

Terry Cloths for Superior Teat Sanitation

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### **History of Dairy Farming in Nepal**

The history of dairy farming in Nepal dates back to the early 1917s when Prime Minister Jung Bahadur Rana began the initiation of dairy development (Pradhan, 2012). The processing of milk in Nepal began in the early nineteen-fifties with the first cheese making factory located in the high mountains, which was funded by New Zealand (Pradhan, 2012). The milk used in this processing plant was milk that came from the first small herd of Murrah Buffalo. After the discovery of cheese processing, different dairy products began to gain popularity such as cream, yogurt and ice cream (Pradhan, 2012). Over the next 50 years, many developments in the industry were raised including the introduction to different dairy species. To incorporate for the increasing demand for milk and/or processed milk, the government of Nepal was set to establish more milk supply mechanisms (Pradhan, 2012).

### **Current Dairy Farming in Nepal**

The livestock sector of agriculture in Nepal consists of a great amount of the total farming systems in Nepal (Sharma & Banskota, 2003). Of the total agriculture sector; livestock contributes approximately 31.5% of the total agricultural gross domestic product. The highest portion of this GDP comes from milk and milk products from the dairy animals populating Nepal; being buffalo and cattle. The milking animals are mostly concentrated in the hill regions of Nepal, although there is a widespread of animals throughout the country (Sharma & Banskota, 2003).

### **Breeds of Milking Animals**

Of the approximate 10 million milking animals in Nepal, the split of dairy animals is primarily between cattle and buffalo (Sharma & Banskota, 2003). There are roughly 7 million head of cattle and 3.5 million buffalo that populate the country of Nepal; however these animals are spread out throughout the country (Sharma & Banskota, 2003). The popularity of buffalo has slowly decreased, mainly due to the import of different dairy genetics that have been put to use and experimented with in the Nepalese dairy industry (Food and Agriculture Organization, 2010). The concentration of the milking animals is in the hill region of Nepal however, more buffalo are concentrated in the Western Hill Region and higher population of cattle are located in the Eastern Hill Region (Sharma & Banskota, 2003).

Due to programmes underway by the Department of Agricultural Development (DAD) located in Nepal, improved cattle breeds are often used in Nepal such as Holstein, Jersey and Brown Swiss dairy cattle (Sharma & Banskota, 2003). The breed of buffalo mainly seen for dairy use in Nepal is the Murrah breed buffalo, with research still being implemented on these animals. Although dairy animals are prevalent in Nepal, and the Nepalese rely on their dairy animals for milk and milk products, an astonishing percentage of these animals are considered unproductive. Of the total population of milking animals, only 12% of cattle and 26% of buffalo produce standard amounts of milk. Despite the potential of these animals to produce milk, the lack of udder health and management of sanitary measures while milking prevents them from doing so (Sharma & Banskota, 2003).

### Small Holder Farms in Nepal

Currently in Nepal, small holder dairy farms make up the largest proportion of milking animals in the country (Sharma & Banskota, 2003). Small holder dairy farms consist of 90% of the dairy farm sector and these farms usually house approximately 2 to 4 head of cattle. As can

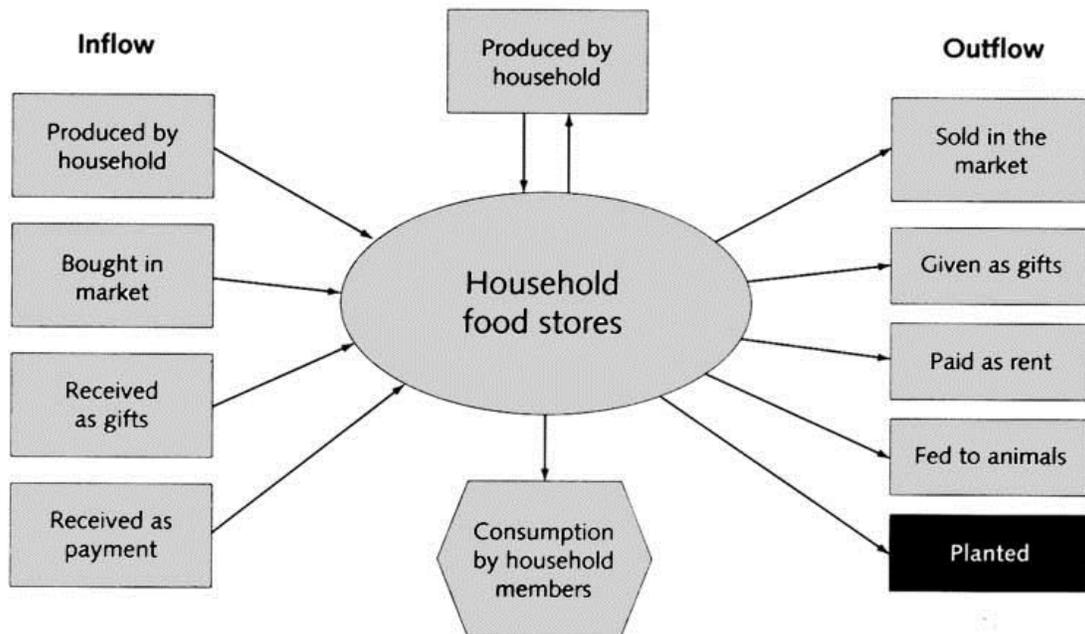


Figure 1. Distribution of Milk and Milk Products in Nepal, <http://archive.unu.edu/unupress/food/V193e/p214.jpg>

be seen through Figure 1, milk produced on these farms is often produced for consumption in the household; any over production is sold to the market (Sharma & Banskota, 2003). Milk does not often go to waste, as it is such a precious item in Nepal. It can be given as gifts, fed to the animals, or even paid as rent (Figure 1). The cows or buffalo are typically milked twice a day by hand into a bucket. When paper towels are of access, they are typically first used at the beginning of the day and re-used during the second milking of the day (R.Thomson, personal communication, 2014).

## **Terry Towels**

The need of proper sanitation protocols in Nepal, along with a reliable source of sanitary milking towels is crucial (A. Drew, personal communication, 2014). Unless serious efforts begin to be taken in regards to improving milk quality, production will continue to decrease and disease rates will increase (Sharma & Banskota, 2003). Nepal suffers from mastitis being one of the most occurring diseases on their small holder dairy farms. Bacterial populations in milk will increase without adequate cleaning and proper manual drying (Galton, Petersson & Merrill, 1986). A product that will have enormous potential in Nepal in regards to sanitation and cleanliness while milking are small terry towels. These terry towels will be approximately 13 inches x 13 inches in size, and will consist of 100% terry cotton.

Currently in Nepal, Nepalese dairy farmers are ignorant to the fact that udder health is crucial to maximum milk output (Pradhan, 2012). To clean the udder, water is often put in a bucket and splashed onto the teats, and excess dirt is wiped off with hands. The milk is then stripped from the udder into the same bucket that contained the water prior to milking. There are some cases where households are fortunate enough to carry paper towels, in which case they will be used and then re-used; but paper towels are fairly rare. Needless to say, these milking practices are below standards, and implantation of more sanitary practices must be stressed (A. Drew, personal communication, 2014).

## **Description of Supplier**

These terry cloth towels will be sourced from the Canadian company, Cintas Ltd. This company supplies different textile products to large corporation based companies, and supplies their products at a bulk price. These terry towels will be priced at \$0.50 cents per towel and will

be available to be purchased in bulk of a chosen quantity. These towels are also made domestically, in Canada (K. Clark, personal communication, 2014).

There were multiple other companies other than Cintas that were contacted in regard to pricing of their terry towels. The Canadian dairy equipment supplier that was also contacted was the company named DeLaval. DeLaval carries a terry cloth towel that is very similar to the one by Cintas. The DeLaval towels were priced higher at \$1.32 per towel, and were only able to be provided in packages of 240 towels, thus one package costing \$316.80 (P. Prekup, personal communication, 2014). Finally, the Canadian company Norwell Dairy Systems was contacted, and a special quote was given for this project; the same size terry cloth was \$9.55/12 towels which were still more expensive, at \$0.80 per towel (D. Clipper, personal communication, 2014). After calculating prices, Cintas was the least expensive company to purchase from for the high quality of the towels.

### **Cleaning Process**

A topic of concern that may be recognized in regards to exporting terry cloth towels is how the used towels will be re-washed and cleaned prior to milking. In Nepal, washing of materials is often done by hand, water comes from a communal village tap and soap is made within the villages (R. Thomson, personal communication, 2014). The Nepalese have laundry practices however they do not devote time each day to do laundry, as this would be too labour intensive (A. Drew, personal communication, 2014). A solution to accommodate the less frequent time devoted to laundry is, each house with milking animals will be given 6 terry cloth towels per head. By supplying the farmers with an abundant supply of towels per cow, they will be more likely to actually implement this protocol rather than think of it as a nuisance (Drew, personal communication, 2014).

The drying of the towels once washed will be done by the sun. Just like the Nepalese do with their personal clothes, the terry towels will be laid out to dry by UV light. Ultra violet light is also an excellent source of disinfecting, and acts as an anti-microbial agent (Fujoka & Rijal, 2001).

### **The Sanitation Project**

Despite the constant arousal by animal health officials and trained dairy improvement volunteers in Nepal, Nepalese farmers choose to maintain their traditional ways of milking (A. Drew, personal communication, 2014). The more stressed this topic is by knowledgeable outsiders, the more likely Nepalese farmers will be to implement these protocols, and make use of the terry towels. An issue with current sanitation protocols in Nepal is that volunteers are more focused on informing farmers, rather than providing them with products to initiate change (A. Drew, personal communication, 2014).

This sanitation project will begin small, where a total of 20 dairy farming households will be chosen to participate. The average number of dairy animal per household in Nepal is 2-4 head, and the project will begin with 6 towels per animal. Therefore, a maximum number of 480 towels will be needed to begin this project. A total of 500 towels will be purchased, to accommodate any households that keep more than four head, and for demonstration purposes. Since the concentration of milking animals is in the hill region, the eco-development region that will be the principal focus of this project will be the Central Hill Region; also called the Madhyamanchal Region (Central Bureau of Statistics, 2012).

### **Inputs Required**

The input required to begin this project and thoroughly implement change in Nepal is relatively minimal. The first and foremost input required is the dedication from the Nepalese farmers that they will use the terry cloths as they will be trained to do. With the encouragement and proper training from the project team, these Nepalese farmers will be motivated to put these towels to use to increase production. The second input required by the Nepalese is a proper food ration for their milking animals.

Without a complete ration, dairy animals are unlikely to produce to their full potential. The feed ration that is being provided to animals in Nepal could make all the difference in regards to composition of components in the milk (Sutton, 1989). The ration in Nepal mostly consists of rice straw as a main diet, grass, bamboo leaf, mustard straw and wheat bran (Kumagai, Shah, & Hayashi, 2005). Although this is quite different from Canadian dairy rations, the necessary components are still present however in different formats.

### **Terry Towels in the Canadian Dairy Industry**

Numerous small-to-large scale dairy operations in Canada make use of terry cloth towels during the milking process. A towel is designated to one cow only to clean all four teats then set aside in a bucket once contaminated. This process is to ensure that no bacteria is passed along from cow to cow, and is done to limit the occurrence of mastitis cases in a herd (Seegers et al., 2003). Paper towels are not made use of on Canadian dairy farms for many reasons; mostly the fact that they are highly inconvenient to dispose of and they are very rough on the cow teats causing breaks in the skin (Galton et al, 1968). This intensity of sanitation is evident when bio-security measures are examined on farms today and how serious of a topic it is in the dairy

industry. The tighter the bio-security protocols are on farms, the less chance of different forms of bacteria entering the animal housing.

### **Target Population**

The market opportunity for terry cloth towels in Nepal is endless. The main target to this product are the small-holder dairy farmers, however this is not the limiting target. Nepal is very populated with different processing plants (Sharma & Banskota, 2003). These plants are often yogurt, cheese or even acidified milk processing plants, and they depend on top milk quality to produce their products. Once processors in the country become aware of this product, they will have the desire to purchase these towels to supply to their own farmers.

### **Transportation Logistics and Cost Analysis**

This project will start off with a target population of 20 milking households; each housing between 2-4 milking animals. Terry towels are very light in weight, and have the ability to be packaged vacuum tight, which makes for simple transportation. The parcel will weigh approximately 3.87 pounds and will be shipped in a package measuring 15 x 15 x 10 inches. A total quantity of approximately 480 towels will be required to begin this project at a cost of \$0.50 per towel. For 480 top quality terry towels, it will cost \$240.00 taxes included.

Ground transportation from Toronto, Ontario to Halifax, Nova Scotia will cost approximately \$22.32 CAD and will take four business days to arrive. The terry towels will be delivered to the Halifax airport where they will be sent by air freight to Kathmandu, Nepal. It was significantly cheaper to send the terry towels out of Halifax compared to sending them out from Toronto; with a total air cost of \$444.10 CAD taxes included (UPS Shipping, 2014). By

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shipping through air freight, long weight times are being avoided. Shipping through cargo ship was unknown and would only take the product to Kolkata, India. Therefore alternative transportation would have been required from Kolkata to Kathmandu, Nepal with very poor infrastructure. Once these terry towels land in Nepal, they will be delivered to the Agriculture Extension in Kathmandu, and distributed to the co-operatives of the district, and finally the farmers.

A total cost that would last 20 Nepalese dairy farms approximately one year, would be \$706.42. However, the first round of towels for the first year will be carried along on the flight to Nepal.

### **Benefits to Canada**

#### **Direct Benefits to Canada**

Exporting of Canadian made terry cloth towels to the country of Nepal allows for numerous different benefits to Canada. Firstly, with the product being Canadian made and exported; the Canadian economy is being improved by means of sales. Although this project will be starting off small, the increase in production this product will take credit for will spread throughout the country. Once the entire country is aware of this product, the number of terry cloth towels needed by Cintas will exponentially increase. With approximately 10 million variation of milking animals in Nepal (Sharma & Banskota, 2003) within 5 years of the start of this project, it is estimated that half of these animals will be making use of terry cloths while milking. Therefore, within 5 years Cintas Ltd. would be required to ship 20,000,000 million towels to the country of Nepal for sanitation purposes. This may require the company to double in size, and expand their warehouse, which would highly increase their sales. When the entire

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country is making use of terry towels for milking, each of these companies may possibly be contributors to the project, and therefore each of the companies will benefit economically.

Table 1: Companies that will benefit when Terry Cloth Towels are used throughout Nepal

Company Name	Company Location	Company Contact
Cintas Ltd.	Toronto, Ontario	Kevin Clark Email:clarkk3@cintas.com 519.836.1772
DeLaval Canada	Montreal, Quebec	Paul Prekup Email: <a href="mailto:paul.prekup@delaval.com">paul.prekup@delaval.com</a> 519.281.9114
Norwell Dairy Systems Ltd.	Woodstock, Ontario	Dave Clipson Email: <a href="mailto:dclipson@norwelldairy.com">dclipson@norwelldairy.com</a> 519.591.5630

Exporting their terry cloth towels from Canada will also increase the amount of jobs available to Canadians at Cintas Ltd. Once the project expands throughout Nepal and the company is asked to start providing higher amounts of terry cloths, this will also begin to increase the number of jobs for Canadians. Increasing the number of Canadian jobs is likely to increase the economy, at a relatively low cost to the importing country for the amount of product they will receive. When this project takes flight, there also opens opportunities for Canada to export sewing machines to Nepal for the Nepalese to make their own terry cloth towels, which will then create jobs.

### **Indirect Benefits to Canada**

Along with many direct benefits to Canada, come many indirect benefits to Canada. The indirect benefits to Canada that exporting terry cloth towels will provide are boundless. Canadian dairy genetics are known to be some of the best genetics for dairy cattle in the world (Agri-Food

Canada, 2009). If the Nepalese can improve their milk production within their herds, they may be eligible to purchase new and improved Canadian dairy genetics exported from Canada. Exporting further dairy genetics to Nepal continues to market the Canadian genetic base as well as increases jobs in the industry.

Another indirect benefit to Canada is the chance to create an externship program with Canadian farmers. Different groups that promote Canadian farmers will be subjected to the farming situation in Nepal, and they will be given a chance to learn more about the conditions of dairy farming in Nepal. Groups such as Junior Farmers, 4H groups, or even University groups will be given the chance to experience an international market, and return to Canada with different views and ideas for their own farms.

### **Needs and Benefits to the Importing Nation**

Lack of proper hygiene in dairy facilities results in an increased amount of bacteria present in the cow's environment, which frequently leads to diseases such as mastitis. In the dairy industry, mastitis is known to be the disease that leads to the highest loss in revenue due to underproduction (Seegers, Fourichon and Beaudeau, 2003). There are many aspects that go alongside controlling mastitis however the most vital is proper teat sanitation prior to and post milking. Any object that touches the teat during the milking process must be highly sanitary as well as practical for a developing company (Galton et al., 1986). Cases of mastitis and other intra-mammary diseases can be significantly decreased by encouraging the proper cleaning of teats prior to milking, as well as lower cases of many other diseases (R. Thomson, personal communication, 2014).

## The Disease of Mastitis

Mastitis is the inflammation of the mammary gland in dairy animals, caused by the invasion of bacteria or microorganisms through the teats of the udder. There are two main categories mastitis can be classified under; subclinical and clinical. The difference between these two forms of mastitis is the visibility of the disease by the naked eye. Clinical mastitis is often more serious; the udder becomes swollen and clots in the milk may be seen while milking. More severe signs of clinical mastitis include; a high fever, rapid pulse, lack of appetite or even death. The second form of mastitis rarely shows signs that the disease is present in the cow; this is called subclinical mastitis. Subclinical mastitis is often found due to an elevated somatic cell count (SCC) in the milk during culturing of the milk (Schroeder, 2012).

## Economic Loss

The primary goals of farmers in Nepal are to earn profit, as well as provide for their family. Profit is such an important issue, because typically Nepalese families are fairly large. When over production of milk is made, it is often sold to collection centers and farmers are paid based off the fat components in their milk. At the collection centers, milk is tested for bacterial counts and often times will be rejected if the milk is of very poor quality (Sharma & Banskota, 2003).

**Table 2: Estimated Loss Due to Mastitis per Day in North America, (Hamadani et al., 2014)**

Source of Loss	Loss per Cow (\$)	Percent of Total (%)
Reduced Production	121.00	66.0
Discarded Milk	10.45	5.7
Replacement Cost	41.73	22.6
Extra Labour	1.14	0.1
Treatment	7.36	4.1
Veterinary Services	2.72	1.5
<b>TOTAL</b>	<b>184.40</b>	<b>100.0</b>

Assumptions: One-third of cows infected in average of 1.5 quarters; milk loss 856 pounds per infected quarter; milk price \$12.07 per hundred weights.

Through examining Table 2: Estimated Loss Due to Mastitis per Day in North America, it can be observed that reduced production contributes the highest to loss in revenue. Overall loss in production per day contributes to approximately 66% of the total loss due to mastitis. Terry towels will increase production by 10% over the first year, which will account for loss in revenue due to years of mastitis problems. After 5 years of the start of this project, it is estimated that production will increase by 50%.

### **Benefits to Animal Health**

Calf mortality on farms is extremely high with approximately 75% of their calves dying post parturition; this means 3 out of 4 calves will die due to poor immunity and/or starvation. A large part of the reason calf mortality is so extreme is because their colostrum they receive is of poor quality, or there is not enough milk for the calf to drink therefore they starve (A. Drew, personal communication, 2014). On average, calves receive only two litres of milk for their first feeding, when in regulations calves should be receiving 4 litres immediately, and another two to three litres eight hours later (Lang, 2008).

With the exportation and proper implementation of terry cloth towels, milk quality will improve by 40% and quantity will improve by 40% over the first year. Calf mortality will decrease by 50% which means less calves will be lost due to the improper feeding and poor milk quality. With the reduction of calf loss, heifer calves can be used within the herd as either replacements, for increased production or be sold, which will in turn generate more profit. Bull calves can also be sold for profit as draught animals within the villages for a substantial profit.

### **Benefits to Local Women and Children**

Often in developing countries, women are considered to be of less value than men, and they tend to be less economically productive (Sherry and Revenga, 2012). In Nepal, women farmers are naturally the ones that are to milk the animals, while the men do more labour intensive work (A. Drew, personal communication, 2014). When these terry towels begin to increase production, more money will be put in the hands of the women at the small holder farm level. By doing this, gender issues will begin to be addressed and will raise awareness to equality for women and girls in developing countries such as Nepal. If gender equality gaps can be reduced, increase in economic productivity will begin to occur along with improving development outcomes for future generations (Sherry and Revenga, 2012).

Talking to any farmer in a developing country, their number one concern with making enough profit is sending their children to school. Although there are not any school fees, Nepalese parents still must pay for uniform fees and any extras (R. Thomson, personal communication, 2014). With the increase in production and milk quality, additional income will be coming to the family, thus being able to afford to send the children to school. Education for females is highly important as it reduces the risk of teenage pregnancy and marriage at a young age, which more commonly ends in abuse (Sherry and Revenga, 2012).

### **Global Competition**

A topic that could be brought up is why the towels could not be sourced from a closer distributor, such as one in India. The price point for lesser quality terry towels was significantly higher than Cintas Ltd. and more restrictions on shipping were present. The differences can be seen as outlined in Table 3.

**Table 3: Comparing Terry Towels to Global Competition of Products on Alibaba.com**

<b>Characteristic</b>	<b>Alibaba.com</b>	<b>Cintas Ltd.</b>
<b>Location</b>	Shanghai	Toronto, Canada
<b>Minimum Ship Quantity</b>	10,000 towels	Unlimited
<b>Price</b>	\$1.86 / kg	\$0.50 per towel
<b>Quality</b>	Knitted	Woven
<b>Size</b>	13 x 13 inches	24 x 24 inches

These terry towels sourced from Alibaba.com are of lesser quality, and a larger size which makes it more difficult for use of udder cleaning. They could potentially be cut, however this adds extra labour for the Nepalese farmers. Not only does sourcing the towels from Cintas Ltd. cost less money, the benefits to the importing nation as well as exporting nation are greater.

### **Government Funded Loans and Grants**

An organization that will potentially fund this sanitation project is the organization called the International Livestock Research Institute (ILRI). The mission statement of this organization is “to improve food and nutritional security and to reduce poverty in developing countries through research for efficient, safe and sustainable use of livestock-ensuring better lives through livestock” (ILRI, 2012). As can be understood when reading their mission statement, their main goal is to improve the use of livestock in developing countries.

An alternative organization that may supply funding to this project is the Department of Foreign Affairs, Trade and Development (DFAIT). This organization is in fact in partnership with the organization mentioned above, ILRI, although they also supply separate funding. This

organization is aimed at improving multiple different factors in developing countries including; health, education, and peace (DFAIT, 2014).

### **Conclusion and Recommendations**

The dairy industry in Nepal makes up a significant portion of the Nepalese agriculture sector, and has the potential to earn enormous profit for Nepalese farmers (FAO, 2010). Exporting Canadian made terry towels to Nepal has the prospective to extremely benefit farmers by increasing sanitation practices on their farms. It is estimated that within the first few days of using these terry towels, milk quality will improve. After 30 days of use, production will begin to increase and after a year of use, production will increase by 40%. Calf mortality rates will drop by 50% after the first year, and rates of metabolic disorders will decrease by 10%. All of these fluctuations in percentages will benefit the farmers of Nepal, and will bring additional income to the farming families.

To seize the opportunities that have been proclaimed throughout this paper, Nepalese farmers must begin to be sustainable with their milking practices. The first step in creating change in Nepal is shifting from traditional milking practices, to further sustainable practices. Along with mentioned opportunities, Nepalese will have a better understanding of milk screening post-milking and how to detect milk quality. With the implementation of this project, different processors throughout the country will begin to expect top quality milk from their producers; thus, encouraging producers to be more cautious of their sanitary measures. The potential that terry towels have to encourage milk production to thrive in Nepal is unlimited, which will overall improve the life of the Nepalese community.

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