Canada-Nepal Export Product: Livestock Probiotic

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Part 1: Product Information

Product Introduction

Livestock probiotics are a supplement used to improve overall livestock health. Livestock probiotics can be beneficial to many different types of livestock. This would be helpful to numerous Nepali farmers as well consumers due to their wide variety of animals and animal products. This paper will look at a specific livestock probiotic called Enzo-lac which is manufactured by a Canadian company called Bio-Ag located in Wellesley, Ontario. This paper will analyze how Enzo-lac could potentially improve the agriculture sector in Nepal. This paper will also show the benefits of trade to Canada, in addition to Nepal. It will show cost of Enzo-lac as well as shipping, and give prices of similar products from the United States of America to give perspective and a comparison.

Description of Canadian Company

Bio-Ag Consultants and Distributors Inc. is a family company that was founded in 1982. Their mission is "to produce and supply products and services that warrant and support true sustainable agriculture" (*Bio-Ag*, n.d.). Bio-Ag is a major supplier of natural products and services for livestock and crop production. They are based in Wellesley, Ontario, Canada (*Bio-Ag*, n.d.). Enzo-lac being transported from Canada to Nepal could greatly improve general livestock health which would have many positive benefits for Nepali people. Michael Flood (2015), a writer for *The Beef Magazine* talks about probiotics and how they have three main potentials: promoting cattle health, reducing illness occurrences, and improving the public perception of the cattle industry. This probiotic in particular would benefit many livestock industries in Nepal and result in an overall increase in food supply to meet the needs of the Nepal

population. Bio-Ag (n.d.) states that, "We have helped many farmers better utilize their natural resources, to reduce their dependency on chemicals and drugs and to create a more profitable business for themselves. Our customers have seen an improvement in the health of their livestock, improved breeding rates, less burnout, fewer calls to the vet and lower cull rates. We will continue to support the farmer to be prosperous and to leave the land nutrient dense and genetically clean for our children's children". They are a very natural company which is suitable for Nepal because adding complicated chemicals and fertilizers to their land and animals could be problematic. If this company could branch out to Nepalese farmers like they have done to so many Canadian farmers, then they could gain a lot of information.

Product Description

Enzo-lac, also known as Bio-lac, is a microbial growth stimulant that combines a probiotic and live plant enzymes on a GMO free wheat carrier (*Bio-Ag*, n.d.). This product is made on site at the drying facility in Wellesley. Bio-Ag (n.d.) states that Enzo-lac "is a combination of a unique lactobacillus, lactic acid probiotic manufactured using a special patented fermentation process". There are many benefits from using Enzo-lac which include: an increase in immune system strength, improved utilization of protein, increased conversion rates, develops a healthier spleen and improves overall health of livestock (*Bio-Ag*, n.d.). There are a number of goats, yaks, buffalo and dairy cows in Nepal that are a source of milk for Nepalese people. This supplement maximizes milk production by stimulating rapid rumen fermentation, as well as reducing the risk of sickness and mortality in offspring (*Bio-Ag*, n.d.). Enzo-lac also improves the average daily gain, feed efficiency and better overall herd health (*Bio-Ag*, n.d.). This product is extremely beneficial to all livestock because the formula increases absorption of nutrients which adds to the efficiency and effectiveness of the feeding program (*Bio-Ag*, n.d.).

Therefore it would be very advantageous to Nepalese farmers as they would have healthier animals as well as an increase in the amount of milk produced.

Enzo-lac is a dry feed supplement, so it stores best in dry cool areas and has 2 year shelf life, but it does not need to be refrigerated (Oesch, 2015). This is great for transportation purposes as well as storing in Nepalese homes due to the lack of electricity and refrigeration. The recommended dosage of various animals is supplied in a table below, numbers provided from Bio-Ag (2015).

Figure 1: Recommended Dosage

Livestock	**Recommended Dosage per animal per day**
Lactating Dairy Cow	15 grams
Dry Dairy Cow	7.5 grams
Dairy Calf	15 grams
Feeder Beef Cattle	6 grams
Newly Arrived Beef Cattle	12.5 grams
Poultry	1 kg per ton feed
Horse	15 grams
Goat	3-5 grams
Sheep	3-5 grams

http://www.bio-ag.com/livestock/

This product is sold in two different sizes. It is sold in a 25 kilo bag which costs $320 CAD, however, if more than one bag is purchased at once the cost reduces to $310 CAD a bag (Oesch, 2015). A 1 kilo bag is also available for purchase for $15.35 CAD (Oesch, 2015). The

farmers in Nepal will need instructions on what dosage to give their animals. Pictures with animals and dosage size could be provided so that illiterate farmers can understand what amount to give their livestock. Although the price may seem quite steep for poor Nepalese farmers, the benefit of the product could potentially pay for itself. If a farmer were to purchase a 25 kilo bag it would last him a long time. There are 25,000 grams on Enzo-lac in a 25 kilo bag of this dry feed supplement. So to feed an animal 15 grams a day it would cost $0.19 and to feed an animal 5 grams a day it would be $0.06. Now the price seems low, but this may not be low for Nepalese farmers. If the benefit of their livestock living longer due to better health, and producing more milk were to provide the farmers with this extra money, they could continue to purchase this product.

Brief Description of Probiotic use in Canada

Probiotics are a good kind of bacteria that is given to livestock which changes the animals' ecology in a positive way by reducing the amount of pathogens within the animal (Hein, 2013). Among various feed supplements, probiotics have the highest growth rate (Hein, 2013). Health Canada plans to phase out the use of antibiotics in livestock (Duckworth & Glen, 2014). This is due to many studies conducted that show negative effects of antibiotics. For example, antibiotics may be linked to the growth of antibiotic resistant bacteria amongst livestock (Flood, 2015). As a result of all the negative publicity of antibiotics, many cattle producers have made the transition to using probiotics instead, as they are seen as a superior product (Flood, 2015). Antibiotics are drugs that kill bacteria, whereas probiotics are live cultures of beneficial bacteria (Flood, 2015). Probiotics benefit livestock health by outcompeting harmful bacteria in an animals gut (Flood, 2015). Probiotics also show notable ability to reduce methane gas emissions which is a very vital factor for reducing cattle's contribution to climate

change (Flood, 2015). In research conducted by the University of Guelph it shows that Probiotics assist in preventing the shedding of E. coli 0157 bacteria in feedlot cattle (Flood, 2015). E. coli is a primary contributor to foodborne illnesses in humans so this is a major breakthrough (Flood, 2015).

Manufacturing Details

This product is manufactured in Wellesley, Ontario; however there is one ingredient in Enzo-lac that comes from the Unites States of America. All the remaining ingredients are from Canada and the product itself is put together on site in Canada.

Benefits of Trade to Canada

As the use of probiotics among livestock is increasing in Canada, it shows that there is a supply to meet this new demand. If Canadian companies are already supplying livestock probiotics, they will gain from new business in Nepal. With the trade of this specific probiotic Enzo-lac, the local Canadian company that produces this product will benefit greatly. It will give them new market opportunities for foreign trade that could take this small family business to a larger scale with higher profits. The export of probiotics will improve the Canadian economy as a whole. Many Canadian jobs will be created through the trade of Enzo-lac to Nepal. This includes jobs at Bio-Ag manufacturing the probiotic as well as new employees in the transportation of this product to Nepal and all together providing more jobs available in Canada.

Part II: Export Potential to Nepal

Brief Description of Nepal

Nepal is located in Asia between India and China. The north of Nepal is home to Mount Everest as well as many other Himalayan mountains (Rose, 2013). The capital city in Nepal is Kathmandu and the total population of the country is 30,986,975 with a growth rate of 1.82% (*Nepal Demographics Profile*, 2014). The life expectancy at birth is 68.4 years, and the gross domestic product is about 19 billion (*Nepal*, 2013). Nepal has been isolated geographically for many years; a result of this has been that the country is one of the least developed nations in the world (Rose, 2013). Many countries have recently granted economic assistance to Nepal including Canada, India, China, the United States, the United Kingdom, Japan, Denmark, and Germany (Rose, 2013). Most of the land in Nepal is covered by mountains or Himalayas, in fact 75% of the land is mountainous, and the remaining surface area of the country is covered in a region called the Terai (Rose, 2013). The terai is a low, flat region with fertile land that runs alongside the Indian border (Rose, 2013). Nepal's climate is influenced by its subtropical location as well as its high elevation (Rose, 2013). In Kathmandu, the average temperature ranges from 10 degrees Celsius in the winter to 26 degrees Celsius in the summer months (Rose, 2013). The average annual rainfall in Nepal is 55 inches (Rose, 2015).

Nepal being one of the least developed nations in the world is also due to the lack of resources for economic development and inconvenient transportation routes (Rose, 2013). Nepal's economy relies on imported basic materials and agricultural products (Rose, 2013). This country imports many essential commodities like fuel, construction materials, fertilizers, metals and many consumer goods, whereas they export commodities like rice, jute, timber and textiles (Rose, 2013). Agriculture employs most of Nepal's population and it accounts for over half of the country's export earnings (Rose, 2013). A few of the main livestock animals in Nepal are cattle, buffalo, goats and sheep (Rose, 2013).

Livestock Industry in Nepal

The mountainous region of Nepal is home to many yaks, sheep, goats and mules (Khatiwada, n.d.). Agriculture based livestock industries and horticulture production in the hill regions are the main sources of income of Nepali people (Khatiwada, n.d.). The terai is the southernmost region in Nepal and is the flattest. It produces most of the food supply for all regions (Khatiwada, n.d.). Enzo-lac would thrive in the hill and mountain regions of Nepal because that is where the majority of livestock are and also it is cooler in these regions so the product will store easily.

Figure 2: Livestock Production in Nepal

Total Livestock (Home Production and Farm Cash)			
	Region	Share of Total Income (%)	
	Mountains	10.6	
	Rural Hills	12.9	
	Rural Terai	8.4	
	Other Urban	3.3	
	Katmandu	1.0	
	Total	8.8	

Livestock Home Production			
Region	Mean Income (NRs.)	Share of Home Production Income (%)	Share of Total Income (%)
Mountains	1,899	11.1	7.1
Rural Hills	2,403	14.0	7.5
Rural Terai	1,183	9.2	3.9
Other Urban	1,052	12.5	2.1
Katmandu	271	7.4	0.5
Total	1,562	11.5	4.9

Livestock Cash			
Region	Mean Income (NRs.)	Share of Farm Cash Income (%)	Share of Total Income (%)
Mountains	1,094	44.4	3.5
Rural Hills	1,751	47.6	5.4
Rural Terai	1,236	32.2	4.6
Other Urban	503	31.9	1.2
Katmandu	1,176	29.5	0.6
Total	1,288	39.9	3.9

http://www.fao.org/ag/againfo/programmes/en/pplpi/docarc/wp13.pdf

This figure shows that the majority of livestock farming takes place in the mountains and hills of Nepal.

Nepal is a very food deficient country, so they do not have excess feed for livestock. Enzo-lac helps improve feed conversion rates so they will gain more energy from the same amount feed (*Bio-Ag*, n.d.). Livestock farming in Nepal is a significant source of protein through the consumption of meat, eggs, milk and other milk products as well as being an important

source of income for farmers (*Livestock Farming*, 2012). Livestock in Nepal accounts for about 32% of agricultural gross domestic product and approximately 11.5% of the country's total gross domestic product (*Livestock Farming*, 2012). Many Nepali people are involved in the production, slaughtering, processing, and trading of livestock and other livestock products like leather and wool for example (*Livestock Farming*, 2012). Over 2 million households in Nepal own cattle and more than 1.4 million households raise chickens (*Livestock Farming*, 2012). In terms of animal mass unit's, cattle is the largest livestock in the country, however it has a low growth rate (*Livestock Farming*, 2012). Buffalo in Nepal is used for meat and milk, whereas dairy cows are farmed solely for their milk (*Livestock Farming*, 2012). Goat milk is not popular in Nepal but the meat is still consumed (*Livestock Farming*, 2012). Pigs, chicken, and duck are also popular meat sources in Nepal whereas sheep are more regularly farmed for their wool because their meat is less popular and has a declining rate of growth (*Livestock Farming*, 2012). All species mentioned above can benefit from the consumption of Enzo-lac.

Figure 3: Livestock in different regions in Nepal

Region	Livestock owners	Herd size (TLU)		Own LR	Own SR	Own Poultry	Own Pigs
	%*	Mean**	sd	%***	%***	%***	%***
Mountains	95.1	3.3	2.7	94.6	52.4	47.0	11.3
Rural hills	93.9	2.9	2.3	94.7	58.5	60.0	13.2
Rural terai	86.2	2.3	2.5	84.7	55.1	44.7	12.2
Other urban	37.1	0.6	1.1	69.8	44.0	44.7	2.5
Katmandu	13.7	0.1	0.6	54.3	23.9	50.0	2.2
Total	76.3	2.2	2.4	88.7	54.8	51.2	11.7

* Percentages refer to whole subsample
** Means refer to livestock owners only
*** Percentages refer to the regional livestock owners subsample
Note: LR=Large Ruminants, including cows, buffaloes and yaks.
SR=Small Ruminants, including sheep and goats.
Source: NLSS (World Bank, 1996), calculations by the author.

http://www.fao.org/ag/againfo/programmes/en/pplpi/docarc/wp13.pdf

As shown in this chart above, almost all Nepalese own Livestock. This product would directly affect all of these people in a positive way. It would then in turn affect the entire population with the increase in food availability.

Needs and Benefits of Importing Nation

According to the Nepal Youth Foundation, nearly half of Nepali children are severely malnourished (*Freedom, Health Shelter, and Education*, n.d.). Malnutrition in Nepal accounts for 60% of child deaths, and 29.1% of children under the age of 5 are underweight (*Nepal Demographics Profile,* 2014). A quarter of the population lives under the poverty line and nearly 3.5 million Nepali people have difficulty getting nutritious food (*Freedom, Health Shelter, and*

Education, n.d.). This livestock probiotic will increase food supply and be able to meet the needs of more Nepali people.

In Nepal they have limited amount of pasture and grazing land available (Chapagain, 2015). Enzo-lac increases feed conversion rates, so livestock would be able to get more energy out of the same amount of feed. Enzo-lac also maximizes milk production meaning Nepal's dairy animals (i.e. cattle, buffalo and goats) could produce more milk than before with no change to their diet other than adding this dry feed supplement (*Bio-Ag*, n.d.). This way they will have a greater amount of meat and milk available to feed more Nepalese. Also, there will be lower rates of livestock deaths and better fertility so farmers' herd size will increase and they can sell more products and increase their income. Hunger is a very dominant issue in Nepal because it is a very food deficit country (Chapagain, T., 2015). Enzo-lac would increase the amount of food production so not as many Nepali people would go without nutritious food.

This product would go directly to the farmers in Nepal and eventually the entire population would start the see the positive results that Enzo-lac would have on livestock and overall food production. Essentially all households in hill and mountain regions in Nepal own livestock, of this amount 88.7% have large ruminants like cows, buffalo, and yaks, and 54.8% have goats and sheep (Maltsoglou & Taniguchi, n.d.). In the tables provided, it is clear that livestock farming is a very big industry in Nepal and this small product could benefit them greatly.

Figure 4: Farmers' Income in Rural Nepal

Rural Terai Typology														
	Total Income					Home Production		Farm Cash		Total Livestock	Livestock Home Production		Livestock Cash	
	Farm	Wage	Rent	Enterprise	Other	HP/TF	HP/ TOT	FC/TF	FC/ TOT	L/TOT	LHP/ HP	LHP/ TOT	LC/FC	LC/ TOT
Landless, no livestock	15.7	24.2	12.7	34.4	13.1	94.3	15.2	5.7	0.5	0.0	4.2	0.2	66.7[12]	0.2
Landless, with livestock	39.1	22.9	10.4	14.4	13.2	78.5	29.6	21.5	9.4	11.4	16.8	4.8	65.6	6.6
Marginal land, less than 2 TLU	56.1	17.4	7.6	12.4	6.4	82.3	44.3	17.7	11.8	6.4	6.2	2.3	31.5	4.1
Marginal land, more than 2 TLU	73.2	6.7	6.2	6.2	7.6	81.2	58.1	18.8	15.1	13.0	12.8	6.6	40.6	6.4
Non-marginal land	80.2	5.8	6.4	4.6	3.0	71.1	55.1	28.9	25.1	8.0	7.4	4.0	20.4	4.0
Total	60.8	13.2	7.8	11.0	7.2	78.6	45.7	21.4	15.1	8.4	9.2	3.9	32.2	4.6

Abbreviations:

HP: Farm home production income FC: Total farm cash income TF: Total farm income LHP: Livestock home production income

TOT: Total household income LC: Livestock cash income L: Livestock

http://www.fao.org/ag/againfo/programmes/en/pplpi/docarc/wp13.pdf

Transportation Information

Transportation facilities are extremely limited in Nepal because there is very little road mileage and an extremely low number of motor vehicles (Rose, 2013). This could make it very difficult getting imported products around the nation. The main road type is a network of footpaths (Rose, 2013). It may be problematic to get this imported product up to the hills and mountain regions where the majority of the livestock live. A representative from Bio-Ag explained that the product would likely be transported from Wellesley to Halifax then down to Miami where it would be shipped across the ocean to Nepal (Oesch, 2015). Because the product has such a long shelf life it is safe to ship it overseas without the product expiring or going bad. The alternative would have been to fly it overseas to save time but this would likely be more costly. The troubled part would be once the shipment gets to Nepal and how it will be distributed

through the country with such a lack of roads and cars. With further research and the help of Grace Oesch (2015) from Bio-Ag it was discovered that with the shipping company Cargo Navigators it would cost $500.79 CAD to ship one skid to Calcutta, India. This shipping company unfortunately cannot ship directly to Nepal since it is a landlocked country without easy access (Oesch, 2015). It would then need additional transportation from Calcutta, India to Nepal, which would be an additional cost.

Product Competition

There are additional probiotic supplements sold by other companies in different Countries. There are many similar probiotics sold in the United States. In the table below it compares Enzo-lac to two other probiotics both made in the Unites States of America. It shows that Enzo-lac is the best economic pick out of these three choices. However, there are many other suppliers around the world that could be cheaper for Nepalese farmers.

Figure 5: Product Competition

Product Name	Country Sold in	Size	Cost
Enzo-lac	Canada	25 kilo	$320.00
Fastrack	USA	5 pounds (2.27 kilo)	$29.50
Jackpot	USA	1 gallon (3.79 kilo)	$128.34

https://www.valleyvet.com/ct_detail.html?pgguid=2e87c3f2-7b6a-11d5-a192-00b0d0204ae5
http://www.bio-ag.com/livestock/
https://www.biositechnology.com/product/6/jackpot-livestock-probiotics

Part III: Future Studies and Conclusion

Unknown/ Future Studies Required

Through this analysis of Enzo-lac potentially being exported from Canada to Nepal there are still a few unknowns and future studies required to draw further conclusions. An eye must be kept on products to keep prices up to date. There would need to be a further investigation about any trade barriers of this product being imported to Nepal and/or exported from Canada. Also, transportation should be looked at into further detail to see how it would get around Nepal. Different shipping and transportation companies should be analyzed to find the most efficient and economical way to export this livestock probiotic to Nepal.

Conclusions

Three out of four households in Nepal own their own livestock; it is a very important and significant resource as well as a source of income for Nepalese people (Maltsoglou & Taniguchi, n.d.). Through the export of Canadian made livestock probiotics it will increase revenue in the Canadian agriculture sector, create many new job opportunities as well as expanding the trade market. The benefits of using probiotics in livestock diets has been tested and proven beneficial in Canada, not only for the animals but also the environment as a whole by reducing the amount of methane gas produced. The export of locally made Enzo-lac will have economic benefits to Bio-Ag and the Canadian economy as a whole. The positive effects this probiotic will have for Nepalese are numerous; improved livestock health, larger herd size, increased milk production, and overall larger amounts of food available to feed a hungry nation which will pure more money in the pockets of Nepalese farmers. This product is an example of a livestock probiotic that would greatly benefit Nepal; however there may be many other similar products that would provide similar outcomes.

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