Planning Dairy Development Programs in Tropical Asia

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Abstract

There has been a history of dairy development programs in tropical Asia that have either failed or required major revisions, for a variety of reasons. There have been obvious biological factors such as overestimating the level of performance of milking stock, or underestimating the required farm inputs to achieve targets for milk production and reproduction. All too often these programs suffer because of incorrect assumptions on the impact of the tropical environment on cow comfort, animal health, feed quality or cow appetites. However the most common reason is the lack of proper planning, both long and short term. This review discusses planning requirements for three scenarios, namely regional programs, "greenfield" sites and trouble shooting problems on existing farm developments.

Keywords: dairy development programs, on farm dairy programs, planning

Introduction

The last 20 years of dairy research, development and extension in many Western countries has produced quite sophisticated dairy production systems. Herd sizes have grown, efficient feeding systems have evolved and many farmers routinely monitor test results on their cows for milk production, composition and quality and for mastitis. They then use this information for making decisions on culling milking cows and for breeding genetically improved stock. High labour costs have led to much mechanisation, such as machine milking, forage conservation and feeding stock, while cows grazing at pasture are able harvest their own forages more efficiently than can farmers. Low population pressures, hence relatively cheap land, have allowed farms in Western countries to expand in both size and cow numbers.

Unfortunately this has not been the case for small holder dairy farmers in most Asian countries. Being in the tropics, feed quality suffers from high temperatures, humidities and often strongly seasonal rainfall patterns. Dairy cows are temperate

animals with thermo neutral (comfort) zones closer to 10°C than to 30°C. Furthermore, high humidities reduce feed intakes which exaggerate the adverse effects of high fibre forages on appetite. A good measure of heat stress, the Temperature Humidity Index, shows milking cows in the lowlands of the humid tropics to be in the "high stress" and "reduced performance" zones for much of most days throughout the year. Many dairy specialists correctly argue that potentially high performance dairy breeds, such as Friesians, may not necessarily be the best cattle genotype for tropical regions, except in highland areas or those with low humidities.

There are many socio-economic reasons why the efficiency of small holder dairy farming in Asia has not greatly improved over the last two decades. Granted, numbers of cows has greatly increased in most Asian countries, largely through government support for social welfare and rural development programs. The increased demand for milk (accentuated through school milk programs) and the concept of national food security are the driving forces behind most dairy development initiatives. However in terms of feed inputs per kg of milk produced or farm milk outputs, improvements have been slow. This is demonstrated by the inability of virtually all dairy industries in SE Asian to markedly improve their self-sufficiencies in milk over the last 10 years (Moran 2009) hence reduce their reliance on imported dairy products.

In addition to the above biological constraints, the other major problem to achieving national dairy development production targets has unfortunately been a common human failing, namely an inability to properly plan for such initiatives, in the short as well as the long term. This paper discusses this problem at three levels, firstly at a regional dairy program level, secondly a "greenfield" or new farm development level and thirdly, trouble shooting an existing dairy farm that is not performing, even to expectations. Many regional dairy development projects involve the construction of a series of medium to large scale dairy farms (say from 200 to 1000 milking cows) frequently on a "greenfield" site or one with little existing dairy infrastructure. The third level occurs all too often when poor planning has resulted in a new or existing farm that does not achieve realistic production and profit targets.

The importance of long term planning is paramount in any dairy development program. We often hear the comment "Failing to plan is planning to fail". Unfortunately this applies to much of the dairy development around tropical SE Asia.

Planning dairy programs

Regional dairy programs

A common problem with many regional dairy development programs is the desire to introduce the stock long before the infrastructure has been fully prepared to support them. Importing pregnant dairy heifers provides a small window of opportunity for their eventual calving and milk production, but all too often this window is too small to prepare for their change to a lactating cow, requiring optimum feeding

and herd management to settle into their new, often more hostile, environment.

Figure 1 lists ten steps that should be followed in any large scale regional dairy development program. It is essential to organise markets, milk processors, physical and social infrastructure before introducing stock. The actual cost of milk production cannot be determined until the stock are on site and their actual, rather than their predicted, levels of performance and required inputs can be quantified.

An additional step that overrides the success of all those in Figure 1 is a planned and ongoing supply of finances to ensure each step actually occurs "on time and on budget". This requires a long term commitment from financiers well before the program starts. This budget must incorporate realistic levels of cow performance based on local information or estimates and not those from other, generally temperate and hence less stressful, environments. The budget obviously needs to incorporate a cash flow as well as long term loan repayments and should not plan for any profits for several years into the programmed development.

A "greenfield" or new farm development site

Converting a greenfield site into a profitable and sustainable dairy farm also requires careful planning. The steps to take are similar to those in Figure 1 except that several of them would be taken for granted. For example, one would assume that there is an existing market and milk processors (Steps 1 and 2) or at least one that will definitely develop in time to utilise the raw milk from the new farm. Ensuring a sustainable feed supply (Step 3) and suitable staff (both managerial and general farm staff, Steps 4 and 5) are essential prior to introducing the stock.

Step 6, training the staff, could be taken for granted as that would have been ascertained prior to the project starting. The basic facilities must be constructed before the stock arrive. Of greatest importance, the assurance of sufficient and timely supply of finances is essential to ensure the project does not stall at any step along the way.

Probably the most important decision that needs to be made for a greenfield site is the proposed stocking capacity, that is the number of milking cow units to be maintained per ha of forage production area. One milking cow unit is one adult cow plus 20% of its replacement heifer, that is assuming a 20% replacement rate per annum. The farm should aim to supply as much of the annual forage requirements as possible, to give the farm management team more control over the supply and quality of such forages than if they have to be purchased off farm. The hardest part of this decision process is the assumption of annual growth rates of such forages. This has been discussed in detail by Moran (2005), who has concluded that to ensure all forages can be grown on farm, such target stocking capacities should range from 7 to 10 milking cow units per ha forage production area. Once this has been decided, then a more realistic calculation can be made of the total tonnages of forage that need to be purchased. The annual requirements for the other major dairy feed,

namely concentrates (either formulated or sourced as raw ingredients) also needs to be ascertained so that long term sources can be assured early in the project.

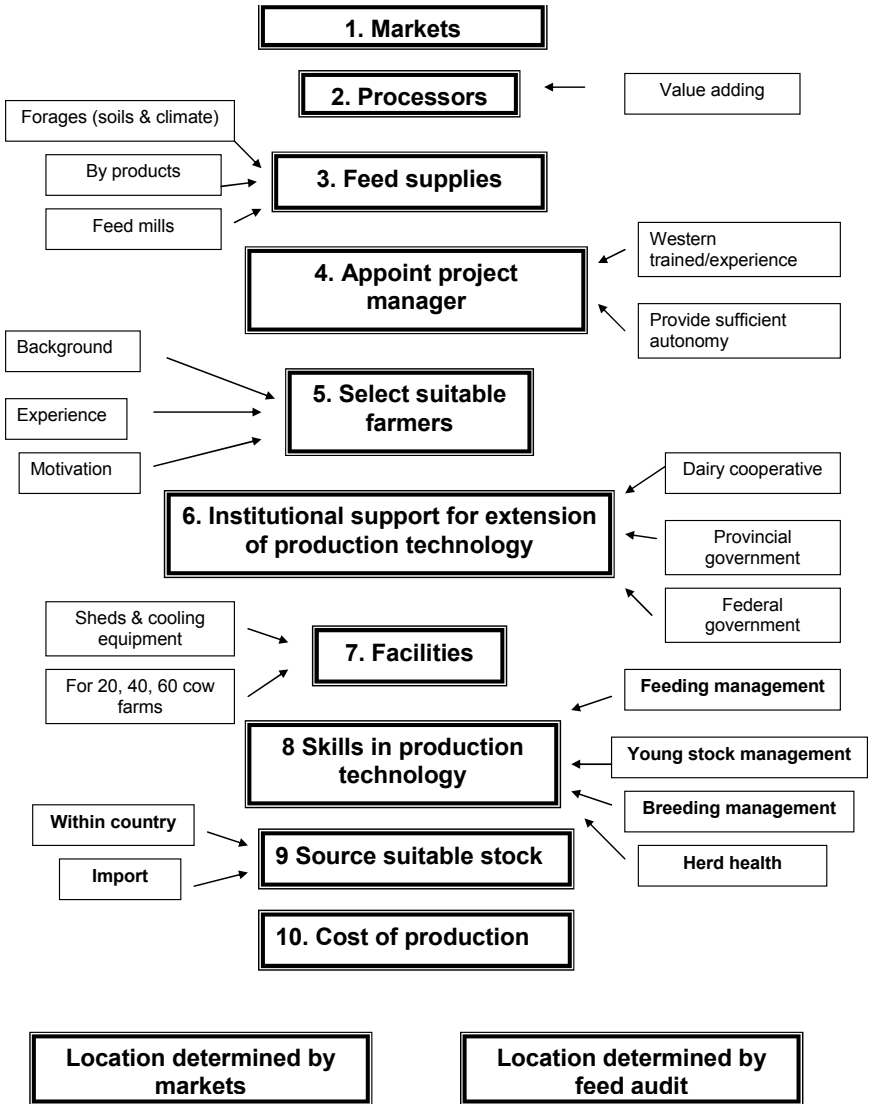

Figure 1. The ten steps to be followed in any regional dairy development program

Net cash flow means an estimate of farm expenses as well as farm income. The majority of cash is generated by the sale of milk. The shape of the lactation curve (Moran 2005) means that this can only be consistent from month to month with careful planning to source dairy stock at several times during the early years of the project, and not all at once. All too often such greenfield projects fail altogether or require major cash flow revision because all the stock were introduced at the same time.

Hitting the "white wall"

The above highlights a classic scenario where "new" farmers enjoy a rapidly increasing cash flow when all cows calf down over a short time frame. The farmer often then increases his cash input, sometimes into lower priority investments, neglecting the most important ones, such as maintaining a high quality (hence high intake) ration as cows approach mid and late lactation and ensuring optimum reproductive performance (using fertile bulls rather than depending entirely on artificial insemination and ensuring all field staff develop skills in heat detection). Persistency of milk production (as quantified by the average monthly decline in milk yield from peak) is one of the often neglected, key measures of success of a feeding program. It should be of the order of 8% rather than the all too common 12% or more (Moran 2005).

All too often herd milk production rapidly decrease as cows move into their less productive phases of their lactation phase, reduced cash flows follow and the farm's net income declines to such an extent that it's long term viability may be at risk. Such scenarios are rarely made public as national pride can be at stake, hence it is often repeated by new, inexperienced investors in dairy development.

Trouble shooting an existing dairy farm

This can cause the biggest problem because errors in design and construction of facilities, shortfalls in supplies of feeds, particularly forages, and inadequacies in managing the stock may have already introduced constraints on potential cow and farm performance. We will discuss this using a theoretical case study based on an actual situation.

A 150 milking cow free stall barn farm was established using pregnant grade Friesian heifers, all imported at the same time, in a hot humid environment in tropical SE Asia. Insufficient area was allocated to forage production and very few staff had had much experience with tropical dairy farming. Within its first 5 months of operation, milking stock were suffering from severe weight loss, stock (cows and calves) were dying, milk yields fell to average only 7 kg/d, cows were not cycling post-partum and there were increasing new cases of mastitis occurring every month.

Over the following 5 months the farm management, with consultant advice, were prepared to invest in a series of farm improvements which had dramatic beneficial effects of cow and farm performance. Milk yields and body condition increased and the cows started cycling. These farm improvements included:

- Developing more area for forage production
- Introducing a mixer wagon to allow for blending the ingredients and mechanical feed delivery
- Concentrating on ration formulation to balance energy, protein and other nutrient supplies

- Introducing a fermentable energy and a rumen degradable protein source
- Incorporating a small amount of rice straw in the diet to provide physically effective fibre
- Formulating lower cost rations to reduce feed costs
- Improving new born calf hygiene and colostrum feeding
- Routinely Californian Mastitis Testing cows followed by antibiotic treatment of subclinical mastitis cases and culling chronically infested cows
- Purchasing bulls for natural mating, rather than planning to practice artificial insemination
- Installing a water sprinkler system and cooling fans for better climate control
- Introducing recording systems, using both note books and computer software, to more closely monitor daily management practices
- Establishing a computer system to quantify milk income less feed costs and the proportion of feed consumed by non-productive stock each day
- Selling off bull calves and cull stock
- Initiating regular faecal and blood sampling and vaccination protocols for better disease management
- Using pregnancy diagnosis and record keeping for better reproductive management
- Importing pregnant stock with a range of expected calving dates
- Improving on farm biosecurity

Over a 12 week period, following these improved management practices:

- The number of cows dying decreased from 5 per week to zero
- Feed intakes increased from 8.4 to 15.0 kg DM/cow/day
- Average milk yields increased from 6.4 to 13.6 L/cow/day
- Body condition scores improved from 2.3 to 5.6 units (out of 8)
- The farm manager signed the consultant up for a further period
- The owner was seen more often with a smile on his face

Importing dairy stock from overseas

Very rarely, if at all, can dairy development programs rely on natural increases of heifers to populate the new regions. Calf mortalities are just too high in most SE Asian countries. For example, Moran (2011) reviewed the published data concluding that a range of 15 to 25% pre-weaning and early post-weaning mortality rates would be typical on many tropical dairy farms, in contrast to the 3 to 5% considered normal on well managed dairy farms in developed temperate countries. Such high mortality rates would also be indicative of large numbers of surviving calves that have suffered permanent health problems leading to reduced lifetime performance. Therefore the only way to source more dairy stock to improve farm and regional milk outputs,

assuming they can be fed adequately, is through an active program of importation. Australia and New Zealand seem to be the countries of choice, although Thailand also has an active dairy heifer export market especially to Malaysia and Vietnam.

When considering importations of dairy heifers, there are two major decisions to be made, namely what genotype is the most suitable and what age should they be on arrival. Unfortunately all too often, the first is considered a "given" by many decision makers who plan dairy development policies. That is, they must be "black and white"! If the dairy region is in the highlands (say above 800 to 1000 m above sea level) and or in a region without extremes in temperature and humidity, this is often the correct decision. However there seems little point in requesting Friesian heifers out of dams that have produced 5000 L milk per lactation, because it is highly unlikely that the imported heifers or their progeny will be managed well enough to achieve such milk yields, particularly if they are to be run on smallholder farms. In most cases, any dairy genotype imported from a developed country is likely to be of higher genetic merit that the typical milking cow in tropical Asia.

Jerseys or their crosses should be seriously considered in tropical dairy systems when climate constraints are apparent and/or when feeding and herd management is very much sub optimum. They are smaller, hence have lower maintenance requirements, have better climatic tolerance (due both to lower milk yields and physical characteristics such as sweat gland density and skin colour) and often better reproductive performance. In areas where premiums encourage farmers to produce milk with higher solids content, Jerseys also outdo Friesians. There are other dairy breeds that seem to perform better than Friesians in the torrid tropics such as Brown Swiss, or synthetic breeds such as Australian Friesian Sahiwals or the Girolanda (from Brazil), while the purebred Sahiwal (from Pakistan) justifies further consideration.

The other decision to make is whether to import pregnant heifers or yearling (virgin) heifers. Pregnant heifers are the most favoured because farmers get "two for the price of one", assuming the foetus is a dairy genotype. In addition as the heifer is pregnant (at least diagnosed as pregnant) she does not have to be mated soon on arrival at her new home where there is no guarantee that she will easily conceive. However with only a few months to adapt to her new environment, there is also no guarantee that that heifer will become a long term member of the milking herd once she calves down. All too often one hears stories of very high numbers (up to 30 or 40%) of imported heifers being culled and slaughtered after having only one calf. The most likely reason is that her poor feeding management post-calving and her higher genetic propensity to utilise body reserves to produce milk, have combined to result in anoestrus for many, many months post calving. Such animals have become very expensive dairy beef animals. In the long run, yearling heifers may be better economic propositions than pregnant heifers.

Lastly and of equal importance when importing dairy stock into tropical Asia, are issues of animal health. All countries, both importing and exporting countries

have disease management protocols. Such protocols must be strictly enforced and regularly reviewed, in case of new disease outbreaks in countries of origin. Foot and mouth diseases and brucellosis are the two most commonly talked about but there are others to consider. In one recent example, two diseases, namely bovine viral diarrhoea (BVD) and infectious bovine rhinotracheitis (IBR) were isolated in virtually every aborted foetuses arising from one importation. These can have long lasting adverse impacts on cow performance so require additional surveillance to ensure they do not enter the country with the consignment.

Conclusions

Dairy farming would have to be one of the most sophisticated forms of livestock production in the world and should only be undertaken after careful and logical planning, and with expectations of a long term investment before profits accrue. To be successful, such development programs must involve sourcing, or at least seeking support from, personnel with proven experience in both dairy farming practices and dairy farm business management. Much can be learnt from the litany of failed dairy development projects throughout tropical Asia so these mistakes will not be repeated, as unfortunately occurs all too often.

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