Dairy management, health and production in Thailand

by Dr Suneerat Aiumlamai, Faculty of Veterinary Medicine, Khon Kaen University, Khon Kaen, Thailand.

Thai dairy farming was initially run as a project by the Ministry of Agriculture for the Royal Thai Government.

The Department of Livestock Development (DLD), the Dairy Farming Promotion Organisation of Thailand (DPO) and the Nongpo Dairy Cooperative have been responsible for intensively promoting dairy farming and the dairy sector ever since.

Originally, there were only 1-5 cows in each farm, nowadays the average number of cattle per farm is approximately 20-30 with 10-20 lactating cows. In Thailand dairy cows are typically kept on small to medium scale farms with 20-50 animals.

Friesian-Holstein genetics

Most dairy cattle have a high percentage of Friesian-Holstein genetics and produce 3,000-5,000kg per lactation period. However, most Thai dairy farms (71%) are classified as smallholder dairy farms (< 20 lactating cows).

In 2005, a national survey reported 381,702 dairy cattle with 154,445 lactating cows, of which replacement heifers were up to 60% in each farm. In addition, there are a total of 25,393 dairy farms located in four regions and mainly in the central part of the country (69.4%).

The cross-bred Holstein Friesian-Native (tropical) cow is a major breed, which Holstein blood line (Bos taurus) is over 87.5% and accounts for 68.6%.

Furthermore, an average milk production was 3,945±1,537kg/lactation with a 324±97 day lactation length. Milk analyses found average fat, protein, and somatic cell count were 3.76±0.65%, 3.17±0.31%, and 549,910±704,614 cells/ml, respectively.

The reproductive performance of dairy cattle was lower than the target for dairy farming in general.

In 2004, DLD reported that conception rate of first service, total conception rate, days open and age of first calving were 45.7%, 38.5%, 196 days, and 33.8±6.6 months, respectively. A previous study also reported similar figures of reproductive performance as regards days open, calving interval, and age of first calving of 174 days, 452 days and 31 months, respectively.

Monitoring milk quality

Quality and production of milk are the main targets for farmers affected by mastitis problems, which is the end result of the interaction of many different factors.

In 1998, milk quality and composition in bulk tank milk were reported (Table 1).

Composition	Result
Av. somatic cell count (cells/ml)	998,000
Total bacteria direct microscopic count (cfu/ml)	739,000
Total solid (%)	12.44
Fat (%)	4.23
Protein (%)	3.13

Table 1. Bulk tank milk results (1998).

In 2000, subclinical mastitis was investigated and 62.8% of cows were found to be positive to CMT test. Several studies were conducted in Thailand. Staphylococcus aureus, streptococcus agalactiae, coliforms, environmental streptococci and coagulase negative staphylococci were reported as micro-organisms causing clinical and subclinical mastitis. A few studies on the effect of nutrition on mastitis have also been done.

Suwanpanya et al. (2005) showed that supplementation of selenium and vitamin E had a positive effect on udder health by reducing SCC and increasing cure rate of clinical mastitis. The Department of Livestock Develop-ment (DLD) intensively used bulk milk samples analyses to monitor milk quality and composition at farm level and emphasised in mastitis control program as well as incentive pricing since 2001.

In 2003, milk quality, particularly in SCC and DC, reduced to 401,000 cell/ml and 607,800 cfu/ml. Milking hygiene, a mastitis control program and proper milking machines are the main factors to prevent mastitis in Thailand.

The pricing system and national regulations (DLD) play an important role in increasing the quality of milk as well as reducing mastitis. Generally, artificial insemination (AI) is used for breeding in dairy cattle (over 90%), and mostly serviced by inseminators who work under veterinarian's advice from DLD, DPO, dairy cooperatives, and private sectors using imported frozen semen and semen produced within the country.

However, DLD has conducted the regulation of disease control programme for dairy health, as well as for AI.

Cattle have to be free from brucellosis, tuberculosis and paratuberculosis and individually tested for these diseases at least once a year where regulated.

Moreover, they have to be vaccinated against foot and mouth disease every 4-6 months and haemorrhagic septicaemia once a year. The sires from semen production centres must be tested and have to be free from reproductive diseases certified by DLD.

The prevalence of brucellosis, leptospirosis, ureaplasmosis, IBR, BVD, and neosporosis in dairy cattle have been reported in several studies in Thailand.

Disease causing abortion, early embryonic death, and repeated breeders have been intensively epidemiologically studied for preventive and control purposes.

A sanitary sheath has been introduced and used in AI services for the prevention of ureaplasmosis and contamination in AI procedure to increase conception rate.

However, the Thai national diseases regulation pays more attention to zoonoses and economic loss from certain diseases such as FMD than reproductive diseases.

Enhancing efficiency

Several approaches have been introduced to enhance dairy reproductive efficiency. Many hormonal programmes are used to control ovulation or oestrus induction to increase conception rate such as prostaglandins, progesterone and ovsynch.

Supplementation of GnRH or hGG after insemination showed satisfactory results to increase conception rate in the hot season. However, the cost of therapy was an economic concern in the field and individual cows were selected to receive the treatment. Using a dairy herd health and production management programme (HHPM) on

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the dairy farm clearly demonstrated better reproductive performances and quality milk. The implementation of veterinarian HHPM has been carried out in limited areas. This programme costs money, man power and time, but the costs should be regarded as an investment.

The routine monitoring programme must be built up gradually but steadily. HHPM by veterinarian could help farmers to improve their productivity, quality and profits in the long term.

Under such tropical conditions, farm management and feeding can affect dairy productivity and efficiency.

Low reproductive efficiency in dairy cattle in Thailand could be associated with a variety of causes such as improper insemination time, AI service system, heat stress, nutrition, reproductive diseases, farm and animal health management.

Studies showed that during the hot and humid season, the temperature and humidity index (THI) was higher than 75 and the conception rate was significantly decreased.

Suadsong and Suwimonteerabutr (2006) demonstrated that the reduction of heat stress by evaporative cooling housing could improve milk production without significantly affecting reproductive functions.

In Thailand, the quality of concentrates and forage is limited because of poor quality soil in the dairy farming areas. Rice straw and other by-products from crops have been used to replace grasses and legumes.

The condition of limited feed leads to a feeding management problem, therefore, farmers have to feed dairy cattle with high concentrate and low forage diets instead. The deficiencies of sodium, copper, selenium and phosphorus in Thailand have been reported.

However, clinical signs due to mineral deficiencies under field conditions are rare and subclinical cases are difficult to identify. However, supplementation of vitamins or minerals to dairy cows could reduce the incidence of retained placenta and increase conception rate.

Determining energy balance

In dairy cows in smallholdings, the low level of blood urea nitrogen, due to low crude protein in the diet, has been reported as well as clinical and subclinical ketosis demonstrated by a higher level of betahydroxybutyrate (BHBA), a lower level of glucose at the post-partum period, and a reduction of body condition score (BCS).

This longitudinal study was assigned to determine the energy balance and reproductive performance in small dairy holders. The results showed that BCS of the prepartum cows was significantly higher than in the postpartum period.

The average concentrations of plasma glucose were not significantly different in prepartum and postpartum period. The levels of serum BHBA were significantly higher than in the prepartum. The average of days after calving to first service, days after calving to conception, service per conception and calving interval of cows in the study were 85±40.61 days, 111±42.00 days, 2.72±2.32 times and 447±119.66 days, respectively.

Moreover, most postpartum cows (>93%) had BCS loss >1 score, whereas certain cows yielded <40mg/dl of plasma glucose and >1.2mmol/l of serum BHBA accounted for 12-13% and ~7%, respectively.

In a large dairy farm, 65 dairy cows were studied. The BCS of cows at 15 days prepartum were significantly higher (see Table 2). About <51% of cows had BCS losses >1 score in each time point.

Days prepartum	BCS
10	2.91±0.48
15	**3.85±0.60**
20	2.83±0.50
30	2.77±0.49
40	2.74±0.52
50	2.74±0.55

Table 2. Large dairy farm study results.

Mean concentrations of plasma glucose of the prepartum cows were significantly higher than in the postpartum period. The average postpartum levels of serum BHBA were not significantly different as compared to the prepartum level. Furthermore, about 52-63% and 9% of the postpartum cows had <40 mg/dl of plasma glucose and >1.2 mmol/l of serum BHBA, respectively.

The average days after calving to first service, days after calving to conception and service per conception of cows in this study were 84.32±31.75 days, 134±45.11 days and 2.26±1.60 times, respectively. These studies showed that energy balance and reproductive performance in post partum dairy cows, both in small and large dairy herds, were not significantly related ($p>0.05$).

Acidosis or subclinical acidosis, which leads to chronic laminitis in dairy cattle, has been discussed as a possible cause of repeated breeder or low conception rate, but no available evidence supports this issue in Thailand. Inchaisri et al. (2005) and Jarassaeng et al. (2006) reported that the prevalence of subclinical ruminal acidosis (SARA) in small dairy farming in Thailand was 30% and 42%, respectively.

Therefore, the effects of SARA on reproductive performance in dairy cattle in Thailand hasto be further investigated.

A main factor reducing dairy production in Thailand is a low conception rate which causes a long calving interval. Under condition of limited quality forage, the feed and feeding knowledge of smallholders, as well as a knowledge of metabolic and nutritional related diseases causing low productivity and poor reproductive performances in dairy cattle, is very important.

A study of prevention and cure of these diseases could be a key to increasing reproduction and production in smallholder dairy farms in Thailand.

A long calving interval and long days open could cause an inevitable negative balance and impair their resistance and defence mechanisms during post-partum. A change in the composition of the diet is that the roughage to concentrate ratio decreases and a sudden change of diets occurs during transition from dry period to lactation.

This change in diets has an impact on the composition of bacteria and protozoa in the rumen to more rapid fermentation and leads to a degree of dysbacteriosis. This could causes ketosis and rumen acidosis and, in turn, raise the risk of long days open and low conception rate in dairy cattle. In 2005, the Thai government signed a Free trade area (FTA) with Australia and New Zealand, which made the Thai dairy industry change to international competition.

In recent times, the cost of petrol has continuously increased, thus markedly influencing feeding costs. Most dairy farmers and dairy cooperatives could not go on with the business while the number of cows and farms were continuously decreasing.

This has an impact on reduced reproductive performance indirectly because of poor feeding to replacement cows. This is a concern to the sector that produces dairy products in Thailand. Each day raw milk is produced from dairy cows with 97% of milk processed in dairy factories as pasteurised and UHT product, but very few as cheese.

For drinking yogurt, almost half of products use imported powdered milk. The school milk program, which is supported by the Thai Government, uses raw milk produced in the country.

Milk consumption

The average milk consumption of Thai people is 23kg/head/year. Raw milk is currently in short supply so Thailand has to import milk and milk products with a tax system used to protect their own domestic dairy industry. However, in practice, a tax rate for imported powdered milk is just 5% with the condition that importers must first purchase local products before turning to imported products. To cope with this problem, every sector in the Thai dairy industry needs to improve its competitive strength to survive in the business.

Many Thai farmers are not sure that they can compete with Australian and New Zealand dairy businesses because the environment in both these countries is suitable for raising cattle at a much lower cost.

In a situation where the dairy industry has to improve its overall competitive strength in terms of productive efficiency and qualitative standard, the limit of free trade conditions might limit the growing opportunity for local milk production.

The only way for Thai dairy farmers to survive in the business is to lower their cost of production. To achieve a competitive position, cost reduction and quality improvement are considerable opportunities. The disadvantage of the Thai dairy industry is the high cost of farming including the cost of feeding, quality management and hygiene standards of raw milk.

Promoting generic dairy consumption and improving the image of local fresh milk are not key factors of government and dairy processors. The milk collection cooperatives have to play a more active role in educating farmers about farm management and in linking payment systems to market requirements. More veterinarians and inseminators are also needed for dairy cooperatives and farm services. The advantage of the Thai dairy industry is the school milk program that demands a large amount of local raw milk. An additional advantage is the fixed price with minor changes of raw milk based on its quality.

However, for milk processors, the fixed price of raw milk could also be a weak point for fair competition. For dairy farmers to survive in the international marketplace, focus needs to be placed on dairy farming, dairy co-operatives, milk processors, consumers, and government policies.

The research and policy in Thailand needs to emphasise cost reduction and quality improvement for competitive strength to survive in the international dairy business. ■