



Improved management packages for tropical and temperate dairy production technology

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Abstract

Over the last six years, more than 310,000 dairy heifers have been exported from Australia to 20 countries around the world. Unfortunately there have been instances where such importations have led to unacceptably high mortalities and poor performance once these stock have entered the milking herds, particularly those of small farmers. The major oversight by both the importers, whether private investors or government organisations, and the farmers for whom these stock are destined, is not “preparing the environment” for the imported stock.

This project developed a series of farmer and adviser manuals for tropical and temperate small holder dairy farmers, in order to improve their management practices so as to increase the performance of Australian imported dairy heifers. A series of checklists was also developed to record current farm practices in six main areas; feed production, feeding management, herd management, housing, milking management and general farm management. A set of key recommendations has been developed for the live dairy export trade.

Executive summary

Over the last 6 years (2003 to 2008), more 310,000 dairy heifers have been exported from Australia to 20 countries around the world. Of these stock, 46% have been exported to China, 21% to Mexico, 10% to Russia, 6% to Kuwait and 3% to UAE. Other Asian countries importing Australian dairy stock include Indonesia, Pakistan, Malaysia, Vietnam and Philippines.

Unfortunately there have been instances where such importations have led to unacceptably high mortality rates and poor performance once these stock have entered the milking herds of importing countries. The major oversight by both the importers, whether private investors or government organisations, and the farmers for whom these stock are destined, is not “preparing the environment” for the imported stock.

In collaboration with the importing country, the Australian government has instigated strict animal selection and quarantine procedures prior to transport, while the exporting agencies have developed post-arrival protocols to reduce stresses on the newly arrived stock. Such protocols differ between agencies and destination countries. Many are undertaken by Australian veterinarians contracted to the export agencies and may or may not include training programs for local dairy staff (both government advisers and farm managers). The success of such programs depends largely on the awareness and ability of new owners of these stock to improve their feeding and general herd management. Unfortunately such programs appear to be very *ad hoc*, with very variable success.

Developing a structured program

To improve the awareness and hence the ongoing herd and farm management practices of traditional farmers in these countries, a more structured training program should be developed. MLA/LiveCorp commissioned DPI Victoria to develop such a set of training manuals. These manuals highlight the important dairy herd management practices required to reduce undue stress on high genetic merit, but unadapted, dairy heifers once they arrive at their new destination.

Two different types of manuals were written, one for dairy advisers and a second for small holder dairy farmers. The farmer manuals are simplified version of the adviser manuals, prepared so advisers can use both manuals in their training programs. In addition, the extension packages contain a series of PowerPoint slides, to be used in the training programs.

These technical packages concentrated on the improvements in feeding and herd management required to reduce mortalities and improve growth and post calving milk yields and fertility of Australian high genetic merit dairy heifers maintained under traditional dairy production systems on destination farms. They addressed cattle handling, husbandry, breeding, climatic impacts, nutrition, animal health, food safety and any other issues that could impact on the health and welfare of dairy cattle. In particular, they addressed traditional farming practices leading to animal health and welfare issues not acceptable in Australia.

A series of checklists was developed to record current farm practices in six main areas, namely feed production, feeding management, herd management, housing, milking management and general farm management. From a previous workshop held in central Java, a set of criteria was developed to grade the suitability of individual small holder farmers to receive imported high quality dairy stock.

A further objective of this project was to undertake a pilot workshop to test the training materials produced. This workshop was conducted in Kluang which is situated on peninsula Malaysia. Kluang is the site of several large scale dairy development programs which will involve importing many dairy heifers over the next few years. A total of 50 participants attended the 3 day workshop. Attendees included government dairy advisers, large scale farmers and small holder dairy farmers. Two farms were visited where participants were asked to assess current management practices and suggest improvements.

The feedback from the workshop indicated that the technical content provided a clear and concise summary of the principles of improved herd management of both small and large holder tropical dairy farms. The opportunity for workshop participants to actively contribute to the workshop during their reporting back from the farm visits, allowed a good assessment of the retention of the new information presented the previous day. The farmer manual was also well received as a valuable extension tool for future reference.

Such workshops would be beneficial for other major destinations of Australian export heifers. Prior to these workshops, it will be important to assess any particular idiosyncrasies of dairy farm management in these countries to ensure these are adequately discussed at the workshops.

Due to management and environmental conditions, it is unlikely that Australian standards of dairy cow welfare can be achieved on many Asian dairy farms. In addition, insufficient access to water limits voluntary feed intakes. Such cows can produce 10, or maybe 12 L milk/day, which is often all the feed nutrients will provide for. Milking cows require both better feeding management and improved animal welfare practices to improve milk production to more “acceptable” levels of milk production. How more accepted farm management practices become incorporated into supply contracts is a major challenge for the dairy live animal export industry.

Key recommendations

- Small holder dairy farmers receiving imported Australian dairy heifers should be selected on their ability to provide adequate feeding and herd management to minimise dairy practices which would adversely influence their potential performance as milking stock in the herd.
- Small holder dairy farmers should be provided with a training program to ensure adequate management of imported Australian dairy heifers. Such programs should be based on the tropical and temperate farmer manuals developed in this project.
- Advisers to these farmers should also be provided with similar training programs based on the tropical and temperate adviser training manuals developed in this project.
- Export agents providing imported Australian dairy heifers should undertake follow up programs to monitor small holder feeding and herd management and advise farm advisers (and ultimately farmers) where improvements are necessary. These agents should provide feedback to MLA/LiveCorp on a regular basis.
- MLA/LiveCorp could become more involved in the routine quality control of such farmer and adviser training programs as well as advising export agents on the suitability of specific countries to receive imported Australian dairy heifers.

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1 Background

The decision makers of most, if not all, South and East Asian countries place high credence on improving the genetic quality of their national herds. This has led to an influx of dairy stock from temperate areas, where they have been selected for many generations. Over 25 countries in the “low latitudes” (namely equatorial and tropical areas) are developing local milk industries based on imported dairy cattle, mainly Friesians from the temperate developed dairy industries in Europe, North America and Australasia. During the 20 years to 1995, 5 million Friesians have been exchanged in international trade, of which half have moved from temperate climate countries to those in the warm climate zones (McDowell 1994). All countries in Latin America have nucleus herds based on Friesians, as do 70% of the Asian and 66% of the African countries. The major exception has been India, which has based its genetic improvement program on indigenous dairy cattle and buffalo.

The importing countries are also being encouraged, often through financial subsidies, to use semen from progeny tested sires from countries of origin of these cattle, thus continuing the program of genetic upgrading of the temperate dairy stock. But with few exceptions, ages at first calving of 30+ months, milk yields of 2500 to 5000 L/lactation and calving intervals of 430 to 485 days in the new importing country are below optimum. Modern day Friesians are genetically capable of producing their first calf at 2 years of age, then one every 12 months, yielding 8000 L milk over 300 days and milking for 5 lactations.

Over the last 10 years, increasing numbers of Australian dairy stock have been exported to overseas markets, both tropical and temperate. The rationale of such countries seeking genetically superior but poorly adapted dairy stock has frequently been questioned due to poor performance and failure to prepare the environment for unadapted stock.

In collaboration with the importing country, the Australian government has instigated strict animal selection and quarantine procedures prior to transport, while the exporting agencies have developed post-arrival protocols to reduce stresses on the newly arrived stock. Such protocols differ between agencies and destination countries. Many are undertaken by Australian veterinarians contracted to the export agencies and may or may not include training programs for local dairy staff (both government advisers and farm managers). The success of such programs depends largely on the awareness and ability of new owners of these stock to improve their feeding and general herd management. Unfortunately such programs appear to be very *ad hoc*, with very variable success.

1.1 Shortfalls in current small holder management

A review of 10 years of dairy development in Indonesia (East Java), concluding that increases in milk production had been mainly through imported cattle, but productivity gains were only at one third of their genetic potential (Ibrahim *et al* 1992). The review listed the main reasons for this reduced potential as:

- Lack of sufficient high quality feed
- Poor adaptability of imported stock to local conditions
- Poor housing and management
- Too much attention of cooperatives to marketing and insufficient extension on cow problems
- Failure to repay dairy credit in view of low productivity and poor milk price

These factors are still relevant to many Asian countries.

The greatest shortfalls in current management are:

- Lack of knowledge of quality of local feedstuffs, particularly forages.
- Lack of understanding of their nutrient requirements for acceptable performance, to reduce stress.
- Low skills of local labour to handle high level of technology in genetics of imported stock.
- Poor sanitation practices for manure disposal, fly control and drying of all floor surfaces.
- Lack of sufficient quarantine, to minimise spread of disease while heifers are still susceptible.
- Lack of knowledge and management skills to address problems during parturition.
- Difficulty of supplying optimum diet during early lactation to ensure limited live weight loss hence short lactation anoestrus.
- Minimising environmental stress during early lactation so newly calved heifers will cycle normally after 2 months.

Other factors to consider include:

- Selection of the most appropriate heifers prior to transport.
- Providing good calf and heifer rearing management so calves from imported heifers are well grown and have the opportunity to express their true genetic merit when milking.

2 Project objectives

1. To develop management support packages for each of the following four target audiences:
 - Tropical dairy advisers
 - Tropical smallholder dairy farmers
 - Temperate dairy advisers
 - Temperate small holder dairy farmers

Following a review of the literature, a series of improved management support packages will be developed for each of the four target audiences, namely tropical dairy advisers, tropical smallholder dairy farmers, temperate dairy advisers and temperate small holder dairy farmers. These packages will concentrate on the improvements in feeding and herd management required to reduce mortalities and improve growth and post calving milk yields and fertility of Australian high genetic merit dairy heifers maintained under traditional dairy production systems on destination farms. They will address cattle handling, husbandry, breeding, climatic impacts, nutrition, animal health, food safety and any other issues that could impact on the health and welfare of dairy cattle. In particular, they will address traditional farming practices leading to animal health and welfare issues not acceptable in Australia.

For advisers, the packages will incorporate an easy to read technical manual and a set of glossy reference cards. The packages for farmers will incorporate a more practical technical booklet and a set of glossy reference cards. Packages will be translated into local language for each target audience (this is not included in the budget). Where possible, local currency units will be used in any economic analyses of practice changes.

2. To undertake a pilot workshop in South East Asia (Malaysia and/or Indonesia) with both government dairy advisers and dairy farmers to “test run” the packages, develop relevant Power Point presentations, conduct practical on farm sessions and to assess their impact on awareness

and ultimately change current farm practices that adversely impinge of long term performance of imported Australian dairy stock.

3 Methodology

A thorough review of existing literature had been undertaken by the author when writing his manuals on tropical dairy farming, namely *Tropical Dairy Farming. Feeding management for small holder dairy farmers in the humid tropics* (Moran 2005) and *Business management for tropical dairy farmers* (Moran 2009). These books were used as the basis for the tropical adviser and farmer manuals. Additional reviewing provided information specific to temperate small holder dairy farming for the temperate adviser and farmer manuals.

The technical packages concentrated on the improvements in feeding and herd management required to reduce mortalities and improve growth and post calving milk yields and fertility of Australian high genetic merit dairy heifers maintained under traditional dairy production systems on destination farms. They addressed cattle handling, husbandry, breeding, climatic impacts, nutrition, animal health, food safety and any other issues that could impact on the health and welfare of dairy cattle. In particular, they addressed traditional farming practices leading to animal health and welfare issues not acceptable in Australia.

In the process of a previous workshop series in Indonesia on milking hygiene, a 4 page glossy manual was prepared outlining the basic principles of good small holder dairy farm management (Moran *et al* 2004). This brochure “Tips for proper managing of dairy cows on Indonesian smallholder farms” provides an excellent extension brochure for small holder dairy farmers in any country. This was included in the two adviser manuals developed in this project as was a large collection of photographs (76 in total) taken throughout South & East Asia.

The project included conducting a pilot workshop in Kluang, Malaysia on “Improved herd management for Australian dairy heifers”. Kluang is located on Peninsula Malaysia and is the site of several large scale dairy development programs which will involve importing many dairy heifers over the next few years. The author had previously conducted several workshops at this site on various aspects of dairy farm management, so had good contacts for the associated farm visits during the workshop program.

4 Results and discussion

4.1 Written material

The project produced 4 manuals (with number of pages) as follows:

1. Advisers guide to good dairy herd management in the tropics. A manual for dairy advisers, technical staff and other dairy specialists (117 pages)
2. Farmers guide to good dairy herd management in the tropics. A manual for small holder dairy farmers (72 pages)
3. Advisers guide to good dairy herd management in temperate regions. A manual for dairy advisers, technical staff and other dairy specialists (112 pages)
4. Farmers guide to good dairy herd management in temperate regions. A manual for small holder dairy farmers (67 pages)

An example Table of Contents (Advisers guide to good dairy herd management in the tropics) is presented below.

Advisers guide to good dairy herd management in the tropics

Table of Contents

	Page
1 Introduction	3
Problems with management of imported dairy stock	
Post arrival management	
Dairy farm management activities	
2 Feed production	6
Provide a year round supply of quality forage	
Conserve excess forage as silage	
Feed nutrients for milk production	
Sourcing concentrate supplements	
3 Feeding management	13
The lactation cycle	
Key aspects of feeding management of high production cows	
Problems with unbalanced diets	
4 Young stock management	22
Rearing the milk-fed calf	
Scours in milk-fed calves	
Management of weaned heifer replacements	
5 Disease management	32
Physical attributes of healthy and sick cows	
Managing dairy herd health	
Health and reproductive performance	
Lameness	
Mastitis	
6 Reproductive management	42
A framework for improved fertility	
Heat detection in tropical herds only using AI	
Nutritional influences on reproductive performance	
Putting it all together – a plan for success	
7 Stock welfare	50
Problems of confinement	
The six basic elements of dairy cattle welfare	
Other general principles of animal welfare	
Specific welfare codes for calves	
8 Environmental management	57
Heat stress in milking cows	
Temperature humidity index	
Management practices to minimise ha stress	
9 Cattle housing	67
Housing the milking herd	
Additional features of dairy shed design	
Sanitation and effluent management	

10 Milking management	77
The principles of cleaning and sanitising dairy equipment Management practices for good milking hygiene Maintaining milking machines	
11 Assessing current farm management practices	85
Checklists to record current farm practices One example of grading farmer skills	
Indonesian dairy small holder pamphlet	90
Tips and traps in managing high genetic merit dairy stock	98

4.2 Power Point material

The project also produced 4 PowerPoint presentations (with number of pages) for use in training workshops as follows:

1. An introduction to good dairy herd management (34 pages)
2. Improved herd management for Australian dairy heifers (27 pages)
3. Tips and traps for small holder dairy farmers (52 pages)
4. Assessing current management on dairy farms (16 pages).

The 34 pages of the Power Point presentation on “An introduction to good dairy herd management” are presented below. This presentation has 6 sections, namely:

- Introduction
- Feed nutrients for milk production
- Cow lactation cycle
- Some dairy herd dynamics
- Problems with exotic genotypes
- Importing dairy stock from overseas



AN INTRODUCTION TO GOOD

DAIRY

HERD MANAGEMENT

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May 2009

1

THE BUSINESS OF DAIRY FARMING

- Small holder dairying farming is now established in many Asian countries
- Since the recent milk price increases, it is quite profitable
- However, current milk yields are not high due to many factors such as nutrition, climate, disease, cow quality
- Farmers milk cows to make money so good farmers have become business managers
- Investments must be well planned
- Purchasing cows for your farm is an investment decision
- This workshop addresses many decisions to be made when planning increases in herd sizes

3

TOPICS DISCUSSED

- Feed nutrients for milk production
- Cow lactation cycle
- Some dairy herd dynamics
- Problems with exotic genotypes
- Importing dairy stock from overseas
- Conclusions

4

FEED NUTRIENTS FOR MILK PRODUCTION

5

DIETARY NUTRIENTS IN FEED

- Water
 - Not really a nutrient but essential for life
 - Milking cows need up to 150 L/day
- Energy
 - Key nutrient for milk production
 - Measured in MJ/kg DM (feed) or MJ/day (cow needs)
- Protein
 - Another key nutrient for milk production
 - Measured in % DM (feed) or g/day (cow needs)
- Fibre
 - Essential for good rumen function
 - Measured in % DM or g/day of neutral detergent fibre
- Also vitamins and minerals
 - Important but required in small amounts

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CLASSIFICATION OF FEEDS (Tropical)

Classification based on energy and protein contents

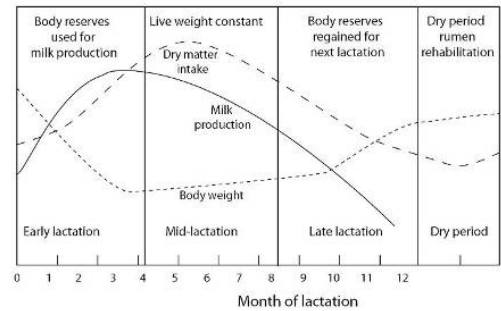
Energy/protein classification	Poor energy (<8 MJ/kg DM of ME)	Moderate energy (8-10 MJ/kg DM of ME)	Good energy (>10 MJ/kg DM of ME)
Poor protein (<10% CP)	Rice straw Corn stover Sugar cane tops Cassava waste	Rice bran (poor) Most grasses Sweet corn cobs Banana stems Urea treated rice straw	Cassava chips Paddy rice Malasses Sweet potatoes Pineapple waste Maize silage
Moderate protein (10-16% CP)	-	Brown rice Well managed grasses Soybean Immature grasses	Maize grain Sorghum grain Rice bran (good) Wheat pollard Palm kernel cake
Good protein (>16% CP)	Urea	Shrimp waste Cassava hay Peanut leaf & stem Legume hays	Whole cottonseed Brewers grain Coconut meal Soybean curd Commercial concentrate Soybean meal Cottonseed meal Soybean leaf

7

COW LACTATION CYCLE

8

COW LACTATION CYCLE



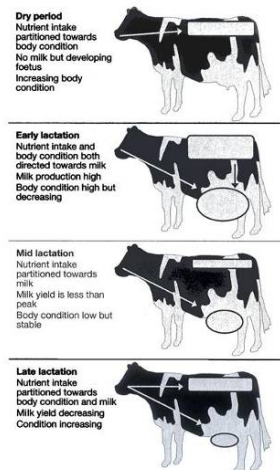
WHAT IS THE LACTATION CYCLE?

This is the MOST IMPORTANT graph for all dairy farmers

- Cows must calve to produce milk
- The cycle is from one calving to the next calving (365-540 d)
- Cycle is split into 4 phases; early, mid & late lact, dry period
- Each lactation phase is about 100 days long
- Early lactation is the most important because:
 - Cows must have high peak milk yield
 - Cows appetite is limited
 - Cows must get back in calf
 - Good cows lose live weight & body condition
- Mid lactation: continue with good milk yield
- Late lactation: good milk yield, regain lost condition, grow calf
- Dry period: grow calf, prepare for calving

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Partition of feed nutrients during lactation cycle



SOME DAIRY HERD DYNAMICS

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HOW PRODUCTIVE IS THE MILKING HERD?

- Cows only generate income when they are milking
- The target lactation cycle is 300 d milking and 65 d dry, hence 12 m calving interval
- However this rarely occurs in the tropics
- It also depends on calving rate (90% is best)
- % days milking is good guide to herd productivity
- This is equivalent to 100% calving rate
- The following table highlights the importance of lactation length

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% DAYS MILKING

Calving interval (d)	Dry period (d)	Lactation length (d)	% days milking
365	65	300	82
	90	275	75
	115	250	68
400	65	335	84
	100	300	75
	125	275	69
	150	250	62
450	65	385	86
	115	335	74
	150	300	67
	175	275	61
	200	250	55

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% PRODUCTIVE COWS IN HERD

% milking cows in adult herd (inc first calf heifers)

- depends on calving rate, calving interval, lactation length
 - 74%; excellent
 - 60-73%; acceptable
 - 50-59%; below average
 - 40-49%; not good

% milking cows in total herd (inc calves & growing heifers)

- depends on calf/heifer mortality, age @ 1st calving, calving interval
 - 48%, excellent
 - 40-47%; acceptable
 - 35-39%; below average
 - 30-34%; not good

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PROBLEMS WITH EXOTIC GENOTYPES

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WHAT IS A HIGH QUALITY DAIRY COW?

- Dairy cows have been selected for over a century on their ability to produce more milk or milk solids
- They achieve this through:
 1. Eating more feed
 2. Utilising their body reserves to produce additional milk
- They have increased their gut capacity through heavier live weight
- They lose more weight in early lactation when their ability to produce milk exceeds their ability to consume more feed
- Many developing dairy industries consider that exotic stock, such as those from Australia, have higher genetic merit than local animals
- However this may not always be the case, particularly when considering local farm management practices

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WHAT IS THEIR IMPACT?

- Between 1975 and 1995, 5 million Friesians entered international trade
- Over 50% went to the tropics and subtropics
 - Since then Friesian has been the most popular dairy semen for AI
- Current tropical small holder farm performance
 - Low milk yields: 2500-4500 kg/lactation
 - High ages at first calving: 30+ months
 - Long calving intervals: 14-16 months
- Modern Friesians are genetically capable of:
 - 8000+ kg/lactation
 - First calf at 24 months
 - One calf every 12-14 months
- Why haven't Friesians made a bigger impact?

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PROBLEMS WITH THESE COWS

- Excess body weight loss can delay oestral cycling, hence getting back in calf
- They also produce more internal body heat, reducing their heat tolerance
- Even if they do not get enough feed in early lactation, they will still lose weight so delay oestral cycling even longer
- Since they are high performing animals, they are more susceptible to diseases, parasites and other constraints to production
- Are they really the ideal dairy cow for tropical small holder farms which suffer from feed shortages and other tropical stresses?

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CURRENT FARM MANAGEMENT

- High genetic merit dairy heifers will not justify their investment unless they can exhibit their potential for increased performance
- They need sufficient feed to produce more milk and get back in calf
- Most important in early lactation when their nutrient demands are highest
- Must have greater protection against the many stresses of tropical small holder dairy systems, which include:
 - Low quality forages
 - Badly formulated rations
 - Climatic stress and unsuitable housing systems
 - Poor sanitation
 - Exposure to parasites and infectious diseases
 - Poor reproductive management
 - Reduced attention to animal welfare
 - Unhygienic milk harvesting
- They have become the "prima donnas" on your farm, demanding greater attention
- Can your farm provide it for them??

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SOME BASIC GENETICS

- Cow's performance is combination of her breeding and her management
 - Phenotype = genotype x environment
- Genotype = dam & sire genes
- Environment = feeding, housing, disease, climate
- Genotype X environment interaction (G x E)
- Cow performance is more dependent on farm management than on cow quality
- No single tropical breed is best under all conditions
- High quality cows often perform poorer than local cows unless farm management is improved

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MATCH THE COW TO THE SYSTEM

- Climate conditions that exist
- Available nutrition, home grown or purchased
- Degree of challenge from parasites and diseases
- Level of management skills
- Availability and costs of labour (incl priorities with other household demands)
- Availability of finance
- Availability and access to profitable markets

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SPECIALLY BRED TROPICAL DAIRY BREEDS

- Ideal dairy breed is:
 - small animal
 - yielding high levels of milk/milk solids
 - annually produces a calf (preferably heifer)
 - under simple village conditions
- But high milk yields require high feed intakes and high internal heat production
- Examples of tropically adapted dairy breeds
 - Australian Milking Zebu (Jersey/Sindhi)
 - Australian Friesian Sahiwal (now from New Zealand!)
 - Sahiwal
 - Brown Swiss? Jersey?

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PROBLEMS WITH CONFINEMENT

- Temperate dairy breeds were bred for grazing conditions
- Most Asian dairy farming is "cut and carry" with creates problems:
 - Seeking comfort on cement floors
 - High humidity in sheds
 - Limiting opportunity for exercise
 - Greater effort to harvest forages
 - Poor hygiene
 - Increased exposure to infectious diseases
 - Other health issues: mastitis, uterine infections
 - Heat detection for AI
 - Extra efforts with sanitation
 - Magnifies social dominance
 - Increases capital investment

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ALTERNATIVES TO CURRENT IMPORTATION POLICIES

- Import stock of lower genetic merit
 - Why request 5000 L heifers?
 - They will have lower feed demands and
 - Better chances of getting back in calf within 100 days post-partum
- Import younger dairy heifers
 - Say, a 9-16 mo heifer (200-360 kg)
 - Will have time to adapt before calving down
 - But don't get "2 for the price of 1", the free foetus
- Importing embryos
 - Far too expensive
- Importing sexed semen
 - Now too expensive but should get cheaper and worth considering

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LOCAL ALTERNATIVE

- Develop contract heifer rearing programs within coops
- Develop commercial "heifer parks"
- Can employ full time rearer with specialist skills
 - Milk rears calves from 7 days old
 - Grows out weaned heifer
 - Mates it with AI or dairy bull
 - Returns it to farmer just prior to calving
 - Can use calf milk replacer, allowing farmer to sell all his milk
 - Uses scales to monitor growth and plan feeding program
 - Ensures heifer gets best feed and attention
 - Successful in other countries (Malaysia & Thailand)
 - Much cheaper than importing heifers
 - Genetic merit not so important until farm management upgraded

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IN SUMMARY

- Temperate dairy breeds were selected and bred for temperate conditions, not tropical ones!
- Tropical conditions are very different from temperate conditions
- Getting "the best" from imported cows requires an additional investment in improved farm management
- Is it good sense to use cows that are genetically programmed to lose excess weight in early lactation in small holder systems where feed shortages are all too common?
- Is it worth it when imported cows are so expensive?
- You do not put standard petrol in a Formula 1 racing car!!

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IMPORTING DAIRY STOCK FROM OVERSEAS

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SHORTFALLS IN LOCAL MANAGEMENT

- Importers/farmers do not prepare the environment for their arrival:
 - Poor knowledge of local feed quality
 - Don't understand their higher nutrient requirements
 - Poor skills of local labour to handle high level of technology
 - Poor sanitation practices
 - Insufficient quarantine, to minimise spread of disease to imported stock
 - Lack of knowledge to address potential calving problems
 - Difficulty in supplying optimum diet during early lactation
 - Don't minimise environmental stress during early lactation
 - Cows then produce less milk and don't cycle

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IMMEDIATELY ON ARRIVAL

- Stock need time and suitable location to recuperate
- They may or may not be subjected to further veterinary attention, depending on requirements of importing country
- This period and range of health checks vary with purchasing country
- Quality of management during this period can have dramatic effect on subsequent survivability, health and performance of imported stock
- Must minimise adverse effects of old stressors on well being
- Must prepare stock for any new stressors (eg transport to farm) on well being

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EARLY POST ARRIVAL MANAGEMENT

- Essential equipment at location includes
 - Well constructed set of cattle yards, race and crush for veterinary attention
- Must reduce adverse effects of new climate stress with shade and adequate resting space
- Sufficient drinking water and quality feed (not just rice straw!!)
- Competent stock people stock may not have previously been closely handled and are still suffering from their long journey
- Prepare stock for final journey to new home farm
- Therefore quiet handling and space to rest are essential for stock
- Make sure transport to new home farm is adequate and well managed

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MANAGEMENT AT NEW HOME FARM

- For the first week or so, isolate stock to reduce chances of disease spread from local dairy herd
- Seek local veterinary advice to develop animal health protocol for such susceptible animals
- May include vaccinations, not already given during quarantine period, drenching for internal and external parasites
- Once settled into normal farm routine, closely watch for early signs of ill health
- Commence a recording system for all stock incl those imported
- Monitor live weights to ensure good growth rate
- Feed some concentrates unless forage quality is good
- Ensure continual supply of drinking water
- Minimise contact with people and other farm animals

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SIGNS OF ILL HEALTH

- Physical state of animal is good guide to its health status
- Healthy stock are:
 - Alert, active, have bright eyes with no discharges, smooth and shiny skin
 - Breathe and urinate regularly, ruminate for at least 6-8 hr/d
 - Tail moves to drive flies away, ears have normal movement
- Signs of ill health include:
 - Loss of appetite, reduced milk yield, increased body temperature
 - High pulse rate (more than 60-70/minute)
 - Fast respiration rate, tongue protruding, open mouth breathing, diarrhoea
 - Inability to lie down, difficulty with normal walking
 - Dehydration: sunken eyes, pinched skin taking time to return to normal
 - Discharges from vagina indicates reproductive problems
 - Calves do not stretch on standing after lengthy rest periods

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CONCLUSION

- High quality dairy cows are not good investments for every small holder farmer
- They should only be purchased by those farmers where they can be properly managed
- Management covers:
 - Feed supplies and feeding management
 - Young stock, animal health, environment
 - Other aspects of herd management
 - Milk harvesting (to maximise unit milk returns)
- Otherwise their performance (milk & fertility) will be no better than that of local (Friesian crossbred) cows
- Don't blame the cows, it is not their fault!
- Blame the advisers & farmers for inappropriate investments

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4.3 Assessing current farm management

Assessing farm management was a new concept developed specifically for this project (Figure1). It provides a check list to monitor current farm management practices to assess the suitability of a particular smallholder farmer to receive high genetic merit stock.

This approach was used with farm visits at the Kluang workshop.

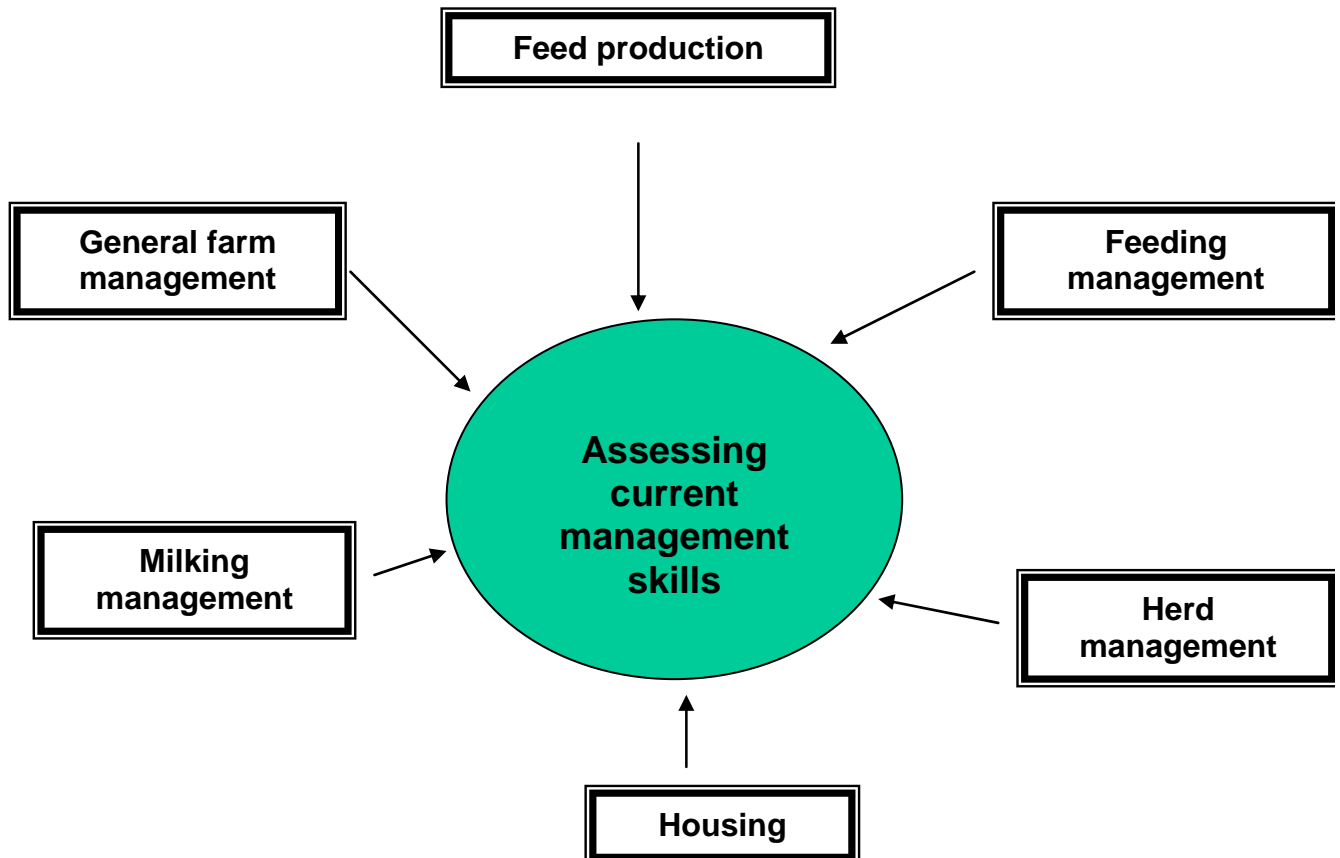


Figure 1. The framework to assess current farm management practices

4.3.1 Checklists to record current farm practices

Imported dairy stock require a high level of herd and farm management to ensure they continue to grow well and remain healthy to become productive milking cows. Poor management practices can lead to low growth rates, delayed breeding, stock diseases and even deaths among imported stock both before and after first calving.

It is desirable to assess the quality of management on each dairy farm prior to the introduction of these stock to help decide on the farm's suitability to be included in such a dairy improvement and importation scheme. A series of checklists to consider when assessing current herd and farm management practices, have been adapted from Moran 2002, 2005 and 2009 and are listed below.

1. Feed production

Size of forage production area (in m²)

Types of forages grown on the farm (grasses, legumes, cash crop by-products)

Quality of forage at harvest

Fertiliser management (manure, inorganic fertilisers)

Forage harvest interval (during wet and dry seasons)

Fodder conservation practices (silage, hay)

Year round supplies of fodder (dry season sources)

Number and type of stock on the farm (milking cows, dry cows, heifers, calves)

Stocking capacity (too high, optimum or too low)

Proportion of forages from home grown supplies

Proportion of forages sourced off farm

Types of forages sourced off farm

2. Feeding management

Typical daily allocation of fresh forages (kg fresh feed/milking cow/day)

Forage preparation (wilting, chopping)

Hand or machine chopping of forages

Type of concentrates fed (formulated, by products, knowledge of energy & protein supplements)

Vitamin & mineral additives (type, others fed)

Allocation of concentrates (kg fresh feed/kg milk produced)

Measures of cow milk production (peak milk yield, current milk yield, days in milk)

Pattern of milk production (rate of decline from peak milk yield)

Body condition at calving, mating, drying off

Knowledge of cow live weights and changes in body condition scores (mating and calving live weights)

3. Herd management

Milk fed calf management (colostrum feeding, milk feeding program, weaning age, calf mortality)

Source of milk (whole milk, calf milk replacer)

Treatment for scours (use of antibiotics v electrolytes)

Calf pens (type, cleanliness)

Weaned heifer management (concentrate feeding, mating age, age at first calving)

Visual assessment of condition of calves and heifers

Disease management (vaccination program, veterinarian support and animal health program, drug storage, protocol for treating scours, milk fever and other diseases)

Reproductive management (heat detection, routine pregnancy testing, calving interval, conception rate)
Breeding program (criteria for selection of sires)
Lameness (locomotion test)
Mastitis (incidence, routine California mastitis tests, management & control programs)
Climatic environment (monitor respiration rates, outdoor access at night)
Structure of dairy herd (% productive cows in milking herd, % productive cows in entire herd)
Record keeping (board in shed, note book, computer)
What records are maintained
Target setting (daily milk yield, long term herd size)
Welfare issues (stock transport, any obvious problems)
Surplus stock (disposal, growing out male stock)
Other sources of dairy income (manure, excess fodder, biogas)

4. Housing

Shed design (floor slope & comfort, roof height, ventilation)
Access to water (adequate, continual)
Climate control (temperature & humidity inside shed, sprinklers, fans, varying feeding management during year)
Shed cleanliness (layout for cleaning, frequency of cleaning)
Cow stalls (tie stalls or loose housing, free stalls, sufficient lounging area)
Milk feeding calf pens (crates, deep litter, can easily separate calves, cleanliness)
Grouping of milking cows based on stage of lactation (yard for heat detection)
Pen layout inside shed (for young stock, hospital pen for isolation)
Location of milk fed calf pens away from adult cows
Feed storage facilities (separate to stock area, bird, insect & vermin proof, mixer for concentrates, chopper for forages)
Services (insulation, electricity, water for washing down, hot water for calf feeding equipment)
Catering for personnel (suitable space and furniture for relaxing, lockable storage for drugs, Effluent disposal (size of manure pit, how frequently emptied)

5. Milking management

Separate milking area (good layout for machine milking)
Hand milking (personal hygiene, milking method, type of and cleanliness of milking bucket)
Machine milking (cleanliness, quality & replacement of rubber liners)
Milk storage (milk cooler, stored in cool location)
Milking hygiene (hot water, soap, sanitisers, store buckets & milk cans upside down)
Milk quality and unit return (Fat%, SNF or protein%, bacterial contamination, milk grade in \$/kg milk produced)

6. General farm management

Record keeping (board in shed, note book, computer) and sufficient office space
Extent of record keeping (cow production only, performance of all stock, all farm inputs, labour)
Systematic record keeping (accessibility, kept in logical format, is it referred to in future)
Extent of financial records (occasionally revisited, relationship with creditors)
Knowledge of costs of milk production (\$/kg milk produced on farm)
Short, medium and long term plan for farm
Making good use of service providers (free information, aware of all services)
Efficiency of utilising employed and family labour

Communication and management of paid labour
Milk marketing (member of dairy cooperative, considered value adding, sought all possible market outlets)
Subjective assessment of overall farm management skills

4.3.3 One example of grading farmer skills

Using this structured approach to assess farm management provides a framework for grading the suitability of individual farmers to receive imported high quality dairy stock. For example, the following set of criteria was developed for a herd improvement program in Central Java. Objective criteria were graded as either good, average or poor. Subjective criteria were also noted:

Objective criteria

- *Average milk yield per cow*: above 12 kg/day, good; 10-12 kg/day, average; below 10 kg/day, poor.
- *Price for existing milk produced* (as this entails milk quality and composition): above 3,000 Rp/kg, good; 2,500–3,000 Rp/kg, average; below 2,500 Rp/kg, poor.
- *Fresh forage supplies (grass, cassava leaf, etc.) in the wet season*: above 30 kg/day, good; 20–30 kg/day, average; below 20 kg/day; poor.
- *Record keeping*: daily production, artificial insemination (when), when veterinarians visit and for what disease, when and what vaccination, from where the stock originate, their predicted calving dates. If the farmer writes the details down and remembers, good; if he remembers but does not write them down, average; if he does not know or remember, poor.

Subjective criteria

- *Condition of cow shed*: size, ventilation, condition of floor, hygiene (where is the manure pit?)
- *Herd management*: condition of dairy cow (health, weight, body condition), condition of young stock (health, weight for age, body condition), reproduction (calving interval).
- *Milking management*: equipment, hygiene, post-harvest milk handling.

This example of grading farmers skills was developed for a dairy adviser workshop in which participants visited several farms to assess their current levels of farm management. This provided a focus for group discussions on the level of farm performance required for them to make the best use of imported stock and the magnitude of current constraints for farmers to achieve acceptable levels of herd performance and farm profits.

4.4 Kluang pilot workshop

This section describes the workshop specifically developed for farmers planning to import high quality (genetic merit) stock onto both small and large holder dairy farms. Farmers, being practical people, learn more from seeing and doing rather than listening and reading. This is called experiential learning. Therefore, to improve their understanding of the principles discussed in the manuals, farmers need to be provided with practical examples of these improved management practices. In Australia, regular farmer group meetings, where they visit one another's farms, have proven to be successful in improving adoption on farm practices. There needs to be a clear focus and set of objectives for these "farmer discussion groups" (Figure 2).

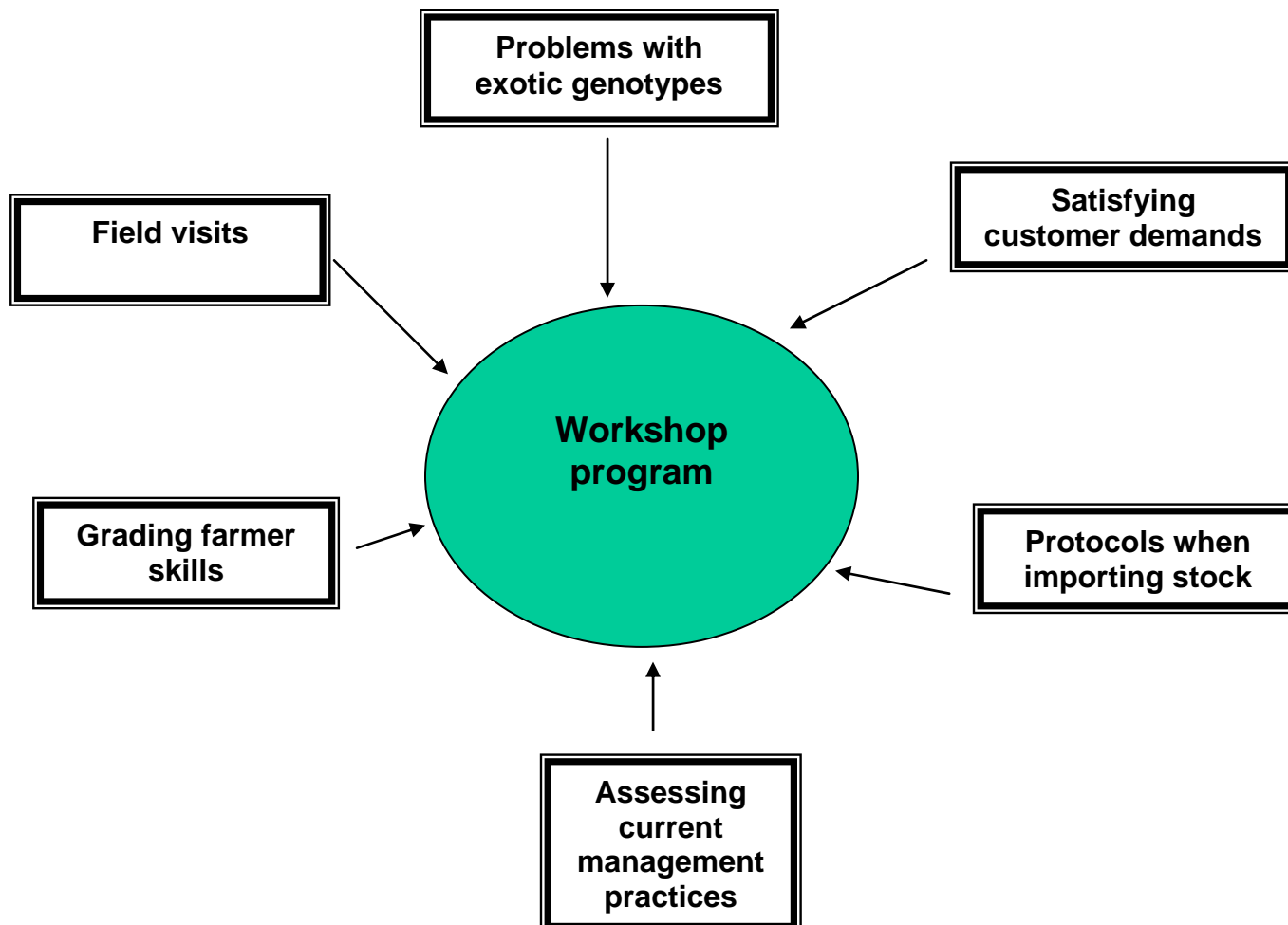


Figure 2

The pilot workshop for this project was conducted in Malaysia, at the Institute Veterinar Malaysia, formally known as Institute Haiwan, in Kluang. It was run over 3 days and incorporated both class room sessions and farm visits. The participants included government (Department of Veterinary Services, DVS) dairy advisers and farmers. The farmers selected generally had larger herds and were more likely to source Australian dairy heifers than would smallholder dairy farmers. Johore is a centre for large scale dairy development and Kluang has the largest throughput of milk of any DVS milk collection centre (MCC) in Peninsula Malaysia.

4.4.1 Planning the workshop

Workshop objectives

1. To increase the farmers' knowledge of improved versus traditional farm management
2. To highlight the importance of improved herd management for high genetic merit dairy stock such as imported Australian dairy heifers
3. To assess the MLA/LiveCorp technical material on improved herd management
4. To provide practical examples of improved farm management
5. To motivate farmers to want to change

Technical material provided to DVS

A collection of technical material was taken to Malaysia to show DVS staff and other dairy advisers some up to date dairy farmer extension material. These included:

- Tropical Dairy Farming book (Moran 2005)
- Calf rearing book (Moran 2002).
- Electronic versions of previous workshops and associated technical material conducted by the author

Material provided by MLA/LiveCorp

One of the major workshop objectives was to provide feedback to MLA/LiveCorp on the newly developed technical material. As well as the PowerPoint modules, this included the draft version of the "The farmers guide to good dairy herd management in the tropics".

Participant hand outs

Each participant received the MLA/LiveCorp material and copies of the first three (above) PowerPoint modules. They were not translated into Bahasa Malaysia because DVS ensured that all participants could comprehend English. This turned out not to always be the case, as was evident of some of the workshop evaluations. At the closing ceremony, each participant was formally given a Certificate of Attendance.

As has been a regular practice with my SE Asian workshops, participants were offered Australian souvenirs as rewards for contribution to the discussions, individual oral presentations or as gifts for farmers who opened up their farm for participants to review their current management procedures. DVS workshop organisers also received such gifts.

4.4.2 Implementing the workshop

The number of participants attending each session varied from 35 to 50, depending on the topic and time of day. A total of 50 participants were booked into the same hotel at Kluang, of which about 30 were dairy farmers.

Herd details provided by 18 of the participating farmers are presented in Table 1. Four of the herds have more than 100 adult cows, another 8 herds have more than 40 cows while 5 herds had 10 to 30 cows. On average, adult cows made up 39% of the dairy herds, although this varied widely from 11 to 83%. The stocking capacity (adult cows per ha forage area) averaged 13 cows/ha, although this varied widely from 0.5 to 90, with 4 of the 17 farms having in excess of 20 cow/ha. Per cow milk yields (when presented on only 10 of the farms) averaged 10.6, varying from 5 to 15 L/c/d.

Table 1 Details of herd sizes and milk yields of farmers attending the Kluang workshop

Location	Adult cows	Total stock	Forage area (ha)	Cow milk yield (L/cow/day or herd milk yield (L/day))
Kelantan	200	450	81	15
Johore	181	217	81	12
Johore	180	350	2	9-10
Johore	113	235	202	9-10
Johore	75	250	17	750
Johore	70	95	2	400 (28 c), 14
Malacca	60	180	2	75
Negri Sembilan	60	190	8	5
Negri Sembilan	53	211	49	9-10 (22 c)
Selangor	43	130	2	600
Pahang	40	143	20	10-12
Johore	40	70	7	130 (15 c), 9
Johore	30	75	14	10-12
Terrenganau	22	90	6	300
Malacca	22	118	2	280
Perak	20	180	49	200
Kuantan	10	?	2	15?
Johore	nil	nil	nil	-

Expectations from workshop

Only 22 expectation forms were completed. Participants were asked for their opinions on various aspects of managing high quality dairy stock (Table 2). Most agreed that Malaysia should import dairy heifers from overseas and that government staff were aware of the need to improve management of these stock. They generally considered that farmers were also aware of this need, but very few had the required skills. All participants agreed that farmers should be selected for receiving such stock on the basis of their herd management skills.

Table 2 Participants opinions collected from Expectation form

	Yes	No
1. Should Malaysia be importing dairy heifers from other countries?	20	2
2. Do you think government staff are aware of the need for improved management of these animals?	20	2
3. Do you think farmers are aware of the need for improved management of these animals?	17	5
4. Should farmers be selected on the basis of their herd management skills?	22	0
5. Do many farmers have the skills to manage imported heifers to achieve high milk yields and fertility?	3	19

When asked what topics they would like to learn in this workshop, their answers included:

- Improved herd management (11 participants)
- Fertility and reproduction (8)
- Feed production (8)
- Cow health (7)
- Young stock management (7)
- Feeding management (6)

- Cow productivity (5)
- Reducing cost of production (4)
- Upgrading herd genetics (2)
- Feet problems (2)
- Milk harvesting and quality (2)
- Increasing milk yields from 10 to 15 L/c/d
- Sourcing cows in Australia
- Ship v air freighting cows from Australia
- Latest production techniques
- Urea as a feed for cows

Running the program

The program for the 3 day workshop is presented in Table 3.

Table 3 Program for the Kluang workshop

Day session &	Content
Day 1 AM	Official opening by Dr Idris, DVS Workshop expectations
Day 1 PM	Introduction to good dairy herd management Assessing current management on dairy farms Plan farm visits for small groups to collect specific information
Day 2 AM	Visit two farms and document current management
Day 2 PM	Prepare for small group presentations Presentations from farm visits
Day 3 AM	Revision of first two day's learnings Tips and traps for small holder dairy farming Review of farmer manual
Day 3 PM	Improved herd management for Australian dairy heifers Workshop evaluations Presentation of certificates

Associated farm visits

A key element of any farmer workshop is a series of farm visits, preferably to farms with different levels of herd and feeding management, so participants can see for themselves what constitutes poor and good farm practices. It is one thing to develop a series of best management practices (BMP) but another thing to see attempts to adopt them. It is also important understand the reasons why farmers fail to achieve BMP. It could be due to:

- Ignorance; farmers don't know about them.
- Lack of resources; farmers don't have the money or facilities to adopt them.
- Lack of incentives; farmers do not see the need to want to adopt them.
- Lack of service provided by government advisers or local agribusiness providers.

Unfortunately many of these BMP are like insurance policies in that farmers take the attitude that "if it isn't broken, you don't need to fix it", particularly if it costs money to modify facilities or purchase additional equipment. Such issues were discussed back in the classroom following the farm visits.

Selection of suitable farms is paramount when planning the visits. Close proximity to the workshop venue is important. Each farm should be chosen with a specific purpose, such as to demonstrate a

particular farming practice or set of practices. Ideally farmers should have good records so they can provide useful background on these observed practices, such as their herd reproductive performance and their cost of production. Selected farmers should obviously not be intimidated by large groups of inquisitive visitors. Inviting farmers back to the workshop is useful so they can further explain their management decisions during the debriefing session.

Review of Kluang farm visits

It was important that participants visit local farms to assess their current management and report back to the workshop to initiate discussion about the key farm practices required for farmers to successfully reap the benefits of high genetic merit. Prior to these visits, participants should be developing some theoretical skills on what constitutes improved farm management.

To aid with the collection of farm data to assess current management, the participants were split into two groups, one for each farm, then divided into four groups to interview the farmer about specific management practices. These were:

1. Feed. Forage production and feeding management
2. Herd. Animal health and young stock management
3. Housing. Physical features such as sheds and effluent systems
4. General. Milk harvesting and business management

Two farms were visited during the Kluang workshop, owned by Mr Majid (Indian) and Mr Chan (Chinese). Details of the farm were as follows:

Majid's farm: It has 6.9 ha of forages, comprising 4 ha Napier grass for hand harvesting and 2.8 ha other forages for grazing. Inorganic fertilisers are not used on the forages, just manure. He has a total of 344 stock, including about 100 milking cows, crossbred with some Friesian type crosses. Each day he purchases two truckloads (6 t) of maize stover which is chopped through a forage harvester prior to feeding out. He has a very large shed (over 100 m in length) for his milking cows where they are individually tethered during the day, after spending the night outside on a hill. The shed has a very low roof and concrete floor with a severe downhill slope (too much). At 1100 hr, the temperature in the shed was 32°C with 65% relative humidity; with one cow having a respiration rate of 84/minute. Cows are given very limited access to drinking water during the day.

The heifers and dry cows are kept in a second shed on a very dirty deep litter floor on with manure is piled up behind the stock, where it is allowed to ferment following inoculation of probiotics.

The feeding management is almost entirely based on purchased by-products (35-40 kg/d maize stover and 8 kg/d concentrates), with milking cows fed a concentrate mixture of:

- 50% brewer's grain
- 30% soya waste
- 15% tapioca root skins
- 5% salt and mineral premix

The cows are machine milked while tethered, using a vacuum line the length of the shed, and produce on average 8 to 9 L/cow/day (2400 to 2700 L/cow/lactation). The milk is AA grade and milking equipment washed with hot water; the rubber liners were in quite good condition. The cows were in good body condition, 5.5 to 6.5 out of 8. Natural mating is used but the two bulls are only given access to the cows during the evening. Target live weights are 240 kg for mating and 350 kg for first calving. Milk fed calves are fed on Calf Milk Replacer. Cows are routinely tested for mastitis with antibiotics used in the treatment protocol. However, dry cow mastitis therapy is not practiced.

To gain access to the cows and fodder area, we had to walk over a lime covered mat while trucks had to drive through a sterilizing pit. The Kluang region was still in a post Foot and Mouth Disease outbreak at the time of this visit.

Mr Majid sells 5% of his milk informally (@ 4 MR/L) with the remaining 95% sold through the local DVS milk collection centre (@ 2 MR/L). He also sells probiotic treated manure to a worm farm @ 20 MR/bag and untreated manure to an orchid grower @ 10 MR/bag (10-15 kg). His manure sales comprise up to 20% of his daily farm income. He has a good staff and meeting room and lives about 1 km from the farm. His son uses a computer for farm data recording.

When asked about his three biggest problems, he listed:

1. Staff (reliability and skills)
2. Mastitis (should use dry cow therapy)
3. Feet (individual tethering on concrete)

Chan's farm: It has 12.1 ha Napier grass which is harvested every 60 days and is fertilized with both manure and inorganic (NPK) fertilizers. He has a total of 303 stock comprising 130 cows, 110 heifers, 60 calves and 3 bulls. Of his adult stock, 75 are lactating and 40 are dry.

He feeds his milking cows 20 kg/cow/d fresh forage plus a mixture of brewers grain, soya waste, corn cobs, bean sprouts, formulated pellets, palm leaves and mineral premix. His farm milk production is 600 to 700 L/d. The shed is currently very crowded with a low roof and poor hygiene. Supplies of drinking water are inadequate.

Mr Chan is expanding his farm, both his forage production area and shed capacity. Currently his milking herd only averages 270 days lactations because of insufficient shed capacity in that he has to dry off cows in late lactation to make room for newly calving cows. He machine milks his cows but has to use a calf to stimulate milk let down because he does not artificially rear his calves, using teat rearing for 12 weeks. He uses both bulls and AI with routine pregnancy diagnosis at 4 months. Lameness and mastitis are problems.

When asked about his three biggest problems, he listed:

1. Limited shed capacity
2. Limited forage production
3. Lack of mechanization, for harvesting forage, feeding out and a pump for effluent disposal.

On both farms, rolling herd average milk yields of only 8 to 10 L/d clearly indicated underfeeding and/or limited supplies of feed nutrients. Both farms have very large herds but very poor housing and limited forage production areas.

On the return to the workshop, the small groups summarized their observations and in turn reported them to the workshop. The two farmers were given the opportunity to discuss the findings. The discussions are summarised in Table 4 and 5 below.

Improved management packages for tropical and temperate dairy production technology

Table 4 **Some suggestions for improving management on Majid's farm**

<i>Aspects of management</i>	<i>Suggested improvements</i>
Feed	What is "Plan B" in case of inability to source maize stover? Improve supplies of drinking water Could provide some dry feed supplies as mixture is too moist Reassess feed quality to improve milkers' ration Use inorganic fertilisers on forage production area Early lactation herd should be provided with better quality rations to achieve higher peak milk yields
Herd	Introduce dry cow therapy to better manage and control mastitis Review management plan for mastitis to include culling high count cows Try some loose housing in existing shed Use more bulls Bulls should have 24 hr a day access to cows on heat Review lameness identification and treatment plan Heifers and dry cows require better hygiene Develop management plan for lameness problems
Housing	New shed for milking cows with high roof, free stalls and smaller floor slope Improved climate control (fans & sprinklers) Too expensive to renovate existing shed Develop specific milking area
General	Reduce problems with staff skills through improved training and/or motivation Use specific dairy computer program to improve herd management

Table 5 **Some suggestions for improving management on Chan's farm**

<i>Aspects of management</i>	<i>Suggested improvements</i>
Feed	Grow and provide more forage Undertake fertiliser strips to assess optimum fertiliser management Provide continual access to drinking water Could provide some dry feed supplies as mixture is too moist Early lactation herd should be provided with better quality rations to achieve higher peak milk yields
Herd	Introduce dry cow therapy to better manage and control mastitis Review management plan for mastitis to include culling high count cows Review lameness identification and treatment plan Improve current hygiene of shed Remove calves from cows within 12 hours of birth
Housing	Increase shed capacity Improve climate control in existing shed
General	Reduce problems with staff skills through improved training and/or motivation Use specific dairy computer program to improve herd management

Practical issues arising from workshop

For this workshop, a series of visual images of poor versus good management would have been useful. This could have formed the basis of a trouble shooting guide covering both post-arrival management and good farming practices. DVD's could have providing better visual images than still photographs.

The audience for future workshops will differ depending on the country for which the program is to be designed. As well as a simple set of PowerPoint presentations, technical workshops for government advisers and trained herd managers could include distribution and discussion of this manual. However technical packages for all farmers receiving the imported stock should be based on simpler material such as visual images and glossy reference cards. The importance of language for communication, such as subtitles and dubbed sound track on any specific DVD's for each target country, must be taken into consideration.

Expectation and evaluations are very important for any workshop. Firstly because workshop participants may not all be aware of the workshop's emphasis on improved management practices and secondly, they can help plan an "open session" on the last day to discuss specific issues on dairy production technology.

Evaluating the MLA/LiveCorp farmer manual

This workshop provided the opportunity for farmers and advisers to evaluate the MLA/LiveCorp farmer manual and its potential role in improving herd management and reducing problems of poor performance and mortalities in imported Australian dairy heifers.

Some of the participant's comments included:

- Farmers (including an Indian medical doctor) generally considered the manual to be very useful and practical and also not too long.
- One farmer suggested the manual could include more details of traditional management practices as they would be very different to those of improved herd management.
- Another suggestion was to include more details of existing practices in other tropical countries.
- On the whole, farmers and DVS staff considered the manual to be a very useful document which highlighted the basics of improving feeding and herd practices to minimise the potential problems of managing high genetic merit dairy heifers.

Evaluation of the workshop

Only 14 evaluation forms were completed. Participants were asked to use a subjective scoring system (1 to 5) for various aspects of the workshop and the skills they learnt (Table 6). Table 7 presents additional evaluation about the workshop processes.

Table 6 Evaluation of the workshop by each participant (1 to 5 with increasing importance of question)

Question	
1a. How do you rate: farm visits	3.7
1b. How do you rate: small groups & reporting back	3.7
1c. How do you rate overhead presentations	4.0
2. How do you rate importance of improved herd management skills in your job?	4.3
3. How much have you improved your knowledge of herd management skills?	3.5
4. How well will you be able to apply knowledge to farmer situations?	3.6
5. When should you do a refresher course? <i>1, in 3 mth; 2, in 12 mth; 3, in 2 yr; 4, never</i>	5, 6, 1,0

On the whole, participants valued the farm visits and the feedback session. They also considered knowledge about improved herd management important in their jobs and that they could apply their newly acquired knowledge to farmer situations. Refresher courses were most requested for 12 months time.

Table 7 Evaluation of the workshop processes by participants

Program delivery	
(not enough/about right/too much)	
Program	3/11/0
Formal instruction	3/11/0
Discussion	3/11/0
Field visit	6/8/0
Reading material	3/11/0
Services and overall program	
(ranging from 4 for excellent to 1 for not good)	
Training	3.3
Location	3.6
Overall program	3.0

Participants generally considered the overall program, lectures, discussion and supply of reading material “about right” whereas more farmers would have liked more farm visits, which is difficult to incorporate into a three day workshop. In addition, they gave good ratings for the trainer, the location and the overall program.

The evaluation process provided participants with the opportunity to mention specific topics where they gained knowledge, how it would be used in their work, and of most importance, how future programs could be improved. The major outcome was a better understanding of good herd husbandry practices with several participants mentioning the “circle” of herd management. As one farmer stated “it is important to know your cows and their environment”. A greater awareness of the need for improved feeding was a key outcome. Many farmers highlighted the relevance of the program for its practical application of theoretical knowledge in prioritizing better farm management practices.

Some of the weaknesses were that there was too much information presented in a short space of time and that translations would have helped with both oral and written presentations. More time for discussions was suggested, while some participants were not happy with the venue or the lack of

transport from the hotel in Kluang. Many highlighted there were no weaknesses in the planning and implementation of the workshop.



Allister Lugsdin, John Moran, Dr Siti, Dr Indris and David Beatty and the official opening of the Kluang workshop



Presenter John Moran at the opening presentation

5 Success in achieving objectives

With the major objective being the improved survivability and performance of Australian dairy stock, the success of this project will not become apparent for several years. Many of the potential problems have been highlighted in Section 4.3.1 of this report, namely the checklists of current farm practices to assess the suitability of individual farmers to receive high genetic merit dairy stock. The most important ones have been prioritised in Section 4.3.3, in the development of a grading scheme specifically for small holders in Central Java. The level of acceptability of farmer management practices will need to be modified for different dairy regions within Indonesia and in other importing countries.

5.1 Preparation of farmer and adviser manuals

The major achievement of this project has been the production of a series of manuals on improved management for imported Australian dairy heifers.

To date, Australia's live dairy export industry has not been able to provide a consistent 'after sales service' to importing countries. Each export agency has provided their own series of advisory booklets but these have been variable with inconsistent messages on expected levels of management and farm practices to reduce the likelihood of sub optimal animal performances once the stock enter their new milking herds.

Firstly, the farmer manuals provide concise, easy to read guidelines for small holder farmers which, we expect would be translated into the local language of the area. Secondly, the adviser manuals provide an easy to follow series of guidelines which are complimented with technical backup so advisers can better understand the reasons for the need for improved herd and farm management. Thirdly, the PowerPoint presentations can be used to develop technical training programs for each country importing Australian dairy stock.

5.2 Addressing potential animal health and welfare problems

The major animal health problems encountered by high genetic merit dairy stock are:

- Rumen acidosis, resulting from unbalanced diets and the feeding of very high levels of carbohydrate rich feeds.
- Lameness, due in part to acidosis (laminitis) but also to traumatic injuries incurred as a result of poor housing conditions, particularly uneven and broken concrete floors.
- Mastitis, due to poor milking and dairy shed hygiene.

Solutions to these animal health issues are discussed in the adviser manual and briefly covered in the farm manuals.

Animal welfare is a common issue in many small holder farms partly because of the different concepts of rearing livestock that exists in Australia and many of the importing countries. Western concepts on animal welfare have yet to greatly impact on many of the livestock keeping practices in South and East Asia in that dairy cows all too frequently live in tie stalls where they are tethered for 24 hr/day and forced to lie down on dirty, uneven and hard surfaces. Deprivation of water, as well as feed, has been known to occur as part of accepted herd management in certain countries, while poor heat stress management is an all too common feature in many tropical countries. Not only do these management practices adversely affect cow performance, such stock are clearly suffering.

Transportation of livestock is currently a debating point among stakeholders in Australia's livestock export industries, but more so with small ruminants. At present, the acceptability or otherwise, of conditions of dairy herd and farm management on small holder destination farms has yet to reach the point of widespread debate, but this could change in the future.

5.3 An example of a potentially successful approach

Pakistan has recently imported Australian dairy heifers as part of their dairy development program. In addition, they have developed a series of guidelines on improved herd and farm management, which are outlined below. This type of approach should be considered by other importing countries to ensure Australian heifers receive the level of management required to ensure their potential productivity may be achieved under small holder dairy systems.

Dairy Pakistan is a government agency specifically established to improve the dairy sector in Pakistan. They have developed a model farm program where they lent money to smallholder dairy farmers for farm equipment, who in turn, had to provide their stock with better feeding and herd management. The program focused on 5 main interventions, namely:

- Free access to water.
- Provision of better fodder with better nutrition than that currently provided.
- Temperature mitigation.
- Preventative health care, particularly for mastitis.
- Improved calf rearing and reproductive performance.

The following requirements are laid down for participating farmers in that they had to ensure that:

- All stock ran free, and were not tethered, except during milking and animal handling.
- Stock were maintained in separate groups, such as milkers, dry cows, young stock.
- Animals were give free access to unlimited clean drinking water
- Stock were not watered via channels, drains and other water courses.
- There was no access to livestock wallows, both natural and artificial (specifically for milking buffaloes)
- There was no grazing in water logged areas and adjacent to water courses.
- The farm would be open to visits of other model farm participants.
- The farmer would undertake mastitis control as per Dairy Pakistan guidelines.
- The farmer would undertake timely vaccination programs for Haemorrhagic Septicaemia and Foot and Mouth Disease using credible vaccines.
- The farmer would undertake endo parasite drenches (including liver fluke) at least 3 times per year.
- The farmer would undertake ecto parasite treatment when required.
- The farmer would use artificial insemination where available.
- The farmer would maintain animal housing in a clean hygienic conditions with weekly disinfections.
- The farmer would maintain records, including financial, as per Dairy Pakistan guidelines.

A review of the first two years of the model farm program (Dairy Pakistan 2008) reported that average daily milk production for 643 farms in 10 dairying regions in Pakistan has more than doubled from 4.7 to 10.3 L/cow/day, or an increase of 5.6 L/cow/day. Of more relevance, mean monthly profits on these 643 farms increased from -5000 to +21000 Pakistan rupees/month. This highlights the dramatic impact of a well directed extension program.

The above guidelines would have to be based on current disease scenarios in different tropical dairy regions. However they should be used to provide a blue print of acceptable herd and feeding management guidelines for importers of Australian dairy heifers.

6 Impact on meat and livestock industry – now and in five years time – section

6.1 Australia's current dairy heifer export trade

The destination of live dairy cattle exports are presented in Table 8. The China trade has predominated, although it decreased in 2006; this is mainly due to the more stringent pedigree requirements recently introduced.

Mexico and the Middle East (Kuwait and UAE) have been consistent importers each year while Russia has become a strong market in more recent years. Virtually every dairy industry in South and East Asia has imported Australian dairy heifers some time over the last 6 years and are likely to increase their demand in the future. The trade has benefited for the identification of BSE in competing overseas markets.

According to Clarke *et al* (2007), about 90% of these exports originate from Victoria, which contributed 47,000 head per year over the period 2003 to 2005.

The trade requires joined or unjoined, predominantly Friesian heifers of 12 to 15 months of age. Specific genetic requirements and pedigree status vary between export markets. However on the whole, Victoria is able to supply quality genetic stock to meet export market requirements without diluting its own genetic resource. The 2002/3 and 2005/6/7 droughts provided the opportunity for dairy farmers to more profitably reduce stock numbers on their farms through selling many of their heifer replacements, particularly in the Murray Goulburn Valley.

Farmers supply heifers direct to exporters or sell 3 to 6 month old heifer calves to specialist backgrounders who grow them out for a further 9 months. Some of the markets seek joined heifers but because dairy farmers do not always mate heifers to Friesian (with bull or semen), it is not uncommon for the progeny to be crossbred Jersey or beef breed. The trade is supplied all year round with stock maturing at 12 month after spring or autumn calving. There is no seasonality in supply or price.

With farm gate prices averaging \$1100 per head, the average CIF value (which includes all the other contributors to the value chain) increases to \$2069 per head.

Table 8. Destinations of live dairy cattle exports from Australia from 2003 to 2008; these data includes dairy bulls as well as heifers and cows. (Source: Australian Bureau of Statistics)

Destination	2003	2004	2005	2006	2007	2008	6 yr total	% of total
China	34688	68176	26471	8979	3526	12209	154049	48.7
Mexico	2331	5633	15181	11263	22167	10131	66706	21.1
Russia	-	-	-	3360	6975	20071	30406	9.6
Kuwait	1916	1844	3039	3331	4479	3936	18545	5.9
UAE	3519	1415	2818	1825	328	272	10177	3.2
Saudi Arabia	-	-	-	-	4463	1700	6163	1.9
Turkey	-	-	-	-	2838	3150	5988	1.9
Indonesia	3218	-	700	1601	-	-	5519	1.7
Pakistan	-	-	-	-	-	3680	3680	1.2
Malaysia	277	-	-	755	83	2858	3973	1.2
Japan	841	650	662	978	-	-	2546	0.8
Vietnam	1872	-	-	-	-	-	1872	0.6
Oman	600	450	250	350	-	-	1650	0.5
Jordan		--	-	-	1200	-	1200	0.4
Korea	847	-	-	-	-	-	847	0.3
Brunei	-	--	-	740	-	-	740	0.2
Taiwan	-	-	-	70	539	-	609	0.2
Philippines	-	-	275	93	67	90	525	0.2
Qatar	-	-	-	-	-	233	233	0.1
Others	28	-	31	85	-	44	411	0.1
Annual total	50137	78168	49427	33430	46665	58364	316191	

6.1.1 Contribution to Australia's dairy industry

Clarke *et al* (2007) undertook a detailed study of live cattle exports on various regions around Australia. They assessed the impact of the live dairy heifer trade on Victorian dairy farmers concluding:

- The 1.3 million milking cows are located on 6100 dairy farms in Victoria. Of these, 2000 to 3000 contribute dairy stock for export on a regular basis. A typical dairy enterprise of 200 dairy cows makes available 20 heifers per year to the trade, with 50 to 250 farms contributing to a single 3000 head shipment.
- The industry averaged 19 shipments per year, mostly out of the port of Portland
- By retaining otherwise surplus stock on farm, farmers incur between \$300 and \$650 per head additional costs. At 12 months of age, these heifers sell for between \$900 and \$1200 per head.
- The live export enterprise earns the dairy farmer a profit of \$11,500 per year which between 2003 and 2006, contributed 20% to total dairy farm profits.

In addition, the value chain includes:

- Backgrounders, with 24 specialists each growing out 400 heifers per year, spending \$850 per head and selling 12 months old stock for \$1100 per head.
- Direct operators such as export agents, road transport providers, assembly operators, veterinarians, AI technicians, and fodder producers
- Other operators such as sawdust and chaff suppliers, port authorities, stevedores, ship's crew and even hotels in dairy cattle purchasing districts

- Businesses in 7 separate sectors of the value chain earn more than 10% of their total revenue from the trade.
- Development of the trade has been able to “piggyback” on existing infrastructure with dairy farmers being able to participate without the need for additional investment. In fact, the trade provides opportunities for dairy farmers seeking lower input alternatives to milking.

In total, the authors calculated an annual gross farm gate price on \$52 million, direct benefits of \$117 million per year, plus \$107 million in gross regional product and generating 1206 jobs in the trade.

The authors estimated that a cessation of the trade would reduce 12 mth heifer prices from \$1000 to \$500 per head while surplus 3 mth heifer calves would fall in value from \$500 to \$100 each. In the first year of cessation, \$170 million would be lost to the Victorian economy and over 650 jobs would be shed. Losses over 10 years would amount to \$290 million.

6.1.2 Industry threats and sustainability

Clark *et al* (2007) have identified 3 major threats to the industry, namely

1. Extreme animal welfare activities shutting down the trade
2. Loss of key markets, such as China, for any number of reasons including a change in Chinese government policy
3. Disease outbreak changing the health status of Australia's largely “disease free” dairy industry.

They can see no reason for these threats to be realised. Their conclusion is that this industry is stable with ongoing exports being sustainable at current levels (40000 to 75000 head per year) without loss overseas of superior genetic material.

Other opinions regarding the future for Australia's live dairy heifer trade are:

- Even though China has introduced stringent pedigree requirements for imported heifers, making it more difficult for dairy farmers to reach such specifications, other less demanding markets (particularly in South and East Asia) are opening up, thus providing alternative opportunities. Many of these countries are investing heavily in import substitution of their dairy products, with increases in the size and genetic merit of their national dairy herd being given a high priority.
- The current drought will eventually break and demands for heifer replacements will be renewed, thus putting increasing pressures on heifer prices. Farmers will be seeking more and more heifers since herd sizes are likely to increase as farm numbers dwindle.
- Competition from other countries supplying dairy heifers is likely to increase with their improved disease status and our reduced supply hence higher prices.
- High mortality rates of imported heifers and/or poor milking and reproductive performance following calving may reduce demand. This may or may not just be a perception that heifers from Australia are less suited to the production systems to which they have been introduced than either local stock or those from other countries.
- This last dot point could have major influence on the future of the trade which highlights the need to minimise any likely adverse effects of poor post arrival management of the exotic and high genetic merit stock originating from Australia.

- I have personally seen the impact of such poor post arrival management in two countries (Indonesia and Malaysia) and have been reliably informed about its impact in a third (Pakistan).

6.2 Predicting Australia's dairy heifer export trade in 5 years time

The volatility of the global market for dairy products is having a dramatic impact on the growth of local dairy industries throughout South and East Asia and the same would be expected with other important markets for Australian dairy heifers. For example, the global price for skim milk powder decreased from US\$5000 per tonne in Jan 2008 to less than \$2000 in Feb 2009. Accordingly, a large dairy processor in East Java has put plans on hold in early 2009 for new farm development programs because it was becoming cheaper to import milk powder from Australia and New Zealand rather than source fresh milk locally. Such decisions will impact on requirements for extra dairy stock in every importing country, hence demands on Australian dairy heifers.

Such price volatility is likely to last as long as the current global financial crisis, so it is likely that in the short to medium term, the number of exported heifers will decrease from 2008 numbers. Their destination will also depend on which countries recover more quickly from the current financial constraints hence reduced demand for dairy imports.

The widespread drought throughout southern Australia will also impact on the supply of export heifers. Once more normal seasons occur and dairy farmers become more confident of their future in the industry, they are more likely to restock their farms hence reduce the potential supplies of export heifers. As supplies dwindle, sale prices will increase and importing countries will look elsewhere for suitable stock. For example, China are sourcing dairy heifers from South America as well as Australia and New Zealand.

7 Conclusions and recommendations

Adviser and farm manuals

Dairy farming would be one of the most sophisticated forms of livestock production practiced by farmers anywhere in the world. Not only must farmers have the skills to grow quality forages, they must also become specialists in ration formulation, growing out young stock, disease prevention and control, environmental management and milking hygiene. As dairy cows were bred and selected in temperate regions, the tropical environments are essentially foreign to the modern high yielding dairy cow, because tropical climates introduce the major problems of heat stress, poorer quality roughages and thriving disease conditions.

The following figure highlights the 9 key management areas on any dairy farm, whether it runs 10, 50 or 200 milking cows.

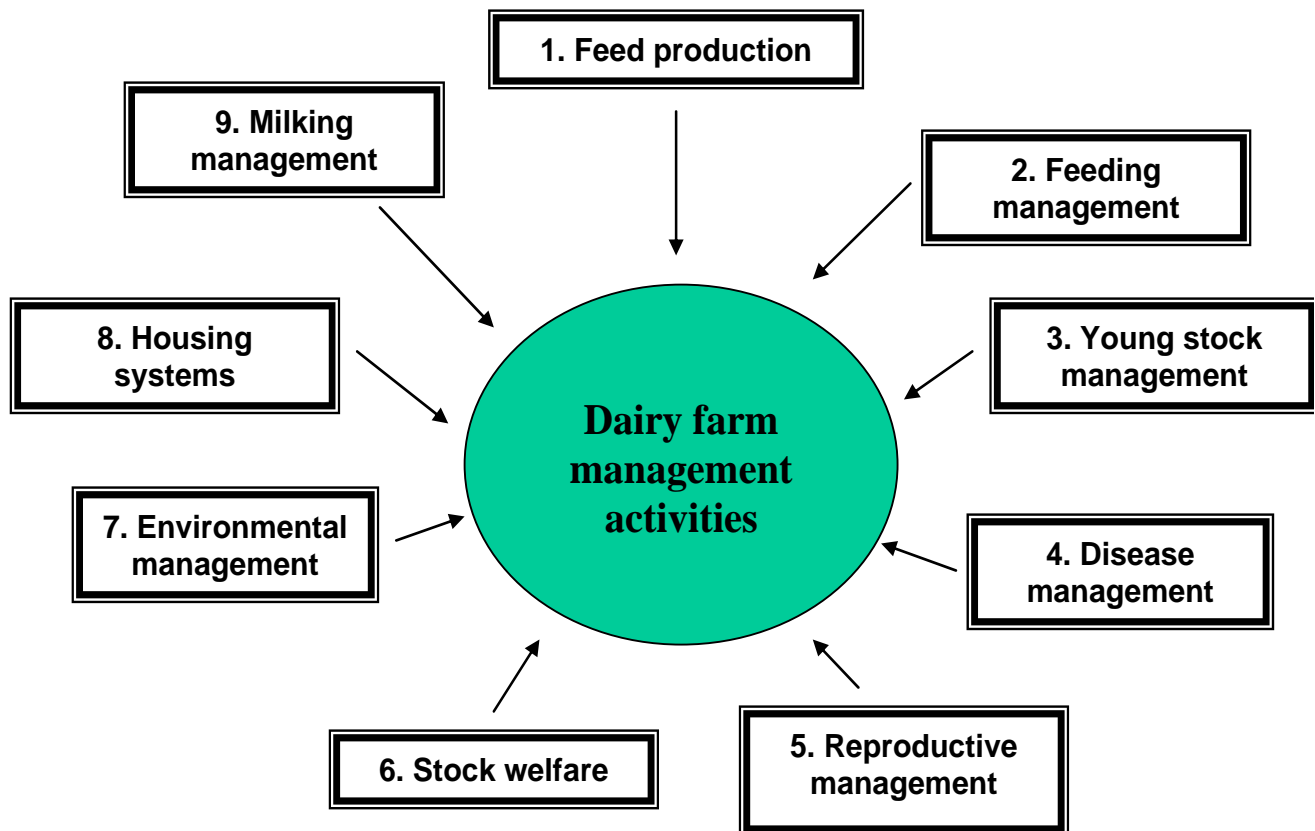


Figure 3

For these reasons, it is difficult to produce an adviser or farmer manual in as few pages as one for growing out imported beef cattle or goats for slaughter.

As “one picture speaks a thousand words” particularly to farmers, many of whom have limited education, the Tips and Traps section of the manuals will be well read. It is recommended that a video of these tips and traps be prepared to further enhance farmer understanding.

Pilot workshop

The feedback from the Kluang pilot workshop clearly indicated that the technical content provided a clear and concise summary of the principles of improved herd management of both small and large holder tropical dairy farms. The opportunity for workshop participants to actively contribute to the workshop during their reporting back from the farm visits, allowed a good assessment of the retention of the new information presented the previous day. The farmer manual was also well received as a valuable extension tool for future reference.

It is recommended that workshops should be planned for every major destination of Australian export heifers. Prior to these workshops, it is important to assess any particular idiosyncrasies of dairy farm management in these countries to ensure these are adequately discussed at the workshops. To date such information has not been easy to source from MLA/LiveCorp or export agents. A study tour of these destination markets would be a good investment for this project.

Assessing current farm management

In far too many instances, imported Australian dairy heifers have been sent to inappropriate new home farms and mortality events have eventuated. Therefore not only should export agents supply reliable information on post arrival herd management (such as the manuals arising from this project), they should also have some input into which farms the stock placed. The initial attempt at grading current farm management (Section 4.3.3) should be extended to other tropical dairy regions outside Central Java. It is obviously not easy for Australian dairy specialists to have any control over the eventual destination of imported stock, but at least such a concept should be discussed in the initial negotiations to develop supply contracts. How more accepted farm management practices become incorporated into supply contracts is a major challenge for the dairy live animal export industry.

Summary of key recommendations

The key recommendations from this project are:

- Small holder dairy farmers receiving imported Australian dairy heifers should be selected on their ability to provide adequate feeding and herd management to minimise dairy practices which would adversely influence their potential performance as milking stock in the herd.
- Small holder dairy farmers should be provided with a training program to ensure adequate management of imported Australian dairy heifers. Such programs should be based on the tropical and temperate farmer manuals developed in this project.
- Advisers to these farmers should also be provided with similar training programs based on the tropical and temperate adviser training manuals developed in this project.
- Export agents providing imported Australian dairy heifers should undertake follow up programs to monitor small holder feeding and herd management and advise farm advisers (and ultimately farmers) where improvements are necessary. These agents should provide feedback to MLA/LiveCorp on a regular basis.
- MLA/LiveCorp could become more involved in the routine quality control of such farmer and adviser training programs as well as advising export agents on the suitability of specific countries to receive imported Australian dairy heifers.

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