

Cefa-Lak Mastitis Treatment for Lactating Bovine Animals

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Introduction to Nepal:



Figure 1: Map of Nepal (Source:<http://www.infoplease.com/atlas/country/nepal.html>)

Nepal is a landlocked country that is in the South-Asia continent, which is bordered by China and Asia. The country of Nepal has a total of 147,181 square kilometres making it the world's 93rd largest country by area (CIA, 2015). Nepal is considered a developing country with a population of around 29 million people. Nepal is divided into 3 different topographical regions known as the Terai, Mountain, and Hill regions (CIA, 2015). The Terai region of Nepal is the flatland of the country which consists of about 23 percent of the total area of the country. The Terai region is home to most of the population in Nepal and is where most of the farming activity takes place. The Mountain region of the country includes Mount Everest and the other seven of the world's ten highest peaks. The human inhabitation and economic activities, such as farming are very limited due to the climate and landscape features of the region. The Hills region in Nepal is the country's most fertile and urbanized region, which consists of two major ranges of hills, commonly known as the Mahabharata Lekh and the Siwalik Range. The Hill region covers 68% of the total land in Nepal. In Nepal, the currency that is used is called a Nepali Rupee, one Nepali Rupee is equivalent to \$81.80 Canadian dollars.

Agriculture in Nepal

Approximately 30% of the land in Nepal is used for agriculture and around 70% of Nepal's population is employed in the agricultural sector. This accounts for 35% of Nepal's Growth Domestic Product. The livestock subsector in Nepal contributes 24% towards the agriculture Growth Domestic product for the country (Pradhanang et al, 2015). The livestock subsector plays an important role in livelihood, food and nutritional security, and poverty



*Figure 2: Agriculture in Nepal
(Source:<http://sadbnpal.org/internshiptraining/>)*

alleviation (Pradhanang et al, 2015). Nepal depends on agriculture the most when it comes to its income. Nepal has the second highest poverty rate, along with

the lowest per capita income (Pyakuryal,2010). Farmers in Nepal don't have access to things like new technologies, new seed varieties, and market opportunities, because of this

agricultural production has decreased therefore increasing cases of hunger and undernourishment (USAID, 2016). Nepalese children who are under the age of 5, 40% are stunted, 29% are underweight, and 11% are 'wasting' (USAID, 2016)

Product Information

Mastitis in Cattle

Bovine mastitis is known as a mammary gland inflammatory infection in the udder which is caused by bacterial infection and is a major disease amongst dairy cattle (Bradley, 2002). Mastitis will most often occur as white blood cells, also known as leukocytes enter into the mammary gland; this is a response to bacteria in the canal of the teat on the cow. Symptoms of bovine mastitis can include redness, hardness, and swelling of the udder as well as major discomfort to the cow. When mastitis is not properly treated, it may be fatal to the animal. Causative bacteria of mastitis can be classified as either major or minor pathogens, as well as contagious or environmental (Harmon, 1994). Contagious pathogens are mainly found in the

mammary gland, along with the skin of udder of the infected cow in a dairy herd. Contagious pathogens are typically spread from cow to cow during milking times as equipment is placed on an infected cow and not disinfected properly before being placed on another cow. Environmental mastitis pathogens can be found in the areas that the cow inhabits, sources such as bedding, manure, soils, and contaminated water (AHDB, 2016).

Although, there are many pathogens that can cause mastitis the three main pathogens are *Streptococcus uberis*, *Staphylococcus aureus* and *Escherichia coli* also known as *E. coli*. *Streptococcus uberis* is a pathogen that causes environmental mastitis, it can be found in the cow's environment, especially in straw and beddings, but can be treated with antibiotics (AHDB, 2016). *Staphylococcus aureus* is very difficult contagious pathogen to treat with antibiotics as it can trap itself within the fibrous tissues as well as within cell structures, which are areas that antibiotics do not effectively reach (AHDB, 2016). *Escherichia coli* is another environmental pathogen and is most common in farm environments as it is present in significant numbers in feces (AHDB, 2016). *E. coli* can lead to very painful, and even fatal forms of mastitis when not treated, and is the biggest cause of environmental mastitis on dairy farms (AHDB, 2016).



Figure 3: Mastitis found in a mastitis detection strip cup
(Source: <http://sites.psu.edu/rclambergabel/tag/mastits/>)

Mastitis can show symptoms such as pain, swelling and redness and could also be hot when it is touched. Symptoms of mastitis can also appear in the milk itself, instead of the normal white colour of milk, it can have a yellowish colour, along with small chunks of pus and a watery appearance (AHDB, 2016). When mastitis is not treated properly, or at all, depending on the type and severity it can cause a reduction in milk yield, increase in temperature, sunken eyes and a lack of appetite (AHDB, 2016).



Figure 4: Cefa-Lak Product from Boehringer Ingelheim
(Source:<http://embrunfarmvet.com/product-category/intra-mammary/>)

Product

The product that I have chosen is a product called Cefa-Lak. Cefa-Lak comes in a syringe like tube that holds 10 mL of the product. This product is also available to be purchased in boxes containing 12 tubes of Cefa-Lak. The main ingredient that is found in each 10-mL tube of Cefa-Lak is an antibiotic called cephalosporin which is then placed in an oil gel (Boehringer Ingelheim, 2016). The product can only be purchased at a veterinary clinic and says for veterinary use only, but can be administered by any farmer as it is the Cefa-Lak product is very easy to use.



Figure 5: Mastitis treatment tube being inserted into the teat of a cow
(Source:http://www.agweb.com/mobile/article/to_tube_or_not)

Treatment

Although easily administered, Cefa-Lak should be handled and used with care as for people have shown some form of allergic reactions, especially penicillin (Boehringer Ingelheim, 2016). Before administering the treatment, for the safety of the farmer and the cow, the cow should be tied up or in a stall where she will not be able to move. Also before administration of Cefa-lak, the udder of the cow should be milked out completely, milking out entire udder, not just the infected quarter (Boehringer Ingelheim, 2016). Once the udder is completely milked out, the

udder and teats of the cow should be washed well with warm water that contains a suitable antiseptic, the teats should then be dried using separate paper towels for each separate quarter to avoid spreading the mastitis (Boehringer Ingelheim, 2016). The bottoms of the teats should be washed with alcohol, again using a separate paper towel for each teat, allowing time for it to dry (Boehringer Ingelheim, 2016). For treatment, remove the protective cap off the product and carefully insert syringe tip into the canal of the teats, squirt the contents of one syringe into each quarter that has signs have mastitis. Remove the syringe and then carefully massage the infected quarter(s) to distribute the product into the udder (Boehringer Ingelheim, 2016).

Along with the treatment using this product, there are certain rules that must followed to ensure the health of the consumers. Milk cannot be used for human consumption at all until 96 hours after the last treatment of the cow (Boehringer Ingelheim, 2016). Treated animals also can not be taken to the slaughter house for the use of food within 4 days of the cow's last treatment (Boehringer Ingelheim, 2016).

Boehringer Ingelheim

Boehringer Ingelheim is a family owned company that was founded in 1885, in Ingelheim, Germany. Since then Boehringer Ingelheim has evolved their company now having 145 other associated companies globally, with 47,000 employees (Boehringer Ingelheim, 2016). The Boehringer Ingelheim company is one of the leading pharmaceutical



Figure 6:
<http://www.thepharmaletter.com/article/boehringer-ingelheim-stops-lux-head-neck-2-and-4-trials-with-gilotrif>

companies being placed in the world's top 20 (Boehringer Ingelheim, 2016). Boehringer Ingelheim is a research-driven pharmaceutical company who provides vaccines, medications, and treatments to both people and animals. The location of focus for this project is the Boehringer Ingelheim company located in Burlington, Ontario. The Burlington location is the Head office for Canada with approximately 250 employees work at this location alone.

Boehringer Ingelheim (Canada) Ltd:

5180 South Service Road

Burlington, Ontario, L7L 5H4

Tel: (905) 639-0333 or 1-800-263-2425 (Customer Care)

Benefits to Canada



Figure 7:
(Source:<http://www.hometowndailynews.com/2015/09/04/revenue-up-by-five-percent-for-missouri/>)

Exporting the product Cefa-Lak to the country of Nepal would provide many benefits for Canada. The export of this product would increase Canada's revenue as it would lead to the partnership in exports between Nepal and the Boehringer Ingelheim company, and possibly other companies in Canada. With this partnership, would come more job opportunities for Canada in the Ingelheim company as there would be a greater demand for their product. The greater demand for products will result in more jobs in manufacturing the product, packaging, and labeling the

product. It would also increase more jobs for shipping the product as the shipping companies would need more drivers and pilots to get the product delivered to Nepal. The export of this product to Nepal would help expand Canada's exports globally, to places that may not have been a big export area for Canada.

Benefits to Nepal

Exporting this product would not only provide benefits to Canada but would also have additional benefits to Nepal. One of the main benefits that exporting this product to Nepal would have is an increase in quantity of milk, and help better the quality of the milk in Nepal. Infections of the mammary gland due to bacteria cause a decrease in milk production, therefore using Cefa-

lak for the treatment of mastitis would increase the quantity of milk for farmers in Nepal (Harmon, 1994). Mastitis can also cause poor quality milk, as the milk can become off coloured, and chunky with pus, as well as potentially unsafe to drink (AHDB, 2016). Another benefit that the introduction of Cefa-lak to Nepal would be an increased income for dairy farmers in Nepal because of the increased amount of milk production and the better quality. Increased milk production per cow for the farmer, would result in the farmers receiving more money per cow for milk, therefore increasing their income. The increased income for the farmers, would decrease the poverty rate in Nepal, and increase their growth domestic product. Another way this product would benefit Nepal is by increasing the milk production, which would, therefore, decrease the amount of food insecurity in Nepal as they would have a greater supply of milk to drink and allow them to make more dairy products such as cheese and yogurt. This would help decrease the amount of malnourished, underweight and stunted children and adults in Nepal.

Shipping the Product

The Boehringer Ingelheim company will only ship the Cefa-lak product to veterinary clinics as it is supposed to be a product meant for veterinarian use only, although it can be sold over the



Figure 8: (Source: <http://shirco.com/shipping-services-shirco/>)

counter at any vet clinic. Therefore, this product would have to be purchased from a veterinary clinic in Canada and then could be shipped using the company called Fed Ex. The product would first be shipped to the states to Memphis, Tennessee (one of their main ‘hubs’) from there the product

would be shipped to Kathmandu in Nepal where it would have to clear customs. For one box of Cefa-Lak to be transported from Burlington Ontario to Nepal it would cost a total of 112.53 Canadian dollars, which is approximately 9,202.97 Nepali Rupees. The price of this shipment is

only based on one tube of the product (one treatment) therefore to send 1 box of Cefa-Lak which hold 12 tubes it would cost 1,350.36 Canadian dollars and a total of 110733.72 Nepali rupees.

Fed Ex Shipping Centre

4243 N Service Road

Burlington, Ontario, L7L 4X6

Tel: 1-800-463-3339 or 1-800-238-4461

Recommendations

Although Cefa-lak is a great product and would be very beneficial to the Nepalese it is not a feasible for to purchase. For one tube (treatment) of Cefa-lak it is a total of \$3.59 Canadian dollars, which is equivalent to 293.60 Nepali Rupees. On top of that expense, Nepal farmers would have to pay for shipping which would add another 9,202.97 Nepali Rupees (\$112.53 Canadian) to their total cost which is more than what Nepalese dairy farmers make in a year, therefore making it unaffordable for them to use and purchase. There are also other Boehringer Ingelheim affiliated companies located in China and Asia which would be a better cost effective way to ship the product to Nepal, making it easier and more affordable for the farmers. It would be a good start to Nepalese if they were taught about mastitis and how it spreads if they learned about preventative measures that they could use to prevent mastitis it would be more affordable then any treatment and would help decrease cases of mastitis while increasing their income.

Ways Nepalese Could Prevent Mastitis

Although the use of a mastitis treatment would be the easiest and quickest way to treat and cure mastitis, there are cost effective way in which Nepalese farmers can reduce the number of cases of mastitis on their farms. One way Nepalese can reduce mastitis cases it to improve the state of the environment and housing that the dairy cattle live in (Pyo`ra`la`, 2002). For example, making



Figure 9: (Source: <http://www.milkproduction.com/Library/Scientific-articles/Animal-health/Prevention-and-control-of-mastitis/>)

sure the cattle have clean bedding that is free of feces and urine as for it can lead to environmental pathogens. Prevention of mastitis can also be helped by disinfecting the teats of the

cattle before and after milking using products like iodine or even soap and water just to make sure the teat/udder is clear of bacteria and pathogens. Increasing hygiene during milking is also a good start to prevent mastitis. Another way to prevent mastitis from occurring is to make sure that contaminated milk does not encounter another cow who does not have mastitis for example, not letting them walk through it or lie in contaminated bedding.

Conclusion

In conclusion, the Cefa-Lak treatment is unfortunately not affordable for the dairy farmers of Nepal. The cost to ship the product to Nepal alone would cost more than what the Nepalese make in an entire year. It could be more cost manageable if the product were shipped from one of the Boehringer Ingelheim companies in China or Asia, but not from Canada as the cost of shipment would decrease. Although it would provide many benefits for Nepal dairy farmers, it just is not a product that they can afford. Introducing low-cost preventative mastitis procedures as mentioned before could be a good start in helping them prevent mastitis cases as antibiotic treatments are currently not an option due to cost restraints.

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