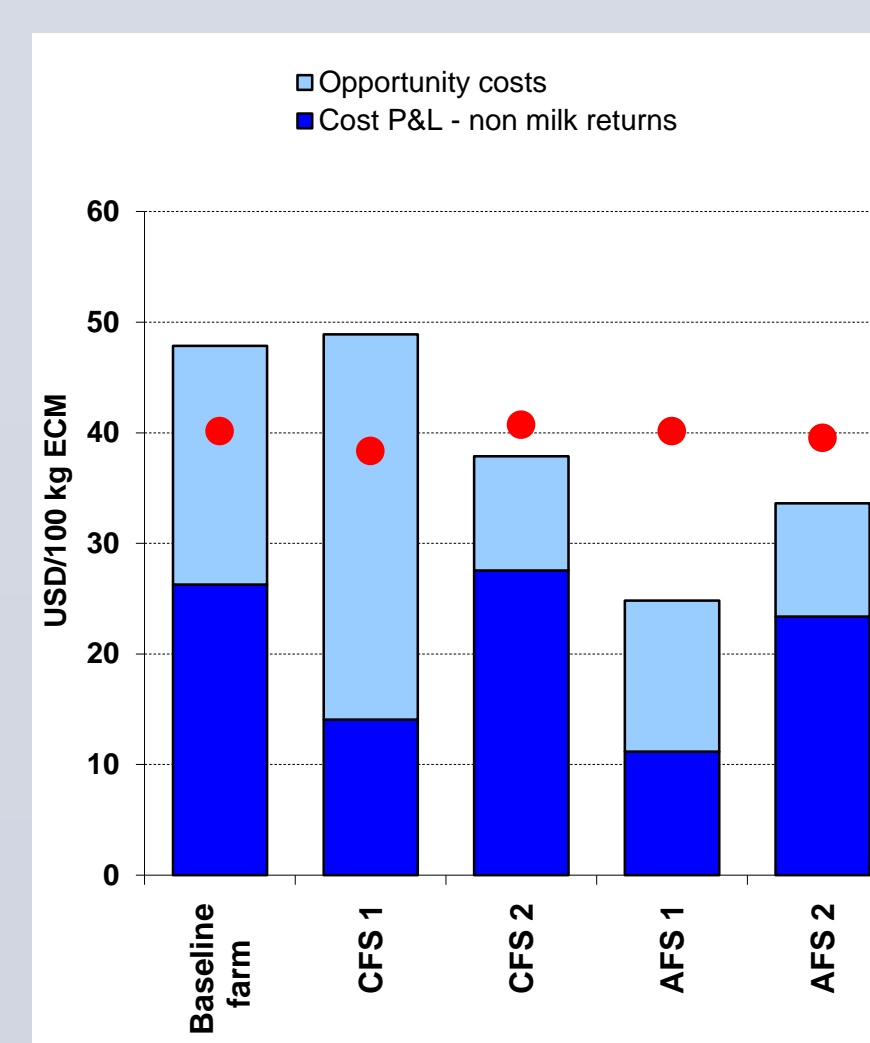


Figure 2. Cost of milk production only

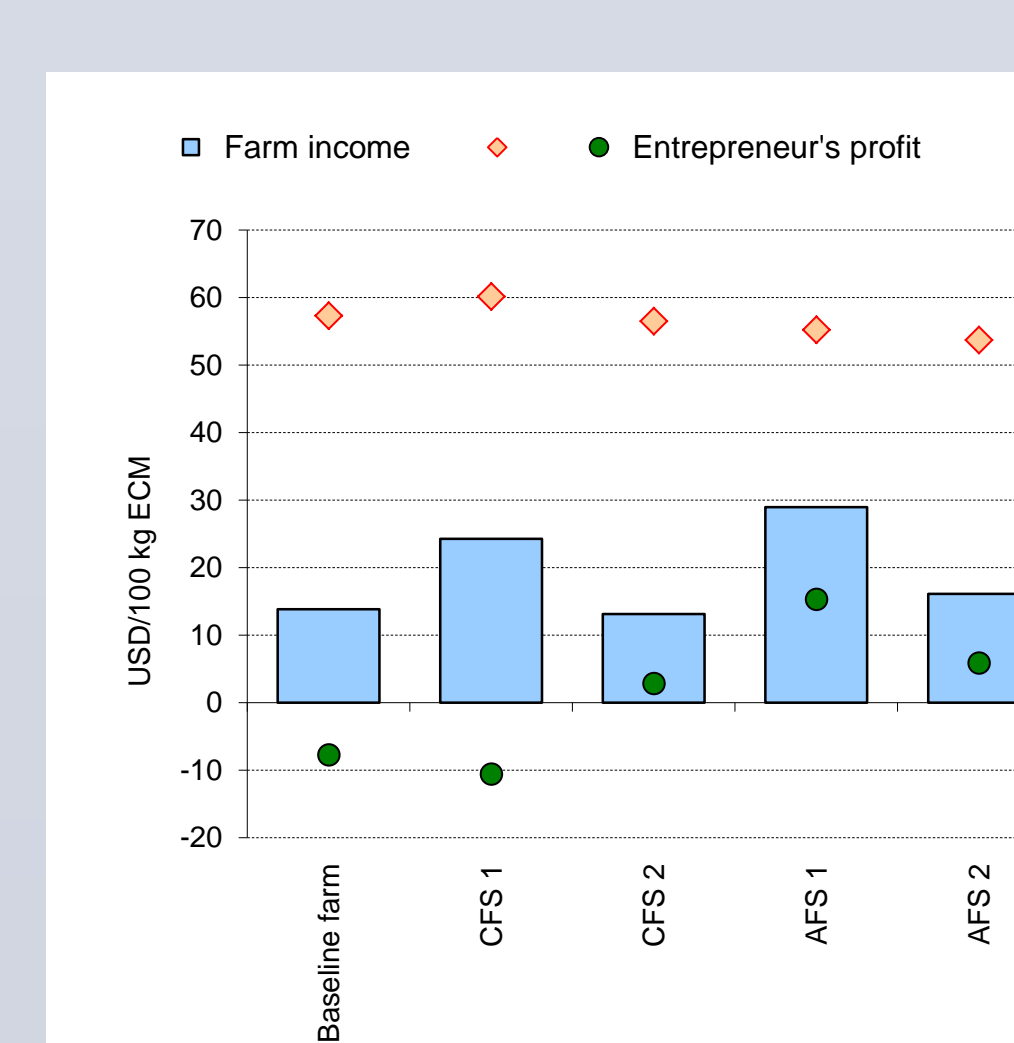


Figure 3: Effect on profit

- The level of feeding system optimization showed that use of local feed resources (e.g. by-products from feed industry) and local grasses are instrumental in reducing cost
- The use of local feed resources could replace 25% concentrates by agro-industrial by-products and cultivated green fodder
- The study revealed the feed cost can be minimized up to 35% once the local feed resources are included in the ration.
- However, the degree of benefits can be maintained only if the level of inclusion of by-product of feeds in dairy cattle are maximized if access to local feeds are ensured through efficient Alternative feed supply system.

Conclusions

- The adoption of AFS is associated with increased milk yield
- The cost of milk production is decreased due to use of local feed resources in the Alternative feed supply system
- The adoption of AFS turned from negative entrepreneurs Profit to positive entrepreneurs Profit

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