Underpinning the future for small holder dairy farming in Asia through improving farmer business skills

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Summary
Dairy farmers are business managers, no matter the size of their milking herd. A successful business is based on a good understanding of the technology underlying the production of the end product, in this case raw milk, and the ability of the manager to run the day-to-day operations at a profit and make astute decisions regarding investments in its sustainable future. The scale of operation is generally limited by personal asset worth, but even small holder farmers can make good financial returns on their dairy enterprise.

Every day we intuitively manage our personal assets when we make household business decisions at the shops, schools and in the wider community. It is the same with the small holder farmer when deciding on today’s livestock feeding program, next week’s crop agronomy program or the optimal herd size for next year’s likely farm gate milk price. Such decisions are based on the elementary frameworks of farm business management. This paper reviews the essential ones for a small holder dairy farmer.

Farm income and costs can be categorised into those cash and those non cash, while farm costs can be separated into variable and overhead items. Furthermore, farm profits can be quantified in various ways and the farmer must decide on which is the most meaningful for his particular needs. Three key measures of the performance of a farm business are cash profit, efficiency of utilising farm resources and increase in wealth, both personal and business.

Keywords: Dairy, small holder farming, business management, Asia

Introduction
During the last three to four decades, governments throughout Asia have established small holder dairy farming as part of their social welfare and rural development schemes, to provide a regular cash flow for poorly resourced and often landless farmers. Now these are becoming accepted rural industries thus requiring a more business-minded approach to management decisions on each farm. Dairy farmers across the world milk cows to make money, even the small holder mixed farmer with only one or two cows. As the dairy value chain becomes more liberalised, and farmers become more exposed to the pressures of global markets, their daily farming decisions should be based on changes to their farm profitability.

This paper provides a framework for farmers to develop new skills to become more astute business managers. Many small holder dairy farmers have mixed enterprises, such as cash cropping and various types of livestock of which dairying may be the major one. Mixed farmers must be able to separate out the inputs and outputs from their dairy enterprise, to be able to manage that part of their business. They should be able to budget their cash inputs to match their cash outflows during different seasons of the year, and also invest wisely in improving their herd size, cattle housing and other farm infrastructure and of most importance, their feed management systems (Makeham and Malcolm, 1986).
Although most farmers intuitively think about farm costs and returns, greater use must be made of formats allowing them to be aware of the relative importance of all their financial inputs in terms of their contribution to the cost of production (COP) per kilogram of milk produced on the farm. In addition, when contemplating changes in their routine farm practices, such as those discussed in detail by Moran (2005), these should be appropriately costed to allow them to make more meaningful and timely decisions.

The performance and sustainability of any dairy value chain in the tropics depends on the continued supply of raw milk from the small holder farmers. Economic pressures, such as those experienced by dairy industries throughout South and South East Asia, require each farmer to be more aware of their individual COP. Without such skills, farmers cannot prioritise their management decisions to address the high cost items of their production systems.

In addition, better knowledge of farm business management allows support organisations to more clearly define the key drivers of profit on small holder farms. This can provide regional and national strategies for government departments and national dairy organisations, such as those overseeing the producer-driven dairy cooperatives, to routinely evaluate and update their industry policies.

**The on-farm supply chain for dairy production technology**

The technology of milk production is similar for any dairy farm no matter its location, level of sophistication or farm performance. The supply chain for this technology can be broken into links (see Figure 1) and as with any chain, it is only as strong as its weakest link. Weakening any of these nine links can have severe ramifications on overall farm performance and profitability.

### Quantifying farm income

Small holder farmers generate income from their dairy enterprise in a variety of ways, either as cash or non-cash (that is imputed) income.

- Cash income originates from the sale of their enterprise products, namely raw milk, cull cows and excess stock, manure and if available, forages above farm requirements
- Imputed income originates from assets that would generate finance following their sale. Stock inventories and appreciation of land value are two good examples.

### Quantifying farm costs

Table 1 presents typical dairy enterprise costs, categorising them into variable and overhead costs.

- Variable (or direct) costs are those directly related to the farm’s output. For the dairy farmer, these can be broken down firstly the herd & shed costs, to maintain the entire dairy herd and to harvest the milk, and secondly, the feed costs, to feed the milking herd. The more milk produced and the bigger the dairy herd, the greater these variable costs.
- Overhead (or fixed) costs must be paid no matter how much milk is produced. These costs can be broken down further into cash and imputed costs. Cash overhead costs involve payments, such as for employed labour, interest and principle repayments on borrowed money, rates and other farm administration costs. Imputed overhead costs are the hidden ones because no cash changes hands. Family labour is the classic example where the farmer and his family work the farm but all too frequently don’t pay themselves for their labour. Depreciation of farm equipment is another imputed cost which becomes obvious when the equipment must be replaced.
1. Soils and forage management  
To optimise forage agronomy and fodder conservation

2. Young stock management  
To generate the productive milking cows

3. Nutrition and feeding management  
To optimise cow performance through adequate supply of nutrients

4. Disease prevention and control  
To overcome the limits imposed by microbial and invertebrate pests

5. Reproductive management  
To ensure herds can replace themselves in future generations

6. Breeding management  
To maintain an acceptable rate of genetic improvement for each generation

7. Environmental management  
To limit the constraints of the tropical climate on stock performance

8. Milk harvesting and hygiene  
To maximise milk quality pre and post farm gate

9. Value adding milk  
To improve unit returns for raw milk

### Table 1: Categorising farm costs on small holder dairy farms

<table>
<thead>
<tr>
<th>Category</th>
<th>Detail</th>
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<tr>
<td><strong>Variable costs</strong></td>
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| Herd & shed costs | Artificial insemination; inseminator, semen, drugs associated with reproductive management  
Young stock: raw milk or calf milk replacer, concentrates & roughages and herd management to point of calving  
Animal health; veterinarian visits, drugs, vaccines and drenches  
Milking harvesting; rubber liners, detergents and sanitisers, maintenance of milking machines, hot water, transport to milk collection centre, cooperative commission  
Purchased concentrates; formulated or ingredients  
Purchased forages; grass, roughage byproducts  
Home grown forages; fertilisers, irrigation, processing/storage, weed and pest control  
Machinery; fuel and oil, repairs and maintenance |
| Feed costs (for milking and dry cows) |                                                                       |

| Overhead costs    |                                                                       |
| Cash overhead costs | Paid labour  
Farm rates  
Farm administration and insurance  
Finance costs; interest, principal repayment, bank fees  
Repairs and maintenance of farm improvements  
Other; such as telephone, professional advice, office equipment, postage  
Family labour, such as operator’s allowance  
Depreciation |
| Imputed overhead costs |                                                                       |
The question often arises, what is the farm manager worth to the business? The answer is either what he could earn if he spent that time being paid to do other work (that is the opportunity cost of his farm labour), or what it would cost to employ someone else to do his job. With regards the latter, as it requires more skills to manage a large dairy herd (say 100 cows) than a small one (say 10 cows), the bigger the herd and the more complex the job, the greater should be the manager’s operator’s allowance or imputed labour costs.

Fuel and oil are normally included in the feed costs while some economists consider repairs and maintenance of farm machinery as an overhead rather than a variable feed cost. It doesn’t really matter so long as it only included once.

Some economists include personal (household) expenses in the farm costing rather than family labour. This does not allow for inclusion of any personal profit in the financial analyses, which is not the same as farm profit.

As dairying is frequently just one of the enterprises on many small holder farms, it is important to only consider the costs relevant to and the income generated from the dairy enterprise. Such partitioning of farm finances is often not easy because labour units, machinery and farm facilities are frequently used for a diversity of farm enterprises. In addition, if feed for any dairy animals (young stock as well as adult cows) is produced from a cropping enterprise on farm, such as rice straw or maize stover, it should be given a cost to the dairy enterprise.

The true cost of production is the sum of all those farm costs included in Table 1. Unfortunately one still finds published estimates of COP for small holder dairy operations that do not include family labour and finance costs. These create a false assessment of the true costs of dairy farming and if used to base government policies for dairy development and even milk prices (as in some countries), they do not paint the true picture of the economics of small holder dairy farming.

**Quantifying farm profit**

Most farmers think of profit in terms of cash as money left over from income after deducting all the costs involved in earning that income, so is the difference between gross income and operating costs. This may be the simplest measure of profit, but it is not necessarily the best. Profit can be expressed in three ways, namely:

1. **Cash;** does the farm generate enough cash to pay the bills, repay the loans and reward the farmer for his work? This can be expressed by a range of indicators such as cash operating surplus, milk income less feed costs, milk gross margin or economic farm surplus.
2. **Efficiency;** how efficiently are the farm resources being used? For a general overview of the business performance, this is expressed as Return on assets while for a more detailed assessment of what the farmer actually owns (namely his equity), a more suitable measure is Return on equity.
3. **Wealth creation;** does the farmer own more than he did last year? This is expressed as capital gains or more suitably as the difference between the two year’s equity.

**Measures of cash profit**

The simplest measure of cash profit is cash operating surplus (COS) which quantifies the sum of all the cash flows on the farm as follows:

\[ \text{COS} = (\text{farm cash income}) - (\text{farm cash costs}) \]
Milk income less feed costs (MIFC) is a useful measure of cash profit because it is relatively easy to measure and provides a guide to how well the cows are being fed. It does not take into account the costs of feeding the non productive stock on the farm, namely the dry cows and replacement heifers.

\[
\text{MIFC} = \text{(milk income)} - \text{(feed costs for milking cows)}
\]

Another way to quantify cash profit on dairy farms is using the milk gross margin (MGM). This calculates the income from milk sales less the variable costs to produce that milk as follows:

\[
\text{MGM} = \text{(milk income)} - \text{(variable costs)}
\]

The most sophisticated method to quantify farm profit, uses both non cash farm income (changes in stock inventory and land values) and non cash farm costs (imputed labour and depreciation), to calculate the net farm income (NFI) as follows:

\[
\text{NFI} = (\text{total farm cash income} + \text{changes in stock} + \text{land values}) - (\text{variable} + \text{overhead costs})
\]

Net farm income is also known as the operating profit, the Economic Farm Surplus or Earnings Before Interest and Tax (EBIT). EBIT is relatively new term in farm management economics defined as farm revenue less farm expenses before the removal of interest on loans and income tax.

**Measures of farm efficiency**

The total capital of the farm is calculated by summing the market value of the land, improvements and animals, plus the machinery and feed reserves. With the numerator NFI, return on assets (ROA) is calculated as follows:

\[
\text{ROA} \% = \frac{\text{Net farm income}}{\text{Total assets}} \times 100
\]

As the farmer probably does not own all the farm assets, he is more interested in how efficiently he is using his own assets. The farmer’s equity is calculated by adding the market value of all the resources he owns then subtracting it from a total of all the money he owes. Equity, expressed in monetary terms quantifies the net worth of the farmer. However it is usually expressed as a percentage, calculated as follows:

\[
\text{Equity} \% = \frac{\text{Resources owned (equity)} - \text{Money owed (liabilities)}}{\text{Resources owned (equity)}} \times 100
\]

Expressing the farm’s annual profit, after paying interest and taxes, as a percentage of this capital is one measure of the effectiveness of the management of the farm’s resources. As the calculation does not take into account any debts, it must also exclude the finance costs associated with these debts. The return on equity (ROE) is then calculated as follows:

\[
\text{ROE} \% = \frac{\text{Net farm income less finance costs}}{\text{Resources owned}} \times 100
\]

The ROE measures the farmer’s effectiveness as a combination of annual inputs such as labour, irrigation, fertilisers, machinery and other resources used to operate his dairy enterprise. It also quantifies the rate of earning of his capital committed to his farm relative to the rate of earning if it were used in some other income generating enterprise.

Calculating his ROE shows the farmer how efficiently he is running the annual operations of his farm business. If it is very low, the farmer should consider alternatives by asking the questions:

- Can I increase my ROE by using better farming methods, borrowing extra money to improve production or diversifying my farm enterprises?
• Should I transfer my capital from this farm and move to a different locality where it is likely to be higher?
• Should I sell up and move into another form of investment?
• Is my ROE low because there has been a large increase in value of my assets?
• Should I use my increased equity to borrow more money to further develop my farm and earn more income

The more rapid the annual increase in asset worth, the more difficult it is to maintain a constant ROE. An increase in asset value provides more collateral against which to borrow to invest in the operation to increase farm income. It can also mean an increase in land tax, hence greater farm costs.

Measures of wealth creation
Since farm assets can be owned outright by the farmer or a proportion of it is still owned by the lending agency, capital gain is usually expressed as change in equity (or net worth) as follows:

\[ \text{Change in net worth} = (\text{equity of farm assets in Year 2}) - (\text{equity of farm assets in Year 1}) \]

This could be considered as the “ultimate” measure of farm profit because business wealth can usually be added to personal profit to create personal (and family) wealth, one of our major motivators to “go to work” each day.

Conclusions
Farm profit should be considered separately to personal profit. For wage earners, personal profit is money left over from wages after paying all the household expenses. Wage earners generally do not use any of their personal assets, except their work skills. Farm profit on the other hand, is excess wealth, in terms of both cash and assets, generated by the dairy enterprise within the farm business.

There is no single best measure of farm profit. For example, it is possible for ROE to fall while the cash profits actually increase, due to a sharp rise in land or stock values. It is then important for farm profits to be quantified using several of the above measures.

This paper provides a blue print to allow COP comparisons to be made between different size and types of dairy farms in different countries. For example, IFCN (2005) have published many surveys of costs and returns from small holder dairy farming throughout Asia, although their methodology is slightly different to the one described above. I have used this blue print to calculate COP estimates during three day Farm Business Management workshops in Thailand, and it provides an ideal learning tool for farmers and advisers to better understand the partitioning of costs and returns from small holder dairy farming. In addition, it assists farmers with prioritising their farm management decisions to address the high cost components on their systems, such as on-farm production of forages and purchases of concentrates, either fully formulated or their ingredients.

References

