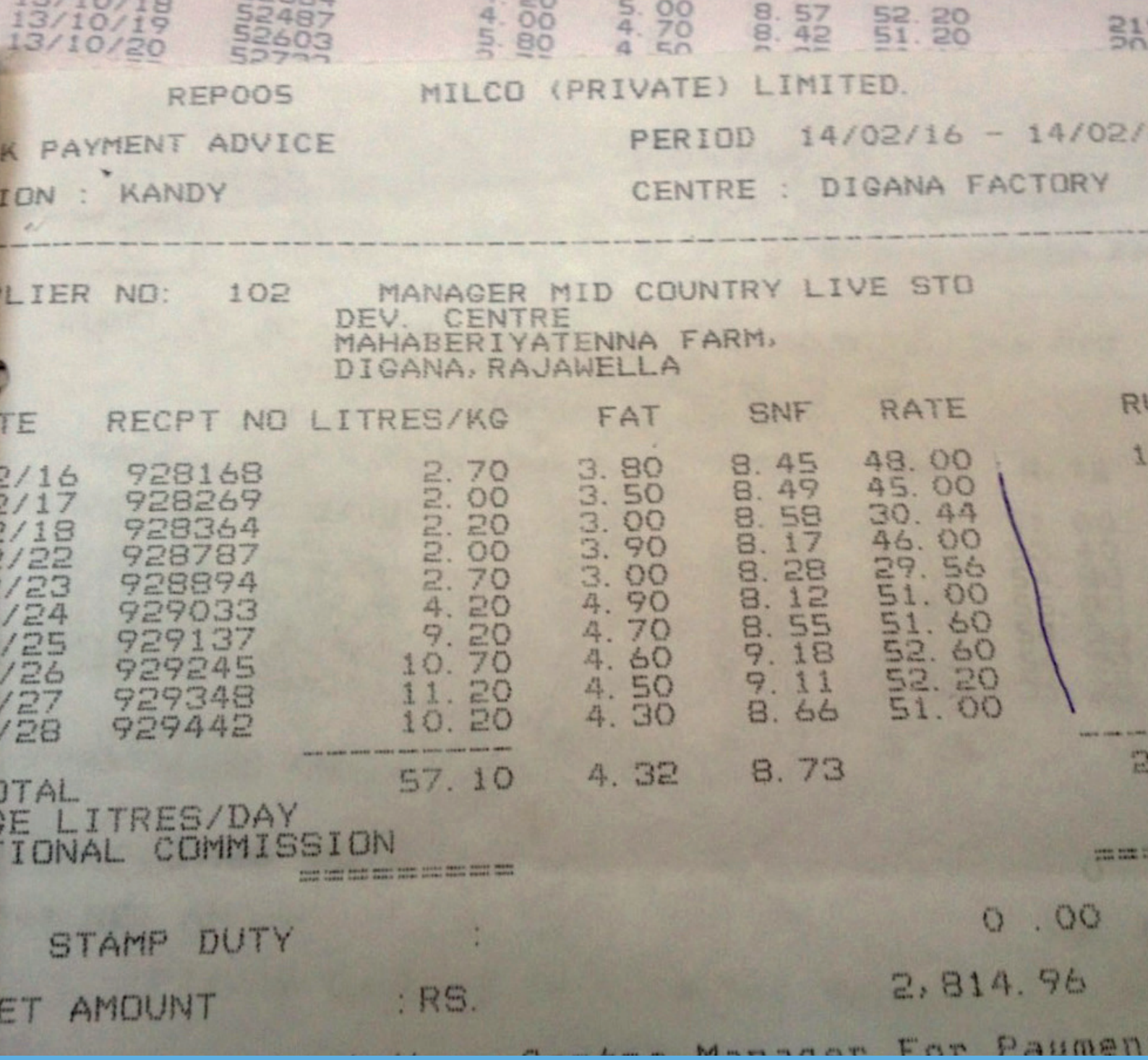

Old friends - New trends

Emerging business opportunities in the dairy sector of Sri Lanka

Authors
Adriaan Vernooij, Wim Houwers, Jelle Zijlstra

LIVESTOCK RESEARCH
WAGENINGEN UR

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The government of Sri Lanka has given high priority to the development of the dairy sector in the coming years. The aim is to raise the present self-sufficiency rate of 35 % to 100 % in 2020. Milk production systems will be modernized through the importation of dairy heifers, establishment of large scale farms and support to medium and small scale farms that are willing to invest in more commercial milk production. The collection and processing system is expanding and modernized through the establishment of more chilling centres and processing plants.

This offers opportunities also for Dutch companies as inputs are necessary amongst others for collection and processing, breeding, feed and fodder production and data management. The government of Sri Lanka realises the need to improve the knowledge base for dairy production and is investing in dairy training facilities and recruiting and training more extensions officer. The present capacity to implement all the necessary training and education activities needs strengthening.

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Foreword

In August 2012, a short dairy trade mission was held to Sri Lanka, organised by the Agricultural Counsellor in New Delhi. During this mission, contacts were made with various players in the dairy industry in the country and a seminar was held ("From Grass to Glass"). The conclusion was drawn by then that few opportunities for Dutch dairy businesses did exist in Sri Lanka. Dairy production had been fairly constant, with few investments in production and processing over the past decade and a half. With self-sufficiency at only approx. 1/3, most (65 %) of the milk was made available in the country through milk powder imported from New Zealand.
In 2013, the Government of Sri Lanka took the decision to strive for self-sufficiency in milk production and announced a number of large investments in and facilitating support measures for the dairy sector in order to attain self-sufficiency by 2020. These recent developments in the dairy sector offer opportunities also for Dutch dairy business. The change of government in January 2015 is not expected to change the current dairy policies of the country.
The Netherlands has previously strongly supported the development of the dairy sector through various dairy development projects. Also many senior officials in government and the private sector have in the past received training in the Netherlands (PTC+, Van Hall Larenstein, WUR).
In order to assess the possibilities for further Dutch involvement in the dairy industry in Sri Lanka, the Embassy of the Kingdom of the Netherlands and the Agricultural Counsellor from the Embassy in New Delhi commissioned a study into the new development of dairy sector in Sri Lanka with the aim to identify business opportunities across the dairy value chain of Sri Lanka. The study looks into main policies and players in the dairy sector in Sri Lanka; analyses previous Dutch aid involvement into the dairy sector and assesses to what extent these past experiences influence possibilities for commercial Dutch involvement in the dairy sector in Sri Lanka; identifies market opportunities for Dutch dairy business across the whole dairy value chain.

Acknowledgements
The implementation of the study was coordinated by Mr. Nishan Dissanayake, Agricultural Policy Officer at the Embassy of the Kingdom of the Netherlands in Colombo, with assistance from Lianne Houben (Deputy Ambassador) and Louis Piët (Ambassador). This assistance made it possible to organise a smooth and effective visiting programme with which it was possible to build up a good view of the current developments in the dairy sector in Sri Lanka and its challenges for the future. The support was often given in effective and also pleasant environments.
We would also like to thank all our contacts in Sri Lanka who have given their time to us for discussions and explanations during visits. We hope and believe it can lead to various forms of further interesting collaboration between the Sri Lankan and Dutch dairy sectors whereby "Old Friends" can certainly continue to work together in "New Trends".

Summary

Given the huge ambition in Sri Lanka to raise self-sufficiency in milk production from 35 % to 100 % in a period of six years, there is need for large investments in the entire dairy chain. Most of the inputs needed to achieve this growth of production are not available in the country but need to be imported. This offers very interesting possibilities for Dutch dairy business and knowledge institutes.

After a period of fairly stable production with little growth, the dairy industry in Sri Lanka has become rather vibrant again in 2013 following the decision of the government to strive for self-sufficiency in milk production in the country by 2020. Self-sufficiency currently stands at 35 %, with an estimated annual production of approx. 300 M litres and a projected demand of 900 M litres for self-sufficiency by 2020.

The government of Sri Lanka has started several support measures to stimulate milk production. The most prominent is the import of 45.000 dairy heifers from Australia. A total of 4500 will be managed as nucleus breeding herds to guarantee a stable and regular supply of new heifers for dairy farmers. These animals are housed on 2 farms of the National Livestock Development Board. The remainder will be directly distributed to dairy farmers who will be selected based on their current involvement in dairy farming. The first 20.000 will be imported in several batches in 2015 and 2016.

Furthermore the government has started a soft loan scheme for new investors in the dairy value chain, has allocated several plots for investors in large scale dairy operations, both domestic and international. Regional development policies for the Eastern and Northern Provinces also offer interesting incentives for investment in milk production.

These changes in the dairy sector require a substantial number of external inputs in the dairy value chain:

- the present knowledge base for dairying is inadequate to drive all the changes, there is a great need for more trained dairy specialists and extension workers who will assist and guide farmers in the process of intensifying and where possible enlarging their dairy operations. The Government of Sri Lanka recognises this and invests in upgrading and establishing new practical training centres and will accelerate the training of 1000 extra extension workers in the coming years. There is nevertheless need for extra training support to allow the necessary adaptation in the knowledge base to be made.
- the necessary material inputs are inadequately available in the country at present. There is a need for e.g. more fodder production mechanisation equipment, barn equipment for large scale investments, semen for breeding, cooling equipment, processing equipment, premixes for concentrates, calf milk replacer (CMR).

It should be noted that material inputs and strengthening the knowledge base are two fully interlinked processes in dairy development. Without properly trained staff and farmers, the necessary innovations in the production system will be much more difficult to realise. Dutch examples of joint public private based approaches are available from other countries and sectors.

As a result of the Dutch dairy development aid given to Sri Lanka in the past, there is still a positive attitude towards working with the Dutch and the Embassy motto *"Old Friends, New Trends"* certainly seems to apply to the dairy sector.

The future of dairying in Sri Lanka is promising and opportunities for Dutch dairy businesses to get involved are looking good. It is necessary though to take quick steps to get involved at this early stage of new developments, otherwise competitors from countries in the region might be the earlier birds catching the worms.

Figure 1: *Milk collection.*

List of abbreviations and acronyms

AAF	Approved Animal Feed
AHTC	Animal Husbandry Training Centre
AI	Artificial Insemination
CMR	Calf Milk Replacer
CSF	Corporate Social Responsibility
DAPH	Department of Animal Production and Health
DEEP	Dairy Enhancement Eastern Province
DM	Dry Matter
DMF	Digana Milk Factory
FAO	Food and Agricultural Organisation
FMRC	Farm Mechanisation Research Centre
GIZ	German Development Agency
GDP	Gross Domestic Product
ICEAPH	Institute of Continuing Education in Animal Production and Health
IDPL	International Dairy Products Ltd
I&R	Identification and Registration
IT	Information Technology
MCC	Milk Collection Centres
MDG	Millennium Development Goals
MED	Ministry of Economic Development
ML&RCD	Ministry of Livestock and Rural Community Development
MLDC	Mid-country Livestock Development Centre
NAFAC	National Animal Feed Advisory Committee
NFP	Netherlands Fellowship Programme
NLDB	National Livestock Development Board
ODA	Official Development Assistance
PDAPH	Provincial Departments of Animal Production and Health
PPRS	Progeny Recording Scheme
PPP	Public Private Partnership
RMCC	Ruwansiri Milk Collection Centre
SCM	Sweetened Condensed Milk
SLSAH	Sri Lanka School of Animal Husbandry
SLAAP	Sri Lanka Association for Animal Production
SNF	Solids Non Fat
SWOT	Strengths, Weaknesses, Opportunities and Threats.
UHT	Ultra High Temperature
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
VIC	Veterinary Investigation Centre

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Figure 2: *Cattle in the Coconut Triangle.*

1 Introduction

Worldwide the demand for animal proteins is growing, especially in countries with growing prosperity. Sri Lanka no longer belongs to the group of poorest countries in the world. The economy is growing, and so are the incomes of the inhabitants and subsequently also their food patterns are changing.
Growth of local milk production has been slow until 2008, after which production and consumption went up 10 to 20 % annually, as a result of the rising demand. Self-sufficiency stands at 30 – 40 %, and local production is supplemented with imported milk powder. The announcement of the government in 2013 to strive for 100% self-sufficiency created a completely new situation. In order to achieve these new targets, the government is investing heavily in the development of the sector.
These recent developments in the dairy sector offer opportunities also for Dutch dairy business. In order to assess the possibilities for further Dutch involvement in the dairy industry in Sri Lanka, the Embassy of the Kingdom of the Netherlands and the Agricultural Counsellor from the Embassy in New Delhi commissioned a study into the new development of dairy sector in Sri Lanka.
The overall objectives of the assignment is *to identify business opportunities across the dairy value chain of Sri Lanka.*

Sub-objectives are:
1. to analyse the previous Dutch dairy development aid to Sri Lanka and to assess to what extent these past experiences influence possibilities for commercial Dutch involvement in the dairy sector in Sri Lanka.
2. to describe policies and players in the whole dairy value chain of Sri Lanka, from production to retailing.
3. to quantify market opportunities for Dutch dairy business across the whole dairy value chain and to formulate strategies on the best ways to establish commercial linkages between the Sri Lankan and Dutch dairy business.

During the study, data from literature and internet were analysed, discussions held with local experts and people in the Netherlands who had previously worked in Sri Lanka. A field visit to Sri Lanka by a team of three researchers from Wageningen UR Livestock Research was undertaken from October 27th till November 7th 2014, during which various site visits were made and discussions held with present major players in the dairy sector in Sri Lanka, both from government and private sector.
The study also incorporates findings and experiences of previous visits to Sri Lanka made by WUR Livestock Research which resulted amongst others in a training programme for senior dairy farm managers of the National Livestock Development Board in September 2014. This training programme was jointly carried out with the Dairy Training Centre in Oenkerk.
The Netherlands has previously strongly supported the development of the dairy sector through various dairy development projects. Also many senior officials in government and the private sector have in the past received training in the Netherlands (PTC+, Van Hall Larenstein, and WUR).
The report first briefly summarizes general developments in Sri Lanka (chapter 2); describes agricultural and livestock productions systems in the country (chapter 3); analyses previous Dutch development aid to the dairy sector (chapter 4) and provides background information and commercial opportunities for various parts of the dairy value chain. Some more detailed and in-depth information is provided in the annexes.

2 Sri Lanka general country background

Sri Lanka profile summary:

- Full name: Democratic Socialist Republic of Sri Lanka
- Population: 21.2 million (UN, 2012)
- Capital: Colombo (commercial), Sri Jayawardenepura (administrative)
- Largest city: Colombo
- Area: 65,610 sq km (25,332 sq miles)
- Major languages: Sinhala, Tamil, English
- Major religions: Buddhism, Hinduism, Islam, Christianity
- Life expectancy: 72 years (men), 78 years (women) (UN)
- Monetary unit: Sri Lankan rupee
- Main exports: Clothing and textiles, tea, gems, rubber, coconuts
- GNI per capita: US $3.170 (World Bank, 2013)
- Internet domain: .lk
- International dialing code: +94

Box 1: *Sri Lanka profile summary.*

The first recorded history of Sri Lanka starts in the early 16th century when the Portuguese start arriving in Sri Lanka. In 1658, Dutch troops take over the country, with the exception of the central kingdom of Kandy. Dutch rule lasts till 1796, when the British started taking over the island, in which they succeeded in 1833. Sri Lanka became independent (as Ceylon) in 1948. It is believed that first habitation in Sri Lanka dates back at least 125.000 years.

Sri Lanka, an island of 65.610 km2s, currently has a population of 21 M inhabitants. 70 % of the population is Buddhist, 13 % Hindu, 10 % Muslim, 7 % Christian. The country has just gone up in the UNDP Human Development Index ranking from the category of medium human development countries to the category of high human development ranking. With a HDI of 0,75 (global average 0,694), Sri Lanka in 2013 stood at 83 in the list of 187 countries and the first in South Asia.
Sri Lanka is still to a large extent a rural country, with an urbanisation rate of around 25 %, with the highest concentration in the south western part of the country. Population density is 330/km^2 .

The former conflict in the Northern and Eastern Provinces and the effects of the Tsunami in 2004 have had great impact on the development of the country. Despite all this, Sri Lanka's GDP per capita grew on average by 4% per annum between 1990 and 2009. The economy has picked up after the war, due to increased agricultural production especially in the Northern and Eastern Provinces, the growth of the tourism sector (60% increase in 2011 compared with 2010) and increased Government spending on reconstruction. The total GDP[1] in 2013 stood at 67.18 $, and the Gross National Income per capita was 3.170 $.

Notwithstanding the progress made and although Sri Lanka is on track towards achieving the MDGs, the country still faces many challenges. It has persistent disparities across regions and between social groups also highlighted in the 2012 National Human Development Report. Uva, Central and Sabaragamuwa provinces, in particular, which include many of the plantations, still suffer from high levels of poverty, hunger and malnutrition.

[1] http://data.worldbank.org/country/sri-lanka

Employment challenges include mismatches between the competencies of graduates and the demands of the labour market. High unemployment prevails among young people, women and the educated in general. Heavy dependence on agriculture for employment continues especially outside the western province. Agricultural productivity remains relatively low.

The main economic sectors of the country are tourism, tea export, apparel, textile, rice production and other agricultural products. In addition to these economic sectors, overseas employment contributes highly in foreign exchange, with 90% of expatriate Sri Lankans residing in the Middle East.

http://www.lk.undp.org/content/srilanka/en/home/countryinfo/
Sri Lanka is a republic and a unitary state governed by a presidential system, with a mixture of a presidential system and a parliamentary system. The president is the head of state, head of the government and commander in chief of the army. Untill the recent election of early January 2015, , the United People's Freedom Alliance led by President Rajapaksa held 144 out of the 225 parliamentary seats. The remainder was divided between the United National Party (60 seats), the Illankai Tamil Arasu Kachchi(Tamil National Alliance) holds 14 seats and the Democratic National Alliance 7.
During the presidential elections of January 8th, 2015 the incumbent president Mahinda Rajapaksa was defeated by his opponent Maithripala Sirisena. He is still in the process of forming a new government at the time of drafting this report.

Figure 3: *Buffalo curd with honey in traditional clay pot.*

3 Sri Lanka agriculture, livestock, dairy – general description

3.1 Sri Lanka agriculture, livestock general

Around 2 million hectares or 30 percent of the total land area of Sri Lanka is agricultural land. Almost 75 % of the agricultural land is under smallholdings and the balance under estates. The number of smallholdings is estimated at about 1.8 million and of this 90 % are less than 2 ha. About 70 % of smallholdings are solely devoted to crop production, the remaining has a mixture of crops and livestock and in few cases solely livestock.

Sri Lanka's most important crop is paddy rice covering 34 % of the cultivated land, followed by vegetables, fruits and oilseed crops. Tea, grown on plantations in the central highlands, is one of the main foreign exchange earners, accounting for 2 % of GDP. Agriculture in total amounts to approx. 15 % of GDP.

Based on the rainfall pattern and altitude, the country is divided into three main agro-ecological zones namely, low country, mid country and the hill country, and the low and mid country regions again being divided into a wet zone, an intermediate zone and a dry zone.

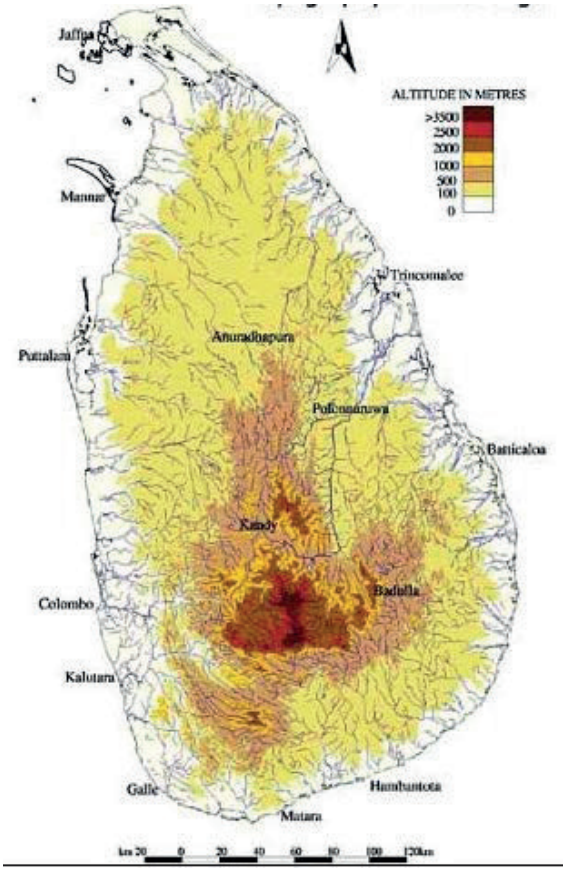

Figure 4: *Topography of Sri Lanka.*

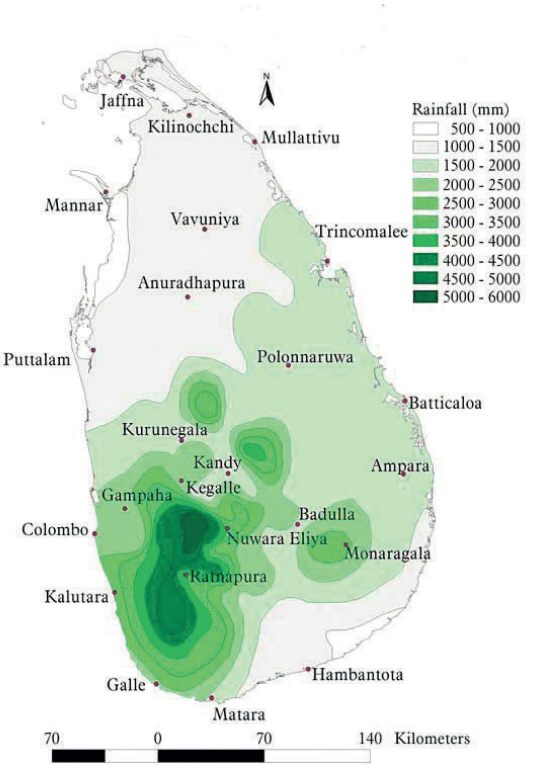

Figure 3: *Rainfall averages in Sri Lanka.*

Topography also plays a major role in the pattern of rainfall distribution. While the northeast monsoon rains are island wide, the mountains intercept the southwest monsoon.

Thus the country can be divided into three climatic zones:

a. The highlands and the southwest receiving both monsoons are the "Wet zone". This is the most intensively exploited zone with 67% of its area under permanent agriculture.
b. The Northern and Eastern lowlands receiving only the Northeast monsoons are the "Dry zone". This zone covers two thirds of the island. It is the most favoured area with regard to radiation levels. But lack of rainfall during February – September is a major constraint to crop production. With irrigation, yield potential for field crops is high in the zone.
c. A narrow strip of land fringing the highlands to the North and East lies between the two zones and is the "Intermediate zone". It is dominated by coconuts along the Western Coastal region, where dairy production has a long tradition.

Livestock keeping in the country not only depends on the agro-ecological conditions but also on the farming traditions. In the east, crop-livestock integration takes place in a combination of rice growing and semi-pastoralist cattle keeping. Cattle graze in jungle areas during the rice growing season and are allowed to graze on the rice fields after harvesting. Religious influences are noticeable because of the restrictions on slaughtering animals resulting in Buddhist resistance to slaughtering animals out of welfare principles.

The main purpose of cattle keeping varies according to the type, breed, and agro-ecological zone. For example, up-country, improved cattle are kept only for milk and manure, whereas the local Lankan cattle are also used as draught animals. In the coconut triangle, buffaloes provide both milk and draught. In Sri Lanka, cattle and buffaloes are not reared for meat per se because of religious barriers to slaughtering. The available meat is a by-product of the dairy industry.

In general, 1.8 million smallholdings covering 1.42 million ha (approximately 0.8 ha per holding) produce food crops and animal products mostly for domestic consumption; a third of holdings have livestock.

3.2 Sri Lanka dairy production systems

Sri Lanka is self-sufficient in most livestock products, apart from dairy. The dairy sector is the most important of all livestock sub sectors though. This is primarily because of the influence it has on the rural economy. Dairying is acceptable to all ethnic groups and religious sectors. In the early 70s, local milk production met 80 percent of local consumption needs. The growing demand resulted in a sharp increase in imports of milk and milk products which was not matched by a growth in domestic production.

69.452 Mt of milk and milk products were imported in 2013. Hence, with the aim of reducing the drain on the country's foreign exchange resources and supporting employment generation and family income, dairy industry is promoted as complementary economic activity across wide sections of the population.

The domestic milk production only constitutes about 35 % of the requirement and the rest is imported as milk powder, mainly from New Zealand. In most areas, milk is collected once a day due to unavailability of a proper cold chain. Since 2013, priority is given to raising local production. Dairy development is taken up by public sector investment programmes and several incentives are offered to the private sector to invest in the dairy sector.

Of the total milk that is available, the volume of milk entering the formal milk market annually is around 250 million litres (see annex 5) and the rest is channelled via informal routes and consumed domestically. With the pressure on land for pasture production, the main milk production areas have recently been shifted from the mid and upcountry to the Northwest and North Central provinces.

Milk is being produced in all parts of the country, the largest cattle population can be found in the dry and intermediate zones though.

The wet mid and upcountry areas are the main milk producing areas. Since the end of the civil war, the number of cattle and the amount of milk produced is rising again in the north and east. The total cattle population stands at approx. 1.5 M head, buffalo approx. 400.000.

Table 1
Milk production zones and production systems in Sri Lanka.

Zone features	Dry zone	Coconut triangle	Mid-country	Upcountry & estate	Wet zone & urban
Location	Dry zone districts in the NC, Northern and Eastern Provinces and parts of Central, Southern and NW Provinces	Intermediate and wet zone areas of the NW Province, and Gampaha district of the Western Province	Wet zone areas in the Central Province – Kandy and Matale districts	Nuwaraeliya district in the Central Province and Badulla district in the Uva Province	Districts in the Western, Southern and Sabaragamuwa Provinces and cities
Animal types	Indigenous cattle, Zebu cattle and crosses, buffalo	Crosses of exotic breeds, Zebu types, crosses of indigenous animals and buffalo	Pure exotic animals and crosses, and Zebu crosses	Pure exotic animals and crosses	Crosses of exotic breeds and Zebu type and indigenous animals and buffalo
Husban-dry	Free gazing, or nomadic-type Large herds or sedentary small/medium-sized herds	Medium-sized herds, limited grazing tethered under coconut palms	Small herds, some tethering, stall feeding	Small herds, zero grazing	Limited grazing, medium-sized herds or small herds, zero grazing
Herd size	Few: 25	5 cows	2–3 cows	1–2 cows	2–3 cows
Average yield	2.1 litres/cow/day Total 300–400 litres/cow over 180–200-day lactation	3–4 litres/cow/day Total 500–800 litres/cow over 200-day lactation	2–4 litres/cow/day Total 500-900 litre/cow	6 or more litres/cow/day Total 1200-1500 litres/cow	8 litres/cow/day Total 1 500–1 600 litres/cow

Source: FAO, 2006.

***Figure 6**: Wallowing buffaloes.*

4 History of Dutch involvement in the dairy sector of Sri Lanka

4.1 Description of Dutch dairy support projects

Old friends

The first relations in the dairy sector between Sri Lanka and the Netherlands started in the period when Dutch Ceylon was a governorate established in present-day Sri Lanka by the Dutch East India Company. It existed from 1640 until 1796 and it is believed that the well-known "Hatton" or "Cape" cattle found in the hill country are descendants of European cattle brought to Sri Lanka by the early Dutch settlers in this period. The name Cape indicates these animals were bred by settlers in South Africa. It can be assumed that the animals were successful in Sri Lanka because they were adapted to high temperature and tropical grasses.

The Netherlands Dairy Development Project (NDDP) started with the importation in 1978 to Sri Lanka of 896 heifers under the Netherlands Development Cooperation Programme. A total of 902 animals, 896 heifers between 6 months and one year old and 6 bulls were imported in 1978 and send to Mahaberiatenne Farm and New Zealand Farm. A total of 116 animals were issued to private farmers. Both farms were supported by a technical expert for a period of 7 years. This import of cattle developed into a broader project including technical assistance towards management and provision of equipment for 2 major breeding farms of the National Livestock Development Board. During the period of implementation of the NDDP, the cooperation in the livestock sector between Sri Lanka and the Netherlands expanded. Activities developed in the field of animal nutrition in the 'Straw Utilisation Project' and the 'Fibrous Feed Utilisation Project' and in the field of extension and farmers' training the 'Mid Country Livestock Development Centre', the 'Coconut Triangle Livestock Development Centre' and the 'Small Holder Dairy Development Project'. In the Mahaweli area the Netherlands assisted in farm development through the 'Draught Animal Project' and 'Livestock Extension Project in System H'. All the activities sponsored by the Netherlands came under the umbrella 'The Sri Lanka Netherlands Livestock Development Programme'.

Furthermore, many Sri Lankan active in the dairy sectors received training in the Netherlands (PTC+, Van Hall Larenstein, WUR). Table 4 presents an overview of the different Netherlands projects from 1978 to 1991.

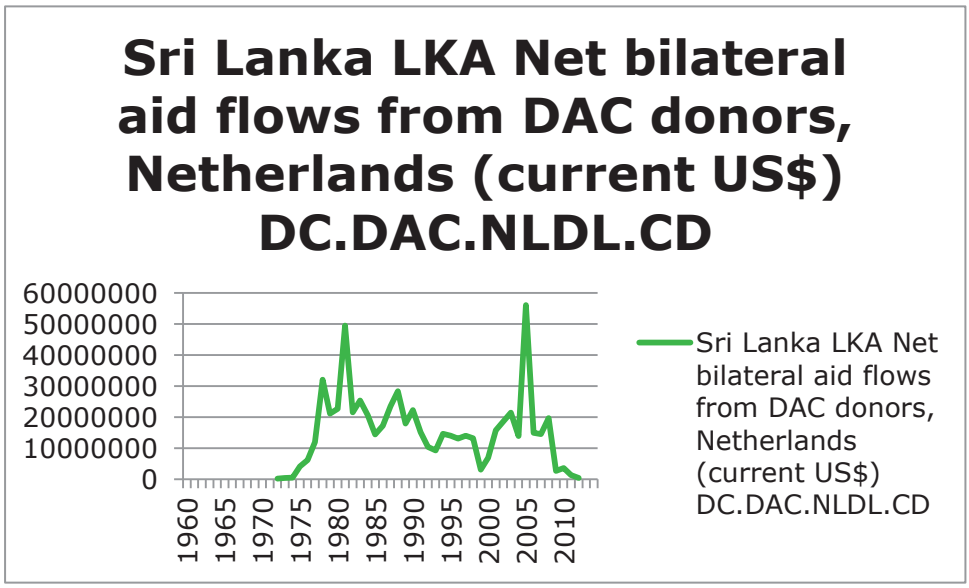

Table 2
Dutch Aid to Sri Lanka. Source: http://data.worldbank.org/country/sri-lanka

Table 3
Overview Dutch dairy support projects

Project	Period	Counterpart organisations	Activities
Netherlands Dairy Project	1978 - 1986	NLDB	Cows, Consultants, Equipment, Scholarship to Netherlands
Straw Utilisation Project	1982-1983	University of Peradeniya	Consultants, Lab. equipment
Mid Country Livestock Development Centre	1982-1985	NLDB, DAPH	Consultants, Equipment
Straw Utilization Project	1983 - 1986	University of Peradeniya	Consultants, Lab. equipment
Extension to Draught and Dairy programme in Mahaweli	1984 - 1986	Mahaweli Authority	Consultants, Equipment
Coconut Triangle Livestock Development Centre'	1985	NLDB, DAPH, IDA Project	Consultants, Equipment
Dairy Development Phase II	1985 - 1988	DAPH, NLDB	
Small Holder Dairy Development Project	1986 – 1989		Consultants, Processing Equipment
Fibrous Feed Utilisation Project'	1986 - 1989	University of Peradeniya NLDB	Consultants, Equipment
Small Farmer Dairy Project	1990 - 1991		Extension and training

4.2 Observations in 2014

The dairy activity at Mahaberiatenne farm has been terminated and all remnant equipment of Netherlands cooperation has been disributed to other NLDB farms, and can still be found in operation on these farms. Issued breeding stock can not be identified or traced anymore as such given the many generations that have been bred
since then. New Zealand farm has continued as a viable operation and is currently in private management under the Stassen Group and managed by a former NLDB manager, trained in the Netherlands.

Figure 5
Dutch equipment still operational after 30 years.

Netherlands trained lecturer Mrs. Punchimanika with farmers from Badullah at MLDC

Research activities on straw treatment and the fodder laboratory at the University of Peradeniya are not in use anymore. However straw treatment with urea is still widely practiced in the dry season, but not as an ensiling system. Currently Wageningen University has one study in progress with the same Department of Animal Production.

The Mid Country Livestock Development Centre (MLDC), including demonstration farms, is maintained well, in operation and conducts courses on request frequently. The centre will be renovated and extended to increase the capacity to meet the training needs recently expressed by the Sri Lanka Government. The same, but on a smaller scale, will apply for the Coconut Triangle Livestock Development Centre which has not been in use for a long period.
The most active memory of the earlier Netherlands involvement is still with the former counterparts of the Netherlands staff and other NLDB staff trained in the Netherlands under the Netherlands Fellowship Programme. The impact is found less so amongst participants in the Department of Animal Production and Health (DAPH) as stated by one of their directors 'they are mostly at places where they can not use this knowledge'. It is hard to assess the output of the trainings, since most of the evaluations are are at an aggregrate objective level, not at country level.
DAPH participants did the application through their own channels and were for a long period successful in NFP applications. The fact that DAPH has more female staff will have been beneficial. Participants on the pig, poultry and feed courses founded the allumni organisation Barneveld Alumni Association Sri Lanka (BAAS), which is still a very active and usefull network at the moment.
Currently former NLDB counterpart staff can be found still within the NLDB, but also with Pelwatte Dairy, Nestlé, Mahaweli Authority, Chilaw Plantation and DAPH. Experienced NLDB staff does not get absorbed in the Ministry of Livestock, but do usually join the private sector when they leave NLDB.

4.3 Lessons learned

From the period of project aid, a number of conclusions were drawn about the rate of successes and outstanding challenges.

- Development of local dairy husbandry is benefitting more from a producer friendly price- and investment climate than by technology development aimed at reduction of variable costs (De Jong, 1996).
- The milk price received by farmers is a major incentive for increasing milk production. In the period of the Dutch sponsored dairy projects, the milk price was low and milk production - certainly in cases of uncertain marketing – was not a very attractive economic activity.
- Importation of improved cattle to Sri Lanka is only justified if fodder and pasture production is established and sufficient (one year) fodder conserved before arrival of cows, if adequate water is available for drinking, cooling and irrigation and other facilities are ready and prepared.

Most of the support efforts were either targeting NLDB or otherwise meant for a larger target group of dairy farmers, with projects implemented through the DAPH supported by research activities with some of the universities.

- In spite of technical and budgetary shortcomings NLDB farm management staff has shown that they can maintain production systems and equipment very well. All farms are still operational.
- A recent training needs assessment carried out of the management NLDB confirmed that dairy farming and processing organizations involved in dairy production require a good knowledge and understanding of the sector to avoid ad hoc decisions which have a negative effect on the performance. (Houwers, 2013).

- Dairy farming activities need to be technically and financially sustainable in the institutional and agro-ecological environment of Sri Lanka; if not the activities are likely to cease after withdrawal of the donor.
- New technical introductions need to be anchored in the whole knowledge and supply chain.

A quick overall assessment of the effects of the Dutch dairy support projects must certainly be positive. The results of the previous aid projects can still be located in many parts of the present Sri Lankan dairy sector.

Donor-recipient relations can result in long lasting relationships. It must be stated that nowadays many Sri Lankan public organisations are used to rely on donor aid and hesitate to switch to more commercially inspired activities. To avoid such dependencies, aid and trade should reinforce each other in a more balanced manner.

It is difficult to judge how the previous donor-aid relationship will influence the success rate of the involvement of Dutch dairy companies in the emerging dairy business opportunities in Sri Lanka. No comparable research exists on this issue. Other recently carried out dairy quick scans did not further analyse this issue either (e.g. Nell *et al,* 2014).

Two careful conclusions emerge from the observations, field visits and discussions and available literature on previous Dutch involvement. Firstly, there still is a very positive feeling about the support provided by the Dutch government towards dairy development in Sri Lanka. This stems from the support to the establishment and management of the NLDB farms, the research on e.g. straw treatment and its corresponding positive effect on dairy farming in the country but more specially so from the long term training support that has been given to a large group of people of whom many are still actively involved in the dairy sector of Sri Lanka. No other donor country has given so much training support to capacity building of key persons in the dairy industry in Sri Lanka as the Netherlands has.

However, despite all the positive feelings towards the Netherlands from recipients of the support, it must be noted that most of the present and most probably also future decision makers on investments in the dairy sector have not been involved in and benefitted from those previous programmes. Most likely their judgement will be based either on present political and economic priorities. Benefits offered by trade partners ("aid for trade") interested in getting involved in the emerging dairy business of Sri Lanka will certainly increase their chances of success. Current aid for trade will be a strong competitor to previous aid for present trade. See also chapter 5.15.

Figure 8: *Sri Lanka dairy managers training in the Netherlands.*

5 Dairy value chain and emerging opportunities

5.1 SWOT dairy sector Sri Lanka

The next overview of strengths, weaknesses, opportunities and threats offers our observations and experiences in a glance. The content of this overview is further elaborated in the rest of this chapter.

Table 5
SWOT Analysis

Strengths	**Weaknesses**
- Booming economy / increasing per capita income - Increasing tourism - Peaceful environment - Huge public sector investments on infrastructure development – highways, ports, airports, electricity - FTAs with India and China - Tax concessions for international investments - Good climate for growing fodder (rainfall and sunshine) - Knowledge of English language - Educational system Sri Lanka in general - Developed and dynamic dairy market: consumption of processed milk (powder, yoghurt, curd, dairy beverages) - Dairy processors developing all kinds of support for their supplying farmers (i.e. social welfare, technical tools, extension services and A.I.) - Agricultural universities available and active - Breeding policy aiming at more crossbreds in climate zones with high temperature	- Poor milk quality and hardly national standards for milk quality - Vast majority of farms has less than 5 cows: cows are side activity for farmers / no focus on improvement - Available fodder (incl. knowledge and experience with fodder conservation) - Professional knowledge and skills on farm level - Excess cattle on farms, because of restricted culling (religion/animal welfare reasons) - Quality of services supplied by veterinary surgeons, AI-technicians and extension workers - Lack of research and innovation, incl. dissemination of innovations
Opportunities	**Threats**
- Increase in domestic consumption of milk - National and regional governments stimulate and support dairy development with active programmes - Positive outlooks for profits from investments in large(r) scale dairy farms - Positive outlooks for profits from investments in dairy processing / incl. processing equipment - Supply dairy products to customer segment with higher demand / market for higher added value - Demand for automation and mechanization of dairy farms - Need for capacity building, training and vocational education when milk production will increase at the pace the government wants	- Government involvement in setting farm gate prices and retail prices - Shortage of fodder / availability of land - Possibilities for slaughtering of cows unclear - Slow adaptation of government departments to dynamics in market and too ambitious plans - Many government departments still expecting donor aid - Growth of consumption fresh milk may be slow as many people still prefer milk powder, also because of a lack of fridges at homes - Alleged human rights violations and UN investigation - Protest by Buddhist movements to ban cattle slaughtering

5.2 Key players in the dairy value chain

5.2.1 Central government

Key players in the dairy value chain can be split in government and private sector. In Sri Lanka, the government plays an important role in setting new policies, whilst the private sector often adopts an awaiting attitude: as mentioned during one of the interviews, the government usually plays the role of the mechanism to kick-start new developments.

Absence of reasonable number of medium scale investors is an inherent weakness of the dairy industry in this country (dairy policy document MLRCD).

Two ministries played an important role in dairy development until the presidential elections in January 2015: the Ministry of Livestock Production and Rural Community Development (MLRCD) (http://www.livestock.gov.lk/site/) and the Ministry of Economic Development (MED) (http://med.gov.lk/english/). Whilst the MLRCD is determining the technical part of livestock development policies, the pace is however set by the MED. Ministerial responsibility may be altered following the installation of a new government after the elections.

The most important development policy for the country is stipulated in the *Mahindra Chinthana Vision for the Future* policy, which falls under the responsibility of the Ministry of Finance and Planning.
The Mahinda Chintana Vision for the future is implemented through the Divi Neguma rural development programme, through which a large variety of rural development programmes are implemented aiming at strengthening local households to become economically viable units for agricultural and livestock production, and for support to establishing cottage industries. The Divi Neguma policy is also used to stimulate various livestock sector development activities, such as distribution of chickens and the distribution of imported heifers from Australia to small scale farmers. Recipients will be experienced dairy farmers with the capacity to manage a 15-20 head dairy farm. The policy stipulates the most important steps to be taken for dairy development (p. 30):

- modernize large scale dairy farms with private sector participation
- enhance production of breeding materials
- strengthen animal feed production
- improve service delivery system (veterinary, training)
- promote research and development
- popularize milk consumption

The MLRCD has recently updated the dairy paragraph of its general livestock development policy, which still stems from 2006. The (undated) update lists a large number of steps that need to be taken to achieve self-sufficiency in the coming years.
http://www.livestock.gov.lk/site/images/stories/dairy_deve.project_rev_150_last.pdf

Present performance of the MLRCD is hampered by insufficient and inadequately trained staff, leading to sub-optimal coordination of dairy production improvement projects.

Most milk is being produced by smallholders, very few private investments in larger scale dairy production exist. Involvement of the private sector is at supply level (feed, pharmaceuticals, collection and processing).

Following the Fonterra milk contamination issue in 2012, the government has decided to stimulate local milk production, with the aim of achieving self-sufficiency (900 to 1000 M litres annually) by 2020. One existing NLDB farm has been adapted and a new NLDB farm is under construction to house 4.500 imported dairy heifers from Australia, to serve as nucleus herds to provide good dairy cattle to farmers.

An additional 40.000 will be imported in 2015 and 2016 for distribution to local farmers. Breeds imported are Friesian Holstein (1/3), Jersey (1/3) and crosses of the two.

The government has launched several support facilities to stimulate local production. Soft loans are available for investment in the dairy value chain; land is allocated to start private large scale commercial dairy farms.

The main implementing arm of the MLRCD is the Department of Animal Production and Health (DAPH), based in Kandy. With the establishment of Provincial Councils most of DAPH's field level functions were devolved to nine (09) Provincial Departments of Animal Production and Health (PDAPH). The National DAPH provides technical leadership, expertise and back-up services to provincial DAPH and to the livestock industry. Divisional Veterinary Offices managed by Veterinarians are the main functional units of the DAPH. 309 Divisional veterinary offices scattered throughout the country are functioning under DAPH to implement all livestock development programs at grass root level (MLRCD, 2014).

5.2.2 Regional governments

As part of the post-civil war rehabilitation activities, extra attention is paid to the development of the Northern and Eastern Province. Both Provinces have been given high priority in the "Mahinda Chinthana" economic development policy framework. For both provinces, regional development programmes have been drafted, which offer good incentives also for investors in agriculture.

Under the "Negenahira Navodaya" Programme major development projects have commenced and some completed in all three districts of the Eastern Province. The programme aims to promote de-militarization, development, democratization and devolution in the East. Thus, it incorporates the core components of the Mahinda Chintana which are restoration of law and order and civil administration, equitable resource allocation among all communities, speedy implementation of the de-mining programme, restarting livelihood activities and reconstruction of damaged social and economic patterns, as well as restoring infrastructure.

Paddy

Paddy areas were 4% in 2006-2007 and it was increased up to 7% in 2007-2008 in Ampara District. It was -13% in Batticaloa District in 2006-2007 and then increased to 133% in 2007-2008. The paddy cultivation area in Trincomalee District was 38% in 2006-2007 and it increased up to 58% in 2007-2008.

Overall the paddy cultivation was increased from 5% in 2006-2007 to 38% in 2007-2008. The average yield of the Eastern Province increased from 4.1 in 2007 to 4.29 in 2008.

Other Crops

Maize cultivation was 8,200M in 2006-2007 and it was increased to 12,775M in 2008-2009. As a result the maize production went up from 12,301M to 19,163M in 2008-2009.

Ground Nut cultivation was 1,089M in 2006-2007 and increased to 2,127M in 2008-2009. Thus, the Ground Nut production went up from 2,178M (2006-2007) to 4,254M in 2008-2009.

Green Gram cultivation was 1,115M in 2006-2007 and it was increased to 2,310M in 2008-2009. Thus, the production increased from 1, 673M (2006-2007) to 3,466M in 2008-2009

Cowpea cultivation was 742M in 2006-2007 and it was increased to 6,409M in 2008-2009. The production increased from 1,114M (2006-2007) to 9,610M in 2008-2009.

Red Onion cultivation was 416M in 2006-2007 and it was increased to 634Min 2008-2009. The production increased from 10,400M (2006-2007) to 15,850M in 2008-2009.

Vegetables
Vegetable cultivation in the Eastern Province was 5345Ha in 2006-2007. It was increased to 9518Ha in 2008-2009.

Livestock
The cattle population in the Province was 264,063 in 2006 and it was increased to 326,671 in 2008 while the poultry population was 698,074 in 2006 and increased to 883,821 in 2008.

Milk Production
The total milk production of the Eastern Province was 96,411 litres per day in 2006. It was increased to 160,404 litres in 2008 due to access to collection facilities and replacement of lost livestock.

Other dairy products, such as curd, ghee yoghurt also increased and contributed to the higher dairy production in the East.

Infrastructure
The expenditure for economic infrastructure in Eastern Province was Rs.82, 951.51 million. The government expenditure for the construction of roads and bridges was Rs.36, 209.02mn. The Government also allocated Rs.1533.19mn for electricity, Rs.44, 865.30mn for water supply and drainage, Rs.68.75mn for transport and Rs.75.25mn for ports development.

Source: http://www.priu.gov.lk/Developmentstories/dev201001/20100115eastern_awakening.htm

Box 2: *Results of the Negenahira Navodaya programme.*

Link between national level and provinces need to be made more effective. E.g. policies are determined at national level; the extension staff to implement these policies belongs to the Provincial Department.

Parallel to development of the small scale farming and herding, a number of large scale (foreign) farms will be stimulated to invest in. There is a blueprint for procedures and investment, and economical analyses of 12 farms for 1000 cow units in Eastern Province.

Government incentives like tax holidays are available in the agriculture sector for farming associated with advanced technology, distribution, collection & marketing, storage, cold rooms, ice plants, animal husbandry and out grower schemes, plant & nursery, pre/post-harvest management, cultivation of plants of any description.

5.2.3 National Livestock Development Board

The National Livestock Development Board (NLDB) was established in 1973 under the State Agricultural Corporations Act No.11of 1972. The NLDB is presently managing 30 livestock & integrated farms, covering a total extent of around 14,000 ha, for maintaining livestock and coconut plantation with 2 training centres.

Its mission is to run a self-sustaining chain of livestock and crop integrated farms in different agro-ecological zones. The activities carried out by the NLDB are:

- To develop livestock activities within a reasonable time period to issue and to respond to the requirement of supplying breeding animals continuously to farms with the objective to making the country self-sufficient in livestock and dairy products.
- To develop livestock and agricultural products with new technology with the participation of the private sector to increase the output and profitability of the organization.
- To cultivate cash crops in selected farms to support the cash crop production programme in the country.
- To achieve optimum productivity levels in livestock and agricultural sector.
- To obtain maximum productivity from livestock and crop integrated farming systems and follow eco-friendly cultivation practices.

NLDB's farms are used to house a nucleus herd of 4.500 heifers from Australia (see 4.1.1.) At another farm 2500 heifers will arrive in 2015.
An unknown number of the NLDB farms will be made available for joint ventures with other investors.
To know more: www.nldb.gov.lk

5.2.4 Industry associations, producers groups and farmers' organisations

In the dairy sector, no existing organisations or associations that represent either producers or processors do exist at present. Village level farmer societies/cooperatives do exist in some villages e.g.- MILCO farmer societies.
On the other hand, the poultry sector in Sri Lanka is better organised. Producers are organised in the All Island Poultry Association and suppliers and integrators in the Poultry Forum. No initiatives to unite the dairy producers and/or processors at the national level seem to be taken.

5.3 Raw milk, informal milk market

Introduction
Although reliable statistics are not available, it is regularly mentioned in various statistics that about 40 % of milk is in the informal milk chains. This part of the milk is either consumed as fresh milk or processed to curd.

Issues
Marketing of raw milk via the informal market is an important part of the economic activities in the dairy chain in Sri Lanka. Product diversification is not an important issues in this market which is dominated by traditional products (curds etc.) only.

Opportunities.
The informal marketing of raw milk at village level does not offer opportunities for Dutch companies. This trade is mainly in liquid milk, but also often in locally processed traditional dairy products such as curds.

Estimation of importance as business opportunity.
Nil

5.4 Milk production, collection, processing and distribution

Milk production in Sri Lanka mainly comes from cattle, buffaloes contribute approximately 20 % of the total production and buffalo milk is for a large part processed into curd. Not much buffalo milk enters the formal market as fresh milk.
The total amount of processed milk has almost doubled over the past ten years. This rise has been most prominent in the past 5 years. From 2003 to 2008, production was fairly stable, more growth has been realised since 2009. This growth is mainly the result of various price rises throughout this period. Milk prices had been fairly stable (close to 20 Rs/ltr) since 2000, but has rising steadily since 2008 and currently stands at 60 Rs/ltr. Government determines farm-gate prices for milk.
During the mission data on the current amounts processed by all dairy plants were gathered and compared with the official statistics. When further analysing this info, the conclusion must be drawn that the growth in processed milk has mainly come from the fact that more milk from the informal market has entered the formal market. Dairy farmers have apparently responded to the more attractive prices offered, but no substantial rise in production has taken place so far.
Processors are taking the lead in expected growth of milk production in the country. New dairy plants are being built, both large scale (Milco) as well as small scale; many investments in small dairy plants have started in the last 1 ½ years.

Most processors are investing in the sourcing of milk; new collection points and cooling centres are established and most of the larger processors have started advice and support activities for their suppliers to assist them in raising their production.

Table 5
The Mahindra Chantana Vision for the future contains the following targets for the dairy sector:

Key Targets of the Livestock Sector				
Indicator	2005	2009	2015	2020
Self sufficiency in milk (%)	15	33	55	100
Milk Production (mln. ltrs)	192	233	500	750
Imports of milk and milk products (Mton)	68.1	63.8	33.375	500
No. of cattle with high production capacity	100.000	150.000	200.000	250.000
Chilling centers	60	80	150	300
Collection centers		2542	5000	10000

Source: Mahindra Chintana Vision for the future.

More detailed information about the developments in the dairy chain and the main players can be found in annex 5.

5.4.1 Primary production

Issues
In terms of milk production, most of the production rise will still have to come from the small scale producers, taking the step from small to medium scale producers. Investors are invited to start large scale dairy farms on government land that can be allocated for long term leases. Furthermore, some of the NLBD farms will become available to be operated as joint ventures between NLDB and foreign or national investors.

Opportunities
Opportunities for Dutch companies in the small to medium scale farms are rather small. Although the total volume of investments on this type of farms may be large in the coming years, the type of equipment (relatively small scale) that is needed is hardly or not available from Dutch suppliers.

Opportunities to get involved do exist though for the large scale investments. Consortia of barn equipment, milking equipment and farm mechanisation machinery suppliers could play a role.

Estimation of importance as business opportunity.
The total number of foreign investments in new large scale farms is not expected to be very large in the coming five to ten years. In the short term a total 14 lots will become available for large scale investments (6 x Crown Land Government, 8 x Army farms). Furthermore, public-private joint ventures will be possible on 10 NLDB farms. On top of this, private investments from Sri Lankan investors might grow in number. E.g. CIC Agriculture has already obtained two large farms (with approx. 700 head of cattle each), which still need to be developed for intensive dairy production.

5.4.2 Collection and chilling centres

Issues
The total number of collection and chilling centres will rise quickly in the coming years. All current processors invest heavily in expanding their supply and enlarging their share in the market. For that matter, they will establish tens of new chilling centres in the coming years. Moreover, several new processors are entering the market and will also invest in collection and chilling facilities.

Opportunities
Opportunities do exist and will continue to be growing in the coming years for supply of cooling equipment, including other facilities (weighing equipment, fat and SNF testing equipment) needed to run collection and chilling centres.

Estimation of importance as business opportunity
Presently there are 80 chilling centres in the country and close to 3000 collection centres. The four major processors will all invest in at least two to three new chilling centres in the coming five years. New small scale investors will establish an estimated 5 new chilling centres. Furthermore, local cooperatives may also invest in collection facilities and sometimes in chilling centres, usually with donor assistance. Possibly another 5-10 new chilling centres in the coming 5 years.

5.4.3 Processing

Issues
Large investments are taking place in expanding processing capacity, by all major players, but also small to medium sized investments by several newcomers into the dairy sector.

Opportunities
There will be a strongly growing demand for new processing equipment, mainly small to medium scale (5.000 to 50.000 litres daily), including cooling equipment.

Estimation of importance as business opportunity
The processors are clearly taking the lead in the new growth of the dairy value chain. The present processors, and several newcomers, are expected to strongly invest in new processing facilities.

5.5 Dairy nutrition: commercial animal feed and fodder supply services, including mechanisation

Introduction
Improvement of fodder supply is obviously the most important bottleneck to be addressed for the further increase in domestic milk production. Achieving this increase can only be realised if adequate quantities of quality fodder are available all year round. In practice this means more emphasis needs to be put on fodder production in general, but especially on fodder conservation to have adequate amounts of good quality feed all year round. Currently there is very little fodder conservation in terms of hay and silage making going on in the country. There is a growing awareness of the need to address this issue. The MLRCD is, together with seed supply companies (e.g. Prima Group of Companies) carrying out training and demonstration activities in various parts of the country, whereby farmers are given one kg of fodder sorghum seed for free (enough for ¼ of an acre). 30 October is annual *"Grass for Milk Promotional Day"*. A new project was introduced in 2013, to develop farmers as commercial fodder producers. Three farmers were selected from North Central, North Western and Southern provinces and provided financial assistance to develop them as entrepreneurs (MLRCD, 2014). The newly established NLDB farm where the imported heifers will be housed has heavily invested in good fodder production and can serve as an example of good practices.

A number of agricultural mechanisation companies are active in Sri Lanka, but the equipment they deal with is mainly meant for arable crops, not for fodder growing.

Agricultural by-products such as rice straw are abundantly available in the country. Paddy yields up to 8 metric tons of Dry Matter (DM) per hectare annually through rice straw. However, a large portion of the residues is burned and wasted but should be preserved as it is a good feed resource for ruminants.

Feed (concentrates) can only be imported, compounded and marketed under the Animal Feed Act no.15 of 1986. NAFAC (National Animal Feed Advisory Committee) is the regulatory body. To impose new regulations to existing industry is difficult and takes more than one year. Manufacturers need permission to operate from the licencing authority Registrar Animal Feed. The products need to be approved by and receive an AAF number (Approved Animal Feed). This is to be renewed every year. Import feed stuffs get an F(foreign) number en other feeds an M number. All ingredients and additives are listed. For approval at least a clear label and directions for use should be available. Now 780 imported ingredients are registered. There are 15 importers of soya beans. Import of compound feed is not allowed.

There is no price regulation for animal feeds; this is decided by supply and demand, given the quality of the quality of the product. Cattle feed production is less than 10% of the total compound feed production.

Dairy feeding is mainly based on use of coconut poonac (coconut oil cake), rice bran and mineral mixture, and often mixed on the farm itself. Consumption of dairy concentrates is still relatively low, because of the low production levels on farm. The consumption is expected to rise strongly, because of the anticipated growth in production amongst other through the large scale import of dairy animals.

There are 19 registered animal feed manufacturers under the animal feed act. The 3 specialized cattle feed producers are Mahaweli, Milco and Pelwatte. The others are producing mainly poultry feed.
Currently there is an export ban on rice bran and coconut poonac.

There is an annual production of 800.000 Mt of animal feed, 700.000 Mt for poultry and 100,000 for cattle. In the poultry sector now 50% is produced by the feed companies, which used to be 80%. Because of rising overhead costs now more poultry farmers are mixing their own feed. This has been supported by the government by providing training and facilities like duty free import of agricultural machinery, including milling equipment.
Antibiotics and growth promoters are permitted. Pharmacies can sell these without subscription.

Calf milk replacer receives special attention and all products are to be forwarded for evaluation by the committee to evaluate the nutritional aspects and substances. The total amount of calf milk replacer used in the country is not known. CMR will also be needed at much larger quantities if options can be found for acceptable ways of dealing with culled animals (see 5.13).

5.5.1 Commercial compound feed production

Issues
Demand for commercial dairy compound feed will rise strongly in the coming years. Most of this demand can be met by expansion of currently operational feed factories in the country. If the targets for production rise are really met, there will be a need for expansion of capacity.

Opportunities
There will be growing demand both for pre-mixes as part of the production of dairy feed. Dutch companies do already provide this at present; more opportunities will emerge in the near future.

The demand for new milling equipment will also rise, but is not expected to rise strongly as a result of the growth of the dairy sector in the country. The existing infrastructure can absorb the initial rise in demand.

Estimation of importance as business opportunity
Trade opportunities for supply of feed ingredients and milling equipment will rise, although it is difficult to estimate what the real growth will be in the coming years.

5.5.2 Fodder production and mechanisation

Issues
Availability of adequate quantities of fodder of good quality all year round is the most important pre-requisite for the success of the planned growth of the dairy sector. Sri Lanka is a fertile country, with sufficient possibilities to grow fodder. Biomass production, (or: "jungle") is abundantly available, be it of low quality, needing replacement by fodder varieties. In the highlands, fodder growth is possible for most of the year. In the semi-dry and dry zones, fodder can only be grown seasonally. Conservation of fodder is therefore a very important issue. Maintaining soil fertility is an essential base for fodder production, laboratory facilities do exist, though its coverage is not clear.

Opportunities
Good quality fodder varieties are necessary, together with the correct equipment for mechanisation of fodder growing and harvesting, and facilities for storage of silage. Equipment of European and North American origin are imported into the country, though the competition with cheaper equipment from India and China is tough. Large scale investors will choose better quality equipment in most cases.
Opportunities do exist in soil testing services or facilities. The existing facilities need to be upgraded and expanded. Most of these facilities are operated by government; there are only few private laboratory service providers.

Estimation of importance as business opportunity
It is hard to estimate how much will really be invested in improving and mechanising fodder growing. Given the fact that investments in fodder will take place, the scale and size of this market should certainly not be underestimated.

5.5.3 Calf milk replacer

Issues
Good calf milk replacer is needed as part of the further intensification of dairying. CMR is needed to replace the use of cow milk (after sufficient colostrum has been taken) as CMR is usually cheaper than the farm gate price for fresh milk.

Opportunities
If calf rearing also for fattening can be professionalized, the market will grow strongly. The existing dairy herd consists of some 500.000 animals. For replacement, 25 to 30 % of the female calves are used, leaving more than 300.000 male and female calves available for fattening. Establishing commercial fattening enterprises from which the slaughtered animals will be exported to the Middle East seem to be an option in the opinion of several interviewees.

Estimation of importance as business opportunity
The real opportunities for this product are difficult to predict at this stage, and they may have to be established by trial and error through small start-ups of fattening enterprises.

5.6 Breeding services

Introduction
Apart from private import of semen (including NLDB's import), all semen in the country is provided by two government bull stations at Kundasale and Polonnaruwa under the management of DAPH. The central AI station is at Kundasale, from which 75 % of the inseminations are carried out. Kundasale was established in 1962. A total of 27 bulls are available (October 2014).

Friesian	08
Jersey	08
Sahiwal	01
Buffalo	02
Jersey Young Bulls	05
Jersey/ Sahiwal	01
Jersey/ Friesian	02

Collection, processing and freezing of semen is being done twice a week. All the field AI centres receive semen and liquid Nitrogen once in three weeks.

Inseminations in 2013 per breed were as follows:

Jersey	104,226
Friesian	37,000
Friesian/Sahiwal	6,000
Jersey/Sahiwal	16,300
Sahiwal	17,000
Murrah Buffalo	6,600
Goats	3,000

Out the above AI inseminations on cattle, 71,800 born calves have been reported. It is not clear how many calves have been born in total out of these insemination, as the reporting back system is covering all the inseminations.

It is expected that in ten years' time the number of inseminations will rise to 500,000. The number of technicians will rise and so will the semen production. No further capacity development is planned yet.

The AI centre at Polonnaruwa covers Artificial Insemination service in Polonnaruwa, Batticaloa, Ampara and Trincomalee Districts. At the moment 8 bulls are kept as semen donors. The breeds maintained at this centre are Sahiwal and Murrah. The training of artificial insemination technicians is also carried out at this centre. Under the fodder and pasture development program an extent of 25 acres of pasture nurseries have established for issue of planting materials at this centre.

AI services are mainly implemented by the veterinary officers from the government. The AI technician selects the bull according to the features of the cow and the national breeding programme. A farmer usually does not have a role in selecting the bull.

A number of private inseminators are also active, though their total number is not known. It is estimated that they carry out some 30% of all inseminations. Average conception rates vary from 40 – 50 %, based on return figures. A large of number of inseminations does not get the required return information though, making an assessment of the effectiveness of the AI system difficult.
Sexed semen is made available and the conception rate hereof is 49 %.
Government costs per insemination is 50 Rs, private inseminators charge 250 Rs. Government officers are not available in the weekend though and due to their specializations, private officers carry out more inseminations than government officers who are also assigned to other tasks.

Sri Lanka imports semen of Jersey, Friesian, Sahiwal and Murrah. Import of semen is tendered after specification of requirements by the Ministry. Sri Lanka would like to import more Indian and Pakistan Sahiwal semen but both the countries have a ban on export of semen and animals to Sri Lanka.

A Pedigree Progeny Recording Scheme (PPRS) was started in 2009 in four wet zone districts, with support from the FAO. This project lasted for 2 ½ years, in which period 1200 animals were included in the scheme. The scheme is ongoing, currently approx. 3,000 cows are included.

There is a campaign to tag all bovine animals. There are however constraints in executing the whole programme, because a lot of animals are feral and cows lose their tags. Tagging is also required for identification in the PPRS programme. There is not yet a national database of cows.

315 herds with 5,940 cows (minimum size 5 cows per herd) are enrolled in an FAO-project to record individual cow milk production. This project will be used to select future breeding bulls. 20% of the pregnancies exist from insemination, 80% is realized by natural service (rough estimates).

Example of NGO Intervention:
Through the Dairy Enhancement in Eastern Province (DEEP) project, made possible by USAID, Land O'Lakes promoted AI and oestrus synchronization practices among the farmers of Eastern Province. Land O'Lakes coordinated closely with DAPH to teach the benefits of these practices and connect AI technicians with dairy farmers. In addition to understanding the advantages of AI, farmers easily appreciated that the low cost of AI semen at 50 cents per insemination compares favourably to $450 for purchasing a crossbreed cow. "In the past, farmers had limited access to extension services, and farmers' demand for AI was very low. Collaborative efforts in 2010 resulted in remarkable results compared to 2009." – Dr. Sivalingam (AI Coordinator for DEEP project) The combined efforts of Land O'Lakes, DAPH, livestock development officers and private AI technicians have changed farmers' attitudes and filled a growing demand for AI among farmers in the Eastern Province of region of Manmunai West. Compared to the 47 cows that farmers artificially inseminated between January and June 2009, during the same period in 2010, they inseminated 290. The former Provincial Director of DAPH Dr. Sivalingam, who was the Land O'Lakes AI Coordinator for the DEEP project, commented: "In the past, farmers had limited access to extension services, and farmers' demand for AI was very low. Collaborative efforts in 2010 resulted in remarkable results in the AI process compared to 2009. It is a good verifiable indicator that farmers have been sensitized to the benefits of using AI. "These upgraded Jersey cows contributed to increased milk yields in Eastern Province, which spurred growth in the nation's ability to produce more of the milk that is consumed. –
See more at: http://www.idd.landolakes.com/Resources/Success-Stories/Breeding-Best-Practices-Boost-Dairy-Farm-Productiv#sthash.MUor9bzb.dpuf

Box 3: *Examples of NGO intervention.*

Issues
Sri Lanka lacks the implementation capacity for a good breeding policy, both in terms of policy development, monitoring of the breeding programmes as well as the possibility to provide permanent good quality breeding services throughout the country.

Opportunities
Opportunities do exist at two levels; supply of good breeding material, mainly in the form of semen, possibly some bulls. Managerial and advisory assistance are needed for the preparation and subsequent implementation of a good breeding policy and a professional well-functioning AI service. Dutch suppliers of AI or semen should adapt to the preference of the Sri Lanka dairy industry for crossbreds of European and Indian/Sri Lankan breeds in the hot climate zones.

Estimation of importance as business opportunity
The demand for advisory support and supply of semen will be growing the coming years. Import of semen is ongoing (mainly American at present), involvement in running breeding and AI programmes requires further lobbying with the government. Expectations of the way production systems and farm sizes will develop in Sri Lanka differ, but in order to achieve the required total production of 900 M litres annually, at least 300.000 dairy cows are needed with an average lactation of 3000 litres. Or 360.000 animals producing 2500 litres. At least up to 400.000 inseminations are required, but the demand will be bigger as the average production is still far below 2500 litres.

5.7 Veterinary and animal health services

Introduction
The veterinary services for the livestock sector are almost entirely provided through the government system of veterinary officers. There are 309 Divisional veterinary offices, from where diseases are diagnosed and treated and vaccination campaigns implemented. Drugs supply is available both from government veterinary offices, as well as from private suppliers.

Dealers of international companies are active in providing drugs and often some form of veterinary advice to farmers. Their most important input is in the poultry sector though. Government obtains its supplies through the normal tendering system. There are strong links between government service and private suppliers though, e.g. through the bi-monthly sponsored meetings with provincial veterinarians and provincial directors. Browns Group, the local representative of Intervet, displays products and gives a brief introduction and product training on such meetings.

Sales to the dairy sector are relatively small. Browns Group e.g. sells 3000 MastiGel injectors (for mastitis treatment) per month to private farmers and NLDB.

Drug registration is done through the Department of Pesticides and Veterinary Supplies Registrar at the DAHP.

Issues
Most important bottlenecks are knowledge on disease prevention and diagnosis by farmers and the implementation of preventive vaccination schemes by the government.

Opportunities
Most important opportunity will be the growing demand for veterinary inputs in the dairy sector. Most international, and Dutch, pharmaceutical companies are represented in Sri Lanka. Effects of dairy sector growth will mainly be growth in turnover through existing channels.
Training activities may have to be availed through G2G[2] projects.

Estimation of importance as business opportunity
Despite the great importance that needs to be given to veterinary services, no major extra business opportunities can be expected in this area beyond what is already established.

5.8 Housing and barn equipment

Housing and equipment needs for establishing dairy farms can be divided into four different levels:

- small scale farms (<10 cows): the necessary housing and small scale equipment/utensils that are needed is limited and usually locally available. There is a general adopted design consisting of corrugated iron or thatch roofed shed with a concrete floor with a gutter behind the cow and a concrete trough and water bowl in front. The design is made for local or Jersey cows and too short for Friesian crosses. Hardly any mechanisation takes place, milking is done by hand.
- small-medium scale farms (10-25 cows): housing/building materials are usually locally available, as are the small utensils needed for farm operations. Milking is increasingly done using small scale mobile milking units whereby either one or two cows can be milked at the time.

[2] G2G: Government to Government projects, aimed at strengthening the role of government.

This milking equipment is available from either European exporters (DeLaval) or export from India or China. Small scale agricultural mechanisation machinery is available on most arable (rice) farms, e.g. for ploughing, transport, grass cutting.

- medium-large scale farms (25-100 cows). Total number of farms of this size in the country is not exactly known, especially because the distinction between total number of animals and productive dairy cows is not always clear. It is estimated that there are between 300 and 500 farms of this size in the country. Statistics are strongly influenced by some of the herds of this size in East and North which are of a more pastoralist nature.
- large scale dairy farms (>100 cows). There are approximately 20 of such farms in the country, most of them owned by the NLDB, which runs specialised dairy farms varying from 100 cows tot 2,500 dairy cows. These farms are highly specialised dairy units, on 20 to 1000 acres, using imported large scale dairy mechanisation equipment, both for milking purposes as well as for field activities. Several of those farms are in the highlands, where due to the hilly and rocky landscape field mechanisation is often difficult and farms rely on grazing of natural pasture with little pasture improvement activities going on.

Exceptions are the two dairy farms of NLDB where the imported 4,500 heifers from Australia will be housed. One concerns a renovated farm, the second one is currently being built by a local engineering company with consultant advice from the Australian exporters.

Issues
Additional machines and barn equipment (including milking) will be needed for the new investments in large scale farms. Buildings can be manufactured by local engineering companies, but the more complex equipment (feeding, cow treatment, automation e.g.) and machinery for field operations can be imported from Western countries if price/quality ratio fits the Sri Lankan needs.

Opportunities
The total number of investments in large scale farms will be relatively low in the coming years and the competition with suppliers of cheap Indian and Chinese products will be tough. Therefore, only a selected number of opportunities may be expected in this area.

Estimation of importance as business opportunity
There are opportunities in this field for Dutch companies, which need acting in consortia to provide a turn- key package to investors.

5.9 Financial services

The Government provides a soft loan scheme for dairy development. These loans are under the Agro-Livestock Development Loan Scheme, operated through the Central Bank of Sri Lanka. Loans can be provided everywhere in Sri Lanka, all commercial activities in the whole dairy value chain qualify for this type of loans. Max loan is Rs.400,000/- for dairy farms and Rs. 300 mln for processing industries. Payback period is 5 years, and the subsidised interest rates are 8% for milk production projects and 12% for processing industries. A total of 14 banks participate in this scheme.

Criteria for eligibility for these loans are:
Should be a permanent resident of the area.
Should have experience and knowledge in dairy farming
Should be able to bring an equity of 25% of the cost of project.

Eligible Loan Categories are:
Purchase of cows, heifers, equipment for the development of dairy projects and construction of cattle sheds.
Processing of liquid milk and production of milk based products.
Agro-based and agro-related processing industries.
Enhancing storage facilities in the processing industry.

Security demands are:
Guarantee of two persons acceptable to the Bank
Assignment over livestock insurance cover
Mortgage over project assets along with mortgage over property (if necessary)
Under this scheme, Peoples Bank has e.g. also funded the new processing plant of Island Dairies, which uses India-bought equipment, with a capacity of 10.000 litres daily[3].

Issues
Financial support is available from a soft loan system of the government for individual investors. The government has secured adequate funds from international banks to finance the required inputs in dairy development.
A weak point is the poor quality of business plans currently drafted for dairy farms.

Opportunities
International banks, including Dutch banks, already provide finances to the Sri Lanka government. Since there are many local banks active, there won't be much demand for new SME loan facilities. There is a demand for providing support to investors, banks and other financial institutes in improving business plans through e.g. training and advisory activities

Estimation of importance as business opportunity
Some options exist for providing training programmes on improving dairy farm business plans, through input of the required technical knowledge through consultancy services or through advisory services of banks.

5.10 Education, training and extension

Introduction
Agricultural training is provided by two government and one private (belonging to the Catholic Church) Diploma Schools (vocational training level) and 4 agricultural universities (BSc and MSc level). The most import agricultural university is the University of Peradeniya. The total number of graduates at both vocational level and the agricultural universities is however far too small for the demand from both government as well as the private sector. The formal education system nonetheless mainly prepares students for future jobs in the government system.

Sri Lanka School of Animal Husbandry, Kundasale
Sri Lanka School of Animal Husbandry (SLSAH), Kundasale has been established to impart advanced knowledge and skills in animal husbandry to Sri Lankan youth. The SLSAH offers a two (02) year diploma course in Animal Husbandry, which is conducted in three mediums; Sinhala, Tamil and English. The Diploma awarded by this Institute is well recognized for employment in both public and the private sector.

The SLSAH, which functions under the Human Resources Development Division of the DAPH, has a capacity of 100 students per batch with residential facilities. Farm units of livestock species have been established to provide-hands on experience in animal husbandry.

[3] http://islanddairies.lk/factory.html
http://www.peoplesbank.lk/products/agrolive

The SLSAH has a team of eight (08) lecturers and some visiting lecturers who have specialized in various disciplines. Courses are provided free of charge and the course structure consists of theory, practical training and six (06) months project work (in-plant type) in private livestock enterprises.

Peradeniya University.
Established in 1968, the Department of Animal Science is responsible for teaching of all aspects of Animal Production and Health Management[4].

Practical farmer trainings, as well as some in-service trainings for government officers takes place both at five government training centres of which Seeppukulama is the most important one, as well as at the 2 training centres of NLDB.

Seeppukulama Training Center
The Animal Husbandry Training Centre (AHTC) is located at Seeppukulama, in Anuradhapura District of the dry zone. The training centre with an extent of 100 hectares has ideal facilities to provide practical training for middle level livestock development officers and livestock farmers. Model farm units of dairy cattle, buffalo, poultry, goat, sheep, pigs, rabbits and pasture/fodder yards have been established to provide practical training. Residential facilities are also available for batches of 75 trainees.

The AHTC, which is functioned under the Human Resources Development Division of the DAPH, offers short –term certificate courses on self-employment promotion and entrepreneurship development for unemployed youths in the country. Course duration vary from two (02) weeks to two (02) months depending on the title. These certificate courses are in high demand by unemployed youths and, dairy management, poultry management and milk processing technologies are the main thematic areas incorporated into these courses.

The two training centres run by the NLDB are the Mid Country Livestock Development Centre and Coconut Triangle Development Centre.

Mid Country Livestock Development Centre (MLDC)
The Mid Country Livestock Development Centre is specialized in training farmer groups

*In all 108 training programmes were conducted at the Mid Country Livestock Development Centre (MLDC) at Digana, Rajawella during 2010 against the annual target of 106. During this period 3597 farmers were trained against the annual target of 3816. When compared to the last year the achievement was low due to poor demand for 3 day residential programmes. Some institutions not allocating training courses having reserved the programmes due to lack of financial allocations for their institutions NLDB, 2011 (*MLRCD, 2012*)*.

Farmers pay a daily fee for participation in the training of Rs 2200; the balance is paid out of NLDB's training budget provided by the MLRCD.

The two training centres of NLDB will be upgraded to training institutes with a capacity of training 250 students daily each. The government will establish a new training institute with a capacity of 500 trainees. These improvements are in response to the required extra training needed to professionalize dairy farmers in the process of attaining self-sufficiency. Physcial preparations for these investments have already started (Oct 2014).

Institute of Continuing Education Gannoruwa
The Institute of Continuing Education in Animal Production and Health (ICEAPH) is the National level Training Institute which provides in-service training and further training facilities for the

[4] http://www.pdn.ac.lk/agri/depts/Dept_of_Animal_Sci.html

department staff. The ICEAPH which is located in Peradeniya, functions under the Human Resources Development Division of the DAPH. The Institute has facilities to provide residential training for batches of 30 personnel, an auditorium, two lecture halls, library and a well-equipped E-learning facility. Its target groups consist all categories of DAPH staff. The Institute also provides training for semi-government and the private sector participants.

The ICEAPH is the only Institute of its kind in Sri Lanka to provide continuing education for technical personnel catering to the livestock industry. The Institute utilizes services of resource persons from the Veterinary Research Institute and other divisions of the DAPH, University system and, from the private sector. Other than residential programmes the ICEAPH is the venue for various types of seminars, workshops organized by the DAPH and other organizations.

Government extension services.
The extension service of the government is dominated by veterinarians from Peradeniya University. There are 19 veterinary Investigation Centres in the country, coordinated by a veterinary officer with livestock development officers or livestock instructors in the working area.

The veterinary officers provide advisory services to individual farmers on request, have a responsibility for monitoring disease prevalence and run various training and demonstration activities for farmers together with their staff of livestock advisors and livestock instructor. Often specialists from national institutes such as Peradeniya University do participate in the implementation of the trainings. These training activities are geared towards all aspect of farm management, e.g. disease control, but also feeding and introduction of new fodder varieties. Such training programmes are regularly conducted with input and support from companies in the private sector such as demonstrations on fodder growing, together with CIC (providing seeds) or on hygienic milking (jointly with processors).

Veterinary Investigation Centres (VIC's) operate under the Animal Health division of the DAPH and are responsible of providing laboratory back up services for divisional veterinary offices in respective districts. These centres are also responsible for disease surveillance activities, laboratory confirmation and disease investigation services. VIC's are equipped with diagnostic and analytical facilities and, are managed by Veterinary Investigation officers.

Extension officers are regularly receiving in-service training on various topics, which are organised by the Institute for Continuing Education.

The government has recognised the need for more trained field staff and included an investment of 700 M Rs to train 1000 extra Diploma level livestock and will invest in the improvement of four and the establishment of 2 new livestock training centres. Two of these will be operated by NLDB, the others by the ML&RCD.

There is hardly any training available for present and new staff working at processing plants. Companies provide in-service training to factory staff, and staff at chilling and collection centres. Milco used to have a training unit, but this has ceased to function several years ago. On the training institutes of the NLDB some practical training can be given, but the facilities and outreach dot not meet the currently strongly growing demand. Peradeniya university has recently been donated a small processing unit which it intends to start using for training purposes. The university however has inadequate training capacity to run a fully-fledged training programme from this unit.

There is a need for more and better farm mechanics. Apart from the Farm Mechanisation Training Centre, which belongs the Ministry of Agriculture, no special training for farm mechanics does exist. Some training is provided by the Farm Mechanisation Research Centre (FMRC). There are however good training and education programmes for car mechanics in the country, which could play a role in training farm mechanisation equipment.

FMRC is vested with the responsibility of testing implements and to develop appropriate technologies to suit local conditions. The prime objective of FMRC is to introduce effective agricultural mechanization technologies compatible with the socio-economic and field condition prevailing in various regions of country[5].

Livestock research is the responsibility of the Veterinary Research Institute in Kandy. The institute started as a diagnostic laboratory in Colombo in 1911 and was institutionalized in 1967. Since its inception, the institute is involved in production of vaccines against contagious animal diseases and carryout disease diagnostic, analytical and advisory services, in addition to the research activities in the livestock and poultry sector. At present, the institute has twenty-three scientists working in seven disciplines with a total staff of 187 in the administration, middle level and supporting staff.

Issues
The knowledge base for the further development of the dairy sector in Sri Lanka needs to be strengthened on a number of aspects. The government of Sri Lanka however realises the need for this and has allocated substantial amounts in the 2015 budget to educate more extension officers and to expand existing practical dairy training facilities. Sri Lanka's educational system pays adequate attention education at vocational level. Curricula however are not yet adapted to the most recent developments and need to be updated in response to the quick changes in dairy productions systems that are expected to take place. Training on processing and farm mechanisation is virtually absent. Peradeniya University has invested in a small dairy processing demo unit from which they intend to set up a training programme.

Opportunities
There is a clear need for strengthening the knowledge base and a willingness from the government to invest in scaling up and improving dairy education. Appropriate training support is available in the Netherlands, and its image is good as a result of the large number of people that have been trained in the Netherlands in the past.

Estimation of importance as business opportunity
Through collaboration with the processors, a training programme can be developed coordinated by Peradeniya University, with technical input from specialists and training institutes in the Netherlands. Similar options can be explored for training on farm mechanisation, together with the providers of mechanisation equipment. Support to strengthen formal education (both at vocational and at university level) is necessary, the right modes of collaboration still need to be explored.

5.11 Environmental issues

Introduction
Because of the mainly low-input-low-output character of the present dairy sector in Sri Lanka, no major environmental issues arising from dairy production do exist in Sri Lanka. General environmental impact concerns (greenhouse gas especially methane emissions, N-leaching, P-run-off) of ruminant production systems are to be taken into consideration of course as a potential result of future growth and intensification of dairy production in the country. Official government policies do not yet take environmental impact aspects related to livestock production into consideration.

[5] http://www.agridept.gov.lk/index.php/en/institutes/1256

Maintenance of soil fertility is an important issue though. Due to the easy availability of heavily subsidized fertilizers, long term maintenance of soil fertility does not always get the attention it deserves. In combination with the high rainfall in the highlands (>3000 mm) leaching and reduction of soil fertility are serious potential risks.

Increased production per cow also reduces the total carbon footprint of dairy production.

Issues
No major issues at stake, apart from including of environmental issues in setup and daily management of dairy farms. Most important issue to be considered is proper and sustainable usage of manure to prevent localised environmental pollution and to maintain good soil fertility levels. The need for good land management to maintain soil fertility and prevent problems such as erosion is obvious. Energy security, including the development of alternative energy sources, is a priority of the Sri Lankan government (see also chapter 6).

Opportunities
There are no major direct investments needed to specifically deal with environmental concerns related to dairy production, apart from manure storage and management investments and if applicable the use of alternative energy.

Estimation of importance as business opportunity.
Included in (turn-key) investments in dairy farms e.g. through investments on proper manure management and use of alternative energy.

5.12 Data management

Introduction
Data management is an important aspect of professional dairy development, at all levels. On dairy farms data are needed to analyse results and to adjust farm management practices whenever necessary. Subsequently data are also needed to improve individual cow management and to monitor results at regional or national level. Further improvement of data management is a prerequisite. This was fully endorsed during the recent training of NLDB senior managers in which data management, through inputs of and discussions with Dutch companies, was also considered an important aspect to guarantee future professional development of the dairy sector.
NDLB is using several farm management programmes and aggregates their results at their head office. Beyond NLDB, hardly any further serious data management systems are applied.

At national level, adequate data management is required as the basis of a well-functioning Identification and Registration system (I&R). I&R is needed for breeding programmes, monitoring the effectiveness of vaccination campaigns and to control outbreaks of diseases. The government of Sri Lanka has an important role to play in this respect, but still has to implement a national I&R system.

Issues
Further development of data recording and management is needed in Sri Lanka as part of the professionalization of the dairy sector.

Opportunities
Professional large scale dairy farms will need appropriate and professional software for farm management. Many companies from dairy nations provide such services. A joint Dutch approach in which data management is offered also for milk recording and breeding purposes which can also be devoted to the cause of national I&R purposes seems to be the best approach.

Estimation of importance as business opportunity
A clear interest of various players in the dairy in Sri Lanka has been expressed in improving the dairy data management base of the country, making this an interesting opportunity also for Dutch companies in this field.

5.13 Culling and slaughtering of cattle

Slaughtering of animals is a sensitive issue in Sri Lanka. Although formally it is allowed, the high value attached to animal welfare in the Buddhist religion leads to lots of controversy on the issue. Some parliamentarians have recently been advocating for a total ban on slaughter, which is supported by the Sihala Rawaya, a coalition of Buddhist organizations. Some monks have gone as far a setting themselves afire in protest against the slaughter of animals. [6]

The government is addressing the issue by proposing new animal welfare legislation (Draft Animal Welfare Act of October 2013, still being discussed in Parliament), in which the slaughtering of animals is allowed when taking the proposed regulations into consideration. Part IV of the proposed bill addresses the slaughter and killing of animals. E.g. pregnant animals may not be slaughtered, animals may not be killed in sight of other animals. Animals awaiting slaughter should not be subjected to unnecessary pain or distress; protected from direct rays of sunlight and from adverse weather; provided with adequate ventilation; immediately slaughtered, if found to be injured or suffering from pain. Due the controversies on killing and slaughtering, it is not clear when the Act will be further discussed in Parliament.

Deputy Minister of Livestock and Rural Community Development, H.R. Mithrapala, however said: "If there is a ban (on slaughtering), and we let the cattle population grow limitlessly, we will not be able to walk on the road and the country would be eventually controlled by cows."[7]

Issues
Killing and slaughtering cows is a sensitive issue in Sri Lanka. Efforts are undertaken to improve options to make it more acceptable (e.g. through the new Animal Welfare Act).

Opportunities
If options such as slaughtering for export markets (Middle East) can become more acceptable, there will be growing opportunities both for fattening calves (see 5.4.3) as well as establishing new slaughtering facilities.

Estimation of importance as business opportunity
Potentially big given the large number of cows and buffaloes in Sri Lanka, but certainly not at short notice.

5.14 Corporate Social Responsibility

The Sri Lanka Chamber of Commerce recently launched a new company called CSR Lanka (Guarantee) Ltd., which has ambitious plans to bring clarity and focus to the Corporate Social Responsibility (CSR) landscape in Sri Lanka. Leading goal of the company is to encourage and direct Sri Lanka's corporate sector to take a more holistic view on CSR. Several of the larger companies do have individual CSR policies, with varying aims and varying ways of implementation. Examples hereof are scholarship programmes, donations of equipment, water projects and building of schools.

[6] http://www.dailymail.co.uk/news/article-2330398/Buddhist-monk-sets-protest-slaughter-cattle-Sri-Lanka.html
[7] http://dbsjeyaraj.com/dbsj/archives/28639

The launching of CSR Lanka was actively supported by the Netherlands Government, e.g. through the input of two CSR specialist from MVO (CSR the Netherlands) during the official launching seminar.

Various companies in the agricultural and livestock actively team up with NGO's in community development work. In Northern Sri Lanka, GIZ (German Development Agency) implements a PPP project on dairy development with support from Cargill and Tetra Pak. In the north also, Nestlé participates in a programme with the UN to reach 1,500 farmers with advice and training. CIC collaborates in a Land of Lakes dairy improvement programme in the East.

Corporate social responsibility is given more and more attention by the major commercial players in the agricultural sector in Sri Lanka. Companies in the dairy sector team up international NGO's to assist rural communities in their further economic development.

The most active Dutch NGO in Sri Lanka is ZOA, who support local communities in resettlement schemes in the East[8]. ZOA has been working in Sri Lanka since 1995 and is experienced well established in emergency and relief aid and the process of rehabilitation afterwards. Sri Lanka is clearly in a process of rehabilitation, in which ZOA plays a role by moving from relief aid into a development approach which included many agricultural activities, including dairy projects. The successfulness of such projects also depend on the collaboration with the private sector. A further involvement of Dutch dairy businesses in Sri Lanka can also be made supportive to achieving the goals of the economic development projects of ZOA.

5.15 International competition

Aid and trade often reinforce each other. The traditional western donors have reduced their aid to Sri Lanka as a result of the economic development in the country. This support has to some extent been taken over by Asian countries, as part of their pledge to build up stronger economic links with Sri Lanka. Total Aid (ODA) received by Sri Lanka has reduced from 579.820 M $ in 2010 to 487.500 M $ in 2012 (Source: World Bank, http://data.worldbank.org/indicator/DT.ODA.ALLD.CD)
Currently, a number of donors are still active in Sri Lanka (both for emergency aid after the tsunami and the civil war, as well for ODA, Official Development Assistance: structural aid). Emergency assistance is still necessary in the resettlement schemes in the north and east, where the remnants of the war are still present, but since less aid is becoming available, the effectiveness of the resettlement schemes is negatively affected.
http://www.irinnews.org/report/95814/sri-lanka-donor-interest-in-north-waning
Existing commercial interest in the dairy sector of Sri Lanka is certainly expected to grow in the coming years. Equipment for dairy processing is available from many countries. In Sri Lanka today a large part of the purchased equipment and the accompanying expertise comes from Sweden, Denmark, Australia and to a minor extent New Zealand.
Investments in establishment of large scale dairy farms might be done by investors from Israel, Australia and New Zealand. These countries can also supply knowledge, training and support for dairy development programs.
India and China are in a good position to provide equipment of a cheaper nature.

[8] http://www.zoa-international.com/content/sri-lanka

6 Sri Lanka as a hub to the South East Asian region

One extra point is worth noting when considering business opportunities with Sri Lanka. Sri Lanka is actively transforming itself into a key regional business through the creation of five strategic hubs knowledge, trade, naval and maritime, aviation and energy.
This strategy provides an inclusive and sustainable framework for growth as Sri Lanka aspires to become the regional hub in South Asia for these sectors[9]

The country benefits from two regional trading arrangements: the South Asia Free Trade Agreement (SAFTA) and the Asia Pacific Trade Agreement (APTA). Sri Lanka has FTAs with India and Pakistan, providing duty free access to 8,200 products from Sri Lanka. An FTA with China is currently under negotiation and is

Aviation hub
Katunayaka International Airport is a key stopping-off point between Dubai and Singapore, and with the growth in tourism, an increasing number of transit passengers, and the arrival of more international airlines, is on track toward becoming a regional air hub. This is likely to open the door for many investment opportunities.

The vision for this sector is to position Sri Lanka as a logistics and services hub and a hub for budget airlines. A second international airport was opened during the year in the Southern city of Hambantota which facilitates access to tourist destinations in the south. The main airport is being modernized and a 2nd runway will be added whilst the domestic airports will be upgraded and with at least one upgraded to accommodate corporate jets.

Maritime hub
Sri Lanka sits at the crossroads of major shipping routes connecting South Asia, the Far East and the Pacific with Europe and the Americas. It is strategically located next to the fast-growing Indian sub-continent, with close proximity to Southeast Asia and the Middle East. It has more than 100 weekly flights to India alone. Meanwhile, Colombo Port has been modernised with up-to-date infrastructure to accommodate triple E-class mega ships and can handle approximately 5.2 million containers.

Sri Lanka is transitioning to a complete logistics handler from being a cargo handler through significant investments in the maritime sector. A second wave of development is already underway to provide related services such as vessel trading, legal and financial services and crew training. The Government has also reduced taxes for this sector to incentivize training of professionals in this industry.

Tourism hub
Sri Lanka attracted 1.1 million tourists and earned USD 1.4 billion from this sector in 2011. Target for 2016 is 2.5 million tourists.

Knowledge hub.
The country's high level of literacy rate, enrollment ratios and gender equality forms a solid base for aspirations in this sector. The government is implementing policies to increase access to higher education, while improving the quality of education. Private sector investment is expected to play a large role in the development of this sector and there are number of professional

[9] http://web.boc.lk/catalog/view/theme/default/images/annual_report_2013/slto.html

organizations and foreign universities that have set up branches in the country at present. The aspiration is to make Sri Lanka an education destination for foreign students.

Energy hub
There is a steady pipeline of investments to assure energy security and position Sri Lanka as an emerging energy hub. These include the development of renewable energy sources, oil exploration and production on three identified basins, three new power plants and development of oil related ancillary services and infrastructure projects.

Commercial hub
The activities from the five hubs are expected to spearhead the transformation of Sri Lanka as a commercial hub for the region.

With this policy, Sri Lanka actively seeks investors willing to establish themselves in Sri Lanka, with the aim of producing for and trading with the South East Asian market. Also for Dutch companies, this could be in interesting additional asset of establishing business contacts in Sri Lanka.

Foreign Direct Investment (FDI) currently accounts for 1.3 per cent of GDP. Growth of FDI is stimulated by the Board of Investment of Sri Lanka[10], the central facilitation point for investors, providing assistance and advice throughout the investment process.

Sri Lanka's business environment is much improved with the end of the 30 year conflict, upon which new laws, rules and regulations that favor investment throughout the country were implemented. Electricity supply is virtually uninterrupted and infrastructure is improved rapidly. New roads are established and the existing road and railway network are being upgraded.

Sri Lanka has signed Bilateral Investment Treaties with 28 countries, including the Netherlands, which smoothen the investments of foreign parties.

Figure 9: *Dairy products*

[10] http://www.investsrilanka.com

7 Conclusions, follow up actions

7.1 Summary of observations, general conclusions

The sudden changes in the dairy sector of Sri Lanka offer many opportunities for suppliers of the necessary inputs required to produce more milk in the country. Sri Lanka still lacks most essential inputs needed to make this big leap to full self- sufficiency.

The best possibilities for Dutch investments in Sri Lanka at short notice are dairy processing equipment and factories. The processors have taken the lead in new investments in the dairy sector. Connected to that is consultancy expertise required to build factories, to improve efficiency within the dairy chain and dairy product development.

Secondly, there are numerous opportunities for supply of various kind of inputs to dairy farmers, small and large scale: fodder supply and conservation, AI services, semen, premixes for feed, milling equipment, barn equipment and automation and field mechanization equipment: the "hardware".
Thirdly, the knowledge base for more intensive production will be needed to be strengthened: collaboration in training and education to improve curricula at formal training institutes, skills of dairy farmers, staff of processing plants and mechanics. Advisory support to breeding policies and their implementation, data management from farm to national level (I&R) and to manage and monitor the outbreak of diseases at the national level.

Sri Lanka is in a period of transition to a middle income country. The government is taking the rebuilding of the country very seriously, after the tsunami and again following the peace settlement in 2009. Large government investments in improving infrastructure are taking place in the North and the East which will put these areas in a better position again to invest in dairy production and to contribute again as much to the national milk production as they used to do in the past.

Dutch dairy businesses can benefit from these opportunities. The most convincing approach would be to approach Sri Lanka, both government and private sector, in a concerted effort offering solutions for all elements of the new dairy direction the country has taken since last year.

Figure 10: *Zero grazing unit, Kandy.*

7.2 Follow up actions

Follow up actions to this study need to take place both in the Netherlands as well as in Sri Lanka.

In Sri Lanka, it needs to be made clear where inputs from the Netherlands can be beneficial to achieving the objectives of the rise in milk production. Lobbying with government, more intensive contacts with commercial players in the dairy sector, discussions on education and training programmes are all activities that need to be intensified in the coming years to convince the major players in the dairy sector of Sri Lanka what contributions can be made from the Netherlands.

Continuous efforts should be ongoing from the side of the Embassy and agricultural counsellor to establish even stronger contacts and network at policy level, especially with MED (the financers), but also with MLRCD (the implementers). The MED needs to be sensitised on the essential preconditions that have to be addressed in order to succeed on the new dairy trail. Discussions with the MLRCD need to be ongoing to convince them of the important role the Dutch dairy business can play in road towards self-sufficiency in Sri Lanka. A seminar in Sri Lanka to highlight the potential contribution from Dutch businesses and knowledge institutes would a good investment in this lobby process.

In the Netherlands the opportunities that do exist need to be disseminated to the relevant parties in the Dutch dairy business(also incorporating the Sri Lankan Embassy in the Netherlands in the process). Following these steps of creating more awareness on the changes taking place in the dairy sector in Sri Lanka, further exploration of the options needs to be undertaken through e.g. a trade mission preferably to take place in the first half of 2015. The later it takes place, the more opportunities may already have been taken by competitors.

From the Dutch government side, available means at RVO can be utilized to initiate projects to strengthen the required performance of the indispensable government services essential to create the right enabling environment for the development of the dairy value chain, e.g. through K2K or G2G projects. Examples are animal health services (monitoring disease outbreaks, efficacy of vaccination campaigns); breeding services (now still a government responsibility, but focus of support to be on privatisation process and role of government herein); data control for improving breeding services; food safety; and I&R. This will obviously create goodwill and raise the rate of success of all improvements in the dairy sector, including those ones where Dutch inputs are involved.
A quick scan as this one carried out into the recent developments of the dairy sector in Sri Lanka paints a good basic picture of the current dynamism in the sector and the opportunities that emerge. Various questions however remain unanswered such as the response of small scale mixed farmers to rising farm-gate prices; what improvements are needed in the knowledge base for dairy production; what do future labour requirements in the sector look like and it would be useful to carry out a labour needs assessment. These questions could be addressed in further follow-up activities in Sri Lanka.

Last but not least it needs to be mentioned that there still is a very positive attitude towards the Netherlands, because of development aid provided to the dairy sector in the past, but more specially because of the fact that a large number of present key players in the dairy industry in Sri Lanka have in the past in one or other received training from or in the Netherlands. They are the best ambassadors the Netherlands can have in the country.

Annex 1: Literature

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Annex 2: Itinerary, interviews held

	Time	Organisation	Purpose meeting	Nishan Dissanayake	Adriaan Vernooij	Jelle Zijlstra	Wim Houwers
Monday	9:00	Netherlands Embassy	Kick-off meeting	x	x	x	x
27-okt	11:30	NLDB	Evaluation training, future plans NLDB	x	x	x	x
	16:00	Tunisia consul, Frostaire Company	Interview	x	x		
Tuesday	9:00	Wellard/Foresight	Interview, follow up of training		x		
28-okt	9:30	Milco	Interview	x		x	x
	15:00	Ministry of L & RCD	Interview	x	x	x	x
Wednesday	9:30	FAO	Interview	x	x	x	
29-okt	16:00	ZOA	Interview		x		
Thursday	9:30	Peoples Bank	Interview	x	x	x	
30-okt		CIC	interview		x	x	
Friday	8:00	DG DAPH, Kandy	Interview	x	x		x
31-okt	9:00	Team of 5 officers DAPH	Interview	x	x		x
	11:00	University of Peradeniya	Discussion		x		
	14:00	Institute for continuing education, DAPH	Interview		x		
	15:00	Breeding unit, DAPH	Interview		x		
Saturday							
1-nov	10:00	Dairy processing plant CIC, Dambulla	Site visit, interview	x		x	x
	13:00	Nestlé, collection centre Panala	Site visit, interview	x		x	x
Sunday							
2-nov	9:00	Coconut triangle milk producers coop soc Kuliyapityia	Site visit, interview			x	x
	13:00	Andigama farm, NLDB farm in Coconut triangle	Site visit, interview			x	x
Monday	9:00	Retired Prof Dr. Oswin Perera		x	x	x	x
3-nov	11:00	SLAAP	Discussion on role SLAAP	x	x	x	x
	13:00	MLDC	Discuss future of training		x		

			centre				
	14:00	Breeding unit DAPH	Interview			x	x
Tuesday							
4-nov	8:30	VRI, Veterinary Research Institute	Site visit, interview			x	
	11:30	University of Peradeniya	Board meeting UoP	x	x	x	x
	11:00	Minister of Livestock, Colombo	Meeting	x	x		
	15:00	Gold Coin	Interview		x		
	19:00	Fonterra, the Friesian	dinner		x	x	
Wednesday	13:00	ZOA	Discussion on project approach		x		
5-nov	14:00	Browns Group	Interview			x	x
	19:00	Dinner, residence Ambassador	Dinner with industry representatives.	x	x	x	x
							x
Thursday	9:00	Discussions Nishan	Summarizing, winding up discussion	x	x	x	x
6-nov	14:00	de Mel	Interview				
	17:00	Munaweera	Dinner with NLDB staff	x	x	x	x
Friday							
7-nov	8:30	University of Colombo	Discussion on collaboration		x		
	15:00	Embassy.	Debriefing	x	x	x	x
Monday							
9-dec	10:00	Ruwansiri Dairies (Pvt) Ltd	Site visit, interview				x
10-dec	10:00	Pelwatte dairy plant	Site visit, interview				x
Wednesday							
12-nov	10:00	Eastern Province officials	Interviews.				x

Annex 3: Milk production and main processors

The statistics about milk processing mentioned in this chapter are collected from different sources. Some of these figures are estimates as statistics are sometimes contradicting.

Table
Milk processors and their annual volumes of processed milk.

Processor	Daily volume[11]	Annual volume (litres)
Milco	210,000	76,650,000
Nestlé	160,000	58,400,000
Pelawatte Companies	130,000	47,450,000
Cargill Kothmale	40,000	14,600,000
Ambewele	30,000	10,950,000
CIC	23,000	8,395,000
Stassen Group Lanka Milk Foods	18,610	6,792,650
Rich Life	11,030	4,025,950
Fonterra	30,000	10,950,000
Ruwansiri	10,000	3,650,000
Other processors	30,000	10,950,000
Total delivered		252,813,600
Milk not deliverd to formal market		83,382,956
Total		**336,196,556**

Source for daily volumes: http://www.ft.lk/2013/08/28/milk-food-revolution-against-multinationals/ and data obtained from processors during the field visits.

Furthermore, data were obtained from individual suppliers either through discussions or by the statistics they provide e.g. through their websites. Interestingly enough, when all data of the individually suppliers data are added up, the annual production is approx. 20 % higher as per the official statistics of the DAPH.

[11] Daily volume according to information from processors.

1. Milco.

Milco was established in 1956 as "The National Milk Board" (NMB) under the then Ministry of Agriculture. It commenced its operations with a single Factory in Colombo commissioned under the Colombo Plan.

The purpose of establishing the NMB was for milk collection, processing and marketing. To fulfil this mission, NMB established an island wide milk collection network, four milk processing factories and a network of agents throughout the country to sell the products.

In 1986, the "National Milk Board" was converted into "Milk Industries of Lanka Company Limited" as a government owned company. In terms of the joint venture agreement signed in 1997 between government of Sri Lanka and National Dairy Development Board of India all assets and liabilities of "Milk industries of Lanka Company Limited" were transferred to "Kiriya Milk Industries of Lanka Company Limited" with effect from 04th of February 1998. The said joint venture was not successful and NDDB – India withdrew from the agreement. Treasury became sole shareholder of the Company and its name and functions were changed in the name and style of "MILCO (PRIVATE) LIMITED" which now stands as a 100 % government owned organization with effect from 23rd of July 2001 (MLRCD, 2014).

MILCO is the premier dairy producer in Sri Lanka with over 55% of the market share. It is projected to reach 200 million litres in the next 10 years. The factory in Colombo is to be shifted to Badalgama. This facility currently produced about 55.000 to 60.000 litres of fresh milk per day running at optimum capacity. Euro 60 million will be invested in the Badalgama Factory and € 33 million to refurbish Ambewela, Digana and Polonaruwa.

Digana Milk Factory

The Digana Milk Factory (DMF) was established in 1987 and as at present, manufactures a number of Highland product range such as yoghurt, cheese, ice cream, curd, sterilized milk, pasteurized milk etc. Initially the staff consisted of 55 workers who processed 4000 – 5000 litres per day. By now the staff is increased to 230 and they process around 11,000 litres per day.

Pollonaruwa Milk Factory

This is a Milco processing Unit focussing on condensed milk production in Polonaruwa and has a capacity to process 70,000 litres of milk per eight hour shift at present. It was established in 1968 under the auspices of the Ministry of Food and Agriculture and handed over to the National Milk Board. The New Zealand government donated a sum of sterling pound 100,000 for this project. Sweetened condensed Milk (SCM) under the "Parakum" brand name was manufactured and marketed by the factory. SCM was filled in 525 g and 397g tins and the production capacity was 40,000 litre of milk per day including both day and night shifts.

Raw milk was obtained from a network of collecting centres in Anuradhapura, Polonnaruwa, Batticaloa and Trincomalee area. Another project called Thamankaduwa Dairy Project was launched concurrently by the government of Sri Lanka by which Pollonnaruwa, Kotaliya, Thrikonamadu and Kandakadu farms were setup under the Department of Animal Production and Health. These farms provided more than an adequate amount of raw milk to the factory.

In 1979/80 this factory was handed over to International Dairy Products Limited (IDPL a company floated by Nestle Lanka Ltd.)for 30 years. In June 2007 after about 27 years IDPL stopped the production and the factory was handed back to the government. In May 2008 Milco (Pvt) Ltd took over and production of SCM under Milco company with the "Highland" brand recommenced. The company started producing SCM in 525g tins and 5kg plastic cans.

Currently the factory condenses 20,000 litre of milk to 6,000 litres and dispatches the condensed milk to Ambewela thereby saving transport cost that would be incurred if several bowser loads of milk were to be sent to Ambewela from Polonnaruwa.

Meanwhile curd production was started in the factory in mid-2009 with filling into 1 litre clay pots and 500 ml plastic containers. The present output is around 2500 litres of curd per day.

Yoghurt production in the factory will also be started after the provision of two pro-pack cup filling machine from CMF and DMF respectively. The capacity of each machine being 1,500 cups per hour and initially it is planned to produce about 20,000 cups per day.

Planning of the Ice Cream production in the factory is being carried out. Initially it is expected to produce 5,000 litre of ice cream per day and to expand production up to 20,000 litres per day at

the later stages. Ice cream and yoghurt will be distributed to the East Coast, Central and North of the Island.

The Ambewela Processing unit of Milco has total capacity 750.000 litres. Products are cheese (10%), sold to tourist hotels. Yoghurt, 7%, UTH milk, 20 %, cheese, 10%, butter. Now at 70% production of capacity of 750.000 litres per month.
In Ambewela milk is sourced from collection centres from Kurunegela area. At collection centres sometimes 2 out of 6 deliveries is rejected. There is no rejected milk at the factory . Poorer quality milk is turned into milk powder. Antibiotic milk is detected very rare, and if so used for flavoured milk.

Milco has organised a social security fund system with a number of benefits for farmers and their family members. This fund supports i.e. benefits like pension of the farmer and financial contributions in case of birth of children, education of children and death grants.

2. Nestlé.

Nestlé established its presence in Sri Lanka more than a century ago, commencing as a trading company in 1906 with condensed milk and infant-food products and became a public-quoted company in 1983 and commenced commercial production in 1984.
http://www.nestle.lk/en/aboutus/nestle-in-sri-lanka
Nestlé Lanka's currently has three UHT milk factories. Nestlé is Sri Lanka's single largest private sector collector with 62 million kilograms of milk procured from 18,000 local farmers. Since 2007 all milk is processed is in Kurunegala factory. Nestlé produces under different Brands milk powder (Nespray), milk shake (Milkmaid) , coconut milk powder (Maggi) , noodles (Maggi) and beverages (Nestomalt)

Nestlé pioneered the collection of fresh milk on a large scale in the North-Eastern districts at the end of the civil conflict to help develop these areas in line with the Nagenahira Navodaya and Uthuru Wasanthaya programs.

The 18,000 farmers of Nestlé deliver on average 8- 10 kg of milk per day. They bring their milk to 1,200 Milk Collection Points from which is it taken to chilling centres and subsequently transported by 32 milk bowsers to the factories. In total Nestlé collects close to 200.000 kg/day, of which 100.000 kg from the Coconut Triangle. From Eastern Provence Nestlé collects 20.000 kg/day. Rejected milk: in the dry zone 50 to 100 kg /day, in the Coconut Triangle this is almost zero.
In CT production is about 6 kg/cow /day and milk is collected twice daily. In the dry zone this is 3 kg/cow/day and milk is collected once a day. In Jaffna total 8000 kg milk is collected morning and evening, but local consumption is high.
Nestlé employs its own veterinarians who collaborate with DAPH technical advisors. They provide technical advice, loans, planting material, barbed wire and AI subsidy and stimulate good calf rearing practices.

3. Pelwatte.

The owner is Mr. Wickremenagala, former chairman of NLDB. Pelwatte is in the sugar cane area and also has a sugar factory, managed by Mr. Hillary Perera, former GM NLDB. Sugar cane tops and molasses are used for cattle feed. Executive Director is Mr. Chandrasena. Quality manager is Mr. Laksiri Dias Amuratunha .
The company wants to set up a breeding farm with crossbreds to issue animals to farmers. A student will set up this programme. Another programme to be developed is 'Clean Milk Production'. There are 20 collection and chilling centres. Time to chilling centres is maximum 3 hours. Pelwatte collects morning and evening milk. Farmers develop integrated farming for livestock and crops. About 0.5 % of milk is rejected at the chilling centre. Most farmers are part-time dairy farmer and have an integrated farm system. They have a maximum 4 cows.

Pelwatte only recently went into processing with a new dairy processing unit that was built in 2010 with a loan from Danida. Process capacity 10.000 litres daily. The factory in Butalla produces bottled fresh milk, ice cream, yoghurt and milk powder.

4. Cargill- Kotmale.

Cargill operates three dairy plants, currently processing 75,000 litres daily which the company has recently taken over from Kotmale dairies, to increase their market share. Kotmale Holdings PLC is now a public listed subsidiary of Cargills Quality Foods which was stablished in 1967 as Lambretta (Ceylon) Ltd. The supply comes from 7 to 8,000 farmers, whom they have organised in societies for milk collection. Total number of farmers in their programme is 12.000. Not clear why others do not deliver (or probably temporarily to competitors?). Through their collection centres Cargills provides feed, drugs and AI services.

Kotmale Holdings PLC is presently the second largest private-sector milk collector in the country with the average daily collection standing at approximately 45,000 litres. Their network comprises over 8,000 farmers from the Central region of Sri Lanka who directly supply to the Company through 330 collection centres connected to 15 chilling centres spread across the Central Province.

The majority of the Kotmale farmer base is organised into farmer societies and Kotmale supports these farmers through a consistent flow of knowledge and technical information. The Animal Health Check programme, a project initiated by Kotmale ensures the health and hygiene of the dairy cattle within their network through the active participation of government veterinarians. The company also provides artificial insemination facilities free of charge through technicians in its employment.

Kotmale provides cattle sheds to smallholders to mitigate the spread of infections. They equally support farmers to cultivate grass for their cattle to ensure good animal. Steps have also been taken to expose their farmer base to training programmes organised by the Department of Livestock.

The Company also operates a farmer welfare scheme to support a variety of farmer-family events and emergencies including in the event of a death in the family, higher education needs of children etc.

To further strengthen the dairy supply chain the Group has finalised an agreement with GIZ and Tetra Pak to set up a Dairy Hub in Chavakachcheri. Meanwhile an agreement has also been linked to purchase milk from the NLDB.

5. Fonterra.

Fonterra is main importer of milk powder from its own sources in New Zealand. However, since the policy drive towards self-sufficiency, the company has started building a stronger local supply base which it intends to increase six-fold in the coming 10 years.

The Biyagama Liquid Plant processes up to 30,000 litres of local milk every day, turning it into fresh dairy products for the Anchor Newdale brand including UHT milk packets, set yoghurt, stirred yoghurt, curd, and stirred fruit yoghurt. Milk is collected from approx. 4000 farmers.

Fonterra is establishing itself as a responsible and sustainable company e.g. through reducing annual energy consumption by 456,060kwh through a series of projects to reduce reliance on electricity. These included installing variable speed drives for powder utility equipment; fitting sky lights; and installing LED lights, which consume less energy than fluorescent lamps.

Fonterra employs 120 people locally and has gone into partnership with the Dutch company the Friesian to assist them in building up their growth in milk supply.

6. CIC.

CIC Dairy is part of a company in Sri Lanka that manages over 10,000 acres of its own farm land, works directly with over 20,000 rural farmers and produces a variety of agriculture and livestock products like paddy seeds, rice, fruits, vegetables, eggs and yoghurt and curd in the dairy sector. Yoghurt and curd are produces under its own brand name for the local and export market,

CIC is increasingly becoming active in the dairy sector. It started in 2009 with a 5.000 litre daily capacity processing unit in Eastern Province which was subsidized by a regional Land O'Lakes implemented USAID funded dairy development programme.

Based on that experience, they invested in a 25.000 litre daily capacity unit in Dambulla, Central Province. It manufactures yoghurt, including bottled drinking yoghurt and curd. The milk is

supplied by 2,500 to 3,000 farmers. The supply is depending on the season, with lower supplies in the east during the paddy season. Cows are then moving to jungle areas for grazing and milk production will drop about 40%. When oversupplied, they sell part of the milk to Nestlé.

CIC has its own extension staff advising farmers, trying to change them from subsistence farming to commercial farming. CIC field workers collaborate with AI technicians and extension services of the government.
CIC operates two farms in Eastern Province, 2 x 500 acres, which they intend to use as dairy demonstration farms. The farms are home of 700 cows (most Jersey x Sahiwal), managed by a staff of 30 persons. The target production per cow of these farms is 10 litre per cow per day. Land now is used for seed production and production of fodder sorghum and maize for silage. Future investments of CIC in dairy are planned to go to a better collection network, chilling centres and processing plants. For chilling centres CIC uses refurbished UK Cool tanks.

7. Lanka Milk Foods (Stassen Group).

Stassen owns Lanka Milk Foods. The milk powder 'Lakspray' is a household name island-wide, and holds a market share in excess of 25%. The group has 85,000 outlets across the entire Island. The company also operates a tetra packing plant which produces liquid milk marketed under the brand name 'Daily', offering a range of flavoured milk. Another processing unit belonging to Stassen Group is in Welisera, where 1 ltr UHT Lucky Lanka packets are produced. In addition to its modern manufacturing and packaging facilities the company Pattipola Livestock Company Limited also owns two of Sri Lanka's largest farms, Ambewela and New Zealand Farm (former NLDB farms).

Not to be confused with the Ambewela based plant of Milco, a dairy plant under the name of Ambewela started in 1974 with 5,600 litres of fresh milk collected at Kotagala Chilling Centre, producing only 100 to 150 Lbs of Milk Powder per day. Today -2007- Ambewela spray Dried Milk Powder Factory produces 10-13 Metric Tons from 110,000 Litres of fresh Milk.
Ambewela is in the Nuwaraeliya district, 6,000 ft above sea level, crossing the border of the Uva province and the Central province. In 1978, National Milk Board introduced their product under a new logo and a brand name Highland – Refreshingly Sri Lankan-. In 1989 production of butter started. Today's butter production stands 33,000 kilos annually.
In year 2003 the packing plant was upgraded and now also produces 30,000 packs of spray dried milk powder per day. Today the total milk collection has reached 10 million litres per annum.

8. Rich Life.

Richlife Dairies Limited, a Board of Investment approved venture, was incorporated in the year 1995. It was the first company in Sri Lanka to manufacture Ultra High Temperature (UHT) treated, shelf stable "Tetra Pak" packaged food products. Richlife Dairy liquid range varies from Ultra-heat treated (UHT) non flavoured milk, UHT flavoured milk, Pasteurised non- flavoured milk and pasteurised flavoured milk which comes in different packaging formats such as Tetra Pak, bottles and sachets.
The cultured product range comprises of set yoghurt, natural fruit yoghurt, drinking yoghurt, curd and value added curd. Richlife Dairies also produces fresh dairy cream and ghee.

9. Ruwansiri.

The Ruwansiri Milk Collecting Centre (RMCC) was established in 1973 at Welimada and the milk to Milco. At the initial stage, milk collection was around 50Ltrs per day.
RMCC expanded their milk collection in the rural areas and offered various other services to farmers.
In addition, RMCC has provided other services to dairy farmers, such as supply of feeds, veterinary drugs, other inputs and credit facilities for productive and social purposes. In 1983, RMCC achieved the remarkable feat of collecting 1,000Ltrs of milk per day. In the year 2010, total milk collection was increased to 10,000 litres per day. At present, RMCC is a large-scale dairy organization with around 6000 registered farmers and suppliers. Out of these 6000 registered suppliers, 3,000 dairy farmers are supplying milk on a daily basis.

Annex 4: Opportunities for investment in primary production

For Dutch investors cooperating with skilled farmers who can organize and manage medium to large scale farms, the need of the government to establish large scale farms might be a serious option to consider. Two Sri Lanka plans might offer profitable opportunities:

1. Department of Animal Health and Production has the plan is to establish 10 farms with 50 cows for every vet range. If this would be executed for all 364 vet ranges, this would lead 3.640 farms with 50 cows.
2. Establishing new large scale farms
   This offers opportunities for those who are willing to invest in large dairy farms. In case of foreigners they cannot buy land, but they can rent land on long term lease contracts. In many regions the government is willing to provide large plots of land for entrepreneurs wanting to start a dairy farm. In Eastern Province e.g. the government has plots of 8.000 acres available and offers detailed proposals for investment plans for 1.000 dairy cow farms[12]. The investment able underneath presents an overview of the investments to start a farm with 1.000 dairy cows, as presented in a brochure supplied by the Ministry of Agriculture of the Eastern Province. The total investment for a 1,000 cow farm outlined in the table is € 600,0000,-. The second table shows the annual operating costs and revenues.

Table:
Investments in a 1,000 cow farm in Eastern Province.

Asset	**Value in LKR**	**Value in €**
1. 1,000 Cross bred cows (including transport and insurance)	70,000,000	424,000
2. Shed for Adult Animals (40 sq. ft/ animal)	20,000,000	121,000
3. Equipment / machinery	1,000,000	6,000
4. Milking equipment (20 cows / machine)	5,000,000	30,000
5. Establishment of fodder Unit 10 acres	450,000	3,000
6. Wells (1 No)	100,000	1,000
7. Land Lease (150 ha)	1,125,000	7,000
8. Irrigation System & Maintenance including electricity	800,000	5,000
9. Building	400,000	2,000
Total investment	**98,875,000**	**599,000**

[12] http://investineast.lk/wp-content/uploads/2014/01/Dairy-Investment-Proposal.pdf

Table:
Average annual operating cost and revenue for a 1,000 cow farm in Eastern Province.

	Value in LKR	Value in €
Annual Costs Estimate		
1. Feeding Costs		
During lactation period (295 Days)		
Concentrate Feed for milking (1kg/3 lit/day)	47,200,000	286.000
Concentrate feed for maintenance and pregnancy	11,800,000	72.000
Dry fodder (5 kg/cow)	4,425,000	27.000
During Dry Period (70 Days)		
Concentrate Feed for maintenance and pregnancy (1.5kg/ cow)	4,200,000	25.000
Dry fodder (5 kg/ cow)	1,050,000	6.000
2. Feeding and other management of calf	6,600,000	40.000
3. Labour costs (1 labour/ 20cows/ day)	9,125,000	55.000
4. Veterinary costs (Cow/ Year)	3,000,000	18.000
5. Cost of death and losses	5,000,000	30.000
6. Breeding and miscellaneous	4,000,000	24.000
Total Costs	97,625,000	592.000
Annual Revenue Estimate		
Sale of milk (Average 14 litre/cow/day for lactation length 208 days, milk price LKR 50/litre)	145,600,000	882.000
Sale of male calves	2,500,000	15.000
Sale of manure	2,000,000	12.000
Total Revenue	150,100,000	910.000
Total Revenues minus Total Costs	**52,475,000**	**318.000**

Based on these calculations made by the Ministry of Agriculture that are shown in the above tables, the payback period is about two years. We did not have enough information to check this calculation during the mission, but in our opinion the potential investor should also make his own calculations and check more in detail what kind of results are feasible given the quality of the land, climatic conditions and level of management on the future farm. But in the Eastern and Northern Province the opportunities for establishing large farms are considered to be attractive. When properly managed, these large farms can contribute strongly to an increase in the national milk production.

This model calculation for the dry zone was based on a milk production of 14 litres per cow per day during a 208 days lactation period. In that case every 1.000 extra cows will produce about 3 million kgs of milk.

In case of establishing farms in the upcountry or in the wet zone there could be possibilities to use cow breeds with higher production levels. Combined with improved herd management these herds may reach a production level of e.g. 18 litre per cow per day during 280 days lactation period. This is 5.000 l per cow per year. This is also what may be expected from the Jersey x Friesian crosses imported from Australia by Wellard when kept under good management. In case of the 40.000 imported animals this could boost production of Sri Lanka with 200 million extra litres of milk.

Annex 5: Projections of milk production growth in Sri Lanka.

Some background figures.
Though statistics are not always consistently providing the same background figures, the following projections take the statistics of the Department of Animal Production and Health as a base.

Item		2003	2006	2008	2009	2010	2011	2012
Population+	Cattle	1,148,700	1,184,710	1,195,610	1,136,860	1,169,670	1,191,850	1,235,535
	Buffalo	280,480	314,076	318,530	371,790	422,650	405,120	414,630
Annual Milk Production	Cow Milk	156,546,000	164,934,000	172,442,406	184,064,880	191,919,600	229,325,411	269,974,310
(L)	Buffalo Milk	30,258,000	31,648,680	35,650,685	49,251,360	55,634,400	57,366,195	66,222,246
	Total Milk Production	186,804,000	196,582,680	208,093,090	233,316,240	247,554,000	286,691,606	336,196,556

Source: http://www.daph.gov.lk/web/index.php?option=com_content&view=article&id=119&Itemid=108&lang=en

Discussions at Peradeniya University and with the Department of Animal Production and Health led to the following differentiation of figures. It is assumed that **by 2014** Sri Lanka has 1.5 M head of cattle, of which 700.000 are dairy cows. This dairy cow herd consist of:

- 70 % crossbreds → of which 50 % is crossed with European breeds and 50 % with Indian breeds
- 5 % purebred (European) dairy breeds
- 25 % local breeds, with various Zebu type cattel grouped together as the Sinhala breed.

Physical potential for milk production in Sri Lanka.
Facts:
Total Area of Sri Lanka 65.610 km^2.

30 % hereoff is suitable for agriculture = 19683 km^2

Of these 19683 km^2, 70 % (13.778 $km^{2)}$ is used for crops , remaining 30 % for mixed farming and pure livestock keeping = 5905 km^2

Assumptions:
Out of the 5905 km^2, some 50 % can be used for fodder production = 3542 km^2 = 354.200 ha.

Annual DM production per ha for actual and potential crops such as Panicum maximum grasses and maize silage can averaged at 12 and 15 tons/ha.
Assume an overall average of 12 tons DM/fodder crop/ha/year.

354.200 ha x 12 ton/ha DM = 4.250.400 tons annually : 365 = 11.645 tons DM (from green fodder crops) daily

A cow weighing 500 kg (most dairy cows, certainly with Jersey blood will weigh less), with a production of 15 litres daily, will need a daily intake of approx. 14 kg of DM

Assume 10 kg DM daily from fodder, the rest from concentrates and agro by-products such as rice straw.

11.645.000 kg daily DM production: 10 kg/cow = 1.164.500 dairy cows that can be fed.

In theory, Sri Lanka has the potential to feed approx. just over 1.1 M dairy cows. However, when taking fodder needs for young stock and bulls into consideration, which will consume about

¼ of the total fodder production, there will be enough fodder left for approx. 800.000 dairy cows.

If these 800.000 dairy cows all produce 15 kg daily, with a lactation length of 280 days, total annual production will be 4200 litre per cow x 800.000 = **3.360.000.000** litres annually.

This amount is thrice the current annual target and approx. eight times current production.

Current production levels.

Current national annual production stands at approx. 336 M litres annually (DAPH officials, newspaper articles e.g. http://www.ft.lk/2014/12/24/maithripalas-manifesto-to-address-local-dairy-farmers-needs . From the figures we collected from the processors, the following picture emerges:

Processor	Daily volume[13]	Annual volume (litres)
Milco	210,000	76,650,000
Nestlé	160,000	58,400,000
Pelawatte Companies	130,000	47,450,000
Cargill Kothmale	40,000	14,600,000
Ambewele	30,000	10,950,000
CIC	23,000	8,395,000
Stassen Group Lanka Milk Foods	18,610	6,792,650
Rich Life	11,030	4,025,950
Fonterra	30,000	10,950,000
Ruwansiri	10,000	3,650,000
Other processors	30,000	10,950,000
Total delivered		252,813,600
Milk not deliverd to formal market		83,382,956
Total (statistics DAPH)		**336,196,556**

According to the statistics of DAPH, currently 336.196.556 litres of milk are produced annually. Of this amount, 252.813.600 are processed, which means that the informal market consists of 83.382.956 litres, which is 25 %.
Earlier publications of the government estimate the informal market at 40 %. Hence the conclusion the rise in production over the last five years has only partially been a rise in production and partially a shift from the informal to the formal market.

[13] Daily volume according to information from processors.

Annex 6: Potential contribution of imported heifers and further sources for 1 Billion litres by 2020

Figures and estimations used in this annex are all indicative, meant to stimulate discussions about the future direction of dairy development in Sri Lanka.

- The following table contains an overview of the potential production that can be reached by the to be imported 40.000 dairy heifers from Australia. Based on the following assumptions:
    - 20.000 heifers to be imported in 2015; 20.000 in 2016.
    - production of 4000 litres per lactation in scenario 1; 3000 litres per lactation in scenario 2
    - first calving at 24 months
    - calving interval 12 months
    - mainly using sexed semen, leading to 75 % female calves.
    - no selection of heifers during rearing period

Projected production of imported heifers.																		
			Herd growth projections (animal in milk)															
				2015	2016	2017	2018	2019				First imported group and offspring						
Original group				20000	20000	20000	20000	20000										
					20000	20000	20000	20000				Second imported group and offspring						
First offspring from original group (born 2016)						15000	15000	15000										
Offspring from first group								12000										
Second offspring original group (born 2017)								15000										
							15000	15000										
		Total		20000	40000	55000	55000	67000										
Scenario	Assumptions:																	
	4000 liters/lactation																	
	20000 imports in 2015																	
	20000 imports in 2016																	
	Calving interval 1 year																	
	All heifers are suitable for production, no selection during rearing																	
	Mainly use of sexed semen, 75 % female calves																	
		Nr of imported animals in milk:								Total annual production								
		First batch		Second batch		Total												
	2015	20000				20000				40 M liter		assuming they will be productive only for half a year						
	2016	20000		20000		40000				120 M		2nd batch productive only for half a year.						
	2017	35000		20000		55000				220 M								
	2018	35000		35000		70000				280 M								
	2019	47000		35000		82000				348 M								
Scenario 2		3000 liters per lactation																
	2015					20000				30								
	2016					40000				90								
	2017					55000				165								
	2018					70000				210								
	2019					82000				246								

In scenario 1 (4000 litres/lactation) the imported heifers will together with their offspring produce 349 M litres annually.
In scenario 2 (3000 litres/lactation), this will be 246 M litres.

If all (ideal !) conditions are met, the contribution of the imported heifers to to targets of self-sufficiency in 2020 will be 300 M litres. Demand to be met by local production by then will be 1.000.000.000 annually, which means that 700.000.000 M litres will have to come from the existing herd.

- The dairy farm structure of the existing herds is as follows (figures are from 2008, but the proportions between categories are not expected to have changed much since then).

Herd size (nr of cows) (2008)						
	<=2	3 to 5	5 to 10	10 to 20	>20	Total
Nr of farms	57064	40157	33173	13433	7400	151227
Nr of cattle in milk	93322	120471	199038	161196	162800	736827
Nr of cattle per farm	1.6	3	6	12	22	
ltrs/cow/day	2	2	4	5	6	
Total milk production	15.030.515	19.403.154	64.114.435	64.905.888	78.662.090	242.116080

Source: *communication from DAPH.*

Total nr of farms < 10 cows	130.394	Total amount of milk produced	98.548.104
Total nr of farms > 10 cows	20.833	on these farms	143.567.978

In 2008, 20.833 dairy farms with > 10 cows each, which is 14 % of the total nr of farms, produce 143.567.978 litrs which is 59 % of the recorded production.

The 40.000 to be imported heifers will be distributed to farms with an average of 25 dairy animals per farm. Assume that 4000 out of the 40.000 will be bought by newly established large scale farms, then 36.000 heifers will remain for distribution to medium scale farmers; 36.000 : 25 = 1440 which can benefit from the imported heifers. This means that 7 % of the farms with > 10 cows will be able to benefit from the improved animals.

The remainder will still face the challenge of jointly producing some extra 400 M litres of milk on top of the current production, in order to achieve the targeted 1000 M litres by 2020. If the imported heifers achieve the above calculated production.

A special position in milk production in Sri Lanka is held by the National Livestock Development Board. NLDB is to receive 4500 heifers which will be kept on two nucleus herds, from which heifers will be made available for distribution to individual farmers. The total amount that can be produced annually by these 4500 heifers and their offspring:

Additional production comes from NLDB farm, 4500 extra heifers after import									
4500 x 4000 liters = **18 M** + production from their offspring gives a total additional product									
Population growth from 4000									
2015	4000		16 M						
2016	4000		16 M						
2017	7000		28 M						
2018	10000		40 M						
2019	16000		64 M						

Summarizing: in 2020, the targeted 1000 M liters can be produced as follows:

- newly imported heifers 300 M liters
- old existing herd, with existing production 300 M liters
- contribution through new animals from NLDB 64 M liters

Conclusion:

An additional 400 M litres will still have to come from the existing herd, which is almost double the present production.

Annex 7: Terms of Reference

ToR LED (Leads for Economic Diplomacy) for the dairy sector in Sri Lanka.

Background
Sri Lanka and the Netherlands have a long history in collaboration in the dairy sector. From the early 80s till mid 90s a large variety of dairy projects was supported, to a large extent through the NLDB (National Livestock Development Board). Training, farm management improvement, importation of cattle were amongst some of the major projects carried out.
During the past one to one and a halve decades investments in the dairy sector have been low. Self-sufficiency has remained stagnant at approx. 30 %; additional milk is obtained mainly from imported powder milk from New Zealand. During a trade mission to the dairy sector in Sri Lanka in August 2012, it had to be concluded that very little progress had been made in the dairy sector.
In 2012 however, the policy changed and greater emphasis was put on raising self-sufficiency in dairy products (Livestock Master plan). In April 2012, the Dep. Minister of Livestock visited the Netherlands, with a delegation of 15 representatives from government and private sector.
Since then, various instruments to intensify production have been launched, such as soft loans for cooling equipment (to allow for better marketing of the evening milk). If 11 farmers with this level of production join their operations, small scale processing equipment can be obtained at equally soft terms.
Furthermore contracts have been signed recently to import 4500 dairy cattle from Australia. 2500 have arrived, 2000 more will follow in 2014. Plans exist for importing 20.000 more.

Current situation
In summary, it can be stated that the dairy sector in Sri Lanka is in transition, from small scale low input-low production to medium and larger scale more intensive types of production systems. Different stakeholders are getting involved as a result of both privatisation of former government involvement and the rising demand for locally produced milk after the scandals with contaminated Fonterra milk.
Moreover, also the knowledge infrastructure is changing: Colombo University have jointly with NLDB developed a (commercial) Diploma course on livestock farming and agribusiness development. Other universities (Peradeniya and Sabaragamuwa) also provide inputs in this programme. The emphasis on and expansion of vocational training is a strong element in building a sound base for raising a higher rate of self-sufficiency in dairy production in Sri Lanka.

Options for Dutch involvement
These developments in the dairy sector offer opportunities also for Dutch dairy business, as the Government of Sri Lanka regularly states. During discussions they stress that they do not want to become fully dependent on New Zealand only. This offers openings for renewed and more commercial Dutch involvement in the dairy sector in Sri Lanka.
The Netherlands has previously strongly supported the development of the dairy sector. A separate overview hereof has been prepared . Many senior officials in government and the private sector have in the past received training in the Netherlands. There is growing interest for investments from the Netherlands in the dairy industry in Sri Lanka.
In order to assess the possibilities for further Dutch involvement in the dairy industry in Sri Lanka, an inventory is proposed of the former involvement of the Netherlands in the dairy sector in Sri Lanka, the current state of affairs, the prevailing livestock development policies in the country and the subsequent options for increased Dutch involvement.

Inventory into past lessons and future prospects

Objective of the inventory is to analyse the previous Dutch dairy development aid to Sri Lanka and to assess to what extent these past experiences influence possibilities for renewed Dutch involvement in the dairy sector in Sri Lanka, under the present economic diplomacy.

- describe previous Dutch involvement in the dairy sector in Sri Lanka. Both from the perspective of development cooperation in Sri Lanka, but also educational activities in the Netherlands. Previous commercial links will be included in this overview.
    - which Dutch dairy development projects have been carried out in Sri Lanka and which projects have been carried out by other organisations/donors.
    - describe objectives, set-up, scope and results of these projects (in general terms)
    - assess results en impacts of these projects.
    - which conclusions can be drawn from the previous dairy development projects, and what is the applicability in the current Sri Lankan (Livestock Master Plan) and Dutch (Economic Diplomacy) policies.
- describe current state of affairs of the dairy sector in Sri Lanka, taking all relevant chain elements into consideration, and describe which attention is given to economic, social and environmental aspects.
- describe current government policies on dairy development. What are the prevailing policies and what instruments are put into place to effectuate these policies?
- describe major challenges for dairy development in Sri Lanka for the coming 5 to 10 years
- list all active Dutch companies active or interested in becoming active in the dairy sector in Sri Lanka
- what is their current involvement, describe business model, describe phase of involvement in Sri Lanka (recently started vs established companies)
- what is the relevance of the findings for a stronger Sri Lankan – Dutch collaboration in the dairy sector of Sri Lanka.
- advice on further implementing the Dutch economic diplomacy implementation in the dairy sector of Sri Lanka. Which options are available to strengthen Dutch involvement in the dairy sector of Sri Lanka and how can these best be achieved.

Output

A report providing analysis of previous involvement and an assessment as to how previous involvement influences the possibilities for the Dutch private dairy sector in Sri Lanka.

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