DCD, a Potential Shield to Uplift Local Milk

(Case Study based on Sri Lankan Milk Powder Industry, 2012/13)

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***Abstract*- Milk powder industry posted country imports of 84,000 MT of milk products in 2011 at a cost of Rs. 30 billion (Central Bank of Sri Lanka, 2012) which is a startling amount in comparison to other powdered milk importers in the world despite having lesser population and extent of land at the same time this was a burning issue to the Sri Lanka as this imports of dairy products from foreign countries had become a critical issue in terms of trade balance deficit reported in balance of payment in the country taking 1195.4 billion of rupees equaling to 9409 US million dollars and imports of dairy products alone accounting for 2.5% of Trade balance deficit (Central Bank of Sri Lanka, 2013). At the same time it was the government policy to be self - sufficient in milk by 2016 (Rajapaksha, 2005). After the media derogated the news about milk powder imported to Sri Lanka from foreign countries are contaminated with DCD and thereby revealing its potential hazardous implications, people became overwhelmed and concerned responding by protesting against milk powder importers and asked the government to address the issue. With the involvement by ITI, milk powder samples were tested and proved DCD to be positive. Backed by the findings the government of Sri Lanka asked both importers and local milk powder manufacturers to with draw products from the market. Further, government took several measures and confined dairy importers not to sell, advertise and exhibit dairy products thus government being able to save more money otherwise could have been incurred in importing milk powder and also to boost the local milk production by reducing imports of milk powder by 12.3% to $307.3 million in late 2012 thus creating a vacuum to be filled by which. It was observed that Highland, Palawatta, locally produces powdered milk, being demanded more whereas imported little or not (Anuranga, 2013). Finally, the government can encourage breast feeding and local dairy manufacturers by importing high yielding cows and distributing them among them as remedial actions are also in place.**

***Index Terms*— Dicyandiamide (DCD), Full Cream Milk Powder, Dairy products, Fonterra, Industrial Technology Institute (ITI), Multi-National Companies.**

I. INTRODUCTION

Sri Lanka is highly hooked on agricultural sector accounting for 9.8% of the gross domestic production (Central Bank of Sri Lanka, 2012). It is projected that the contribution of the livestock to the agricultural sector is 5.5% of the GDP and 1.2% to the national GDP (Ibrahim & Staal, 1999). Dairy industry in Sri Lanka is headed by both the government and private sector consisting of both local and foreign multinational companies, local providing both powdered milk and fresh milk, collectively still the foreign multinational companies embodying private sector plays the main role leading in the industry and posting country imports of 84,000 MT of milk products in (2011) at a cost of Rs. 30 billion (Central Bank of Sri Lanka, 2012) which is a startling rate in comparison to other powdered milk importers in the world despite having lesser population and extent of land at the same time this was a burning issue to the Sri Lanka as this imports of powdered milk from foreign countries had become critical issue in terms of trade balance deficit reported in balance of payment in the country taking 1195.4 billion of rupees otherwise equals to 9409 US million dollars accounting for 2.5% of Trade balance deficit by imports of powdered milk alone (Central Bank of Sri Lanka, 2013). Thus the dairy industry is one of the most prominent industries which almost never have had decrease in sales, as Sri Lankans are so addicted to milk powder that as they wake up in the morning the first beverage they take is cup of tea made with milk powder diluted in which and stand sixth position in the world in terms of money incurred in importing powdered milk from New Zealand, until the news about DCD contamination in milk powder leaked in all modes of media. DCD is short term for dicyandiamide (DCD) and was developed about 30 years ago and DCD, (Ravensdown (Ltd).) a nitrate inhibitor used in fertilizers, contains a poisonous melamine[1] , component that is found in DCD, and DCD falls in to cyanide category, which can be deadly if released in that formula. It is also known that melamine which is formed by the combination of two DCD molecules may cause health issues. Meanwhile, DCD is said to have been used as a substitute for the proteins that is extracted out of milk powder. Melamine, which is synthesized by DCD, was used for this purpose. Protein content in food is measured by measuring its nitrogen content. In this case study, it is expected to discuss deadly consequences of DCD, media gearing in the industry to change the behavior by stake holders involved in the industry. government's visionary expectations in terms of dairy industry and involvement and actions taken in attending to the DCD issue and resulted implications to multinational diary companies, specially Fonterra, and what they had to do and importers of Full cream milk powder and Sri Lankan entrepreneurs marching forward to stimulate both local dairy product manufacturers and people. Finally, what remedial actions and recommendations for the milk powder contaminated with DCD. This case study was developed based on a true phenomenon took place in Sri Lankan dairy industry using both newspaper (from August 2013 to December) and

[1] Melamine is an organic base and a trimer of Cyanamid, with a 1, 3, 5-triazine skeleton. Like cyandiamide, it contains 67% nitrogen by mass and, if mixed with resins, has fire retardant properties Formula: C3H6N6, Molar mass: 126.12 g/mol, Melting point: 345 °C, Density: 1.57 g/cm³, IUPAC ID: 1,3,5-Triazine-2,4,6-triamine, Soluble in Water

journal articles associated with which, official websites of companies producing DCD, associated reports issued and personal interviews had with doctors and personal observations did. One of the limitations of this case study is that non availability of data relating to the sales figures of the dairy product manufacturers and importers as they are deemed to be secret and confidential and there was no way available to gain information with regard to which but there is a clear cut information available in the newspapers used to develop this case study.

II. WHERE OPPORTUNITY ARISES; THE TURNING POINT

Adding high nitrogen content compounds to protein containing dairy food generates higher protein content and a higher price (Lucas, 2013). By proving this process, in 2008 was a case of melamine allowing further dilution of milk to give a continuous protein reading and increasing profits dishonestly. In the mentioned year, increasing numbers of infants and young children in China started to develop unexplained urinary tract stones due to the addition of melamine to raw milk to falsely increase the protein content even after the dilution. Furthermore, dicyandiamide is a nitrogen-rich compound that is classified with compounds such as melamine as a potential economic food adulterant to enhance the apparent protein content of the dairy food products and DCD is the active ingredient applied as a fine particle suspension spray to grazed pastures to control nitrogen losses from cow urine patches and cows eating contaminated grass may produce milk with traces of DCD residues and also it is used in the production of a wide range of organic chemicals including slow and continuous nitrogen release fertilizer, pesticides, dye fixing, fire proofing agents, epoxy laminates for circuit boards, powder coatings and adhesives, water treatment chemicals, leather and rubber chemicals, explosives and pharmaceuticals with the appearance of White Crystal Packing net 25kg, 500kg or 1,000kg (Jiafeng).

III. RIVAL REACTION BY MEDIA AND CONSUMERS

The issue of milk powder imports to Sri Lanka has become highly controversial. It was back in early March that the Nation newspaper boldly informed the public of Sri Lanka about (*hazardous milk powder sneaks in to Sri Lankan market*), (The Nation, 2013). Triggered by the media about deadly consequences of contaminated milk powder and its implication to the health of both children and their parents and people consuming milk powder in Sri Lanka started to be puzzled as to whether they should use powdered milk or not and asked many questions from the government and associated authority to attend to this burning issue. The DCD contamination of the milk powder in Sri Lanka caught the attention of all the parties involved in the dairy industry in Sri Lanka. After the news about milk powder contaminated with DCD broke out in Sri Lankan media following the claim In 2008, increasing numbers of infants and young children in China started to develop unexplained urinary tract stones due to the addition of melamine to raw milk to falsely increase the protein content after dilution (Moore, DeVries, Lipp, Griffiths, & Abernathy, 2010). China and Vietnam stopped some dairy imports from New Zealand in response to that incident. Fonterra said eight customers had been affected in seven countries: Australia, China, Malaysia, New Zealand, Saudi Arabia, Thailand and Vietnam (Aneez G. , 2013).

Consequently, with the protests demonstrated by public, "ITI officials commenced testing imported milk powder for DCD shortly after the New Zealand media reported the incident of DCD contaminated milk powder being sold in Sri Lanka. Around one month after the milk crisis broke out in the country, the confusion continued to be serious, further puzzling and shedding much light on crucial issues related to DCD and there were back to back telephone calls from various consumers. Following are the Responses made by the people gathered from numerous ways. Is milk good or bad? Should people stop giving milk to their children, after two years of age? What is better – liquid milk or powdered milk? If liquid milk is better, does Sri Lanka have the capacity to meet the demand of the people? What are the guarantees the Government can give to assure the purity and quality of liquid milk? Is there Dicyandiamide (DCD) or any other contamination in milk powder? In addition to all these questions around 200 people demonstrated around Fonterra brands Lanka head office due to alleged DCD presence in their milk powder and Great many parents are worried, not merely for their children alone, but also for themselves (Daily News, 2013). With an interview had with one of the consumers he said that he would switch to fresh milk if so called allegations are found to be true (By Kumudini Hettiarachchi, 2013). Present milk contamination scare came 5 years after the discovery of melamine in milk in China leading several baby deaths (Waduge S. D., 2013) thus making public to be more concerned and alert on milk powder contaminated with DCD and subsequently leading to the government to take necessary measurement to mitigate the tense conditions rose in the country. ITI officials obtained chemicals, equipment etc. and used the best and accurate basic testing theory (Gunatilleke N. , ITI Reports accepted by New Zealand, 2013). ITI detected 371 DCD contaminated milk powder samples in September 2012 after testing 1,992 samples and found three milligrams of DCD in a kilogram of milk powder which is of a highly alarming level (Gunatilleke N. , ITI clearance for milk powder only at port – Patali, 2013).

IV. GOVERNMENT ENDEAVOR TO RESTRICT DCD LEAKING IN TO MARKET

Tracing the leads from countries, including China, Russia and Vietnam, protests against certain companies by public refusing milk powder, media derogating DCD issue as a burning issue worth paying attention to by stakeholders and test results issued by ITI based on DCD contamination in full cream milk triggered the Sri Lankan government and health authorities to take the measurements as mentioned below. The government paid serious attention to the controversies on DCD and prepared itself to take all measurements within its power to make sure the safety of milk products in the local market. It was in the Cabinet press briefing that it was disclosed cabinet Sub Committee comprising relevant Senior Ministers and Ministers had been appointed to look into this matter deeply and recommend remedial actions (Mudalige, 2013). Six milk powder samples were tested by ITI as Fonterra's (Anchor, Anchor 1+, Ratti and samples including other dairy manufacturers Lanka Sathosa, Milgro, Maliban, Nespray and Lakspray, and local milk powders known as Highland,

Pelawatta)[2]." The test concluded to have found the traces of dicyandiamide (DCD) in four brands of milk imported to Sri Lanka such as Anchor, Anchor 1+, Diamond and Maliban Non Fat. Secondly, "Ten milk powder samples were taken from Fonterra dairy products and subsequently detecting presence of 0.64 mg of DCD in every 1 kg of Fonterra milk powder," and said no traces of DCD were found on local milk powder, Highland and Pelawatta.

Health Ministry, based on the tests initiated by the Ministry of Technology and Research and carried out by ITI, the country's premier scientific and industrial research organization, had held a meeting with the Government Medical officers Association (GMOA), Food and Drug Authority and the Food Advisory Committee on the 06th of August and expressed their contentment to have all the batches of the milk products tested to be positive for DCD removed from the market as soon as possible. However, the results issued by ITI were challenged by the multinational industry players and importers and tried their best to refute claiming that their milk powder is contaminated with DCD. However, Technology, Research and Atomic Energy Minister Patali Champika Ranawaka said his Ministry is geared to the requisite level of modernizing their facilities, a state-of-the-art laboratory to be set up in Malabe soon with the assistance of the Japanese Government and also Sri Lankan scientists are ready to take up this challenge. Further it was revealed (*Sri Lanka's laboratories are equipped with all facilities to conduct these tests and Sweden has given accreditation. ITI has its own accreditation board too. (Some laboratories and institutions in Saudi Arabia, Pakistan, India and the Maldives have been accredited by the Sri Lanka Accreditation Board for Conformity Assessment* (SLAB)) (Kumarasinghe U. , 2013)

The DCD issue aggravated the condition; the minister to Technology Research and Atomic Energy Champika Ranawaka challenged industry representatives of multinational dairy companies and importers to prove their claims that their milk powders are free from traces of the hazardous chemical compound Dicyandiamide (DCD) and to refute the determination of his ministry's Industrial Technology Institute (ITI) that their milk powders are indeed contaminated with DCD given the further claims by industry players. At the end of all the accusations, the Minister claimed that melamine is a toxic ingredient that is found in DCD although Fonterra and industry players continued to maintain that their dairy products are free from DCD contaminants; the tests conducted by the scientists of ITI have proved otherwise (Weerasinghe C. , 2013) Followed by the decision to "*all milk brands imported from New Zealand to be held back to stop giving clearance from the harbor"; Health Ministry* (Weerasinghe C. , 2013). The government, extending its concern over health risk posed on people's health by DCD contaminated milk powder. A special team of Health Ministry staff conducted an inspection for milk powder contaminated with DCD in supermarkets and other shops in Colombo and found the items were no longer available in supermarket shelves joined by Health Services Director General Colombo Municipal Council Chief Medical Officer Dr. Pradeep Kariyawasam and over 50 PHIs. All MOHs and PHIs had been ordered to carry out inspections to detect banned milk powder and food items and remove them from the market As soon as possible. (Gunathilaka, 2013). Advancing the search operations on milk powder contaminated by DCD, a special unit was assigned by the (ITI) to continuously and constantly carry out DCD tests on milk powder samples and further, it was confirmed that (*at present there is not even a single milk powder sample of the Fonterra Brand left to be tested, since all the samples were tested and the reports submitted to the Health Ministry*) (Wimalapala, 2013). Health Ministry officers continued to test all imported milk powder for DCD before releasing consignments from the Port. Imported milk powder is released only after ascertaining there is no DCD. Health authorities also continued to check if the milk powder in the local market contains DCD (if there is unchecked milk powder) thus making the condition hard for the multinational diary company Fonterra and other importers of full cream milk powder and their consignment having to undergo a lengthy procedure to have the consignment cleared. They also inspected if banned DCD contaminated milk powder were available in the local market and all inspections were completed by September 30. The inspections and tests were carried out by officers attached to the Food Department of the Health Ministry and Consumer Affairs Authority," and the Medical Research Institute was also upgraded to carry out all tests to ensure food safety. (Gunatilaka, 2013).

The Health Ministry made arrangements to raise awareness among PHIs and Drug and Food Inspectors on their powers in connection with Food Act No 26 of 1980 and Health Services Director General briefed around 5,000 PHIs and Drug and Food Inspectors during the awareness raising program and this program was extended to other areas of the country and the PHIs and Drug and Food Inspectors were educated on DCD and the negative health effects of DCD. Health Services Director informed all the relevant companies to recall numbered batches of their milk powder from the local market as soon as possible over and over again. The decision was made using powers under Food Act No. 26 of 1980 and taking the report released by ITI in to account. The particular batches of milk powder containing the hazardous agro-chemical DCD were identified to be Anchor 1+ Batch Number 107610163 (Fonterra Company), Anchor Full Cream Milk Powder Batch Number 0605C0883 (Fonterra Company), Maliban Non Fat Milk Batch Number 13074A1 Maliban Milk Products Pvt and Diamond Milk Powder Batch Number NW1F1PDX1 (P.M. Mohamed Ali and Company), (Gunatilleke N. , 2013). Further experiments were also done regularly with the other batches as well to ascertain whether there is DCD. ITI Director Dr. Sirimal Premakumara stated that "*milk product samples from outstation had also been collected and put through the experiments and the staff would also be tasked to work extra hours to overcome this national issue"* (Ranadewa, 2013). Subsequent to the detection DCD by ITI the, IRI carried out the testing on the second batch of products and it was revealed that such brands as Anchor, Lakspray, Lanka Sathosa, Milgro, Ratti, Maliban, Nespray and Lakspray were among the DCD free products. Despite this, Health ministry made it compulsory for the diary companies to run DCD tests and the Cabinet approved to introduce a new labeling system to identify products free of DCD (Daily News, 2013). Despite having disclosed that imported milk powder is free of DCD, people show some reluctance to buy milk imported to the country thus paving the way for the state body National Livestock and Development board and local private dairy manufacturers to improve their production to meet the local demand created and

[2] Brand names of the full cream milk powder sold in Sri Lanka

replace imports of 70,000 – 75,000 Mt. of milk powder annually incurring huge sum of Rs.30 billion (Central Bank of Sri Lanka, 2012), with local fresh milk as it has been proved by ITI that local milk powder and other related products are not contaminated with DCD. It was observed that Highland, palawatta, locally produces powdered milk, being demanded more whereas imported little or not (Anuranga, 2013). For Sri Lanka to be self-sufficient in milk another 482 million liters have to be produced annually. It would be an impossible task to gain this production target with the current production of the National herd (National Livestock Development Board, 2012). At present the contribution of NLDB contribution to the National Production is about 2% which is not enough to make an impact in the Dairy industry and it is important that the NLDB plans to increase the milk production to make a significant contribution at 7% against the National requirement while producing more improved breeding material to the farmers. To achieve the above objective, NLDB was successful to import high yielding 2000 pregnant heifers[3] in the breeds of Friesian, Jersey and Jersey x Friesian cross bred to Sri Lanka after two decades under National Dairy Development Programme as per the "Mahinda Chinthana[4]" policy. Thus the Average yields per milking cow in farms have increased up 20 liters per day whereas only 7 liters Prior to the importation. Further, the NLDB[5] has planned to introduce 10,000 high yielding dairy cows for other NLDB farms. Intensified by the consumers switching to Fresh milk and local milk powder from imported milk powder and related products as a remedial action against the DCD contaminated and imported full cream milk powder, 1,400 million liters per year would be required to bridge the gap created. It is apparent that the local dairy producers only provide 40% of the required amount (Kumudini Hettiarachchi S. J., Milk in a pickle, 2013)

V. TIME TO CAPITALIZE REPLACING FOREIGN WITH LOCAL: EMPHASIS BY LOCAL ENTREPRENEURS

It had been scientifically proved that DCD may cause a number health hazards among children in the future and that people are aware of which. Thus realizing this matter, NLDB, state own dairy manufacturer, has taken a number of measurements to Strengthen and conquer the untapped market by itself. Going in line with what state owned firms and a team of local entrepreneurs, triggered by the potential hazardous implications of imported milk powder contaminated by DCD, including Laughs Holdings[6] Chairman W.K. Wegapitiya and Triad- Joint Managing Director Dilith Jayaweera, asked the public to avoid consuming imported milk powder and start consuming local fresh milk and local full cream milk powder such as Highland and Pelawatta in a meeting held (Bandara, 2013). In addition to that the entrepreneurs asked (*"All local entrepreneurs who love the motherland, must get together to find solutions to this issue. The best alternative is to empower the local farmer to produce sufficient milk quantities for the required consumption*) (Bandara, 2013). In addition to that Milco Pvt. Ltd., a semi-government organization was asked to buy all the farmers' unsold milk to safe guard and uplift the dairy farmers by the government and advancement of local diary manufacturing firms and businesses have been expedited and intensified by the DCD found in imported dairy products as the consumers using imported dairy products are still reluctant to purchase said products. The growth of the local fresh milk industry has been 2% per annum up to 2011, and last year it spiked to 16%. The "spike" in milk production, occurred due to the price of raw milk being increased from Rs. 33 to Rs. 50 under the 2011 Budget and as farms in the east part of the country have been provided collection centers (Planning, 2011). Sri Lanka's efforts to popularize fresh milk to boost local production and achieve self-sufficiency in the island nation in the past few years has helped to reduce imports of dairy products by 12.3 percent to $307.3 million in late 2012.

VI. SUGGESTIONS AND REMEDIAL ACTIONS BY INTERESTED PARTIES

As everyone knows breast feeding is a natural food for infant and there has been no any complication caused due to which. As per the Sri Lanka Medical Association (SLMA) President Dr.B.J.C. Perera , Sri Lankan water in village wells contain adequate calcium (Gunatilleke N. , 2013) there is no need of consuming or drinking full cream milk powder for the daily calcium intake by infant and adults and drinking milk powder containing extra calcium can lead to serious health complications, Osteoporosis can only be prevented through doing adequate workouts and additional protein we take through milk powder and additional protein we take do not store in our body. As per Dr. Anoma Jayatilleke, WHO / NPO, (*children who are breastfed for five years always excel in sports and become very intelligent*) hence the government should encourage by educating mothers and women in Sri Lanka to breastfeed children as much as possible rather than going for alterative contaminated milk sources such as milk powder imported and contaminated with DCD. Breast milk never causes any sickness in children. A healthy childhood without sicknesses is very important for their growth thus healthy workforce is very important for the development of a country like Sri Lanka of which the main goal is to be recognized as a middle income earning country by nearing 4000 dollar per capita income in 2016 (Central Bank of Sri Lanka, 2014 Jan 03) . Given the Mahinda Chinthana policy statement, "Sri Lanka is expected to be self-sufficient in Milk. Both the government and local dairy product manufacturers can start distributing and selling dairy to daily consumption by consumers jointly, E.g. Lucky Lanka Gedarata Kiri Program. The government can strengthen the local dairy industry with the support of local dairy farmers in the village by importing and distributing high yielding cows among them. E.g. Imports 10,000 cows to Sri Lanka from Australia in 2012 (National Livestock Development Board, 2012) . Promoting the good

[3] A young cow before she has had her first calf.

[4] Mahinda chinthana has been based upon the proposals and suggestions of thousands of my beloved fellow citizens who have been closely associated with me over the past 32 years of my political journey, Mahinda Rajapaksha, the president of Sri Lanka.

[5] The National Livestock Development Board was established in 1973 under the State Agricultural Corporation Act No.11 of 1972.Its field operations commenced on 1974.Government first milk processing plant was installed in 1954 in Narahenpita.

[6] Established in the year 1995, LAUGFS Holdings is a Sri Lankan diversified business conglomerate covering all spectrums of industries.

results could be gained by consuming fresh milk daily with the support of nutritionist and doctors and midwives island wide by the government and promoting dairy farmers and public about livestock management. Government is capable of setting up full cream milk powder manufacturing plant in Sri Lanka with the support of private sector thus playing a responsible role.

REFERENCES

[1] Andrea Vance, T. W. (2013, August 11). Fonterra Rubbishes Sri Lanka's flawed. New Zealand.

[2] Aneez, b. G. (2013, August 11). Fonterra Withdraws Milk from Sri Lanka. Wellington, New Zealand.

[3] Aneez, G. (2013, August 11). Fonterra Pulls 'DCD' Milk Powder in Sri Lanka. Colombo/Wellington, Western, Sri Lanka/New Zealand.

[4] Aneez, G. B. (2013, August 11). NZ's Fonterra pulls 'DCD' milk powder in Sri Lanka, disputes test. Wellington/colombo, New Zealand, Sri Lanka.

[5] Anuranga, B. (2013, December 12, 15, 17, 21, 29). Observation of Milk Powder Demand. Kelaniya, Kiribathgoda, Tissamaharama, Kadawatha.

[6] Bandara, S. A. (2013, August 13). Local Diary Farmers can produce sufficient Milk for Local Consumption. Retrieved December 26, 2013, from Daily News: http://www.dailynews.lk/local/local-dairy-farmers-can-produce-sufficient-milk-domestic-use

[7] By Kumudini Hettiarachchi, S. J. (2013, August 18). Milk in a Pickel. Colombo, Western, Sri Lanka.

[8] Central Bank of Sri Lanka. (2012). Central Bank Report. Rajagiriya: Central Bank Printing unit.

[9] Central Bank of Sri Lanka. (2012). Sri Lanka Expects to be Middle Income Earn Country by 2016. Rajagiriya: Central Bank Press Unit.

[10] Central Bank of Sri Lanka. (2013). Key Socio Economic Indicators. Rajagiriya: Central Bank Printing Press.

[11] Central Bank of Sri Lanka. (2014 Jan 03). Sri Lanka Expects to be upper middle income country by 2016. Colombo: Central Bank of Sri Lanka.

[12] Central Bank of Sri Lanka. (2014, January 3). Sri Lanka expects to be an Upper Middle Income country by 2016. colombo, Western, Sri Lanka.

[13] CHEN Xiaozhen, C. W. (2013). Determination of dicyandiamide in dairy products by high performance liquid chromatography [J]. Chinese Journal of Chromatography, 875-877.

[14] Daily News. (2013, August 30). Cabinet Nod to introduce new Labeling System. Colombo, Western, Sri Lanka.

[15] Daily News. (2013, August 17). Court bans Fonterra milk products. Retrieved December 26, 2013, from Daily News Local: http://www.dailynews.lk/local/court-bans-fonterra-milk-products

[16] Daily News. (2013, August 10). Milk Managers and Menace. Retrieved December 26, 2013, from Daily News: http://www.dailynews.lk/editorial/milk-managers-and-menace

[17] Dr.M.N.M. Ibrahim, D. S. (1999). Appraisal of the Sri Lankan dairy Sector. Colombo: Ministry of Livestock Development and Estate Infrastructure.

[18] Envirolabs. (2013). Trace of Diciandiamide in New Zealand Milk. Retrieved 12 23, 2013, from Envirolabs: http://www.envirolabs.com.hk/services.php?cati

[19] Gunathilaka, N. (2013, August 13). Milk powder contaminated with DCD not on market shelves. Retrieved 9 22, 2013, from Daily News: http://www.dailynews.lk/local/milk-powder-contaminated-dcd-not-market-shelves

[20] Gunatilaka, N. (2013, 09 18). Test for DCD in milk powder to continue. Retrieved 12 26, 2013, from Daily News: http://www.dailynews.lk/local/test-dcd-milk-powder-continue

[21] Gunatilleke, N. (2013, August 6). Health Service Director General Orders immediate milk recall. Retrieved from Daily News: http://www.dailynews.lk/local/health-services-director-general-orders-immediate-milk-recall

[22] Gunatilleke, N. (2013, September 3). ITI clearance for milk powder only at port – Patali. Retrieved December 26, 2013, from Daily News: http://www.dailynews.lk/local/iti-clearance-milk-powder-only-port-patali

[23] Gunatilleke, N. (2013, August 15). ITI Reports accepted by New Zealand. Retrieved December 26, 2013, from Daily News: http://www.dailynews.lk/local/iti-reports-accepted-new-zealand

[24] Gunetilleke, N. (2013, August 8). Srictly no milk powder advertis. Retrieved from Daily Mirror: http://www.dailynews.lk/local/strictly-no-milk-powder-adverts

[25] Ibrahim, D., & Staal, D. S. (1999). Appraisal of the Sri Lankan Diary Sector. Colombo: Ministry of Livestock Development and Estate Infrastructure.

[26] Jiafeng. (n.d.). Dyciandiamide. Retrieved December 24, 2013, from Jiafeng: http://www.jiafengchem.com.cn/en/product_detail.aspx?ProductsCateID=41&ProductsID=11&gclid=CKulyJmoyLsCFesl4godQCkAIg

[27] Kumarasinghe, U. (2013, September 1). DCD milk powder issue, artificially created . Colombo, Western, Sri Lanka.

[28] Kumarasinghe, U. (2013, September 01). DCD milk powder issue, artificially created - Minister Ranawaka. Colombo, Western, Sri Lanka.

[29] Kumudini Hettiarachchi, S. J. (2013, August 18). Milk in a pickle. Colombo, Western, Sri Lanka.

[30] Kumudini Hettiarachchi, S. J. (2013, August 18). Milk in a pickle. Colombo, Western, Sri Lanka.

[31] Kumudini Hettiarachchi, S. J. (2013, May 19). Wholesome Questions. Colombo, Western, Sri Lanka.

[32] Lucas, G. (2013). Dicyandiamide contamination of milk powders. Sri Lanka Journal of Child Health,, 42,63,64.

[33] Moore, J. C., DeVries, J. W., Lipp, M., Griffiths, J., & Abernathy, D. R. (2010). Total protein methods and their potential utility to reduc the risk of food protein adulteration. Comprehensive Reviews in Food, 9.

[34] Mudalige, D. (2013, August 13). Govt has paid serious attention to DCD; whey protein issues - Keheliya - See more at: http://www.dailynews.lk/local/govt-has-paid-serious-attention-dcd-whey-protein-issues-keheliya#sthash.r0tMi42G.dpuf. Retrieved 12 26, 2013, from Daily News: http://www.dailynews.lk/local/govt-has-paid-serious-attention-dcd-whey-protein-issues-keheliya

[35] National Livestock Development Board. (2012). Sri Lanka Diary Development Project. Narahenpita, Western, Sri Lanka.

[36] National Livestock Development Board. (2012). Sri Lankan Diary Development Project. Narahenpita, Western, Sri Lanka.

[37] New York Times. (2013, August 11). Fonterra Withdraws Milk Powder from Sri Lanka. New York, New York, USA.

[38] Planning, H. E. (2011, November 22). Budget Speech 2011. Sri Jayawardenapura, Western, Sri Lanka.

[39] Rajapaksha, M. T. (2005). Mahinda Chintana. Colombo: Ministry of Finance.

[40] Ranadewa, A. (2013, August 23). Kids not Guinea Pig. Retrieved December 26, 2013, from Daily News: http://www.dailynews.lk/local/kids-not-guinea-pigs

[41] Ranawaka, P. C. (2013, September 08). Contaminated-milk-powder-when-errant-companies-play. Colombo, Western, Sri Lanka.

[42] Ravensdown (Ltd). (n.d.). Facts about dyciandiamide. Retrieved December 24, 2013, from Ravensdown: http://www.ravensdown.co.nz/nz/products/pages/eco-n/eco-n/dcd-facts.aspx

[43] Reuter. (2013, 08 11). Fonterra Withdraws Milk Powder From Sri Lanka. Retrieved from The New York Times: http://www.nytimes.com/2013/08/12/business/global/new-zealand-dairy-giant-pulls-milk-powder-from-sri-lanka.html?_r=0

[44] Rich Life. (2011). our company. Colombo 02, Western, Sri Lanka.

[45] Senanayaka, M. (2013, August 10). DCD in anchor: Conspiracy or genuine error. Colombo, Western, Sri Lanka.

[46] Soysa, S. D. (2013, August 6). Contaminated Milk Powder, Why have authorities lied to Sri Lankan consumers? Retrieved January 12, 2014, from Lanka Web: http://www.lankaweb.com/news/items/2013/08/06/contaminated-milk-powder-why-have-authorities-lied-to-sri-lankan-consumers/

[47] The Nation. (2013, March 24). Hazardous milk powder sneaks into SL market. Retrieved February 16, 2014, from The Nation: http://www.nation.lk/edition/latest-top-stories/item/16839-hazardous-milk-powder-sneaks-into-sl-market.html

[48] The Nations. (2013, March 24). Hazardous milk powder sneaks into SL market. Colombo, Western, Sri Lanka.

[49] The Republic Square. (2013, August 06). Health Ministry: Milk powder stocks will not be released until test results prove they are safe for consumption. Colombo, Western, Sri Lanka. Retrieved from Latest on milk powder issue: Ban on whey protein lifted, DCD found in four products and NZ fund to salvage reputation.

[50] Waduge, S. D. (2013, august 06). Contaminated milk Powder. Colombo, western, Sri Lanka.

[51] Waduge, S. D. (2013, December 26). Contaminated Milk Powder – Why have authorities lied to Sri Lankan consumers? Retrieved February 15, 2014, from The Independent: http://theindependent.lk/news2/901-contaminated-milk-powder-why-have-authorities-lied-to-sri-lankan-consumers

[52] waduge, S. D. (2013, August 06). Contaminated Milk Powder why have authorities lied to Sri Lankan consumers? Colombo, Western, Sri Lanka.

[53] Weerasinghe, C. (2013, August 6). No Milk from New Zealand. Retrieved from Daily News: http://www.dailynews.lk/local/no-milk-new-zealand-health-ministry

[54] Weerasinghe, C. (2013, August 8). Prove your milk powder DCD free. Retrieved December 26, 2013, from http://www.dailynews.lk/local/prove-your-milk-powders-dcd-free

[55] Wimalapala, N. (2013, 12 5). Special unit for DCD tests. Retrieved 12 26, 2013, from Daily News: http://www.dailynews.lk/local/special-unit-dcd-tests