

The Importance of Udder Sanitization; Preodyne to Nepal

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Known as the poorest country in the world Nepal is located in Asia, south of the Chinese border and the north of the Indian border causing it to be landlocked (Nepal, 2014). There are around 31 million people inhabiting Nepal with an average lifespan of almost 73 years (Nepal, 2014). Nepal has recently formed a new democratic republic government in 2008 and the new Prime Minister Sushil Koirala won with the help of the communist UML party this last February (Arrouas, 2014). The total land mass is 147,181 square km but a lot of the land is impractical for human survival since the northern part of Nepal is where the Himalayas are located, the home of Mount Everest (Nepal, 2014). Even though the north part of Nepal is mountainous the southern part is flat and known as the Tarai region which is the most ideal place for agriculture, the central hill region is also used for agricultural purposes (Figure 1) (Nepal, 2014). Only 16% of the land is arable so it is very important to use their land efficiency since their country is very dense, 210 people inhabit a single square kilometer (Nepal, 2014). The country's geography can make transportation very difficult for a lot of citizens since they are fairly isolated from the world and many new technologies, almost half of the roads are paved but the road conditions can be very bad, there is only 59 kilometers of railroad throughout Nepal as well so it makes much harder for larger products to be moved around the country (Nepal, 2014). The weather in Nepal is also very diverse because the southern region will have subtropical summers and mild winters while the northern region has cooler summers and harsher winters (Nepal, 2014). As mentioned above, Nepal is one of the poorest and least developed countries in the world (Nepal, 2014). Nepal relies on agriculture since 70% of population live on family farms, one third of Nepal's GDP is from the agriculture industry (Nepal, 2014). The products that Nepal produces in the agriculture industry is pulses, rice, corn, wheat, sugarcane, jute, root crops,

milk, and buffalo meat (Nepal, 2014). The GDP per capita is around fifteen hundred American dollars which slightly increased from the fourteen hundred dollars in 2011 (Nepal, 2014). However, even though their GDP per capita is very low the majority of the people will rely on their small family farms for food and shelter (Figure 2). These people will mostly produce enough food for themselves because it is very hard to transport food without it becoming bad.

Nepal is becoming more informed about the issues in their dairy industry because the National Dairy Development Board (NDDDB) is focusing on the many factors in the dairy industry (National, 2011). They have many objectives such development in the industry, the health of animals, to connect private and public farmers, to increase research, and to increase the feeding within the industry (National, 2011). These objectives will help the dairy producers to improve the quality of milk and to produce larger amounts of milk throughout the country (National, 2011). Dairy farming in Nepal can be very profitable since many farmers have cows or water buffalo that contribute about 6% of the GDP in Nepal (National, 2011). This shows that Nepal is focused on improving the dairy industry and they notice that it will be very beneficial for the producers and the economy, this agricultural industries like dairy in developing countries really need a backbone which can help them with the issues. The National Dairy Development Board can show the producers how to effectively produce quality milk since all they really need is an education on what the priorities of dairy farming really are. The NDDDB can bring many producers together and allow them to communicate with each other since that will bring many new ideas or methods to the table.

Asia is becoming one of the leading consumers of milk, countries such as China, Indonesia, and Viet Nam are in a large demand for milk in the last decade (Figure 3) (Dairy,

2014). Since many citizens in Asia are becoming wealthier they want to consume products that developed countries consume, the demand is very high right away because there are so many people that live in these areas (China and India) (Dairy, 2014). Due to China's increasing GDP per capita the government is focusing on supplying citizens with milk (for the younger generation), their consumption in 2007 went from 16L to 24L in 2012 per capita (Yaron, 2014). Their population is making a huge impact since there are over 1.3 billion inhabiting the country and half of them live in urbanized areas, they are increasing milk production by 8% to 10% annually to meet their demand (Yaron, 2014). China is unable to fill their own market by 15% so it gives many other countries an opportunity to export their milk and milk products, China was not ready for the demand because their dairy industry was still undeveloped (Yaron, 2014). A lot of the milk still came from small farms that were only around 100 cows or less (60% of milk comes from these farmers), they needed better technology and a better education about the dairy industry. Dairy farming takes time to start and set up since it takes two years for a calf to become full-grown and produce milk, it will also take time to train individuals to manage larger scale operations (Yaron, 2014). Similar to China, Nepal is also increasing their milk consumption due to the increase of income (Sharma et al, n.d). This is a great opportunity for Nepal to increase their dairy industry and exportation of milk and milk products because the demand of milk will continually increase in the next years. This allows the Nepalese dairy producers to make more money on each liter which they can reinvest it into the business to increase productivity and sanitation.

Nepal is having many issues with a certain bacteria known as coliform because there are traces of coliform in the milk which is not good for consumption (Kaski, 2013). The Department

of Food Technology and Quality Control found unsafe levels of coliform in the milk (Figure 4) (Kaski, 2013). The producers are poor and they can't afford all the techniques or technologies to maintain a great hygiene when milking and shipping their product, training the farmers about hygiene is one of the first things that they can do (Kaski, 2013). The water quality is an issue as well since it contains the coliform, properly cleaning/sanitizing the water throughout Nepal would be too expensive for the government to invest in (Kaski, 2013). Even though coliform is not allowed in milk it isn't considered dangerous, when coliform is tested positive in water it will mean that the water is contaminated with animal waste (mostly found in the rumen of a cow's stomach) (Coliform, 2014). Coliform indicates that there are possibly more dangerous bugs inside the water (or milk), the higher coliform concentration the higher chance of a larger threat (Coliform, 2014). Coliforms cause infections within the udder known as mastitis and these environmental pathogens are usually the main reason for mastitis (Jones, 2009). It was found that these pathogens were found in both lactating and non-lactating cows, a watery substance is produced inside the infected quarter which would swell up and cause stress for the cow (Jones, 2009). Cows that are infected would lose their appetite and would lose weight fairly fast since the toxins would increase their body temperature, these cows must be treated fast to eliminate the pathogen because these cows could die within a day or two (10% of them) (Jones, 2009). There is large loss for the producer since milk that is contaminated or treated is unable to be shipped to the processing plant, all the milk must be properly dumped to avoid it from interacting with any cows or people (Jones, 2009). Pathogens enter the cow's udder through the teat duct but healthy teat ducts are designed to stop them from entering the udder (Milking, n.d). However, if the udder duct has come in contact with dirt or

manure the pathogens are still able to enter if the teat is not properly cleaned and sanitized before and after milking (Milking, n.d). Cows that are still in their lactation are least likely to be infected rather than the non-lactating cows since they are cleaned and sanitized at least twice a day during milking (Jones, 2009). Dairy farming consistently requires proper sanitation to avoid any economic loss since livestock will always be prone to sicknesses and infections.

Food safety is major concern for all countries, thus the product that should be introduced to Nepal is a teat dip for the dairy industry. This product is known as preodyne which is a very good dip that can be used prior and post milking, preodyne is designed to eliminate pathogens from entering the teat duct for about 12 hours until the next milking. The product is a liquid that is applied to each teat which can have multiple applicators such as teat dippers, sprayers, foam, or rags/towels. The product is manufactured in Arthur, Ontario by Agrisan who specialize in chemicals and pharmaceuticals, the company focuses on agriculture/food sanitation (Agrisan, n.d). They have an 116000 sq ft facility that can produce large quantities of products and have a Health Canada establishment license to produce the pharmaceuticals as well (Agrisan, n.d). The company is able to produce large quantities of this product per day, a thousand liters will cost around twenty-five hundred dollars (John Mahr, Personal Communication, October 10, 2014). The product costs two dollars and fifty cents per liter so if the product was sold in two and a half gallon jugs (ten liters) it would cost twenty-five Canadian dollars before shipping and handling. This product is continually manufactured if there is a demand and their facility is able to produce as much as they want (John Mahr, Personal Communication, October 10, 2014). The cost is fairly reasonable since the product is dual purpose which makes it much easier to use because only one teat dip applicator may have

to be purchased and maintained for a few cows, shipping is easier as well since some other products may have different specifications such as heat resistance. The active ingredients in Preodyne is Nonylphenoxypoly (ethyleneoxy) ethanol-iodine complex (List, 2013).

Nonylphenoxypoly (ethyleneoxy) ethanol-iodine complex is toxic when digested and the toxin fumes can be released when overheating, iodine atoms are released

(NONYLPHENOXYPOLYETHYLENEOXY, n.d). The flash point is 155.6 °C and the boiling point is 385.2 °C, this shows that the product doesn't have high temperature restrictions

(NONYLPHENOXYPOLYETHYLENEOXY, n.d). This product should be kept away from children to avoid them from consuming this foreign product; labeling should be in English and Nepalese to avoid any issues for the producer and consumer, a lid that is child prove may also be a great method to avoid harm.

This product is ideal for many dairy farmers and it will be a success since there are many small dairy producers present in Nepal. There are about thirteen million cows and buffaloes in Nepal with up to two to twenty liters of milk per day (only the latest artificial inseminated cows) (Kaski, 2013). These cows are mostly holsteins and jersey crossed due to the introduction of artificial insemination, the buffaloes are Murrah cross (Figure 5) (Sharma et al, n.d). Cows are mostly found in the eastern region of Nepal while the buffalo is tripled or quadrupled in the central hills and western hills, these herds are typically about one to four animals which are run by small family owned farms (Sharma et al, n.d). The animals are fed using stalls and they are all fed a diet of green grass and other feeds such as fodder leaves, rice straw/ maize stovers, and tree fodder leaves; cows consume around 25kg while the buffaloes consume around 30kg of feed (Figure 6) (Sharma et al, n.d). These artificially inseminated dairy cows are a lot more

efficient than the local cows/buffalo because they produce more liters with a smaller diet (Sharma et al, n.d). There is a market for milk and other dairy products but the market is separated in three different sections, these sections include rural, urban, and export (Sharma et al, n.d). The rural consists 90% of the market which are small dairy farms that consume their own milk or milk products, however they can be sold on the 'market' without it going through a processing plant (Sharma et al, n.d). Most urban centres obtain the milk through processors, they either process the raw milk and/or manufacture milk products such as cheese and yoghurt (Sharma et al, n.d). There is an increasing amount of chilling centres in Nepal to stop milk from going bad which gives more Nepali dairy producers a chance to sell their product for cash (Sharma et al, n.d). Therefore, the dairy industry is improving to allow dairy farmers to make money and lets them invest in new supplies and technologies such as preodyne, these farmers can be educated about udder health and how this product helps their income. These two and a half gallon jugs can last these producers for a long time so the demand will not be extremely high throughout the year.

There are some great benefits for Canada if the product is being exported to Nepal, when Canada exports goods to foreign countries it improves the businesses that are involved such as the manufactures and the shipping companies, trade is a key component of living standards and incomes for every citizen (Canada's, 2012). Canada's imports and exports calculated up to 1.1 trillion dollars in 2011 which determines the GDP in Canada, tariffs within a country can be a method to increase or decrease the exportation and importation (Canada's, 2012). The number of jobs within Canada can be increased through exportation since one of every five jobs in Canada rely on exporting products, Agrisan could potentially increase their

facility to make large quantities of preodyne if it is necessary (larger quantities manufactured means that it may be cheaper for the producer and consumer); growing businesses are essential to Canada because jobs are formed which is important for a successful economy (Canada's, 2012). Even if there aren't any newly formed jobs to increase production, jobs will still be needed to ship the product by land, sea, or air. The government relies on growing companies since they are more likely to stay in business and they will pay larger amounts of taxes, this will benefit the public because more money can be spent on health care or other public services (Canada's, 2012). This company should rely on foreign trade because dairy farming in Canada is fairly small compared to farms across the globe and Canada may not have a large demand for such products since there is great variety of products on the market. With the company selling in multiple countries it can start comparing what products a specific country needs, for example Nepal may need a stronger teat dip solution for the teats since the conditions (cows are dirtier) are bad compared to western dairy farms. This allows companies to be more diverse in their products and to become more specialized in the industry (Canada's, 2012).

Nepal will have great benefits if the product were to be sold to dairy producers because their quality of milk will be improved and the production will also be improved (Howard, n.d). If cattle are pre-dipped, cleaned, and post-dipped during the milking procedure the somatic cell count will be lower than a cow that is not properly sanitized, the chances of getting mastitis will be lowered dramatically (Howard, n.d). Nepal will benefit greatly because it forms a barrier to stop the pathogens into the udder that may cause infections that are painful and lower milk production which can economically hurt a producer that only has a few cows or buffalo. Since

dairy cows in Nepal don't produce that much milk the producer must rely on every liter to make the business affordable. Therefore, the quality of milk can improve production/business and it will be much healthier for the consumers; the SCC can be harmful for people because this will be a transfer of pathogens from the cow to a person. If milk were to be pasteurised it could kill the pathogens but many producers consume their own milk which can be a major risk.

If the product were to be shipped to Vancouver it would go on freight ships and be shipped to either one of the two ports that are located in India (Kolkata and Haldia) (Consulate, 2013). The shipment from Arthur, Ontario to Vancouver would cost around \$7000 for a shipment of 26,000 liters (40 foot container), the company will ship the product straight to the port since the product is already in a forty foot shipping container. The price of shipping a full 40 foot container load (with insurance) is estimated to cost around \$2,500 to \$2,800 from Vancouver, Canada to Kolkata, India (World, n.d). Nepal has made an agreement with India for them to receive imports through these ports and export through them as well (Consulate, 2013). Nepal relies on these ports since they are landlocked which is a massive disadvantage for Nepal because it makes it much harder for foreign products to be introduced into the country. When the products arrive at the port the shipment containers will to be set on a train that will go straight to Birgunj, Nepal (Consulate, 2013). When the products arrive in Birgunj they will have to be distributed by vehicle to the shops around the country, small loads will have to be sold to Nepalese hardware stores. However, there are multiple options for the product to be sold across Nepal, the first option is that the product has to be sold in rural villages where dairy producers would actually go, the second option is that the product might have to be stored in a

few warehouses across Nepal so sales reps could bring the product straight to the producers door; it will create more jobs in Nepal.

Since the product is sold in two and a half gallon jugs the smaller producers will still be able to purchase the product, the product costs \$2500 for a 1000 liters, \$7000 to transport 26000 liters to Vancouver and around \$2800 to ship overseas to Kolkata, India. The price will be around \$72 Canadian dollars before it travels on railroad to Nepal, therefore after most of the costs are covered the product should be around \$85-\$95 Canadian dollars for the producer in Nepal. If a producer were to have four dairy cows that could produce 20 liters each it could be affordable because producers are paid around 24-28 Nepalese Rupee per liter (Selling, 2013). Therefore, if the producers are paid 26 Rs per liter and one Canadian dollar equals 88 Rs, then a producer will make around 23 Canadian dollars a day. The product will be reasonable because it will only take four days for them to pay for the product and this product can last them a long time, it can be very beneficial for these producers to invest in the product.

Teat dip is very important for the dairy industry so it must be advertised properly. The producers cannot afford media such as television or radios, so the product must be introduced to the product via communication. Therefore, some people in Nepal must be educated to forward the information about preodyne and these educators may be sales reps that travel around the country selling the product. The sales rep must talk about the benefits of the product and how it is used since these people may have never seen or heard of it before. Another great way to advertise the product is by having small workshops in local villages throughout the country where these producers can come and listen about the importance of teat dip, these workshops can also increase communication within the dairy industry.

Communication is key for these developing nations because there must be a flow of information from other producer to producer; if a producer were to use the product and saw good affects then they could tell and show this to his/her neighbours.

Even though Nepal may not have great milk quality or might only have four cows, there are still products similar that are available in the country or India and China. There are most likely larger farms that use some sort of product like preodyne because they are already educated about farming at a larger scale. On an Asian website called Alibaba there are products that are on the market that are similar because they're either pre, post or both dips. China and India produce massive amounts of milk so they do have these types of technologies but Nepal doesn't have the money to invest in the product or advertising the importance of udder wash. There will always be global competition since dairy farming is at a global scale (Table 1), farms in Europe and North America are much more advanced and their products continually change.

Preodyne is recommended because it will be a great product for Nepalese producers to invest in if they understand the importance of the product and willing to invest in it. Milk has become an important food source for many people across the globe and Nepal has an opportunity to become more specialized in the dairy industry. Both Nepal and Canada can become larger trading partners in the future if this product is successful, more products in the dairy industry can be exported to Nepal if the government and producers want to advance their technology. Dairy farming continually changes so countries must keep up with competing countries so they do not fall far behind. Some future studies that may have to be conducted are the tax rate in Nepal, the transportation costs within Nepal, the legal documents that are needed for exporting the product, and loans and grants from the government.

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Appendix:

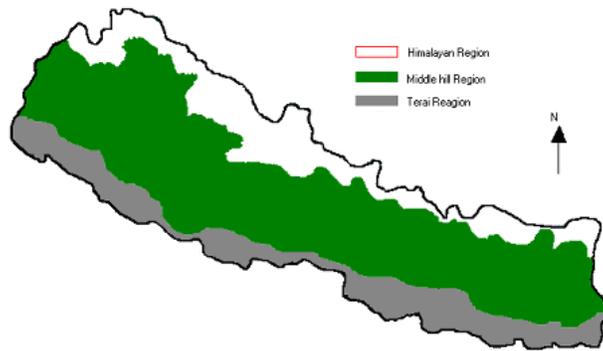


Figure 1 (Geography, n.d)

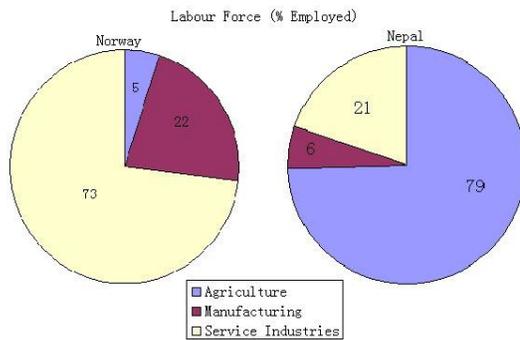


Figure 2: (Daphne, 2011)

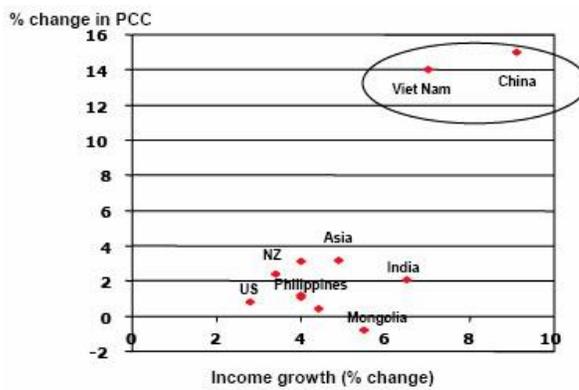


Figure 3: (Morgen, 2008)

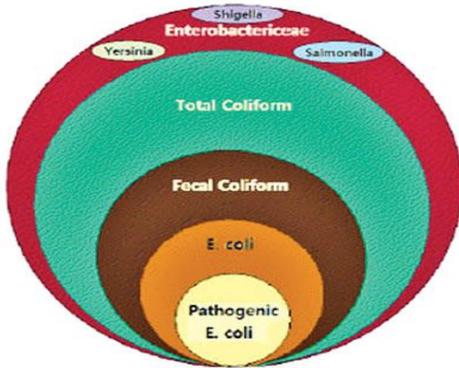


Figure 4: (Gartaula, n.d)

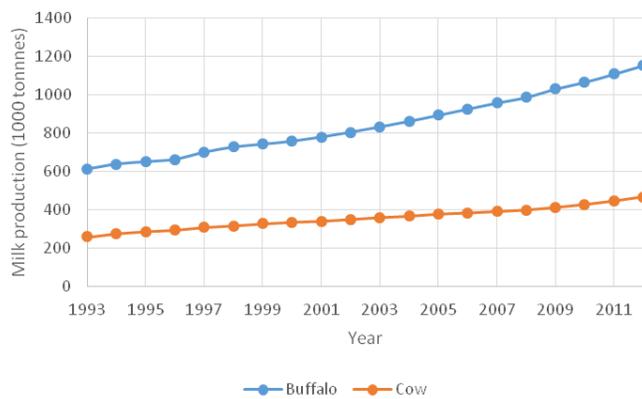


Figure 5: There are more buffalos

milked because cows are still being introduced (Ghimire, 2014).



Figure 6: (Poudel, 2012)

Product	Company
Iodip 5	Agrisan Specialty Chemical & Pharmaceutical
Della-Pro	DeLaval Inc.
4XLA	Ecolab Co.
Oxy-Gard Sanitizing Teat Dip	Ecolab Co.
Theratec Pre and Post Sanitizing Teat Dip	GEA Farm Technologies Inc.
Della-Pretech Plus	DeLaval Inc.

Table 1: These are all pre and post dips that are recommended by Canadian veterinarians. (List, 2014)

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