

Evaluation of Feed Grade Sodium Bicarbonate Export to Nepal

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Part 1: Product Information

Feed Grade Sodium Bicarbonate

Sodium bicarbonate has increased the production and health of many cows in North America through several ways (Bath et al., 1984). Looking forward the use of sodium bicarbonate will be analyzed on how it is possible to increase milk production in Nepal. This paper will also discuss how sodium bicarbonate works in the rumen of ruminants and if it is economical for Nepalese dairy farmers to feed sodium bicarbonate to their animals. Sodium bicarbonate is refined from Trona, a relatively rare mineral that is only found in a few countries around the world (U.S. Department of the interior, 2011). This implies that only a few countries can produce sodium bicarbonate on a large scale.

Sodium Bicarbonate Distributed through Pestell Minerals

Sodium bicarbonate has potential be shipped to Nepal in 50 lb bags or in bulk from Pestell minerals warehouse and packaging facility which is located in New Hamburg, ON (Pestell, 2016). As no feed grade sodium bicarbonate is mined and processed in Canada, Pestell minerals will import there sodium bicarbonate from the United States. Pestell minerals 130 000 square foot faculty in New Hamburg, ON can receive bulk sodium bicarbonate from rail and then ship out packaged sodium bicarbonate to a Canadian port (Pestell, 2016). On top of Pestell minerals huge warehouse and packaging faculty they also



employ 45 people and have a net sale of over \$50 000 000 per year (Innovation, Science and Economic Development Canada, 2015). Pestell minerals huge income and large worker base means the company has the infrastructure to expand their facilities to export sodium bicarbonate to Nepal. To contact Pestell minerals there phone number is 1-888-718-5552 and email is info@pestellminerals.com (Pestell, 2016).

Benefits to Canada

If Pestell minerals exports sodium bicarbonate to Nepal they will have to import it from the United States in bulk and then package it into 50lbs bags or tote bags. With handling this extra material Pestell will need to hire people for the transportation of the product, the packaging of the product and the office jobs for setting up distribution. The extra jobs created and an increase in exports will boost Pestell's income which in turn will boost Canada's economy. Also by exporting goods to Nepal our trade relations with Nepal will increase resulting in an increased potential to import products from Nepal and place Canadian investments in Nepal (Government of Canada, 2014).

How Sodium Bicarbonate works

Sodium bicarbonate is a proven natural buffer that has been used to prevent sudden changes in the pH of cow's rumens for many years in North America (Bath et al., 1984). When sodium bicarbonate is dissolved in water the sodium ion is displaced and a weak base called bicarbonate is formed. As a cows stomach is an acidic environment and high producing cows are fed acidic feeds (Marden et al., 2008), a buffer with a high amount of weak base will regulate the pH of the rumen the best. The weak base bicarbonate, will accept any hydrogen atom and form carbonic acid thus removing hydrogen ions from the solution. As pH is a measurement of the

amount of hydrogen ions in a solution, the added hydrogen atoms to the cow's stomach from the acidic feed will react with bicarbonate to form carbonic acid thus regulating the pH in the rumen (Block and Cummings, 2002). If a buffer is not added to a cows ration while it is consuming high energy low fibre rations the stomach can have too low of a pH thus damaging the papillae lining the cows stomach (Bath et al., 1984). When the papillae are damaged, nutrient absorption is decreased resulting in an incline of the cow's stomachs efficiency, which can impact the cow's health and milk production (Bath et al., 1984).

Part 2-Export Potential to Nepal

Geography of Nepal

Nepal is made up of three main regions consisting of the plains region in the south, the hills region in the middle and the mountain region in the north (CIA, 2016). As seen in figure 1 India borders Nepal in the south where as China borders Nepal in the North meaning Nepal doesn't have access to waterway shipping. If materials are imported into Nepal from a ship the materials have to be transported by land through India or China to get to Nepal. The land in Nepal is used for a variety of different things with 28.8 percent of the land being used for agricultural production, 25.4 percent for forest and 45.8 percent of the land consists of mountains, lakes, waterways and cities (CIA, 2016). The population of Nepal is high for the size of the Nation as the population density is 180 people per square km with a total of 26,494,504 people (Central Bureau of Statistics, 2012). As 81.4 percent of Nepal's population lives in a rural area and there is a high population density in Nepal the size of the farms in Nepal are quite small meaning to live a family has to produce a great amount of food from the land that they own.

Figure 1



State of Dairy Industry in Nepal

Agriculture is a huge income source for Nepal's economy as around 40 percent of Nepal's Gross Domestic Product comes from agricultural production (Hayashi et al., 2005). Two thirds of the Agricultural Gross Domestic product comes from the dairy industry in Nepal (Chaudhary and Upadhyaya, 2013), meaning the dairy industry in Nepal is a huge contributor to the nation's economy. In Nepal there are many milk co-operatives spread throughout the country whose purpose it is to collect milk from farmers, test it for quality and ship the milk to chilling centers or processing plants (Sapkota, 2010). Chilling centres or processing plants are run by private dairies or the dairy development co-operation which are responsible for paying the milk co-operatives to distribute the money to farmers. The dairy development co-operation is responsible to organize milk collection, provide a fair milk price for farmers, and organize milk marketing. The milk collected from the Nepalese dairy farmers is processed into a variety of

different milk products by dairy development co-operative processing faculties (figure 2) and private dairy processing plants (Sapkota, 2010).

Figure 2: Milk and Milk Products sold through the dairy development corporation in

S.N.	Milk and Milk products	Quantity (mt.)		
		2006/07	2007/08	2008/09
1	Pasteurized Milk	52,262	52,094	55,315
2	Yogurt	1,705	2,009	2,299
3	Ice-cream	52	53	65
4	Cheese	148	164	187
5	Butter	201	165	137
6	Ghee	823	628	459
7	Paneer	78	96	123
8	Flavored Milk	89	94	113
9	Sweets	168	176	191

Nepal (Sapkota, 2010)

Most of the income from livestock in Nepal is from the hills region which accounts for 53% of livestock income. The remaining income is from the plains region (38%) and the mountain region (9%) (Singh and Maharjan, 2005). As most of the income from livestock is in the hills region most of the dairy farms are in that region with a fair amount in the plains region and a little bit in the mountain region. The number of dairies in each region can also be supported in figure 3 showing the number of cows and buffalo in each region.

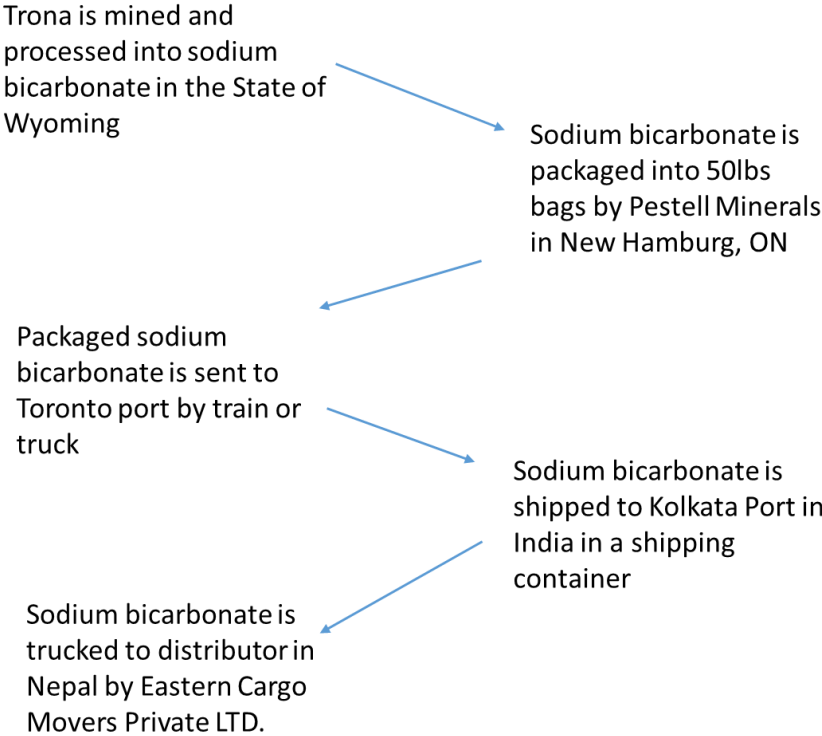
Figure 3: Number of Cattles in Nepal according to Geographical region (Singh and Maharjan, 2005)

Region	Animal	Average number of animals	Share in Total (%)
Mountain	Cow	819,243	11.66
	Buffalo	313,500	9.18
Hill	Cow	3,447,598	49.06
	Buffalo	1,939,134	56.77
Plain	Cow	2,760,302	39.28
	Buffalo	1,163,435	34.06
Nepal	Cow	7,027,143	100.00

	Buffalo	3,416,069	100.00
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Transportation

Figure 4: Flow of sodium bicarbonate from being refined to Nepalese farmers



As Pestell minerals gets their sodium bicarbonate from the United States and sells it to Canadian dairy farmers they have a set price of sodium bicarbonate per 50lb bag at \$20.95 (B. van Nes, personal communication, November 26, 2016). To export sodium bicarbonate bags to Nepal the most economical way would be to ship the sodium bicarbonate to Kolkata, India in a shipping container which would cost around \$10.26 per 50lb bag of sodium bicarbonate. Once in Kolkata, India the sodium bicarbonate could be trucked to a distribution centre in Nepal by Eastern Cargo Movers Private Ltd. Distribution of sodium bicarbonate to famers could be done by Nimbus, Triveni feed, or by the milk cooling stations and milk co-ops in Nepal.

Cost of Product for Farmers in Nepal

When the costs of shipping sodium bicarbonate to Nepal and the value of the product are added up the cost of sodium bicarbonate will be around \$31.21 Canadian dollars. As one Canadian dollar is worth 81 Nepalese Rupees the cost of one bag of sodium bicarbonate would be around 2528 rupees. The average GDP in Nepal is 691.7 dollars US (United Nations, 2016), which converts to 930 Canadian dollars per year or 75,330 Nepalese Rupees. Most dairy farmers in Nepal would think the price of sodium bicarbonate is too expensive as they would have to spend around 3.5 percent of their hard earned income on the product.

Benefits to Nepal

Nepal, through introducing new knowledge and technology has an enormous potential to increase its food production. With an increase in food production Nepal can increase its food exports which will help with the country's trade imbalance (Paudel, 2016). Through the introduction of sodium bicarbonate to dairy farmers in Nepal, with proper management dairy farmers can increase the health of their cows by preventing digestive disorders such as subacute ruminal acidosis (Marden et al., 2008). With the increased health of the cows the farmer will have less sick animals and spend less money on medication for the cows. Also when sodium bicarbonate is fed to cows they have a chance of increasing their milk production (Kilmer et al., 1981), meaning Nepalese dairy farmers have an increased potential to sell more milk and make more money. To introduce sodium bicarbonate to dairy farmers in Nepal there will have to be sales people to promote the product. Once buyers have been established there will need to be people that will transport the sodium bicarbonate to the many difficult regions in Nepal on a regular basis. The jobs created and the sales of sodium bicarbonate will help the Nepalese

economy as it will provide more people with jobs and the company selling sodium bicarbonate will increase their profit.

Companies in Nepal

Nimbus is a company founded in Nepal in 1998 that imports vitamins, veterinary medication and vaccines into Nepal for farmers (Nimbus, 2015). Nimbus also started the first pelleting feed mill in Nepal in an effort to export feed supplements in Nepal to India. Nimbus has established a rural distribution network in Nepal to market its products and also has access to some markets in India. This network contains more than 600 employees with 110 dealers and 500 sub-dealers reaching out to more than 10,000 farmers throughout Nepal (Nimbus, 2015). Sodium bicarbonate from Canada could be added onto Nimbus's product line and then sold to dairy farmers in Nepal as they already have an extensive rural distribution network set up. Triveni Feed, also a company in Nepal, could sell the sodium bicarbonate from Canada to Nepalese dairy farmers. Triveni Feed, based in Kathmandu, processes a wide range of chicken feeds, dairy feeds, pig feeds and fish feeds (Sanghai, n.d.). As Triveni Feed already sells feeds to Nepalese farmers, they could add to their product line and sell sodium bicarbonate to dairy farmers. Adding sodium bicarbonate to an established company's product line would get the sodium bicarbonate out to Nepalese dairy farms faster than creating a new distribution network just for sodium bicarbonate through a private company. Another option of getting sodium bicarbonate to dairy farmers is it could be sold at chilling centres across Nepal. Dairy co-operatives pick up milk for the farmers in their co-op and drop it off at chilling centres (Sapkota, 2010). The co-op can then pick up sodium bicarbonate and bring it back to the dairy farms the next day when they pick up the milk from the farmers.

Conclusion

Most cows in Nepal don't produce large amounts of milk due to an imbalance of high amount of fibre in the ration and not enough grains or fermented feeds (Hayashi et al., 2005). Since sodium bicarbonate is only needed to buffer the rumen when a high amount of grains and fermented feeds are fed (Block and Cummings, 2002), sodium bicarbonate probably won't have an economic effect when fed to animals in Nepal consuming high fibre diets (Hayashi et al., 2005). When cows do not consume acidic feeds the addition of sodium bicarbonate to their ration will not have any effect on the cow's milk production (Hu and Murphy, 2005) as the naturally occurring sodium bicarbonate in the cow's saliva will be enough to buffer the rumen when a cow consumes a high fibre diet (Block and Cummings, 2002). Methods could be taught to Nepalese dairy farmers on how to ferment feeds and how addition of the proper amount of grain to a cow's diet can increase their milk production. Then in the near future sodium bicarbonate will have enough of an effect on the cow to make it economical to feed sodium bicarbonate.

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