

Chlorhexidine Udderwash as Aide in Mastitis Reduction  
Export Evaluation

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## **PART ONE PRODUCT INFORMATION**

### **CANADIAN DAIRY**

The dairy industry in Canada is a profitable and complex production chain that encompasses input from multiple sectors including producers, processors, distributors and the government (Government of Canada 2014). Working on a mass scale, over 12 000 farms across the country provide nearly 8 billion litres of milk annually which translates into 10 billion dollars of economic revenue (Government of Canada 2014). A cornerstone in the Canadian dairy industry is the concept of biosecurity. Farmers are educated on livestock disease risks such as mastitis that result in decreases in quality of milk which reduces operation profitability. Similarly, the government is aware of public health risks that are related to the same disease processes (Government of Canada 2014). To address these issues, the dairy industry in collaboration with the Canadian government has implemented biosecurity regulations into the production chain. To reduce the risk of transmission of contaminants such as bacteria, sanitation protocols for equipment as well as livestock are strictly adhered to. Today, the primary step in the milking procedure is regular use of udder washes and teat dips to reduce risk of mastitis and contamination of milk (Gerry Lange, personal communication, October 11, 2016).

### **HEXIPREP- PRODUCT ANALYSIS**

#### a) **PRODUCT INFORMATION**

HexiPrep is a chlorhexidine based udder wash that is manufactured by Agrisan Specialty Chemical in Arthur Ontario. It is specifically designed to be used daily as an antimicrobial wash to remove organic debris from the teat prior to milking. This effectively works to reduce the load of mastitis causing pathogens found on the teat thereby decreasing the occurrence of mastitis (Blowey & Edmondson, 2010). HexiPrep is distributed in a concentrated liquid form of 1.75% chlorhexidine and requires dilution prior to use (Gerry Lange, personal communication, October 11, 2016). After dilution, HexiPrep is utilized to wash the teats and udder and then is wiped off with a clean cloth or

paper towel prior to milking (Blowey & Edmondson, 2010). A specific contact time for efficacy is not required (Gerry Lange, personal communication, October 11, 2016). It is available in multiple container sizes including 4L, 18L, 208L and a tote. Specific product details about HexiPrep are listed in Table 1. The main ingredient in HexiPrep, chlorhexidine, is not considered by the government to be a controlled substance. Thus, this product does not have any legal or label restrictions that would hinder export out of the country (Gerry Lange, personal communication, October 11, 2016). Contact information for Agrisan Specialty Chemical can be found in Appendix A, Table 2.

**Table 1. HEXIPREP PRODUCT DETAILS**

<b>Size</b>	<b>DIN #**</b>	<b>Active Ingredient</b>	<b>Retail Cost**</b>	<b>Dilution 30ml per 10L water</b>	<b>Cost/ L</b>
4L	02299720	Chlorhexidine acetate	\$26.95	Results in 1333L solution	2 cents/L

Retrieved from (Emily Pullin, personal communication October 25, 2016) and (Gerry Lange, personal communication, October 11, 2016)

\*DIN – Drug Identification Number, required for approved sale in Canada

\*\* Retail price in Canadian dollar after seller markup

**b) SPECIFIC PRODUCT BENEFITS**

In evaluation of a product with regards to suitability for export it is important to understand the specific benefits that product provides. As outlined and explained in Figure 1, HexiPrep has assets that make it a useful potential product in a variety of situations related to udder care and long term farm use.

**Figure 1. SPECIFIC BENEFITS OF HEXIPREP**

<b>Benefit</b>	<b>Significance</b>
<b>Broadspectrum Activity</b>	Chlorhexidine is a broadspectrum antimicrobial. This means that it has an effect on a large range of important pathogens including gram negative and gram positive bacteria as well as certain yeast and fungi (Blowey & Edmondson, 2010). Additionally, chlorhexidine is less effected by the presence of organic matter then other antimicrobials and remains active on the teat for a period of time after washing (Blowey & Edmondson, 2010).
<b>Storage</b>	HexiPrep is very stable and does not degrade quickly. This means that its shelf life can be several years in length. Recommended storage is 15-30°C in low light conditions however it can withstand freezing and thawing with no damage (Gerry Lange, personal communications, October 11, 2016).
<b>Safety Human/Animal Use</b>	HexiPrep has a pH close to 7 and therefore is non irritating to teats and hands even with multiple uses per day (Gerry Lange, personal communications, October 11, 2016). Additionally, Health Canada has stated that dermal uptake of chlorhexidine with product use is minimal and that chlorhexidine is noncarcinogenic (Government of Canada, 2013a). Chlorhexidine disinfectants are commonly used in human hospitals on a daily basis (Gerry Lange, personal communications, October 11, 2016).
<b>Safety Environment</b>	Multiple studies have been performed by the Canadian government on agricultural chlorhexidine use and the environment. Although regulation and monitoring of products entering the environment is still necessary, studies have concluded that although chlorhexidine does meet the criteria for perseverance in an environment, it does not meet the criteria to be considered a chemical that bioaccumulates (Government of Canada, 2013b).
<b>No Iodine</b>	Iodine uptake by livestock or in milk can occur when iodine based antimicrobials are not removed from the teat effectively enough after use (Castro, Berthiaume, Robichaud & Lacasse, 2012). Iodine is used by the body in the conversion of thyroid hormones therefore regular increased uptake will cause thyroid dysfunction (De Leo, Lee & Braverman, 2016). This risk is a specific concern with developing countries like Nepal where the use of products like udder washes may be a novel process, leading to some error in use. A recent study

<b>No Iodine</b>	in Nepal found that the current iodine levels in a large portion of women's breast milk was far above what the World Health Organization recommended for child development (Henjum, et al., 2016). In these cases, ensuring no additional iodine is consumed is critical.
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c) COMPANY INFORMATION

Agrisan Specialty Chemical was established in 1995 in Arthur Ontario Canada with the goal of providing state of the art and competitive products in the field of agricultural and food sanitation (Agrisan, n.d.). Agrisan manufactures products for an assortment of sectors including livestock veterinary drugs and livestock biosecurity. Additionally, they assist in research and development of new products and work with Health Canada regarding regulatory guidance for new product submissions (Agrisan, n.d.). Agrisan possesses a Health Canada Establishment licence which ensures they upholds regulatory standards with manufacturing and distribution of their products (Government of Canada, 2016a).

All business is conducted on site. The Arthur location includes the main office, research and testing lab, manufacturing plant, packaging and storage areas as well as a distribution center (Agrisan, n.d.). Agrisan Specialty Chemical utilizes a chain of distributors and does not sell product direct to consumers. Currently, Agrisan has seventeen full time employees and participates very minimally in foreign export (Gerry Lange, personal communication, October 11, 2016).

When looking to initiate growth in avenues such as export tools such as a SWOT analysis are useful during initial project planning. A SWOT analysis looks at the internal strengths and weaknesses in a business as well as evaluates external opportunities and threats (Shaoming, Daekwan & Tamer, 2009). This tool is beneficial as it assists in clarifying company qualities that should be exploited in a new venture and highlights shortfalls allowing for implementation of improvement strategies (Shaoming et al., 2009). Figure 2 illustrates an example of a SWOT analysis with regards to Agrisan and export of HexiPrep to Nepal.

**Figure 2. SWOT ANALYSIS - HEXIPREP EXPORT TO NEPAL**

<b>INTERNAL</b>	
<b>Strengths</b>	<ul style="list-style-type: none"> <li>✓ Well known locally, good standing with the Canadian Government</li> <li>✓ Smaller operation, therefore is able to respond to situations quickly</li> <li>✓ Packaging is completed on site therefore accommodations are more easily made</li> <li>✓ Well educated and established team</li> <li>✓ Works in human and animal sectors therefore has wide knowledge base and strong quality assurance standards</li> </ul>
<b>Weakness</b>	<ul style="list-style-type: none"> <li>✓ Limited experience with high volume exports</li> <li>✓ Has minimal global market presence</li> <li>✓ Limited knowledge of foreign markets such as Nepal</li> <li>✓ Smaller operation, therefore has potentially less financial depth to fund export costs</li> </ul>
<b>EXTERNAL</b>	
<b>Opportunities</b>	<ul style="list-style-type: none"> <li>✓ Government of Canada provides support for new agricultural and export endeavours</li> <li>✓ There is a large market potential for HexiPrep in Nepal</li> <li>✓ There is currently no established similar product in Nepal</li> </ul>
<b>Threats</b>	<ul style="list-style-type: none"> <li>✓ There are global competitor companies that have experience with export and offices in China and India</li> <li>✓ Competitors also exist in China and India</li> <li>✓ Initial market growth in Nepal will most likely be slow</li> </ul>

### **MARKET ANALYSIS**

Important to the success of the export process is a viable consumer market in the importing country. Potential foreign markets are determined by degree of need or interest in the product, potential for sale within those markets as well as the availability of distribution chains (Shaoming et al., 2009). Agriculture and related agricultural activities such as dairy account for over 1/3 of Nepal's annual GDP. This provides a large overall potential market for a product like HexiPrep. Additionally, Nepal is classified as a developing country (The World Bank, 2016). This provides an opportunity for use of HexiPrep to become integrated into the local market as practices become better established. This situation provides many opportunities for expansion and growth in the future.

The potential market in Nepal can be further divided into several categories: individual subsistence farmers, communities, larger dairies and dairy co-op organizations. As the use of HexiPrep is not limited to cows, the exploration of use with other lactating mammals such as goats may reveal other potential markets. Subsistence farmers and the communities in which they live make up the largest portion of potential market, attributing to nearly 90% of all agricultural holdings in the country (Sharma & Banskota, 2000). Although this portion of the market is significant in size, individual farmers may lack the financial means to purchase the product on a regular basis. The storage and dilution properties of HexiPrep would make it ideal for collective purchase by a community; however, infrastructure problems as described by The World Bank (2016), from urban areas to rural could hinder distribution and overall sales. Nepal does have dairy co-op organizations responsible for overseeing, regulating and distributing milk throughout the country. As a result, a handful of larger dairy operations have been established closer to urban centers (FOA, 2010). These last two portions of the potential market account for a notably smaller percentage of the overall market however hold significantly greater purchasing power. Additionally, in being located closer to urban centers, distribution to these groups is more easily organized and facilitated. Nepal’s dairy co-operatives currently have established transport channels into rural areas (FOA, 2010). With partnerships, these may be utilized to make product more available to smaller communities. Although HexiPrep would be beneficial to the entirety of Nepal’s agricultural dairy sector, export would focus initially on target markets such as the larger dairies and dairy organizations. Table 3 outlines specific companies within Nepal that are part of the target markets.

**Table 3. NEPAL DAIRIES AND DAIRY ORGANIZATIONS**

<b>Dairies</b>	<b>Co Operations</b>
Sitaram Gokul Milks	Dairy Development Cooperation of Nepal
Himalaya Dairy	Central Dairy Cooperative of Nepal
Sujal Milks	Milk Producers Cooperative Society

Retrieved from: (FAO, 2010)



## **DOMESTIC AND FOREIGN COMPETITON**

The market in North America for sanitation products related to mastitis and udder care is currently saturated. There are multiple companies that produce varying formulations and types of antimicrobial products. Agrisan has identified Ecolab as a primary competitor in this market (Gerry Lange, personal communication, October 11, 2016). Ecolab is a global enterprise based out of the United States that has offices stationed around the world, including Canada, China, and India (Ecolab, 2016). Due to scale of operations, Ecolab has significant brand recognition within agriculture markets and possesses established financial collateral. Ecolab produces a chlorhexidine udder wash called Superwash. Other Canadian companies that produce and sell chlorhexidine udder washes includes 3M Canada and Ostrem Chemical Ltd. Foreign competition in this market is also a factor with companies such as Zoohance Biotech Co., Ltd. based out of Ningxia China that produces several udder sanitation products including chlorhexidine based udder dips (Alibaba, 2016). Table 4 provides a comparison of related products. Contact information for competitive companies can be found in Appendix B, Table 5.

**Table 4. PRODUCT COMPARISON**

	<b>Ecolab</b>	<b>Ostrem Chemical</b>	<b>Zoohance Biotech</b>
<b>Product</b>	Superwash	H-50 Udderwash	Pre-milk Sanitizer
<b>Price</b>	*company unable to provide price to non-distributor	\$27.50 (4L)**	\$23.50 (5L)**
<b>Available sizes</b>	18.9L	4L, 20L, 56L, 205L	5L, 25L, 200L
<b>Dilution</b>	30ml per 18.9L water	30ml per 10L	*information not available

Retrieved from: (Vanda Highland, personal communications, November 14, 2016) & (Ben-Ostrem employee, personal communication, November 16, 2016) & (Alibaba, 2016)

\*\*retail price in Canadian dollar after seller markup

## **EXPORT PROCESS**

The Canadian export process is a complex system that requires strict adherence to regulation and user knowledge. The first step in the process is for a company to obtain an import-export account via a registered business number. From there, the exporting company must evaluate whether the product in question can legally be exported out of Canada as well as imported into the target country (Government of Canada, 2016b). Furthermore, it must be established if the product belongs to a controlled or limiting category. As previously mentioned, there are no restrictions or special permits required with regards to the export of HexiPrep. Once these steps have been finished, paperwork such as the Export Declaration Form must be completed, including appropriate export codes. This paperwork must be submitted prior to the product leaving the country and can be submitted either electronically or via hard paper copy. Transport arrangements are the responsibility of the exporting company (Government of Canada, 2016b). Establishing export of product requires solid knowledge of domestic and foreign legalities and can be a costly endeavour (Shaoming et al., 2009). To assist with these challenges, the Canadian government provides organizational and logistical supports as well as monetary assistance funds. A list of these supports can be found in Table 6.

**Table 6.** CANADIAN EXPORT SUPPORTS

<b>Canadian Border Services Agency</b>	<ul style="list-style-type: none"> <li>✓ Provides step by step instruction on exporting</li> <li>✓ Provides detailed explanation of necessary documentation</li> <li>✓ <a href="http://www.cbsa-asfc.gc.ca/export/guide-eng.html">http://www.cbsa-asfc.gc.ca/export/guide-eng.html</a></li> </ul>
<b>Canadian Trade Commissioner Service</b>	<ul style="list-style-type: none"> <li>✓ Provides direct consultation and advice with regards to entirety of export process including knowledge of importing country</li> <li>✓ Has an office located in Nepal</li> <li>✓ <a href="http://tradecommissioner.gc.ca/index.aspx?lang=eng">http://tradecommissioner.gc.ca/index.aspx?lang=eng</a></li> </ul>
<b>Global Opportunities for Associations</b>	<ul style="list-style-type: none"> <li>✓ Potential funding source</li> <li>✓ <a href="http://tradecommissioner.gc.ca/funding-financement/goa-oma/index.aspx?lang=eng">http://tradecommissioner.gc.ca/funding-financement/goa-oma/index.aspx?lang=eng</a></li> </ul>
<b>CanExport</b>	<ul style="list-style-type: none"> <li>✓ Potential funding source</li> <li>✓ <a href="http://www.international.gc.ca/canexport/index.aspx?lang=eng">http://www.international.gc.ca/canexport/index.aspx?lang=eng</a></li> </ul>
<b>Export Development Canada</b>	<ul style="list-style-type: none"> <li>✓ Provides several financial assistance programs to assist in funding start up and process costs</li> <li>✓ <a href="http://www.edc.ca/EN/About-Exporting/Trade-Links/Pages/financing.aspx">http://www.edc.ca/EN/About-Exporting/Trade-Links/Pages/financing.aspx</a></li> </ul>

Retrieved from: (Government of Canada, 2016b)

## **CANADIAN BENEFITS**

### **DIRECT**

Currently in Canada revenue from imports and exports account for over 30% of the gross domestic product (The World Bank, 2013). GDP can be considered an overview of the status of a country's economy (Statistics Canada, 2016). Therefore, the successful export of HexiPrep will contribute to a growth of Canada's overall GDP, improving economic stability. The export of this product will also provide the opportunity for a Canadian company, Agrisan, to enter the global market. Increased revenue from sales of HexiPrep will provide the financial means for expansion of business on home soil. This will result in potential job opportunities as a larger staff will be required.

### **INDIRECT**

Agrisan is first and foremost a company dedicated to innovations in the field of sanitation (Gerry Lange, personal communication, October 11, 2016). Increased revenue through export will provide a larger fund to utilize with regards to product research and development. This will allow Agrisan to remain competitive in the market and could result in discoveries with significant safety or environmental impact. Additionally, as the export process involves multiple secondary parties, including advisors, banks, transport, marketers and distributors (Shaoming et al., 2009), the export of HexiPrep will provide the opportunity for secondary financial and job growth in these sectors. Finally, this export provides the chance for Canada to become a larger contributor to the solutions based assistance required by Nepal. Introduction of HexiPrep can open the door for involvement and knowledge sharing between groups such as the Canadian Dairy Association and Nepal's Dairy Co-operatives. This could lead to eventual export of other beneficial agricultural products related to dairy and the dairy business.

## **PART TWO PRODUCT IMPORTANCE IN NEPAL**

### **OVERVIEW OF NEPAL AND ITS DAIRY SECTOR**

Nepal is a small country located in Asia between China and India (OEC, 2015). Classified as a low income, food deficient country by the Food and Agriculture Organization of the United Nations, Nepal's GDP sat at just over 20 billion dollars in 2015. Over 1/3 of the total GDP was the result of the agricultural sector (The World Bank, 2016). Current challenges to economic growth in Nepal include poor overall infrastructure such as roads, electricity and water and a difficult regulatory environment for businesses. The constraints in the business sector stems from the involvement of over 41 government agencies and ministries in regulation. This has resulted in a general public reluctance towards regulation, inspection and taxation (The World Bank, 2016). Despite these issues, Nepal has seen a 16.6% increase in global business through imports since 2009 (OEC, 2015). The largest portion of imports occurs with Nepal's neighbours, India and China (OEC, 2015).

Nepal's population as of 2015 was slightly greater than 28 million people (The World Bank, 2016). Of the total population, 86% actively practice Hinduism (FOA, n.d.), a fact that significantly impacts diet and livestock production in the country. The majority of men and women in Nepal are located on rural farms away from major urban centers with subsistence farming accounting for over 90% of all agricultural holdings (FOA, n.d.). This dramatically impacts the overall welfare of the population. Greater than 56% of the populace are considered to live under the poverty line, 40% have inadequate access to food and over 17% are considered undernourished (FOA, n.d.). Life expectancy in Nepal is estimated to be only 62 years for both men and women (FOA, n.d.). The three top crops grown in Nepal are rice, sugar cane and vegetables and the top three livestock productions are cow milk, buffalo milk and eggs (FOA, n.d.).

In relationship to the high level of subsistence farming in Nepal, dairy herds typically consist of only 2-3 animals. Buffalo, along with indigenous types of cattle, sometimes crossbred to Holstein or Brown Swiss make up the common breed types used (Sharma & Banskota, 2000). For its small size, Nepal boasts a high density of lactating animals with over 7 million cattle and 3.5 million buffalo respectively. However total milk production is only slightly greater than 1 million tonnes annually (Sharma & Banskota, 2000). This indicates a high number of unproductive animals in the country. Most milk collected on farms is consumed on site either as fresh milk or as traditional dairy products. Excess milk, if storage or transportation is available, is traded directly with consumers or collecting agents for use in urban centers or for export (Sharma & Banskota, 2000). In Nepal, the Milk Producers Cooperative Society, a substituent of the government, has developed a three tiered system along side dairy cooperatives in multiple districts. The purpose of this system is to support the financial and social improvement of rural dairy producers by acting as an efficient channel between rural producers and urban milk processing industries (FOA, 2010).

#### MASTITIS-A CHALLENGE TO NEPALESE DAIRY

Mastitis is an inflammation of the udder due to external pathogens that results in increased cell count and infection. It can be classified as subclinical or clinical as well as contagious or environmental depending on the origin of the infecting pathogen (Blowey & Edmondson, 2010). A common problem in Nepal, mastitis effects 65% of the population of lactating animals, of which 57% is caused by an environmental agent (Acharya 1995). Common pathogens associated with environmental mastitis are listed in Table 7. The prevalence of environmental mastitis is correlated to animal husbandry and sanitation practices. Currently subsistence farmers in Nepal lack resources and a structured sanitation protocol for milking (Ng et al., 2010). The effects of mastitis include bacterial contamination of milk, decreased quality of contents of milk, and decreased or cessation of milk production. In severe cases, mastitis can lead to the death of the animal (Blowey & Edmondson, 2010). These consequences have dire effects on farmers and their welfare.

**Table 7. COMMON ENVIRONMENTAL CAUSES OF MASTITIS**

✓ Streptococcus uberis	✓ Bacillus licheniformis
✓ E. coli	✓ Pasteurella
✓ Enterobacter	✓ Streptococcus faecalis
✓ Klebsiella	✓ Fungi
✓ Psuedomonas aeruginosa	✓ Yeast
✓ Bacillus cereus	

Retrieved from: (Blowey & Edmondson, 2010)

## **NEPALESE BENEFITS**

### **DIRECT**

Subsistence farmers in Nepal live with a very small financial margin therefore mastitis poses a significant financial threat in multiple ways. When trade of milk for product or money is depended on to provide the means to eat or farm, decreased yield of milk from lactating animals can have long lasting effects. Additionally, as mastitis changes the cellular content of milk, including casein levels (Blowey & Edmondson, 2010), the quality of sellable dairy products such as cheese made from the milk significantly lessens. Finally, mastitis associated animal death can be considered a crisis as procurement of a replacement animal for labour and milk production may not be financially possible. Treatment of mastitis once present in an animal is a challenge in Nepal due to costs and limited availability of animal health services (FOA, 2010). HexiPrep provides the opportunity to act in a preventative manner to reduce the prevalence of mastitis before it occurs. Studies have demonstrated that environmental mastitis responds to changes in sanitation and husbandry practices with a reduction rate of 43% with regular use of udder washes (Blowey & Edmondson, 2010). An overall reduction of mastitis in Nepal will lead to greater financial stability in its farming population.

Industrial pasteurization of dairy products prior to consumption is uncommon in Nepal with the majority of milk being either boiled or consumed raw (Ng et al., 2010). Bacterial contamination of milk as a result of mastitis poses a significant public health risk with staphylococcal food poisoning being the prevailing food related illness found worldwide (Johler, Layer & Stephan, 2011). This situation is amplified by the proliferation of bacteria in milk in poor storage areas, as found in Nepal (Johler, Layer & Stephan, 2011). Uncontaminated milk is a high nutrient dense food source. It

contains fats, carbohydrates, vitamins, minerals and protein that consists of all essential amino acids (Field & Taylor, 2012). Utilizing HexiPrep to decrease the occurrence of mastitis will improve public health and assist in boosting national food security.

### INDIRECT

Similar to the organizational processes that are required to arrange export on the Canadian side, facilitating the import, storage, distribution and marketing of HexiPrep in Nepal will require input from local Nepalese businesses. This will result in stimulus for growth and job opportunities in this sector. The import of HexiPrep also provides opportunities for local individuals to pursue entrepreneurial endeavours such as becoming district product representatives involved in demonstrations, training and sales. In support of entrepreneurs, Nepal hosts several support systems such as the Project for Agriculture Commercialization and Trade that works with individuals to form strategic business connections (The World Bank, 2014).

As discussed earlier, a large proportion of cattle and buffalo in Nepal are unproductive. The use of HexiPrep as an aide in the reduction in mastitis will assist in decreasing the discrepancy between annual milk production and number of lactating animals in the country. Increased production of higher quality milk with lower bacteria counts provides the means for improved revenue through expansion of export of milk and dairy products. In addition, higher demand for dairy products will provide employment and growth opportunities for processing operations in the major urban centers (FOA, 2016).

### IMPORT PROCESS

Import of products from Canada falls under the classification of “Third Countries” according to the Nepalese government (The Government of Nepal, 2016). The main process on which import-export transactions occur revolves around the utilization of letters of credit. In this system, a bank acts as an intermediary to facilitate payment to the exporting country so that product can be shipped (The Government of Nepal, 2016). Once product has arrived in Nepal it must be assessed and

processed through customs before being approved to enter the country. In addition to ensuring necessary documentation is in order, custom offices are responsible for collecting import duty (The Government of Nepal, 2016). Successful import of product into Nepal requires specific documentation such as a Packing List, describing the quantity, weight and type of product and a Bi.Bi.Ni. Form 4, which is necessary at customs and acts as a guarantee appropriate payment has been made (The Government of Nepal, 2016). Contact information for the head and airport customs offices can be found in Table 8.

**Table 8.** NEPAL CUSTOMS CONTACTS

<b>Department of Customs</b>	Tripureshwor, Kathmandu Telephone: 01-425-9861 Email: <a href="mailto:csd@customs.gov.np">csd@customs.gov.np</a>
<b>Tribhuvan Airport Customs</b>	Kathmandu, Metropolitan Ward no.35, Gauchar Telephone: 01-447-0382 Email: <a href="mailto:tia@customs.gov.np">tia@customs.gov.np</a>
<b>Department of Customs Website</b>	<ul style="list-style-type: none"> <li>✓ Provides information on commonly asked questions regarding imports</li> <li>✓ Describes necessary import paperwork.</li> <li>✓ <a href="http://www.customs.gov.np/en/faq.html">http://www.customs.gov.np/en/faq.html</a></li> </ul>

Retrieved at (The Government of Nepal, 2016)

## **TRANSPORTATION**

The logistics of transportation in the export process are most commonly arranged through ocean and air shipping and provide opportunities for economies in scale and distance (Shaoming et al., 2009). Ocean shipping with HexiPrep would involve land transport utilizing a train or trucking service from Arthur Ontario to a Canadian coastal port. Product would then be loaded on a liner for transport to India and then moved by land transport into Nepal. Import products entering Nepal through India require additional customs paperwork (The Government of Nepal, 2016). Challenges with ocean shipping include a more complex transportation chain, less flexibility in shipping times and decreased predictability in product arrival time. However, ocean shipping allows for shipping of mass quantity of product and overall cost is generally less than air shipping (Shaoming et al., 2009).



Utilizing air transport to facilitate shipment of goods would require land transport via a trucking service from Arthur Ontario to the Pearson International Airport in Toronto Ontario. Product would then be flown directly to Tribuvan International Airport in Nepal. Benefits of air shipping involve a simpler, more direct transportation chain, as well as faster, more flexible and reliable transport times. Challenges to air shipping include limitations in volume capacity per flight and cost (Shaoming et al., 2009).

Until market demand for HexiPrep is established, product will most likely be exported to Nepal in smaller amounts to lessen financial risk. Initial shipments of 100-200 bottles would best be sent by air shipment. Although ocean shipment is less expensive, the sale from this volume of product will not compensate for the additional land transport costs associated with ocean transport. Growth in the volume of product exported or size of product containers desired will allow for reevaluation of export transport options in the future. Table 9 provides an estimation of air shipment of 400kg, or 100 bottles of HexiPrep from Canada to Nepal. Additional costs such as taxes, insurance or freight have not been included.

**Table 9.** AIR TRANSPORT COST ESTIMATION 400KG PRODUCT

<p><b>A1 Freight Forwarding</b>          Telephone:          1-800-280-0277          Email: a1freightforwarding.com</p>	<p><b>From Toronto to Kathmandu</b>          \$1660.00 CAD</p>
<p><b>Canada          Transportation.com</b></p>	<p>✓ Provides a list of transportation companies involved in export in Canada          ✓ <a href="http://www.canadatransportation.com/Export_Import_hAA.htm">http://www.canadatransportation.com/Export_Import_hAA.htm</a></p>

Retrieved from: (A1 Freight Forwarding, 2016) & (Canada Transportation, 2015)

## **MARKETING STRATEGY**

Utilizing appropriate marketing strategies for new products is directly related to the success of the export (Shaoming et al., 2009). Outside of small areas in urban centers, conventional advertising routes such as television, radio or internet might not possible in Nepal. Therefore, it is

important to value local expertise on functional advertisement options as well as trends in population purchasing habits and opinions (Shaoming et al., 2009). Appendix C, Table 10 lists examples of marketing and distributing companies based out of Kathmandu Nepal. In addition to marketing knowledge, these businesses provide valuable resources with regards to translation of labelling, storage and distribution routes. Value based marketing with emphasis on product benefits would be an appropriate angle to adopt with the introduction of HexiPrep (Shaoming et al., 2009).

### **CHALLENGES**

The proposal of export of HexiPrep to Nepal presents several difficulties that should be investigated while evaluating this export idea. Figure 3 summarizes the primary challenges related to the success of this proposal.

**Figure 3. EXPORT CHALLENGES**

<b>Challenge</b>	<b>Explanation</b>	<b>Potential Solution</b>
<b>Cost Initiating Export</b>	Startup costs associated with initiating an export project can exceed tens of thousands of dollars and require a company to have sufficient collateral to attain necessary bank loans (Shaoming et al., 2009). As a smaller, more recently formed company, Agrisan may lack the financial means to accomplish the export proposition.	As outlined in Table 6, the Canadian government provides financial assistance opportunities for local business expansion such as export. In addition, the government provides knowledge based resources to help navigate various types of loan systems.
<b>Cost Customer Purchase</b>	Product price in Nepal will be the result of manufacturing and export costs therefore determining exact cost is not possible at this time (Shaoming et al., 2009). Markup cost will more then likely result in a higher cost per unit than seen in Canada.	Initial sale of product should be focused on target markets around urban centers that possess larger spending power. Additionally, organizing the sale of product around community purchases will be beneficial. To assist low income individuals with purchase, organizations such as the CECI could be contacted for aide.

<b>Distribution</b>	Infrastructure in large portions of Nepal are very poor (The World Bank, 2016). This limits the use of conventional transportation routes to deliver product to consumer markets.	This challenge may be partially overcome by partnering with other businesses or organizations that have established distribution routes such as Nepal’s dairy co-operatives (FOA, 2010). See Appendix C for other Nepalese distributors who could act as buyers. The convenience of the size and weight of a 4L bottle of HexiPrep with regards to transport could also be exploited.
<b>Perceived Value Compliance</b>	Resistance to change can be a natural human response particularly if something has been completed in a certain fashion for generations (Werner & Lynch, 1994). Compounding this issue is the fact that use of HexiPrep does not produce immediate gratification. Benefits are only seen after a period of use.	It is important to ensure that promotion of this product does not invalidate the Nepalese knowledge or past. Emphasizing the benefits along with demonstrations on trying the product could be helpful in boosting perceived value (Werner & Lynch, 1994).

**FUTURE STUDIES – PROPOSAL EVALUATION**

The backbone of initiating successful export of a new product stems from having the correct knowledge as well as the financial means to support the process until sale numbers increase. It also depends on having a demand for a product at a price consumers can afford (Shaoming et al., 2009). There are multiple financial factors that contribute to retail product price that were not evaluated in this report. Production costs such as labelling, storage, marketing and distribution should be evaluated through direct contact with appropriate companies. In addition, both the Canadian and Nepalese government should be contacted to determine what tariffs or taxes are applicable to the export and import of HexiPrep. Finally, to have a better idea of actual market demand for an udder wash product, it would be beneficial to attain information from Nepal’s dairy co-operations. This will assist in clarifying what products may already be in use, as well as local trends or opinions regarding sanitation and mastitis.

The potential for reduction of environmental mastitis in Nepal through use of regular use of an udderwash such as HexiPrep is significant. The product is easy to use, stores and travels well, and the cost to the Nepalese community appears from initial evaluation to potentially be considered feasible. The limiting factor in this endeavour is likely Agrisan's financial resources and export experience. Utilizing government resources, it would be beneficial to further investigate their ability to initiate the export process in addition to exploring similar chlorhexidine products created by other Canadian companies. In conclusion, this report outlines a beneficial export idea that holds merit for real world application.

## APPENDIX A

**Table 2.** AGRISAN CONTACT INFORMATION

<b>Address</b>	451 Smith Street Arthur, ON N0G 1A0	<b>President &amp; General Manager</b>	Jeff Maher
<b>Phone Numbers</b>	877-731-7194 519-848-2453	<b>Director of Quality and Regulatory Affairs</b>	Gerry Lange MSc/MBA gerrylange@agrisan.ca
<b>Fax Number</b>	519-848-2780	<b>Director of Animal Health Products</b>	Dr. Don Huber DVM donhuber@agrisan.ca
<b>Email</b>	info@agrisan.ca	<b>Inventory Manager</b>	Kyle Maher kylemaher@agrisan.ca
		<b>Quality Control Manager</b>	Donna Dietrich BSc donnadietrich@agrisan.ca

Retrieved from: <http://www.agrisan.ca/contact.aspx>

## APPENDIX B

Table 5. COMPETITOR CONTACT INFORMATION

<b>Ecolab Canada</b>	5105 Tomken road Mississauga, Ontario L4W 2X5 Telephone: 1-905-238-0171 Email: ecolabs@ecolab.ca
<b>Ecolab India</b>	215 Atrium, A 808 Andheri Kurla road, Andheri East Mumbai 400 059, India Telephone: 91-22-66445000
<b>Ecolab China</b>	18 Waterfront Place, 168 Daduhe road Shanghai, China 200062 Telephone: 86-21-6183-2500
<b>Ostrem Chemical Ltd</b>	2310-80 <sup>th</sup> Ave Edmonton, Alberta T6P 1N2 Telephone: 780-440-1911 Email: inquiries@ostrem.com
<b>Zoohance Biotech</b>	No. 6 Yard, Jinxing West road, Huangcun, Daxing District, Beijing, China Website: www.zoohance.com

Retrieved from: (Ecolab, 2016) & (Ostrem Chemical, n.d.) & (Alibaba, 2016)

## APPENDIX C

**Table 10.** MARKETING AND DISTRIBUTION COMPANIES NEPAL

	<b>Ads Market Pvt. Ltd</b>	<b>Welcome Advertising and Marketing Pvt. Ltd</b>
<b>Address</b>	Kamaladi, House no. 309 Kathmandu, Nepal	Bhimsengola, Purano Baneshwor
<b>Telephone</b>	01-421-8069	01-411-6227
<b>Email</b>	info@adsmarket.com.np	inquiry@welcomeadnepal.com
	<b>Ethnicorganic Health Products Ltd.</b>	<b>Galaxy Scientific Trade Ltd.</b>
<b>Company Type</b>	Wholesale supplier of agricultural products Kathmandu, Nepal	Wholesaler and distributor of agricultural products Kathmandu, Nepal
<b>Website</b>	<a href="http://www.exportersindia.com/ethnicorganichealthproducts">http://www.exportersindia.com/ethnicorganichealthproducts</a>	<a href="http://www.exportersindia.com/galaxy-scientific-trade-pvt-ltd/">http://www.exportersindia.com/galaxy-scientific-trade-pvt-ltd/</a>

Retrieved from: (Ads Marketing, n.d.) & (Welcome Ads and Marketing, n.d.) & (ExporterIndia, n.d.)

## REFERENCES

A1 Freight Forwarding. (2016). *Air freight, general cargo shipments*. Retrieved from: <http://www.a1freightforwarding.com/quote/rate2.php>

Acharya KP (1995). Influence of air temperature and precipitation on the incidence of clinical and environmental mastitis in the three dairies. *Proceedings of the 4 th National Veterinary Conference*, volume 21(issue 23) pages 64-71. Retrieved from: <http://narc.gov.np/publicaton/pdf/book/A%20Compendium%20of%20Livestock%20and%20Fisherie%20Research%20Highlights%20in%20Nepal.pdf>

Ads Marketing. (n.d.). *Contact us*. Retrieved from: <http://adsmarket.com.np/>

Agrisan Specialty Chemical and Pharmaceutical. (n.d.). *Home-about us*. Retrieved from: <http://www.agrisan.ca/Default.aspx>

Alibaba. (2016). *Ningxia zoothance biotech co. ltd. Udder sanitation*. Retrieved from: [https://zoothance.en.alibaba.com/product/60402747764-802651714/Sanitizer\\_pre\\_milking\\_teat\\_dip\\_for\\_cow.html](https://zoothance.en.alibaba.com/product/60402747764-802651714/Sanitizer_pre_milking_teat_dip_for_cow.html)

Blowey, R. Edmondson, P. (2010). *Mastitis control in dairy herds* (2<sup>nd</sup> ed.). Wallingford: CABI. Retrieved from: doi:10.1079/9781845935504.0000

Canada Transportation (2015). *Export and import trucking and transportation companies*. Retrieved from: [http://www.canadatransportation.com/Export\\_Import\\_hAA.htm](http://www.canadatransportation.com/Export_Import_hAA.htm)

Castro, S.B., Berthiaume, R., Robichaud, A., & Lacasse, P. (2012). Effects of iodine intake and teat-dipping practices on milk iodine concentrations in dairy cows. *Journal of dairy science*, volume 95, issue 1, 213-220. Retrieved from: <http://dx.doi.org.subzero.lib.uoguelph.ca/10.3168/jds.2011-4679>

De Leo, S., Lee, S. Y., Braverman, L.E. (2016). Hyperthyroidism. *Lancet*, Volume 388, 906-918. Retrieved from: [http://dx.doi.org/10.1016/S0140-6736\(16\)00278-6](http://dx.doi.org/10.1016/S0140-6736(16)00278-6)

Ecolab. (2016). *Global locations*. Retrieved from: <http://www.ecolab.com/locations/north-america>

ExporterIndia. (n.d.). *Distributor-agricultural product-nepal*. Retrieved from: <http://www.exportersindia.com>

Field, T.G. & Taylor, R.E. (2012). *Scientific farm animal production: an introduction to animal science*. (10<sup>th</sup> ed.). Pearson, Boston, MA.



Food and Agriculture Organization of the United Nations. (2010). *Dairy Sector study of nepal*. Retrieved from: <http://www.fao.org/countryprofiles/index/en/?iso3=NPL&subject=4>

Food and Agriculture Organization of the United Nations. (n.d.). *Country profiles-nepal*. Retrieved from: <http://www.fao.org/countryprofiles/index/en/?iso3=NPL&subject=4>

Government of Canada. (2013a). Health Canada. *Screening assessment for the challenge of chlorhexidine acetate*. Chemical abstracts service registry number (CAS RN):56-95-1. Retrieved from: <http://www.ec.gc.ca/ese-ees/default.asp?lang=En&n=50D4580B-1>

Government of Canada. (2013b). Environment and climate change canada. *Risk management scope for 2,4,11,13-tetraazatetradecanediimidamide, N,N-bis(4-chlorophenyl)-3,12-diimino-, diacetate (chlorhexidine acetate)*. Chemical abstracts service registry number (CAS RN):56-95-1. Retrieved from: <http://www.ec.gc.ca/ese-ees/default.asp?lang=En&n=50D4580B-1>

Government of Canada. (2014). Food inspection agency. *Biosecurity for canadian dairy farms: national standard*. Retrieved from: <http://www.inspection.gc.ca/animals/terrestrial-animals/biosecurity/standards-and-principles/dairy-farms/eng/1359657658068/1359658301822>

Government of Canada. (2015). *Innovation, science and economic developments canada. Company profile: ecolab*. Retrieved from: <http://www.ic.gc.ca/app/ccc/srch/nvgt.do?lang=eng&prtl=1&estblmntNo=123456144547&profile=cmplPrfl&profileId=201&app=sold>

Government of Canada. (2016a). Health Canada Drug and Health Products. *Frequently asked questions- drug establishment licence and fees*. Retrieved from: <http://www.hc-sc.gc.ca/dhp-mps/compli-conform/licences/ren-doc/del-lepp-faq-eng.php>

Government of Canada. (2016b). Canada border service agency. *Step by step guide to exporting commercial goods from canada*. Retrieved from: <http://www.cbsa-asfc.gc.ca/export/guide-eng.html>

Henjum, S., Kjellevoid, M., Ulak, M., Chandyo, R.K., Shrestha, P.S., Froyland, L., Strydom, E.E., Dhansay, M.A., & Strand, T.A. (2016). Iodine concentration in breastmilk and urine among lactating women of bhaktapur, nepal. *Nutrients*, volume 8, issue 5, 255. Retrieved from: doi:10.3390/nu8050255

Johler, S., Layer, F., & Stephan, R. (2011). Comparison of virulence and antibiotic resistance genes of food poisoning outbreak isolates of staphylococcus aureus with isolates obtained from bovine mastitis milk and pig carcasses. *Journal of food protection*, volume 74, issue 11, 1852-1859. Retrieved from:

[http://search.proquest.com.subzero.lib.uoguelph.ca/docview/900925552?rfr\\_id=info%3Axri%2Fsid%3Aprimo](http://search.proquest.com.subzero.lib.uoguelph.ca/docview/900925552?rfr_id=info%3Axri%2Fsid%3Aprimo)

Ng, L., Jost, C., Robyn, M., Dhakal, I.P., Bett, B., Dhakal, P., & Khadka, R. (2010). Impact of livestock hygiene education programs on mastitis in smallholder water buffalo (*babalus bubalis*) in chitwan nepal. *Preventative veterinary medicine* (issue 96), pages 179-185. Retrieved from: 10.1016/j.prevetmed.2010.06.012

OEC. (2015). *Nepal*. Retrieved from: <http://atlas.media.mit.edu/en/profile/country/npl/>

Ostrem Chemical Ltd. (n.d.). *Contact us*. Retrieved from: <http://ostrem.com/contact/>

Shaoming, Z., Daekwan, K., & Tamer, C. (2009). *Export marketing strategy: tactics and skills that work*. Business expert press. Retrieved From:

<http://site.ebrary.com.subzero.lib.uoguelph.ca/lib/ughbep/reader.action?docID=10373441&ppg=18>

Sharma, B., & Banskota, K. (2000). *Smallholder dairy farming in nepal: characteristics, constraints and development opportunities*. Center for resources and environmental studies. Retrieved from: [http://lib.icimod.org/record/21368/files/c\\_attachment\\_79\\_555.pdf](http://lib.icimod.org/record/21368/files/c_attachment_79_555.pdf)

Statistics Canada. (2016). *Gross domestic product gdp*. Retrieved from: <http://www.statcan.gc.ca/eng/nea/list/gdp>

The Government of Nepal. (2016). Ministry of finance. *Department of customs*. Retrieved from: <http://www.customs.gov.np/en/index.html>

The World Bank. (2013). *Export of goods and service as percentage of gdp- canada*. Retrieved from: <http://data.worldbank.org/indicator/NE.EXP.GNFS.ZS?locations=CA>

The World Bank. (2014). *Nepal agriculture commercialization trade*. Retrieved from: <http://www.worldbank.org/en/results/2014/04/11/nepal-agriculture-commercialization-and-trade>

The World Bank. (2016). *Overview countries- nepal*. Retrieved from:  
<http://www.worldbank.org/en/country/nepal/overview>

Welcome Advertising and Marketing. (n.d.). *Contact us*. Retrieved from:  
<http://www.welcomeadnepal.com/>

Werner, T.J., & Lynch, R.F. (1994). Challenges of a change agent. *The journal for quality and participation*, volume 7, issue 3, 50. Retrieved from:  
[http://search.proquest.com.subzero.lib.uoguelph.ca/docview/219125029?rfr\\_id=info%3Axri%2Fsid%3Aprimo](http://search.proquest.com/subzero.lib.uoguelph.ca/docview/219125029?rfr_id=info%3Axri%2Fsid%3Aprimo)