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# Murrah Dairy: Thailand's first and only buffalo milk producer

Rasi Kunapatarawong

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## 1. Introduction

Murrah Dairy Company Limited (Murrah Dairy) is Thailand's first and only buffalo milk producer. The company was established in 2003 by Mrs Runchuan Hengtrakulsin and her daughter, Ms Charinee Chaiyocharb, with the introduction of Murrah Farm. The company engages in fully integrated organic buffalo dairy farming and is committed to providing products and services that are of high quality, nutritious and safe. Murrah Dairy is dedicated to operating its business with strict adherence toward sustainable development that promotes economic, social and environmental balance for the community.

With 11 years of experience, Murrah Dairy remains the first and only extensive dairy buffalo farm in Thailand. The market is growing, the brand is catching on and the family keeps expanding. Beginning with Murrah Farm in 2003, now the family operates Murrah Farm, Murrah House and Mini Murrah Farm. The question now is where can they go from here and what will it take for them to grow?

## 2. Global dairy industry

Today, the dairy industry serves over seven billion consumers, and majority of these people live in developing countries (FAO, 2014a). The dairy industry provides jobs for approximately one billion people in dairy farms (IFCN, 2014a). Approximately 150 million households around the world are engaged in milk production (FAO, 2014b).

### 2.1 World milk production

World milk production in 2013 was at 746.7 million tons. Figure 1 reports the latest data on world dairy production. Despite a drop in 2013, world milk production is expected to grow by 2.4 per cent, reaching 792 million tons in 2014 (FAO, 2014a).

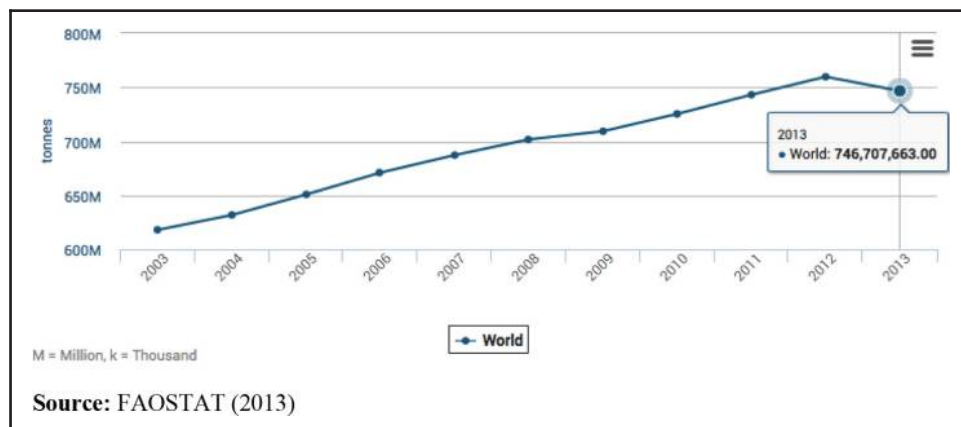
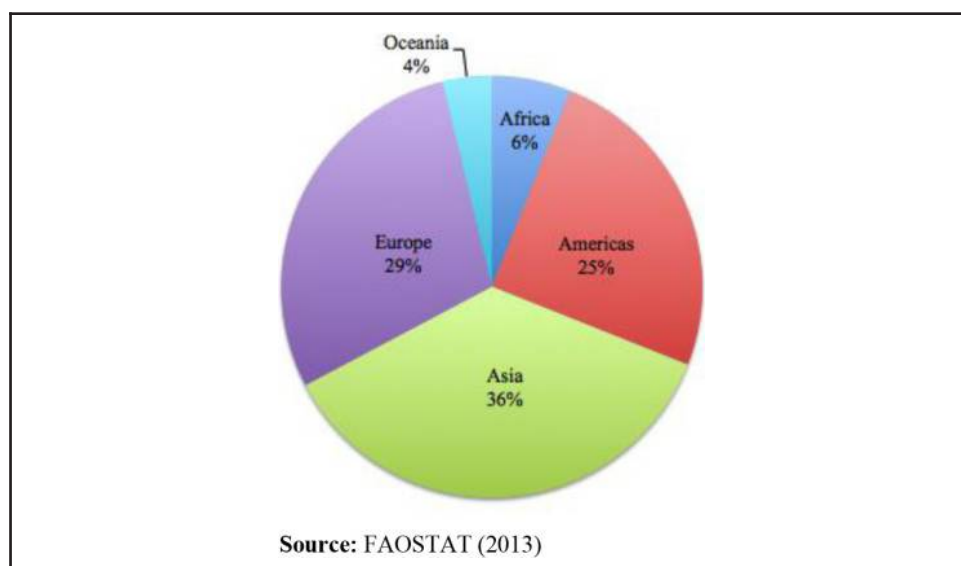
Previous worldwide growth in dairy production, nonetheless, was due to an increase in the number of animals rather than a rise in productivity per animal. In developing countries, milk is still mostly produced by smallholders and animals are often raised in subsistence. These animals are usually used for other purposes as well and are reproduced under difficult conditions (FAO, 2014c). Therefore, dairy productivity is constrained by several issues such as poor-quality feed, diseases, limited access to markets and services, as well as dairy animals' low genetic potential for milk production (FAO, 2014b).

**2.1.1 World milk production by region.** In 2013, Asia dominated dairy production (FAO, 2013) (Figure 2). Most expansion has been in India, South East Asia and China (FAO, 2014b). The top three dairy producers in the world in 2013 were India at 135.6 million tons, followed by the USA at 91.27 million tons and China at 80.75 million tons (FAOSTAT, 2013). From being a laggard in dairy products in the past, today India is the leading milk



Disclaimer: This case is written solely for educational purposes and is not intended to represent successful or unsuccessful managerial decision-making. The author/s may have disguised names; financial and other recognizable information to protect confidentiality.

This case was selected as the winner of the MBS/Emerald Case Writing Competition. The author greatly appreciates Murrah Dairy Company Limited and its owners for their full cooperation and support for the study.

**Figure 1** World milk production (all dairy animals) from 2003-2013**Figure 2** World milk production by region in 2013

producing country in the world, setting to grow by 4.9 per cent or 6.8 million tons to 145 million tons (FAO, 2014a). Population growth and rising disposable income are two main drivers, along with herd size expansion and improved productivity, behind India's increase in milk production (FAO, 2013).

For other regions, FAO (2014a) Outlook reports that favorable weather conditions in 2013 in Africa led to moderate increase in milk output and further expansion is anticipated for Egypt and Morocco. Latin America and the Caribbean experienced dairy production growth due to firm demand and rising income. The overall positive outlook has stimulated investments in new technologies and animal genetic improvements. Production is forecast to expand, particularly for Brazil, Chile, Ecuador, Colombia, Uruguay and Paraguay. In Oceania, sustained high prices for dairy products in international markets have stimulated the dairy industry. Milk production in New Zealand and Australia is anticipated to grow due to generally favorable weather and stable feed costs. For Europe and North America, milk production has increased a little and was forecast to expand slightly in 2014. Growth in the European Union (EU) was stimulated by favorable milk prices and reduced feed costs. According to 2013 EU census data, the number of dairy cattle in Europe increased for the first time in many years (FAO, 2013).

Figure 3 shows growth in world dairy production by region from 2008 to 2013. Asia showed the highest growth in dairy production, with 55 million tons increase, followed by South America, North and Central America, Oceania and Europe.

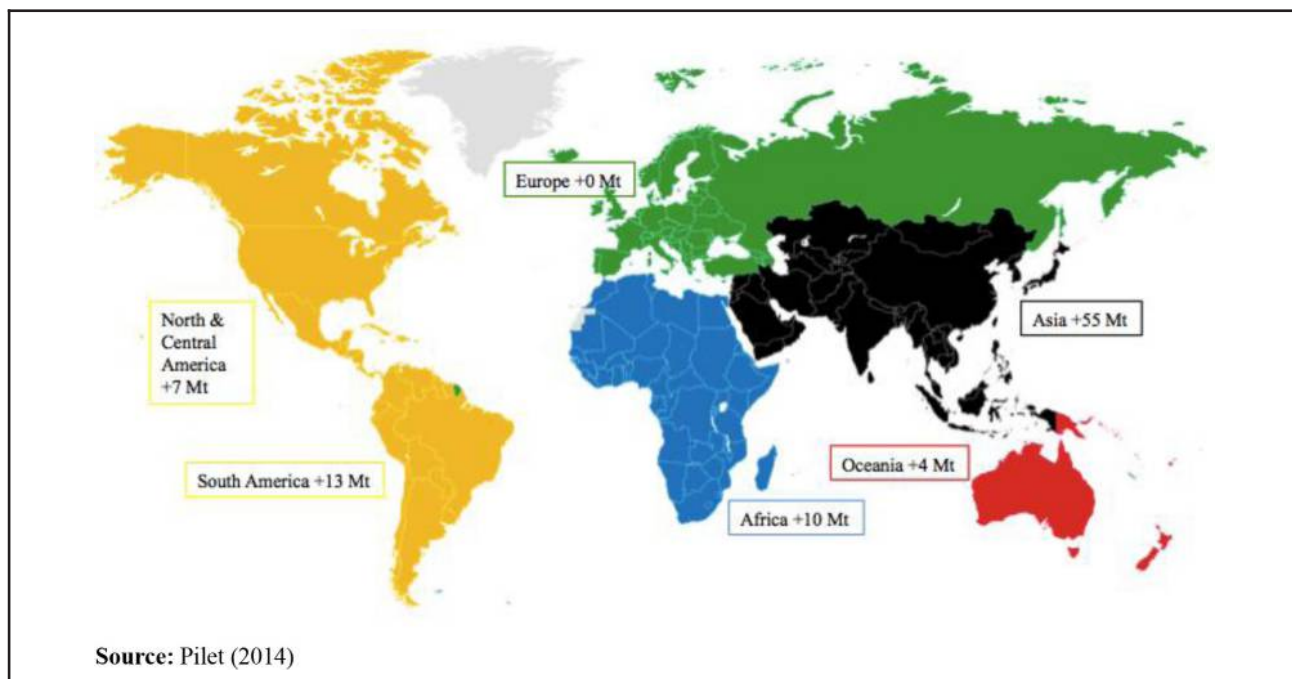
*2.1.2 World milk production by dairy animals.* According to dairy animal facts by the Food and Agriculture Organization of the United Nations (FAO) (2014), world milk production is almost entirely from cattle, buffaloes, sheep, goats and camels. Other less common milk animals are horses, yaks, donkeys and reindeer. The importance and presence of each species varies depending on regions and countries. The key determining elements for preferred dairy species are feed, water and climate. Other factors that may influence include dietary traditions, socio-economic characteristics and market demands.

Cattle produced 83 per cent of world milk production, buffaloes 13 per cent, goats 2 per cent, sheep 1 per cent and camel 0.3 per cent. The remaining is by other dairy animals such as yaks and equines. Almost all milk in developed countries is produced by cattle. In developing countries, however, only about one-third of milk is from cattle and the other two-thirds comes from buffaloes, goats, sheep and camels. As such, milk from other dairy animals that are not cattle represent about 40 per cent of milk production in Asia, 24 per cent in Africa, followed by 3 per cent in Europe, 0.4 per cent in the Americas and is almost non-existent in Oceania (FAO, 2014c).

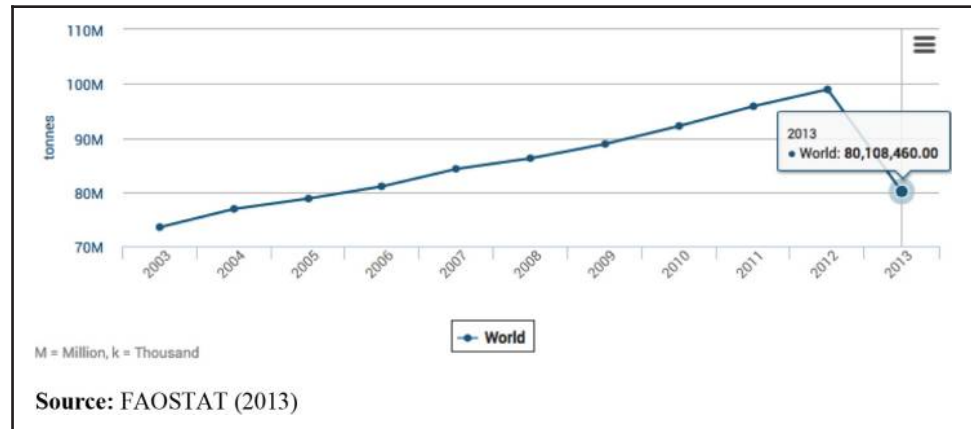
*2.1.3 World buffalo milk production.* According to FAOSTAT data on world buffalo production, buffalo milk production had been growing but then dropped in 2013, in line with the trend in world dairy production (Figure 4). World buffalo milk production was 80.10 million tons in 2013, while production was 98.94 million tons in 2012 and there were about 182 million buffalo heads (Borghese, 2012). The top four producers were India, at 70 million tons, followed by China at 6.10 million tons, Egypt at 2.61 million tons and Pakistan at 2.43 million tons (FAOSTAT, 2013).

In 2013, Asia dominated buffalo milk production, accounting for 96.5 per cent of total buffalo milk production (FAOSTAT, 2013), with 8 per cent growth from 2005 (Borghese, 2012). This positive trend is due to increasing population in India and Pakistan, where buffalo milk is mostly consumed and the buffalo milk market is very strong (Borghese, 2012). Major buffalo milk

**Figure 3** Evolution of dairy production (all categories) from 2008 to 2013



**Figure 4** Total whole fresh buffalo milk from 2003-2013



producers in Asia were India and China, followed by Myanmar, Pakistan, Sri Lanka, Iran, Iraq, Syria, Turkey, Malaysia and Vietnam. Africa accounted for 3.3 per cent in world buffalo milk production, with Egypt as the major producing country. Buffaloes in Egypt are used both as basic draught animal and for milk production for direct consumption. Europe accounted for the last 0.3 per cent of world buffalo milk production, with Italy as the major producing country in the region (about 400,000 buffaloes), followed by Romania (25,000 buffaloes), Bulgaria (more than 5,000 buffaloes) and Greece (more than 3,000 buffaloes) (Borghese, 2012). The decreasing trend from 2005 is due to production reduction in countries such as Romania, Bulgaria, Macedonia, Greece, Albania and Serbia.

Water buffalo is the major milk-producing animal in several regions, particularly in South Asia. River buffaloes, a popular type of water buffalo for dairy, usually produce between 1,500-4,500 liters of milk per lactation and have a significantly longer productive life than cattle and can provide milk up until 20 years of age. However, factors that constrain commercialization of buffalo milk are animal's late age at first calving, long calving intervals and dry periods and seasonality of estrous. In the past decades, Bulgaria, China, Egypt, India and Pakistan have attempted to improve milk yield of river buffalo. At the moment, more than 95 per cent of world population of water buffaloes is in Asia, 2 per cent in Africa (particularly in Egypt), another 2 per cent in South America and the rest is in Australia and Europe (FAO, 2014e).

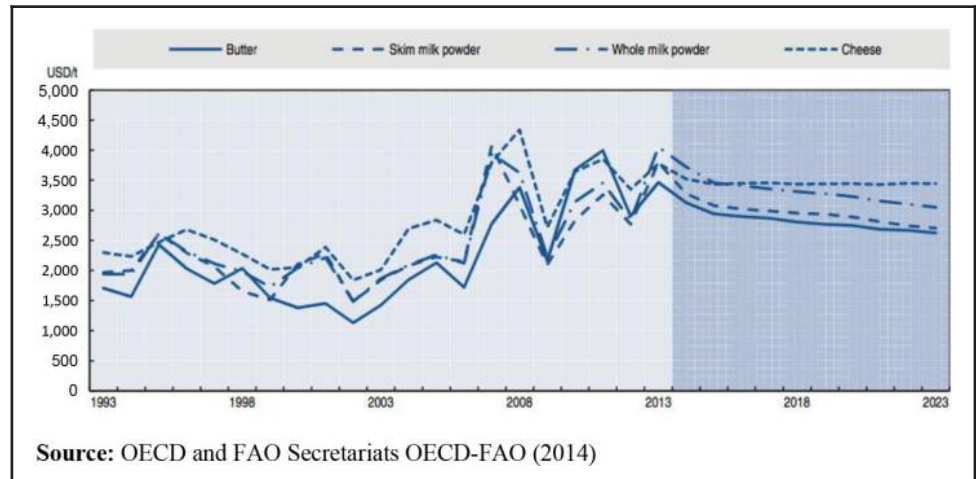
### 2.2 Dairy product prices

Dairy product prices were at historic peak at the beginning of 2014 (FAO, 2014a) due to limited milk availability and supply was not met, particularly in Asia (Gyan Research and Analytics, 2014). However, prices of milk fell continuously between March until September of 2014 (Figure 5), reflecting reduced import demand and more export availability from the EU and Oceania (FAO, 2014a).

### 2.3 World dairy consumption (all dairy animals)

Total trade of dairy products from all dairy animals during 2012-2014 is shown in Table 1. Total trade of dairy products is expected to increase.

Presently, there are more than six billion people worldwide who consume milk and milk products. The majority of these people live in developing countries (FAO, 2014a). As milk demand is driven by two factors – population and per capital milk consumption (FAO, 2008) – a large population of developing countries, particularly in Asia, is expected to play a crucial role in dairy demands. Population growth, rising incomes, changes in diets and urbanization all contribute to an increase in per capita consumption of dairy products. The growth has been more pronounced in East and

**Figure 5** World dairy prices in nominal terms

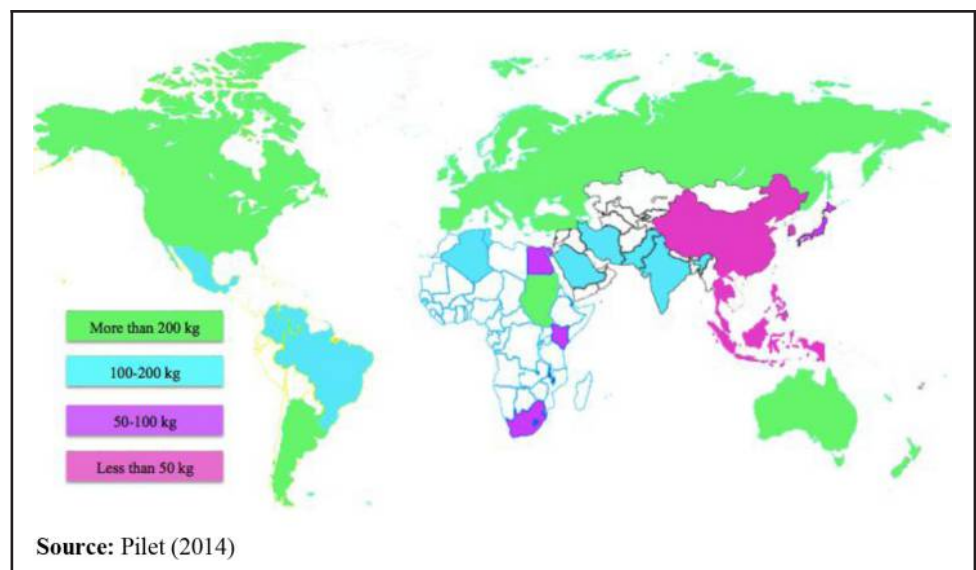
Southeast Asia, particularly China, Indonesia and Vietnam. By volume, milk in liquid form is the most consumed (FAO, 2014a).

In general, milk consumption is high in developed countries and low in developing countries, particularly in tropical and subtropical climates (FAO, 2008). Figure 6 shows dairy product consumption levels for all dairy animals in 2013.

**Table I** Total milk trade (all dairy animals)

Total trade from all dairy animals (in million tons)	2012	2013 (estimated)	2014 (forecast)
Total trade (in million tons)	66.1	68.8	71.9

Source: FAO (2014a)

**Figure 6** Dairy product consumption levels in 2013 from all dairy animals (kg per capita/year)



*2.3.1 World buffalo milk consumption.* In developing countries such as India, Pakistan, Egypt and Nepal, buffalo milk consumption accounts for over 50 per cent of the total drinking milk. A report by [OECD-FAO \(2014\)](#) shows that most Indian buffalo milk is consumed fresh and that only very small amounts are processed. The buffalo milk fat is used to produce ghee, butter and cream ([Borghese, 2012](#)). In India, every Indian consumes about 250 grams of milk per day, and buffalo milk is an essential source of protein for the predominantly vegetarian Indians.

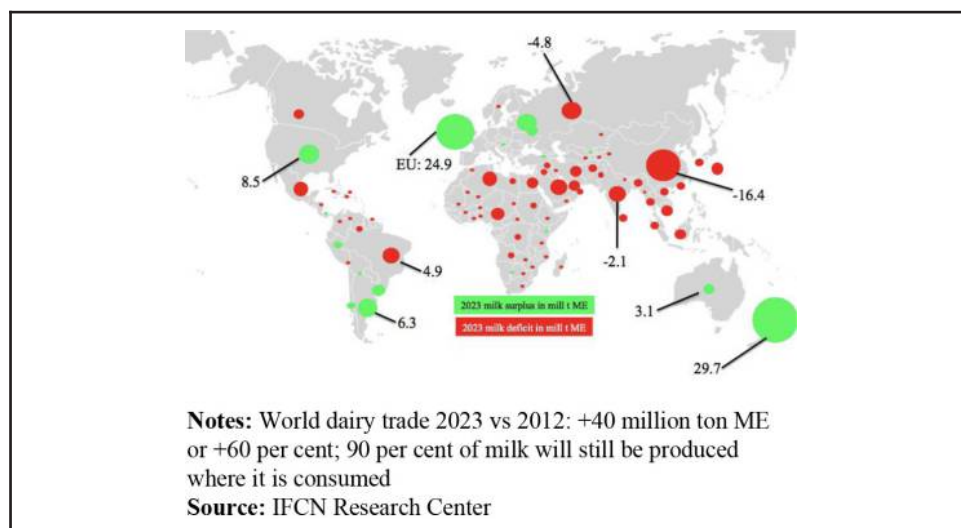
Italy uses buffalo milk mainly to produce mozzarella and is a major export of buffalo mozzarella. The amount of exports in 2010 stood at US\$430 million (13.22 billion Baht) ([Kongrut, 2010](#)). In 2010, 36,000 tons of buffalo mozzarella was produced for both internal market (82 per cent) and for export (18 per cent), mostly to Germany, France, the USA and the UK ([Borghese, 2012](#) and [2013](#)). Australia, Brazil, Bulgaria, Egypt, Switzerland, the USA and China have also started to produce buffalo mozzarella ([Kongrut, 2010](#)). The buffalo milk industry in China remains a relatively new industry with promising prospects, especially as the Chinese government has been attaching great importance to the buffalo industry in recent years through medium- and long-term development plans for the buffalo industry ([OECD-FAO, 2014](#)).

#### 2.4 World dairy market outlook

Dairy industry worldwide is recovering ([Gyan Research and Analytics, 2014](#)). World trade in dairy products is forecast to increase in 2014. This is linked to continued strong demand and favorable milk production in most major milk exporting countries ([FAO, 2014b](#)). Moreover, reduced milk production cost has contributed to production growth. Trade in dairy products is expected to grow 4.6 per cent, reaching 72 million tons of milk equivalent (ME) ([FAO, 2014a](#)).

In the future, Asia is expected to dominate in milk demand from all dairy animals, with increased purchase forecast for China, Indonesia, Malaysia, Vietnam and Thailand. Significant additional demand can be expected from developing countries and countries experiencing milk deficits shown in [Figure 7](#). Demand for dairy products in developing countries, especially Asia, is growing due to population growth, rising income, changes in diets and urbanization. Per capita dairy product consumption in developing countries is expected to increase by 1.2-1.9 per cent, as compared to 0.2-0.9 per cent in developed countries. Liquid milk is the most consumed dairy product in all developing countries ([FAO,](#)

**Figure 7** Milk surplus and deficit forecast for 2023 (In million ton milk equivalent – ME)



2014a). Overall, faster demand growth than current production yield is expected (IFCN, 2014a).

### 3. Thailand's dairy industry

#### 3.1 History of dairy industry in Thailand

Like most other Southeast Asian countries, milk has not been a cultural food in Thailand (Boondouangprasert, 2013) and Thai people still drink very little milk. Extensive cattle dairy development only began in the early 1960s, with HM King Rama IX (Boondouangprasert, 2013). The King viewed that "dairy farming would provide Thai people healthy foods and help Thai farmers develop a secure and stable occupation, instead of trespassing forest grounds and conducting mobile plantation" (DPO, 2014).

Many parts of India and Pakistan have climate similar to Thailand and few problems are anticipated if Thailand were to begin extensive buffalo dairy farming. Dairy buffaloes give more milk than cows, particularly the Murrah breed that is generally bigger and healthier than Thai buffalo. As a result of this fact, in 1978 Thailand's Department of Livestock brought in 60 Murrah buffaloes from India for research purposes. Despite the research's positive results, local farmers are still not very interested in raising dairy buffaloes and products from dairy buffaloes are not popular (Suthipholpaibul, 2010).

#### 3.2 Nature of Thai dairy industry

In the Thai dairy industry for all dairy animals, "milk co-operatives reign supreme", particularly small co-operatives formed by small dairy farmers who own, for instance, around 15-20 lactating cows (Valencia, 2013). These co-operatives are a vital structure of the industry and have become major sources of several services such as veterinary services, artificial insemination and other farm management services. Dairy farmers can also purchase farm, milking tools and concentrate feed from co-operatives. Thailand now has almost 100 co-operatives (Valencia, 2013).

#### 3.3 Different types of dairy products in Thailand

The dairy industry (for all dairy animals) can be divided as follows.

**3.3.1 Thailand's milk sector.** The sector values more than 70 billion Baht (ASTV, 2014) and exports dairy products worth around 5 billion Baht annually (Keeratipipatpong, 2013). As of 2013, total milk production from cows was around 3,095 tons/day. Milk supply has increased steadily at a compound annual growth rate (CAGR – a constant rate of return over the time period) of 7.5 per cent from 2009 to 2013 and there are currently about 20,000 dairy farms, producing around one million ton/year (Neawna, 2014). Cow milk from co-operatives account for 61 per cent and the remaining 39 per cent is by Milk Collection Centers (MCCs) and other sources. The government supports a school milk program for all students from kindergarten until Grade 6. A total of 40 per cent of domestic milk consumption is, therefore, for school milk programs (Boondouangprasert, 2013).

**3.3.1.1 Buffalo milk sector.** The buffalo milk sector and buffalo dairy farming are at the beginning stages in Thailand and it is only Murrah Dairy and the Thai Royal Project Foundation that raise dairy buffaloes. Murrah Dairy raises dairy buffalo for commercial purpose. The Royal Project Foundation raises dairy buffalo for research purposes. His Serene Highness Prince Bhisadej Rajani, the President of Royal Project, wanted Thailand to be able to produce buffalo mozzarella for sale to help reduce the amount of cheese imports. The Royal Project and the Department of Livestock work together to produce mozzarella, feta cheese and yogurt from buffalo milk (Chaimanee, 2012). For buffalo milk production, Murrah Dairy produced 100 kg/day in 2010. Now, it produces 300 kg per day, with 1 kg sold for 200 Baht but the current supply is still not enough to satisfy the demand (Chaiyochlarb, personal communication, April 25, 2015).



Thailand's milk market can be segmented into mainstream and premium. Mainstream consumers are price-sensitive (Positioning, 2011), while premium consumers are interested in added values such as additional nutrition, or the organic nature of the product. Presently, buffalo milk is considered niche and premium.

*3.3.1.2 Thailand milk consumption.* Given the low consumption of milk per capita, as compared to other countries, there remain growth opportunities for milk from all dairy animals in Thailand, particularly with the ongoing health and wellness trend in the country. As of 2011, Thais consumed, on average, 14-15 liters per person/year, far from other developed countries such as Japan, whose people consume on average more than 60 liters of milk per person/year (Positioning, 2011). At the moment, milk is regarded as an inexpensive source of protein and calcium and Thai consumers are becoming more familiar with drinking milk. Opportunities for milk growth also remain from rapid expansion of coffee shops and rising demands for other types of milk (Euromonitor, 2014).

*3.3.1.3 Thailand milk sector outlook.* At the moment, Thailand milk sector is the largest in ASEAN (Keeratipipatpong, 2013), despite the fact that most Thai dairy farms are small in size (Valencia, 2013). Thailand currently exports mainly to Cambodia, Indonesia, Malaysia, the Philippines and other neighboring countries.

The sector has great potential to export to ASEAN market (MCOT, 2014), particularly with the ASEAN Economic Community (AEC) opening up a market of over 600 million people (Keeratipipatpong, 2013). When compared to neighboring countries, the sector has a wide competitive edge (Keeratipipatpong, 2013) in terms of higher yield, higher-quality milk (MCOT, 2014), better milk processing, better supply chain and better breed development (Keeratipipatpong, 2013), particularly for cattle and buffalo dairy farming. For instance, Mr Noppadon Tunvichien, the current Acting Director of the Dairy Farming Promotion Organization of Thailand (DPO), said:

The taste [of Thai milk] has already been accepted by neighboring consumers, especially sweet milk in Cambodia. Customers don't even want us to print the local language on packaging. They love it the way it is (Keeratipipatpong, 2013).

However, Thailand is at a disadvantage in terms of its higher minimum wage and expensive imported animal feed. The Ministry of Agriculture and Cooperatives, therefore, has come up with several initiatives to support the sector such as the planting of special grass to help cut cost of feed imports (MCOT, 2014).

*3.3.2 Thailand's yogurt sector and outlook.* The sector is composed of yogurt and drinkable yogurt. Drinkable yogurt accounts for 83 per cent and yogurt 17 per cent (Euromonitor, 2013). In 2013, the sector saw a positive performance, thanks to the booming health and wellness trend and to manufacturers' educational and promotional efforts, making Thai consumers more aware of the benefits of yogurt. In 2013, Dutch Mill Co., Ltd. continued to lead, with 41 per cent value share (Euromonitor, 2014). The drinking yogurt market in Thailand has very few players, despite its 10 billion Baht value (Keeratipipatpong, 2013).

In general, the consumption rate is low, particularly as compared to countries with the tradition of consuming yogurt. However, due to its nutrition, yogurt consumption in Thailand is at 4 kg per person/year, as compared to 7 kg in the USA, 10 kg in Japan, 10 kg in Canada and 27 kg in Europe (Setheetorn, 2,557).

Concerning its outlook, the yogurt sector has grown due to the faster-paced lifestyle of today as consumers demand food with high nutrition that can be consumed easily. They are also particularly interested in homemade yogurt (Setheetorn, 2,557), and this sector is expected to grow due to health and wellness trends. There are also still unmet demands from different age groups (Euromonitor, 2014).

*3.3.3 Thailand's cheese sector and outlook.* According to the information from Euromonitor (2014), the cheese market in Thailand grew 6 per cent in 2013, reaching sales worth of 1.4 billion Baht. In 2013, Kraft Foods (Thailand) Ltd. held 43 per cent in unspreadable

processed cheese and 38 per cent value share in spreadable processed cheese. The cheese market in Thailand is fragmented due to the wide variety of cheese availability from local and imported brands.

Concerning buffalo mozzarella, wholesale buffalo mozzarella accounts for 90-95 per cent, while retail buffalo mozzarella accounts for the other 5-10 per cent of the buffalo mozzarella market. The wholesale segment values one million Baht/day. In addition to Murrah Dairy, other available buffalo mozzarella is imported. There is, however, cow mozzarella available by Thai producers (Chaiyochlarb, personal communication, April 25, 2015).

Concerning its outlook, given many Thais still see cheese as a product full of fat, companies have to educate Thai consumers about consuming cheese as well as offering lower-fat alternatives. In the future, Thai consumers are likely to be exposed to more varieties of cheese products due to efforts by manufacturers.

*3.3.4 Thailand's other dairy sector and outlook.* The dairy industry report by [Euromonitor \(2014\)](#) shows that the sector recovered in 2013 after the floods of 2011. Plain condensed/evaporated milk was key growth driver, thanks to rising demands for coffee products at retail and consumer foodservice outlets. In 2013, Thai Dairy Industry Co., Ltd. continued to lead with 46 per cent value share, particularly due to the Mali brand. The sector is forecast to have a constant value CAGR of 4 per cent, reaching 13.9 billion Baht by 2018, up from 2 per cent CAGR. The higher consumption of hot drinks and coffee in Thailand will be the key factor driving growth in condensed/evaporated milk and coffee whiteners. However, concerns over cholesterol and obesity among health-concerned consumers may cause a switch to fresh or pasteurized milk.

### *3.4 Demographics data*

In Thailand, milk is not a product that is consumed by all ages and is not the main drink in families ([Positioning, 2011](#)), and the majority of Thais who consume milk are children. A total of 40 per cent of domestic milk production is consumed by children in schools through a state-subsidized milk program that gives one free milk carton to every child per day ([Keeratipatpong, 2013](#)).

Concerning cheese, people in Bangkok are more exposed to international experience of cheese. Therefore, most of cheese consumption is concentrated in Bangkok and other major cities in Thailand, with the most consumption in Bangkok.

According to Thailand food market report on yogurt and drinkable yogurt in Thailand (Setheetorn, 2,557), 58 per cent of consumers like to consume yogurt and drinkable yogurt, 32 per cent feel indifferent and another 10 per cent do not like to consume it at all. Of the 58 per cent, 55 per cent is Gen Y, 26 per cent is Gen X and the remaining 19 per cent is other members of the population. For drinkable yogurt, consumers are mostly young children. In the past few years, many companies have tried to expand customer base by offering products in different sizes, adding functional benefits (such as collagen, fiber, vitamins) or offer low or zero fat products.

Further information on Thai demographics is provided in [Table II](#).

## **4. Murrah Dairy Company Limited (Murrah Dairy)**

### *4.1 Background*

The Murrah Dairy Company Limited (Murrah Dairy) is Thailand's first and only dairy buffalo producer. The company was established in 2003 by Mrs Runchuan Hengtrakulsin and her daughter, Ms Charinee Chaiyochlarb, with the introduction of the Murrah Farm located in Chachoengsao, Thailand.

Murrah Dairy is a family-run SME that operates under a community enterprise principle to build a business that can be used to achieve community benefits as well as private gains.

**Table II** Thailand demographics between 2011-2014

Demographic variable	2011	2012	2013	2014**
Total population (in million)	66.57	66.78	67.01	67.74
Population in Bangkok (in million)				9.09
Urban population (% of total)	45.4	46.7	47.9	49.2
<i>Age structure</i>				
Population ages 0-14 (% of total)	18.9	18.5	18.2	17.6
Population ages 15-64 (% of total)	72.0	72.1	72.1	72.8
Population ages 65+ (% of total)	9.1	9.2	9.7	9.5
Tertiary education enrollment (% of total)	52.6	51.4	51.2	n/a
<i>Average monthly income per household (in Baht)*</i>				
Whole kingdom	23,236	n/a	25,194	n/a
Greater Bangkok	41,631	n/a	43,058	n/a
Central region	20,822	n/a	26,114	n/a
Northern region	17,350	n/a	19,267	n/a
Northeastern region	18,217	n/a	19,181	n/a
Southern region	27,326	n/a	27,504	n/a
<i>Number of household by region ('000)*</i>				
Whole kingdom	19,985.9	20,068.0	20,167.5	n/a
Greater Bangkok	2,939.8	2,942.3	2,947.8	n/a
Central region	3,936.5	3,961.1	3,984.9	n/a
Northern region	3,931.5	3,941.6	3,953.3	n/a
Northeastern region	6,473.8	6,500.4	6,527.8	n/a
Southern region	2,704.3	2,722.6	2,753.7	n/a

Sources: World Bank (2015); \* Statistical Office of Thailand (2015); \*\* CIA (2015)

The company is a dairy buffalo breeding community enterprise with the goal to develop dairy buffaloes to become the new livestock animal in Thailand.

The family was previously in the tannery business, exporting to major retailers in the USA such as Walmart and Target. In 2003, Mrs Runchuan saw the opportunity in buffalo mozzarella, as there were no local mozzarella producers at that time and Thailand only imported cheese from other countries. In addition, the value of the market is huge. In 2010, the amount of cheese imports was over 6,000 tons of cheese, worth more than one billion Baht, and butter and milk fat of more than 9,000 tons, worth almost 1.5 billion Baht (Suthipholpaibul, 2010). Attracted to this opportunity, Mrs Runchuan changed her business's direction from tannery to buffalo milk production.

Mrs Runchuan started with eight local buffaloes and rented a 5-rai (8,000m<sup>2</sup>) plot of land to raise and research them. She said:

In any new business venture, you must choose one with few or no competitors. And most of the dairy farms here in Thailand raise cows. Besides, cows are very expensive, so how could I possibly compete? (Kongrut, 2010).

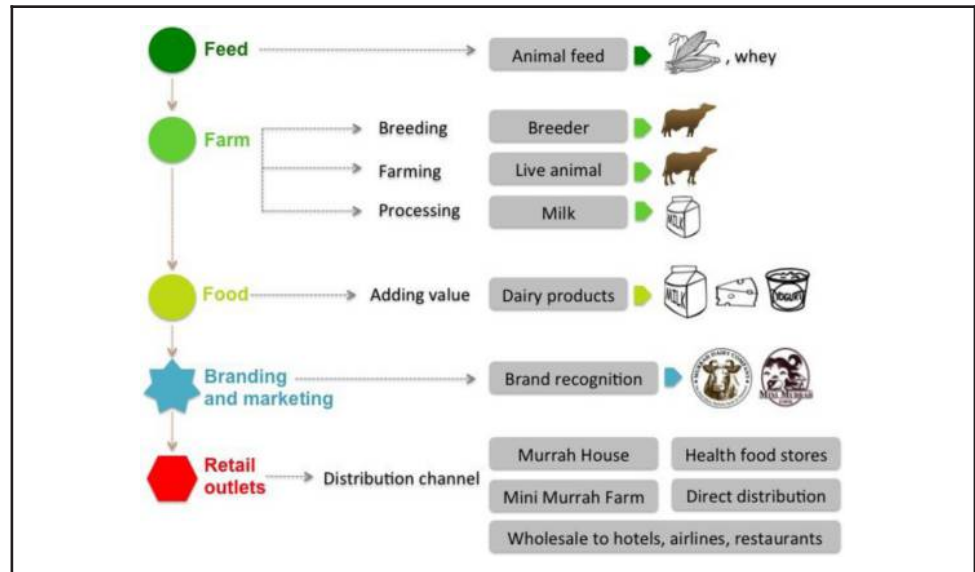
For years, she has studied, researched and improved the Murrah breed, working closely with the Department of Livestock and professors from universities, as well as sending her daughter to learn how to make mozzarella in Italy. Now, the family raises over 300 buffaloes at a 400-rai (64-hectare) farm.

#### 4.2 Operations

Murrah Dairy started with Murrah Farm in 2003. In 2007, the family finally started selling Murrah Dairy products for the first time by opening up Murrah House. Later, in 2013, they created Mini Murrah Farm to cater to the growing demands and to find more ways to market its products.

Operations of Murrah Dairy are shown in Figure 8. Murrah Dairy is divided into three units below:

**Figure 8** Murrah Dairy's operation in brief



1. *Murrah Farm*: A fully-integrated organic buffalo dairy farm.
2. *Murrah House*: A bistro serving food and drinks using dairy products from the farm as main ingredients and a company's first retail division.
3. *Mini Murrah Farm*: An agro-tour and a retail division of the business.

Murrah Dairy's consolidated statement of earnings is shown in [Table III](#).

#### 4.3 Organizational structure

Murrah Dairy is run by Mrs Runchuan Hengtrakulsin and Ms Charinee Chaiyochlarb, mother and daughter. At Murrah Dairy, Mrs Runchuan is responsible for the production, operations and farm management at Murrah Farm, while Ms Charinee is responsible for Murrah House, Mini Murrah Farm and the marketing and distribution of Murrah Farm's products. Management structure of Murrah Dairy is shown in [Figure 9](#).

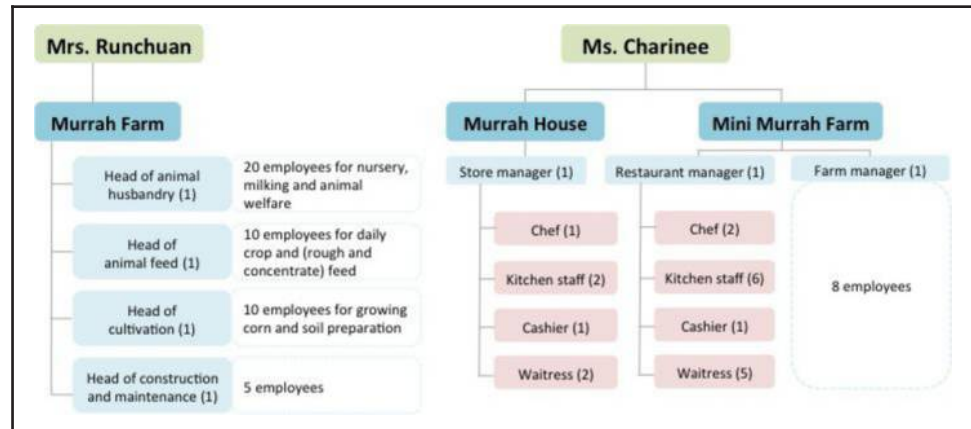
At Murrah Dairy, there are over 80 employees. The wage and benefits given to all employees are according to industry standards and as required by law. Full training is provided, particularly to ensure the buffalo are well taken care of and quality is controlled. All labor workers are foreign labor, mostly from Cambodia. It is difficult for the company to find Thai labor to work in the farm, but the rest of the workers (the heads) are Thai. The family often experiences problems with its laborers at the farm having low morale, no motivation, being lazy and high turnover. For those at the managerial level, in contrast, the

**Table III** Murrah Dairy consolidated statement of earnings

(in Baht)	2012	2013	2014 (first half only)
Net sales	17,256,836.37	19,174,262.63	15,308,137.04
COG	8,180,250.32	9,197,557.02	6,796,021.96
Gross profit	9,076,586.05	9,976,705.61	8,512,115.08
Operating expenses	6,847,588.96	8,559,486.20	6,740,596.47
Income tax	—	—	—
Profit (loss) after tax	2,228,997.09	1,417,219.42	1,771,518.61
Exchange rate (Baht/US\$)*	31.61	30.74	33.11
(as of 1 January of each year)			

Source: \*Historical exchange rate from Bangkok Bank

**Figure 9** Organizational structure at Murrah Dairy



turnover is zero. Its managers often lack confidence in decision-making and rely on the founders, however, and employees trust in Mrs Runchuan's and Ms Charinee's abilities.

#### 4.4 Products

The goal of Murrah Dairy is to present “premium, organic and allergy-free” products to customers. The products are distributed under the brand name “Murrah”. Murrah Dairy places importance on its product quality, particularly in terms of nutrition, taste and safety. All products meet established standards such as from FDA (for food) and Good Agricultural Practices – GAP (for crops). The staff is well-trained to ensure quality control throughout every step of the production line.

Murrah Dairy's main products include buffalo milk and cheese (mozzarella, ricotta and burrata), and their fresh cheese gives its best taste one to three days after it has been produced. Besides Murrah Dairy's mozzarella, other mozzarellas sold in Thailand are all imported. Murrah Dairy's main products accounted for more than 90 per cent of the company's total revenue earned, milk 75 per cent and cheese 19 per cent of total milk production. The margin for milk is roughly 20 per cent higher than for cheese. Other products include yogurt, butter, daisy ghee, whey drinks (for health-concerned customers) and ice cream (at Mini Murrah Farm). Ghee made from buffalo milk is considered better than ghee from cow's milk. In addition, the company also sells milk soap and lotion made from buffalo milk. Soap and lotion are made with the cold process method to retain its quality ingredients to make effective soap that help balance the skin (Chaiyocharb, personal communication, December 15, 2014).

#### 4.5 Price

From price observations in the supermarkets during May 2015 and from the interview with the owner, Table IV describes prices of Murrah Dairy products and of other brands.

#### 4.6 Marketing

The family markets their products through:

- Below the line – i.e. booth, Farmer's market events;
- Media – TV shows and magazines;
- Social media – Facebook, Web sites; and
- Word-of-mouth.

A study by Paitaksri *et al.* (2012) on Murrah milk consumption in Bangkok shows that about 72 per cent of consumers heard about Murrah milk from friends and 57.1 per cent knows much

**Table IV** Price comparisons of Murrah products with other brands

<i>Product</i>	<i>Details of the product</i>	<i>Retail price</i>	<i>Retail price per ml</i>
<i>Milk</i>			
Murrah Dairy	Fresh buffalo milk (pasteurized)	40 Baht/180 ml	0.22 Baht/ml
Butterfly Organic	Fresh organic cow milk (pasteurized)	58 Baht/300 ml	0.19 Baht/ml
Dairy Home	Fresh organic cow milk (pasteurized)	17 Baht/200 ml	0.08 Baht/ml
Milk and More	Fresh cow milk (pasteurized)	39 Baht/250 ml	0.15 Baht/ml
CP-Meiji	Fresh cow milk (pasteurized-mass)	12.25 Baht/200 ml	0.06 Baht/ml
Chokchai	Fresh cow milk (pasteurized - mass)	22.25 Baht/400 ml	0.05 Baht/ml
Foremost	Fresh cow milk (pasteurized - mass)	12.75 Baht/200 ml	0.06 Baht/ml
Dutchmill	Fresh cow milk (pasteurized - mass)	24.50 Baht/400 ml	0.06 Baht/ml
Yana Farm	Fresh goat milk (pasteurized)	40 Baht/300 ml	0.13 Baht/ml
Love Goat Milk	Fresh goat milk (pasteurized)	55 Baht/180 ml	0.30 Baht/ml
Eden	Fresh almond milk (pasteurized)	80 Baht/200 ml	0.40 Baht/ml
<i>Yogurt</i>			
Murrah Dairy		35 Baht/150 g	0.23 Baht/g
Dairy Home	Organic cow yogurt	24 Baht/130 g	0.18 Baht/g
Meiji	Cow yogurt (mass product)	13 Baht/135 g	0.09 Baht/g
Dutchie Bio	Cow yogurt (mass product)	14 Baht/110 g	0.12 Baht/g
Dutchie	Cow yogurt (mass product)	14 Baht/135 g	0.10 Baht/g
Activia	Cow yogurt (mass product)	14 Baht/105 g	0.13 Baht/g
Caroline	Cow yogurt	25 Baht/150 g	0.16 Baht/g
Moo Caroline	Greek yogurt	129 Baht/500 g	0.25 Baht/g
Farmers Union	Cow yogurt	65 Baht/200 g	0.32 Baht/g
Dairymans	Cow yogurt	35 Baht/180 g	0.19 Baht/g
Dairymans Goat	Goat milk yogurt	40 Baht/180 g	0.22 Baht/g
Elle n Vire	Imported cow yogurt (from France)	52 Baht/125 g	0.41 Baht/g
Zott Zottis	Imported cow yogurt (from Germany)	19 Baht/100 g	0.19 Baht/g
Bauer	Imported cow yogurt (from Germany)	75 Baht/150 g	0.50 Baht/g
<i>Cheese</i>			Wholesale price
Murrah Dairy	Buffalo mozzarella	800 Baht/1 kg	150 Baht/125 g
Imported	Imported buffalo mozzarella	850-1200 Baht/1 kg	
Caroline	Cow mozzarella		86 Baht/100 g
Del Casero	Cow mozzarella		75 Baht/100 g
Ambrosi	Imported cow mozzarella (from Italy)		145 Baht/100 g
Ambrosi	Imported cow mozzarella (from Italy)		265 Baht/150 g

Source: Observed by the author (2015)

about the benefits of Murrah milk. Current customers (89.2 per cent) recommend further public relations on the benefits of Murrah milk. The market is niche and the family produces just enough milk to be sold at the company' outlets and few other outlets. Due to the small farm size and seasonal nature of the products, particularly milk, the demand and supply often does not match. Among its main target groups, products are highly in demand.

While Murrah Dairy's mozzarella has been met with success, the family still struggles to get Thais to drink buffalo milk as local people associate buffaloes with stupidity. Historically, buffaloes represented positive attributes as they have always played important role in agriculture in Thailand. However, buffaloes, particularly swamp buffaloes, have become a metaphor for a negative attributes in people. The word "kwa" or buffalo is often used to describe someone who is slow, stupid, less educated or sometimes difficult to train. Mrs Runchuan said, "People are still biased against buffalo. Many people refuse to drink buffalo milk even when I give it to them for free. Some even believe drinking it will make them stupid" (Kongrut, 2010).

#### 4.7 Distribution

Murrah Dairy pays particular attention to the way its products are packed, chilled and distributed to ensure the highest quality and safety. Previously, cheese products were sold through retailers. However, the family changed its strategy and decided to sell products through company-owned outlets, as, in this manner, people can come taste the products.



The company can also then educate its customers about the nutrition and other things, making people overcome their concerns regarding buffalo being stupid. Particularly important is that the family can also get to know its customers, discover why customers buy their products, as well as their needs, wants and concerns. A study by [Paitaksri et al. \(2012\)](#) on Murrah milk consumption in Bangkok shows that 89.2 per cent of consumers buy Murrah milk from Murrah House. More than half (55.4 per cent) feels that it is convenient in coming to buy milk from Murrah House.

At the moment, the products are sold via: company-owned retail outlets (Murrah House and Mini Murrah Farm); health food stores; customers' direct order; and wholesaling to restaurants, hotels and airlines. All products are available at a domestic level.

#### 4.8 Customers

For milk, Murrah Dairy's main target group is children, aged between 3-15 years from middle-to high-income families, with parents who have a high education level and who are able to pay premiums for their children. Murrah milk is organic and is more expensive than regular cow's milk. From [Table II](#), we can see that the total population in Thailand in 2014 is 67.74 million. Of the total population, urban population accounts for 49.2 per cent (in 2014), and the number of people with tertiary education accounts for 51.2 per cent (in 2013). In 2013, average income per household (in Baht) in the greater Bangkok area is 43,058 Baht, while, in the whole kingdom, it is 25,194 Baht. The number of household in Thailand is 20,167,500 households. Of this, there are 2,947,800 households in the greater Bangkok area. Birth rate in Thailand in 2013 was 0.2 per 1,000. Birth rate has been decreasing continuously, from 10.5 in 2012, 10.7 in 2011, 11.0 in 2010 and 12.6 in 2005 ([World Bank, 2015](#)).

Surprisingly, a study on over 300 participants by [Paitaksri et al. \(2012\)](#) on Murrah milk consumption in Bangkok shows that 60.7 per cent of the sample are male customers, with the average age of 31.61 years. About 30 per cent of them hold a bachelor degree. The average income is about 35,000 Baht/month. The average consumption per household is 1.70 persons. The average consumption per day is 1.11 time, and the average expense spent on Murrah milk is 277.26 Baht/person/week. More than half of the sample drinks milk in the morning. About 66 per cent drinks Murrah milk on a regular basis, mostly for health purpose (60.4 per cent). After consuming Murrah milk, 42.9 per cent feels that their health is better.

As for cheese, the main target group is wholesale customers such as Italian restaurants, airlines and hotels. Thailand is still not a cheese culture, making the value of buffalo mozzarella market in Bangkok area to be only 1 million Baht/day. In Bangkok, people are more exposed to international experience of cheese and dairy culture; therefore, most cheese consumption is concentrated in Bangkok and other major cities in Thailand, with the most consumption in Bangkok. For other products such as yogurt, ghee or even soap, the main target group is visitors to both Murrah House and Mini Murrah Farm (Chaiyochlarb, personal communication, April 25, 2015).

Murrah Dairy attracts other groups of customers who are not their main target market too. Many Indians come to buy ghee and milk. Elderlies and health-concerned people are attracted to the high nutrition of Murrah milk and often come to buy milk, yogurt or whey drink. Many members of the Buddhist community also come to buy milk as milk can be offered to monks. Murrah House also attracts a lot of foreigners who come for Italian food.

The comparisons of several milk products are provided in [Table V](#). They are selected base on the products' same customer group, which is children.

### 5. Murrah Farm

Mrs Runchuan commits herself to a sustainable development and self-sufficiency and adopts a fully integrated organic farm management. Murrah Farm is a "model organic farm" that promotes the Murrah breed as commercial animal for dairy production, particularly

**Table V** Comparisons of buffalo milk, cow milk, organic cow milk and goat milk in Thailand

<i>Dimension</i>	<i>Murrah buffalo milk</i>	<i>Cow milk</i>	<i>Organic cow milk</i>	<i>Goat milk</i>
Target customers	Children	Children	Children	Children
Consumer demographic	Children Elderly High income family High education In the capital and major cities	All age All income levels Mass	Children Elderly High income family High education In the capital and major cities	Islam group
Consumer behavior	Allergy concern Health concern Looking for products that are not mass produced	Non-allergy Consume milk because believe in the benefits of milk, i.e. growth	Health concern Looking for products that are not mass produced	Allergy concern Health concern Looking for products that are not mass produced
Popularity	Currently is the least popular and least known among the 4 groups in this Table Products have just been launched. Still in to introductory stage Thais have negative image of buffaloes	Popular to all age and all income	Popular, particularly among consumers who look for an alternative for mass produced products and are concerned with health	Not popular among children Not popular among Thais who are not Islam due to the smell
Price Distribution	Expensive Own shops Organic/green/specialty stores Farmer's markets	Moderate All types of outlets, i.e. supermarkets, premium supermarkets, convenient stores, markets Except for farmer's markets and organic/green stores	Expensive Premium supermarkets Organic/green/specialty stores Farmer's markets	Expensive Premium supermarkets Organic/green/specialty stores Farmer's markets
Promotion	None	A lot of promotion both above and below the line	None	None

organic milk. The farm attaches utmost importance to the fields of farming techniques, technologies and genetic selection. Numerous farming, milking and dairy processing standards are implemented that meet the standards set by Thailand's Ministry of Agriculture and Cooperatives and Department of Health.

To obtain organic milk, Murrah Farm follows the organic milk standard set by Thailand's Department of Livestock where:

- organic milk has natural flavor;
- organic milk contains no chemicals, pesticides or hormones; and
- organic milk contains higher nutrition compared to normal dairy animals that have received high feed concentrates.

The use of low feed concentrates helps generate natural Omega 3, and is safe from other substances that can be contaminated from additional feed concentrates, which might affect the immune system of humans and can cause allergies.

As such, the family does not use any pesticides or chemicals, enabling the farm to provide clean, safe and high-quality products. Furthermore, the family does not use hormone injections to stimulate growth in its farming process, in which hormones are prohibited substances according to the Agricultural Standards Act and the Food and Drug Administration.

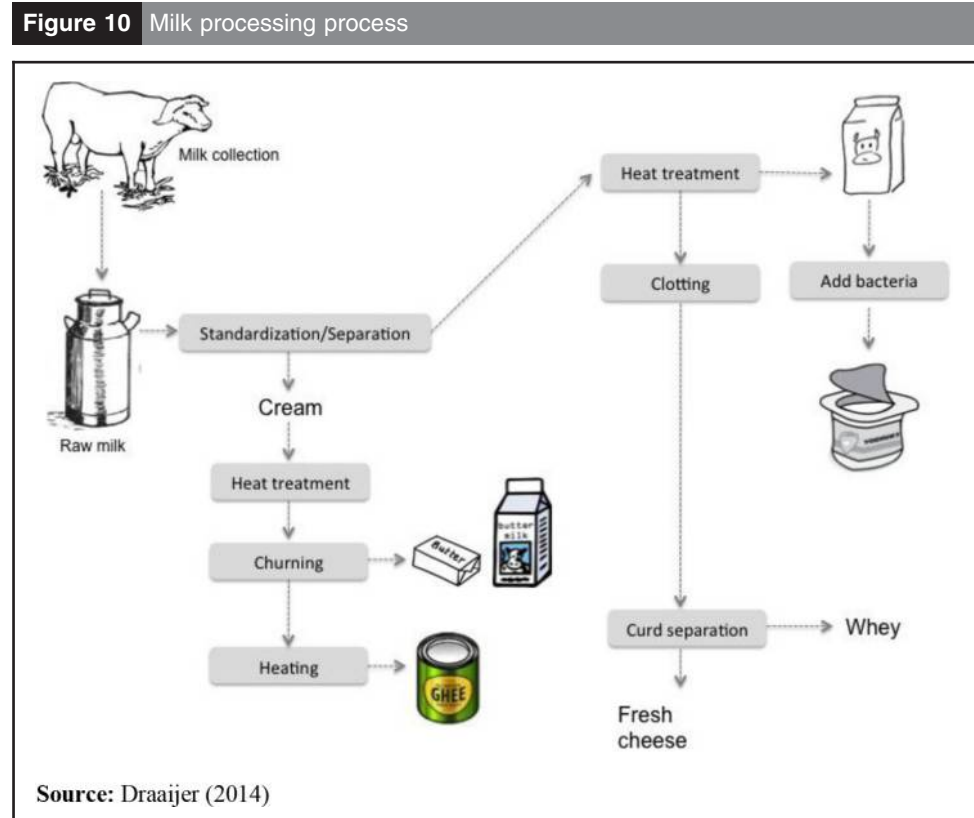
Waste from buffalo droppings is used as fertilizers to grow organic corn as synthetic fertilizers are not allowed. The use of buffalo droppings, a traditional and natural method of nutrient recycling, thus creates a healthy soil structure. The corn leaves and stalks are then harvested and used as roughage to feed buffalo while corncobs are exported, helping the family to earn more income. Additionally, Mrs Runchuan invested in a rice mill to reduce animal feed costs. Paddy is cheaper than rice germ and she now buys paddy and mills the rice. The by-products in rice milling are rice hull, rice germ and bran layers. Rice germ is

fed to buffaloes and the rice hull is used as fertilizer, insulation material or fuel. Broken rice is sold to employees in the farm at a cheaper price.

Mrs Runchuan invested in the technologies to allow the company to process the milk itself instead of outsourcing. This offers the farm several benefits. First, it allows Murrah Farm self-reliance. Second, as noted by the [FAO \(2014d\)](#), small-scale dairy producers who process dairy products themselves earn higher cash incomes than selling raw milk and have better opportunities to reach their markets. Third, milk processing helps Murrah Farm to deal with seasonal fluctuations in milk supply. Lastly, milk processing helps Murrah Farm reduce waste and cost. When making cheese, the liquid part of the milk that remains after the separation of curd in cheese making is called whey. In other farms in Thailand that produce cheese, trucks are hired to transport whey to be dumped outside the farms. However, at Murrah Dairy, Mrs Runchaun gives whey to baby buffaloes and Ms Chariness sells whey in the form of whey drinks at Murrah House. In this manner, Murrah Farm is able to completely reduce the whey waste and transportation costs caused by cheese production. [Figure 10](#) describes the milk processing process ([Draaijer, 2002](#)).

## 6. Murrah breed

The best dairy buffalo among the riverine buffalo breeds is Murrah. Other dairy buffalo breeds include Nili-Ravi, Kundi, Surti, Jaffarabadi, Bhadawari and Mehsana. Murrah is the most popular because it provides more milk yield ([FAO, 2014e](#)) and, additionally, Murrah milk contains more nutrition than milk from other animals ([Table VI](#)). Murrah milk is the best in terms of nutrition level. This breed is raised in many European countries, such as in Italy and Bulgaria, many South American countries, such as in Brazil, as well as in many Asian countries such as in India, Pakistan, the Philippines and Vietnam ([FAO, 2014e](#)).



**Table VI** Comparison of milk content (per 100 g)

Nutrient	Unit	Cow	Buffaloes	Goat	Sheep
Protein	g	3.2	4.5	3.1	5.4
Calcium	IU	120	195	100	170
Cholesterol	mg	14	8	10	11
Carbohydrate	g	4.8	4.9	4.4	5.1
Energy	Kcal	66	110	60	95
Water	g	87.8	81.1	88.9	83
Fat	g	3.9	8	3.5	6

Source: [www.iloveindia.com/nutrition/milk](http://www.iloveindia.com/nutrition/milk)

## 7. Murrah house

The family established Murrah House as Murrah Farm's first retail outlet in 2007. Dairy products, such as milk and mozzarella cheese, are sent straight from the farm to Murrah House. In addition to selling milk and other dairy products at Murrah House, Ms Charinee further adds value to her farm produce by offering a wide selection of Italian menus to her customers featuring dishes that use Murrah Farm's produce as major ingredients. For example, Murrah serves pizzas with fresh mozzarella, fresh baked goods and coffees that are made using Murrah milk. In this manner, people can taste the products and learn more about Murrah Dairy products and might be able to overcome their fears of the new milk flavor and the negative image associated with buffaloes. Particularly important is that Murrah Dairy can also get to know its customers and therefore can discover why customers buy their products, their needs, wants and concerns.

## 8. Mini Murrah Farm

In 2013, due to growing demand and the capability to invest more, the family decided to open Mini Murrah Farm, the first and only dairy buffalo farm tour in Thailand. Mini Murrah Farm provides agro-tour, knowledge-based tourism, where its visitors are encouraged to experience and learn about agricultural life first hand. These days, agro-tourism is gathering strong support. The family targets families with children of middle- to high-income level. With only 30-Baht entrance fee, visitors can learn about Murrah buffaloes, taste the products, experience dairy buffalo farming, feed the animals, make pizzas and ice creams, enjoy food and drinks made from Murrah milk and enjoy the nature.

Mini Murrah Farm serves several purposes:

- To provide the company with a new channel to sell the products;
- To allow people to experience Murrah buffaloes. Baby Murrah aged between 2-6 months are brought to Mini Murrah Farm from Murrah Farm so visitors can feed them and become familiar with them;
- To respond to the growing agro-tour knowledge-based tourism trend in Thailand. Mini Murrah Farm educates and demonstrates visitors on how to have a fully integrated farm; and
- To cooperate with universities to conduct research projects on the test group.

Visits to Murrah Farm are possible, but only for educational purposes. For recreational purposes, visitors can visit Mini Murrah Farm.

With 11 years of experience in dairy buffalo farming and marketing in Thailand, Mrs Runchuan remarked, "I want to make buffalo farming an acceptable business in Thailand" (Kongrut, 2010). The society still associates buffaloes with poor farmers, and such prejudice prevents dairy farmers from the high economic potential of buffalo produce (Kongrut, 2010). The question remains for Mrs Runchuan and Ms Charinee; how to overcome this negative image and how to grow from here?

### Keywords:

Entrepreneurship,  
Marketing,  
Management,  
Dairy sector,  
Growth strategy,  
Environment assessment

## References

- ASTV (2014), “วัวแดงยกเครื่อง เจาะนมพรีเมียมรุกเอเชีย” (“Red cow upgraded, using premium milk to penetrate AEC market”) [Online] ASTV ผู้จัดการรายวัน, 18 January, available at: [www.manager.co.th/AstvWeekend/ViewNews.aspx?NewsID=957000006533&Html=1&TabID=2&](http://www.manager.co.th/AstvWeekend/ViewNews.aspx?NewsID=957000006533&Html=1&TabID=2&) (accessed 26 December 2014).
- Boondouangprasert, P. (2013), “Growth of pasteurized dairy products in Thailand, Compilation of some presentations from the IDF World Dairy Summit 2013, Yokohama, 28 October – 1 November”, *Bulletin of the International Dairy Federation* 473/2014, Brussels, available at: [www.fil-idf.org/Public/PublicationsFolder.php?ID=27123](http://www.fil-idf.org/Public/PublicationsFolder.php?ID=27123) (accessed 27 December 2014).
- Borghese, A. (2012), “Chapter 1: Buffalo species and population, in Borghese, A. (Ed.)”, *Buffalo Livestock and Products*, available at: <http://umvp.kormany.hu/download/3/40/60000/BUFFALO%20LIVESTOCK%20AND%20PRODUCTS.pdf> (accessed 22 March 2015).
- Borghese, A. (2013), “Buffalo livestock and products in Europe”, *The 10th World Buffalo Congress and the 7th Asian Buffalo Congress*, Phuket, 6-8 May, available at: [www.fmvz.unesp.br/bufalos/Proceedings\\_INVITED-PAPERS\\_WBC2013\\_Thailand.pdf](http://www.fmvz.unesp.br/bufalos/Proceedings_INVITED-PAPERS_WBC2013_Thailand.pdf) (accessed 31 May 2015).
- Central Intelligence Agency (CIA) (2015), “The world factbook: Thailand”, available at: [www.cia.gov/library/publications/the-world-factbook/geos/th.html](http://www.cia.gov/library/publications/the-world-factbook/geos/th.html) (accessed 2 May 2015).
- Chaimanee, S. (2012), “กระบือนมและผลิตภัณฑ์จากนมกระบือ” (“Dairy buffaloes and products from dairy buffaloes”), Highland Research and Development Institute, 20 October, available at: [www.hrdi.or.th/HighlandDevelop/detail/1631/](http://www.hrdi.or.th/HighlandDevelop/detail/1631/) (accessed 22 December 2014).
- Dairy Farming Promotion Organization of Thailand (DPO) (2014), “History D.P.O.”, available at: [www.dpo.go.th/?page\\_id=199](http://www.dpo.go.th/?page_id=199) (accessed 26 December 2014).
- Draaijer, J. (2002), *Milk Producer Group Resource Book: A Practical Guide to Assist Milk Producer Groups*, FAO Publishing, Italy.
- Euromonitor (2013), “Country report: dairy in Thailand”.
- Euromonitor (2014), “Country report: dairy in Thailand”, available at: [www.euromonitor.com/dairy-in-thailand/report](http://www.euromonitor.com/dairy-in-thailand/report) (accessed 26 December 2014).
- FAOSTAT (2013), “FAOSTAT: livestock primary”, available at: <http://faostat3.fao.org/browse/Q/QL/E> (accessed 2 May 2015).
- Food and Agriculture Organization of the United Nations (FAO) (2008), “Chapter 2: global dairy sector: status and trends”, available at: [www.fao.org/docrep/012/i1522e/i1522e02.pdf](http://www.fao.org/docrep/012/i1522e/i1522e02.pdf) (accessed 2 May 2015).
- Food and Agriculture Organization of the United Nations (FAO) (2013), *Food Outlook: Biannual Report on Global Food Market*, FAO Publishing, Rome, available at: [www.fao.org/docrep/019/i3473e/i3473e.pdf](http://www.fao.org/docrep/019/i3473e/i3473e.pdf) (accessed 27 December 2014).
- Food and Agriculture Organization of the United Nations (FAO) (2014a), “Food outlook: October 2014: milk and milk products”, available at: [www.fao.org/fileadmin/templates/est/COMM\\_MARKETS\\_MONITORING/Dairy/Documents/OCTOBER\\_2014\\_FO\\_DAIRY.pdf](http://www.fao.org/fileadmin/templates/est/COMM_MARKETS_MONITORING/Dairy/Documents/OCTOBER_2014_FO_DAIRY.pdf) (accessed 27 December 2014).
- Food and Agriculture Organization of the United Nations (FAO) (2014b), “Dairy production and products: milk production”, available at: [www.fao.org/agriculture/dairy-gateway/milk-production/en/#.VJ46pBkv8](http://www.fao.org/agriculture/dairy-gateway/milk-production/en/#.VJ46pBkv8) (accessed 27 December 2014).
- Food and Agriculture Organization of the United Nations (FAO) (2014c), “Dairy production and products: dairy animals”, available at: [www.fao.org/agriculture/dairy-gateway/milk-production/dairy-animals/en/#.VJ46YBkv8](http://www.fao.org/agriculture/dairy-gateway/milk-production/dairy-animals/en/#.VJ46YBkv8) (accessed 27 December 2014).
- Food and Agriculture Organization of the United Nations (FAO) (2014d), “Dairy production and products: milk processing”, available at: [www.fao.org/agriculture/dairy-gateway/milk-processing/en/#.VI2aq74xF-U](http://www.fao.org/agriculture/dairy-gateway/milk-processing/en/#.VI2aq74xF-U) (accessed 15 December 2014).
- Food and Agriculture Organization of the United Nations (FAO) (2014e), “Dairy production and products: water buffaloes”, available at: [www.fao.org/agriculture/dairy-gateway/milk-production/dairy-animals/water-buffaloes/en/#.VJ09RBkv8](http://www.fao.org/agriculture/dairy-gateway/milk-production/dairy-animals/water-buffaloes/en/#.VJ09RBkv8) (accessed 26 December 2014).
- Gyan Research and Analytics Pvt. Ltd. (2014), “Global dairy industry – the milky way”, available at: [www.reportbuyer.com/product/2262903/global-dairy-industry-the-milky-way.html](http://www.reportbuyer.com/product/2262903/global-dairy-industry-the-milky-way.html) (accessed 27 December 2014).

International Farm Comparison Network (IFCN) (2014a), "Dairy report 2014: for a better understanding of the dairy world", available at: [www.ifcndairy.org/media/downloads/EXTRACT-IFCN-Dairy-Report-2014.pdf](http://www.ifcndairy.org/media/downloads/EXTRACT-IFCN-Dairy-Report-2014.pdf) (accessed 27 December 2014).

Keeratipipatpong, W. (2013), "DPO seeks to milk ASEAN market: AEC will serve as a springboard into China", Bangkok Post, 21 January, available at: [www.bangkokpost.com/print/331793/](http://www.bangkokpost.com/print/331793/) (accessed 26 December 2014).

Kongrut, A. (2010), "Restoring the value of buffalo", Bangkok Post Outlook, 23 September, available at: [ftp://202.60.207.28/BP/2010/09\\_BP\\_Sep/23092010/BK230910O01.pdf](ftp://202.60.207.28/BP/2010/09_BP_Sep/23092010/BK230910O01.pdf) (accessed 22 December 2014).

MCOT (2014), "Bright prospects for Thai dairy farming in ASEAN market", MCOT News, 27 November, available at: [www.mcot.net/site/content?id=5476daf6be04707f278b45ee#.VKDdQBkv8](http://www.mcot.net/site/content?id=5476daf6be04707f278b45ee#.VKDdQBkv8) (accessed 26 December 2014).

Neawna (2014), "กษ.ย้า ไทยได้เปรียบเทคโนโลยี มั่นใจตลาดนมไทยรุ่งในอาเซียน", ("Ministry of Agriculture and Cooperatives assures that Thailand has advantage in terms of technology and able to compete successfully in the ASEAN market"), Neawna, 5 December, available at: [www.naewna.com/local/133943](http://www.naewna.com/local/133943) (accessed 26 December 2014).

Organic Agriculture Certification Thailand (2014), "Organic farming", available at: [www.actorganic-cert.or.th/en](http://www.actorganic-cert.or.th/en) (accessed 13 December 2014).

Organization for Economic Co-operation and Development/Food and Agriculture Organization of the United Nations (OECD-FAO) (2014), *OECD-FAO Agricultural Outlook 2014*, OECD Publishing, Paris, available at: [http://dx.doi.org/10.1787/agr\\_outlook-2014-en](http://dx.doi.org/10.1787/agr_outlook-2014-en) (accessed 27 December 2014).

Paitaksri et al., (2012), "Consumers' opinion toward Murrah buffalo milk consumption in Bangkok metropolis", *The 3rd STOU Graduate Research Conference*, O-ST 032.

Pilet, V. (2014), "The world dairy situation: session IV: status and opportunities for dairy sectors around the world", *Annual National Workshop for Dairy Economists and Policy Analysts*, Milwaukee, 1 May, available at: [www.dairymarkets.org/Workshops/2014Milwaukee/Presentation/Pilet.pdf](http://www.dairymarkets.org/Workshops/2014Milwaukee/Presentation/Pilet.pdf) (accessed 15 December 2014).

Positioning (2011), "(ตลาด) นม...แตกแล้วโตจริงหรือ", ("Milk market . . . When it grows, it will really burst?"), 5 January, available at: [www.positioningmag.com/content/ตลาด-นมแตกแล้วโตจริงหรือ](http://www.positioningmag.com/content/ตลาด-นมแตกแล้วโตจริงหรือ) (accessed 26 December 2014).

Statistical Office of Thailand (2015), "รายได้รายจ่ายครัวเรือน และจำนวนครัวเรือน" (Income and expenses per household and number of household), available at: <http://service.nso.go.th/nso/web/statseries/statseries11.html> (accessed 2 May 2015).

Suthipholpaibul, S. (2010), "ควายนม", ("Dairy buffaloes"), Matchon: Agriculture, March-April, available at: <http://info.matchon.co.th/techno/techno.php?srctag=05090150754&srctag=&search=no> (accessed 22 December 2014).

Valencia, C. (2013), "The power of cooperatives in the Thai dairy industry", *The Philippine Star*, 7 July, available at: [www.philstar.com/agriculture/2013/07/07/962397/power-cooperatives-thai-dairy-industry](http://www.philstar.com/agriculture/2013/07/07/962397/power-cooperatives-thai-dairy-industry) (accessed 26 December 2014).

World Bank (2015), "Data: Thailand", available at: <http://data.worldbank.org/country/thailand> (accessed 2 May 2015).

## Further reading

FAOSTAT (2010), "FAOSTAT", available at: <http://faostat.fao.org/default.aspx> (accessed 31 May 2015).

Food and Agriculture Organization of the United Nations (FAO) (2011), "Supply and demand for milk", available at: [www.fao.org/geonetwork/srv/en/metadata.show?id=38220&currTab=simple](http://www.fao.org/geonetwork/srv/en/metadata.show?id=38220&currTab=simple) (accessed 28 May 2015).

Gardebroek, C. and Jongeneel, R. (2004), "The growth in organic agriculture: temporary shift or structural change?", paper presented at 2004 AAEE Annual Meeting, Denver, 1-4 August, available at: <http://ageconsearch.umn.edu/bitstream/20074/1/sp04ga04.pdf> (accessed 13 December 2014).

International Dairy Federation (IDF) (2014), "The world dairy situation 2014", *Bulletin of the International Dairy Federation 476/2014*, Brussels.



International Farm Comparison Network (2014b), "World dairy map 2014", available at: [www.ifcndairy.org/media/downloads/WDM-2014-low.pdf](http://www.ifcndairy.org/media/downloads/WDM-2014-low.pdf) (accessed 27 December 2014).

Kwankam, D. and Thechatakerng, P. (2011), "Production process and management of Thai farmers in community enterprise for organic farming: some changing", *Proceedings of the 2nd International Conference on Education and Management Technology*, IACSIT Press, Singapore.

Ministry of Commerce (2014), "Organic and natural expo 2014", available at: [www.organicnaturalexpo.com/introduction.html](http://www.organicnaturalexpo.com/introduction.html) (accessed 14 December 2014).

Sakdipitakul, P. (1991), "The development of dairy farming in Thailand", available at: [www.fao.org/livestock/AGAP/frg/AHPP86/Pichet.pdf](http://www.fao.org/livestock/AGAP/frg/AHPP86/Pichet.pdf) (accessed 26 December 2014).

Setheetorn, S. (2014), "Thailand food market report: February 2014", available at: [http://fic.nfi.or.th/broadcast/Rep\\_Yoghurt\\_14.02.04.pdf](http://fic.nfi.or.th/broadcast/Rep_Yoghurt_14.02.04.pdf) (accessed 2 May 2015).

Sompakdi, C., Phonprapai, C. and Sindecharak, T. (2014), "Readiness and requirements of dairy farmers in the operational area (Northern region) of the Dairy Farming Promotion Organization of Thailand in approaching Thai agricultural standard for organic livestock", *Thai Journal of Science and Technology*, Vol. 3 No. 1, pp. 182-195.

Techatakerng, P. (2009), "Attitude and motivation for organics consumption", *Proceedings of the XVth International Symposium on Horticultural Economics and Management*, Chiang Mai, 28 June 28 – 2 July.

Thai Organic Trade Association (2011), "Overview of organic agriculture in Thailand", available at: [www.thaiorganictrade.com/en/article/442](http://www.thaiorganictrade.com/en/article/442) (accessed 13 December 2014).

Willer, H. and Lernoud, J. (Eds) (2014), "The world of organic agriculture: statistics and emerging trends 2014", FiBL-IFOAM Report, Research Institute of Organic Agriculture (FiBL), Frick and International Federation of Organic Agriculture Movements (IFOAM), Medienhaus Plump.

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