CIDR ®: Analysis of Possible Economic and Productivity Benefits of the Introduction and Utilization of a Slow Releasing Progesterone Device in Nepal

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Part 1:

CIDR Inserts:

Controlled internal drug release (CIDR®) inserts, first produced in 1981 in New Zealand, now used internationally, and is currently being sold in 24 countries, such as Canada and Japan. (Wheaton et al., 1993). These inserts are used for numerous livestock, including beef cattle, dairy cattle, sheep and goats (Bó & Baruselli, 2014; Rudolph et al., 2011; Wheaton et al., 1993). CIDR ® devices are composed of the natural hormone progesterone ($C_{21}H_{30}O_2$) (Compendium of Veterinary Products (CVP), 2016). Veterinarians, as well as farmers, tend to favour this veterinary product as they are dependable hormone release process and can be repeatedly used (Macmillan & Peterson, 1993). The inserts are entrapped by and molded with a silicone layer, with an attached flexible nylon spine. (CVP, 2016).

CIDR ® 1380 and CIDR ® 330:

Produced in Canada, CIDR ®1380 (Figure 1) and CIDR® 330, designed for cattle and sheep, respectively, are two varieties of CIDR® inserts (CVP, 2016). Both are composed of progesterone, but vary in the amount; CIDR ® 1380 contains 1.38 grams, while CIDR ® 330 0. 35 grams of progesterone. (CVP, 2016). Although the masses of progesterone differ, both have similar impacts in its designated species. They allow for greater control over reproductive cycles in both cattle and sheep, through synchronization of estrus cycles as well activating estrus cycles (Robinson, 2016).

Figure 1: Retrieved from http://www.pbsanimalhealth.com/details/Eazi-Breed-CIDR-for-Cattle/365-1421.html

CIDR ® 1380:

Designed for lactating, suckled, or replacement cattle, whether beef or dairy (CVP,

2016). Within bovines, CIDR ® inserts have been found to increase both conception rate and embryo survival(El-Zarkouny et al., 2004). Additionally, through the study of the response of a Korean cattle herd to these inserts, it was determined that the supplements cause an increase in ovulation response, superovulation (Son et al., 2007; Robinson, 2016).CIDR ® are sold both individual or in packages containing ten inserts, with a price of around $20.00 and $208.70 respectively (Dundas Animal Hospital (DAH), 2016; Robinson, 2016).

CIDR ® 330:

Figure 2: Retrieved from https://www.jefferspet.com/products/eazi-breed-cidr-sheep-inserts-and-applicators

CIDR ® 330 (Figure 2) inserts are designed for ewes, female sheep. (CVP, 2016). The majority of a group of ewes, treated with simultaneously gave birth within six days of each other (Wheaton et al., 1993). While a flock of sheep, not treated with controlled internal drug release devices, lambed within a sixteen day period of each other. (Wheaton et al., 1993). Similar to 1380, these inserts are sold both individual, $6.70, or in a package; however, the package contains twenty inserts, $142.70 (DAH, 2016).

How CIDR® Inserts Work:

Application:

CIDR® inserts are placed within the reproductive tract of livestock, near the pelvic bone region. In order to properly place the insert, a T-Shaped Applicator (Figure 3) is used (CVP, 2016). The insert is placed inside the applicator, after which the “wings are folded, allowing for easier passage through the intravaginal tract (CVP, 2016). The insert is inserted through the

vulva until resistance is felt, after which the insert is placed into the interior vagina (CVP, 2016). A tail, the nylon spine, should be visible in order for extraction; however, the tail must be cut in order to prevent other herd or flock members to forcibly remove product (CVP, 2016). The insert should be removed after 7 days, if CIDR ® 1380 is used, or 5 days, if CIDR ® 330 is used (CVP, 2016).

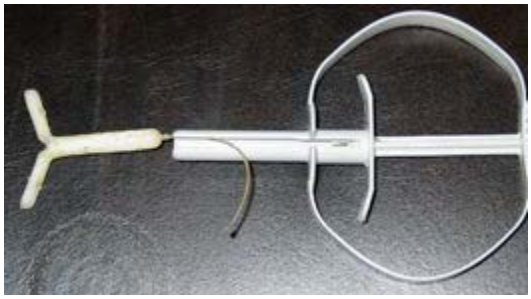


Figure 3: Retrieved from www2.luresext.com.edu/GOATS/training/advrepro.html

Function:

While the insert is inside the reproductive tract, the progesterone is gradually absorbed through the vaginal lining, causing an increase in progesterone levels (Hall et al., 2009). Upon removal, progesterone levels decrease to levels almost indictable, causing the animal's endocrine system to initiate production of other estrus hormones (Figure 4), primarily estrogen and luteinizing hormone. These hormones are linked to the commencement of ovulation. The body's

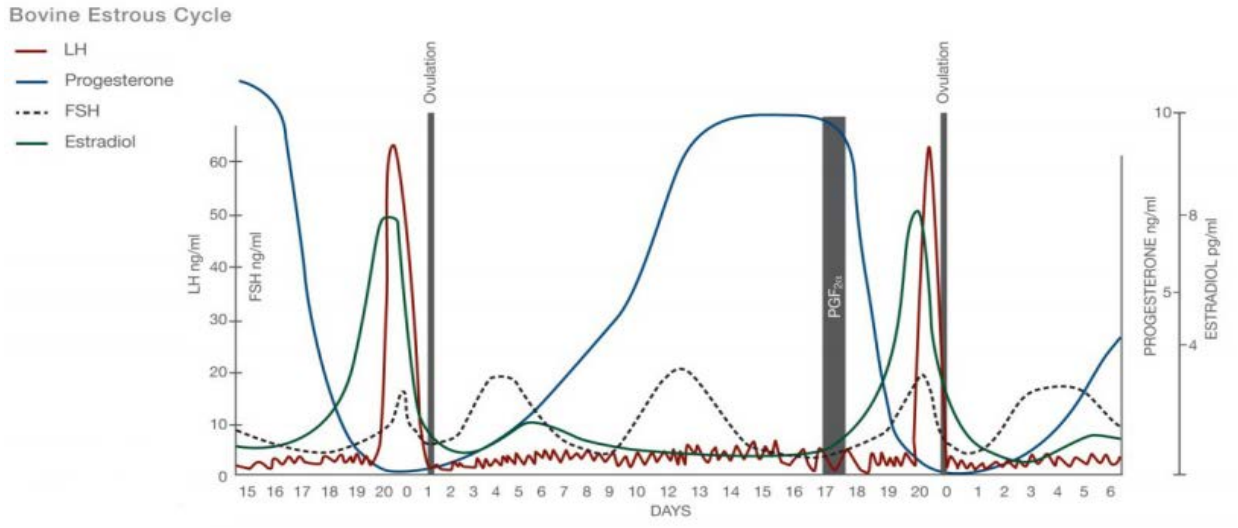


Figure 4: Retrieved from http://www.holsteinfoundation.org/pdf_doc/workbooks/Dairy_Cattle_Reproduction.pdf

production of these hormones was suppressed by progesterone, as it is not until the progesterone levels are very low, that estrogen levels begin to rise (Henricks et al., 1971). Through the

constant supply of progesterone provided by these inserts, synchronization of the herd or flock's estrus cycle becomes possible.

Zoetis Canada Incorporated:

Zoetis Incorporated currently has twenty-eight manufacturing facilities in multiple countries, including India and China (Zoetis, 2016). Located in Kirkland, Quebec, Zoetis Canada Inc. is the current holder of the trademark of CIDR® products, and the license to produce CIDR® 1380 and CIDR ® 330 (Zoetis Canada, 2016; CVP, 2016). Zoetis became its own company on February 1st, 2013, after its mother company, Pfizer (Figure 5), created it as a subsidiary company ("Pfizer Split", 2013). This division of Pfizer left Zoetis in control of agricultural and animal health products. As of 2012, Pfizer, before the split, had 1800 employees (Innovation, Science and Economic Development Canada (ISEDC), 2015).

Figure 5: Retrieved from http://www.pfizer.ca/

Health Information:

Although this product is not considered a dangerous product, it is recommended that some safety precautions should be taken ("Safety Data Sheet: Sheep Insert", 2014). Gloves should be worn when in contact with inserts (Figure 6) to prevent over exposure (Robinson, 2016). If over expose occurs, irregular menstrual events, the irregular function of and irritation of the gastrointestinal tract; as well as an increase or decrease in body weight ("Safety Data Sheet: CIDR 1380", 2014).

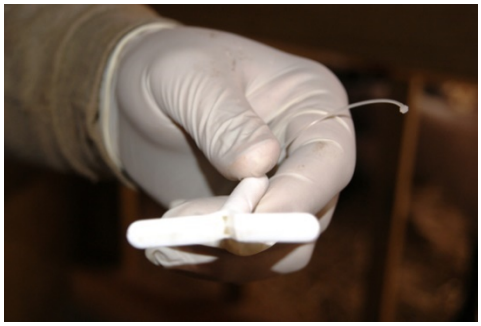


Figure 6: Retrieved from https://www.premier1supplies.com/sheep-guide/2012/10/using-sheep-cidrs/

Benefits to Canada:

Increased Employment:

Through the development of international exporting business for this product, more Canadian jobs will develop. Jobs that are more productive as well as higher paying, as there will be a need to develop this new exporting avenue (Office of the US Trade Representative (OUSTR), n.d.). Jobs will not be limited to this specific sector, as the transportation sector will need to grow in order to move product from production site to new market. Additionally, training will be necessary in order to train local Nepalese veterinarians how to properly use the product (Robinson, 2016). Furthermore, studies will need to be conducted, to show the benefits of this product, to persuade local veterinarians to recommend this product to local farmers. (Robinson, 2016).

Increased Income:

Through the development of trade between Nepal and Canada for this veterinary product, outside investments could occur, if the product proves to be plausible for Nepalese agriculture. Both international and local investment could occur within this sector, which will contribute to an increased rate of economic growth (OUSTR, n.d.). A cycle will begin to form after increased investment, as investments are linked to increased growth and exportation, thus increasing employment, which increases the appealing investment opportunities (Global Affairs Canada, 2016).

Figure 7: Retrieved from https://www.edrawsoft.com/Cycle.php

Company Stability:

Zoetis will benefit through increasing trade between Canada and Nepal through increased company stability. Through accessing the global market, the company can become more stable, even during national economic fluctuations (International Trade Administration, n.d.). Through the export of CIDR® inserts, Zoetis will enter into a new economy, and less dependent solely on the Canadian economy, as they currently only sell CIDR® to Canadian veterinarians (Zoetis, 2016). Additionally, through access to the Nepal market, revenue will increase, allowing the company to have access to extra funds in case of economic downturns (International Administration, n.d.).

Additional Benefits:

Through the exportation of these intravaginal inserts, the population of sheep and cattle will increase, as CIDR® inserts are used to increases pregnancy rates ("Eazi-Breed™ CIDR®", 2016). An increase in population could result in a higher demand, resulting in increased production to meet demand set by Nepalese consumers (Gonçalves et al., 2005). Demand is directly related to employment, as through increased demand, employment increases; as a result, Canadian unemployment will decrease in sectors involved in this industry (Nickell, 1978).

Part 2: Export Potential to Nepal

About Nepal:

Located in southern Asia, Nepal is landlocked (Figure 8) between China and India (Sarup, 1972). As a result, Nepal is highly dependent on them, as they are their biggest trading partners and only access to a port for international trading (Patel, 2013). Nepal is home to 29,033,914 people, of which forty-six percent are unemployed, with the sixty-nine percent of the remaining workforce employed in agriculture (CIA, 2016). It has been estimated that ninety percent of Nepal's total population are subsistence farmers (Metz, 1995).

Figure 8: Retrieved from http://sunlighthr.com/index.php?module=nepal

Nepal is one of the poorest countries in Asia, with a gross domestic product per capita of $2500 USD as of 2015, which if converted to the Nepalese Rupee, the national currency, would be 273,528.90 NPR (US Aid, n.d.; CIA, 2016; Foreign Exchange, 2016). 29.4 percent of the national GDP, $70.09 billion USD, 7.669 trillion NPR, comes from the agricultural sector, emphasizing Nepal's reliance on agriculture for economic growth (CIA, 2016).

Livestock Statistics in Nepal:

The majority of Nepal's livestock, specifically the cattle, including dairy cattle, and sheep, have and continue to experience a steady increase in population (Pradhanang et al., 2015). However, the sheep population is beginning to increase as of 2009, after if dropped by 12,250 (Table 1) between 2006/07 to 2009/10. (Ministry of Agricultural Development (Nepal), 2012). In

correlation with the continual increase in cattle, specifically dairy cattle, milk production (Table 2) has been on a steady increase, the growing sheep population has had a similar impact on wool production (Table 3) (FAO, 2005).

Table 1: Livestock, Cattle, and Sheep, Population in Nepal

Species Population	Year					
	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12
Cattle	7,044,279	7,090,714	7,175,198	7,199,260	7,226,050	7,244,944
Milking Cow	908,712	915,411	932,876	954,680	974,122	998,963
Total Cattle	7,952,911	8,006,125	8,108,074	8,13,940	8,200,172	8,243,907
Sheep	813,621	809,480	802,993	801,371	805,070	807,267

Retrieved from Government of Nepal; Ministry of Agricultural Development; Agri-Business Promotion and Statistics Division Statistics Section (2012).

Table 2: Milk Yields and Proportional of Dairy Animals

Species/Year	Milk Yield (kg/year)				Percentage Milked			
	1980	1990	2000	2002	1980	1990	2000	2002
Cattle	325	371	401	413	8.5	11.0	12.0	12.2

Retrieved from Food and Agriculture Organization of the United Nations (2005)

Table 3: Annual Production of Meat (1,000 metric tonnes)

Species/Year	Meat			
	1980	1990	2000	2002
Sheep and Goat	25.9	31.9	39.8	41.4

Retrieved from Food and Agriculture Organization of the United Nations (2005)

Targeted Consumer:

Currently, Zoetis Canada Inc.'s market for CIDR ® 1380 and 330 is exclusive to Canadian veterinarians (Zoetis, 2016). However, farmers have begun purchasing this product from retailers, thus expanding Zoetis's market within Canadian borders (Robinson, 2016). A similar scenario would most likely occur if these products were exported to Nepal. However, minimal training, approximately five to ten minutes, is needed to properly use the product. (Robinson, 2016). The simple basic training and simple implementation, local Nepalese farmers will be able to place them inside their livestock, instead of relying on veterinarians (Robinson, 2016). Therefore, shifting the target consumer from veterinarians to local farmers.

Needs and Benefits to the Importing Nation:

CIDR ® 1380 and 330 inserts would be a major asset to Nepalese agriculture, through advancing livestock reproduction (Robinson, 2016). Increased ovulation cycles, conception rate will increase, allowing breeding to more success could positively impact farmer's GDP ("Eazi-Breed", 2016). If this became a common practice, an increase in overall GDP and wellbeing could follow.

Earlier Pregnancy Rates:

CIDR inserts are used in animal agriculture to induce estrous cycles in livestock who are not currently experiencing one (Zoetis, 2015; Robinson, 2015). Anestrous livestock limit the productivity of the herd and or flock; however, through the use of this product, herd efficiency and production can increase (Zoetis, 2015). As certain species, milk-producing cattle and sheep, require a birth to maintain high levels of production.

Easier Heat Detection:

The ability to control and initiate the estrous cycle could enable Nepalese farmers to more accurately determine when the bovine or sheep are in "heat" (Robinson, 2016). Through, this there is a narrower time period of when breeding is most successful, approximately twelve hours, depending on the animal (CVP, 2016).

Accurate Breeding Times:

This progesterone supplement initiates the hormonal imbalance necessary for an estrus cycle to begin. (Henricks et al., 2009). After one to three days, the estrus cycle will become apparent in the animal's behaviour, after which is the ideal breeding period (CVP, 2016). This creates a narrow breeding window, thus, if successful, a relatively accurate prediction can be made in terms of birth (Zoetis.com, 2016).

Controlled Reproduction:

CIDR ® 1380 and 330 commonly used as a method to synchronize reproductive cycles within livestock (Robinson, 2016). Through the use of inserts, the offspring can be born within a smaller period of each other due to the synchronization of the estrous cycles of the group (Robinson, 2016). For instance, ewes have produced offspring within a range of six days, instead of sixteen days if no inserts were used (Wheaton et al., 1993). Moreover, the use of intravaginal inserts allows for the inhibition of estrous allowing for synchronization of breeding times, such as in autumn or late winter (Wheaton et al., 1993). This could result in less labour throughout the year as offspring will be birthed during the same time.

Economic Benefits:

As approximately ninety percent of Nepalese are substance farmers, the livestock population is quite low (Metz, 1995). Table 4 displays the average livestock owned per household as of 1993. Assuming these figures have increased slightly within the past two decades, the introduction of these devices could be beneficial through the potential to increase herd or flock size. The Nepalese farmers could then keep the offspring for other products such as meat, milk or fibres, or could be sold. Either way, increase farmers' income. Similarly, if this product were to be used on dairy cattle in Nepal, milk production would increase as cattle with a higher pregnancy rate, tend to have a higher milk yield (Peters & Pursley, 2002)

Table 4: Average livestock ownership (number) per household for eco-zones

Species	Mountains	Hills	Terai
Cattle	6.2	3.18-4.2	4.63-7.1
Sheep	3.2	0.13-0.4	0.29-0.3

Source: Food and Agriculture Organization of the United Nations (2005)

Additional Benefits:

The use of intravaginal insert does not have an impact on quality of milk nor meat. Milk produced by livestock, of which is being treated, is harmless (CVP, 2016). Slaughtering livestock for meat must be postponed for one day upon removal of the insert in order for safe consumption (CVP, 2016). The minimal restrictions on consumption of animal byproducts, whether milk or meat would benefit the local farmer as they rely on their livestock for their food as well as for income.

Additional Products Required:

Controlled internal drug release inserts could benefit Nepal in multiple ways; however, the inserts require additional products to be inserted, as well as to reach their full potential. Foremost, an applicator is required in order to properly place the product inside the animal, whether sheep or cattle (Figure 9), with minimal discomfort (Robinson, 2016). Similarly, a non-irritating antiseptic solution is highly recommended as it acts as a lubricant, allowing for easy insertion, and limiting animal discomfort (CVP, 2016; Robinson, 2016). During the use of CIDR® 1380, it is recommended that an LUTALYSE ® sterile solution, also produced by Zoetis, to be injected upon removable of the intravaginal insert, as it is linked to breeding success. (CVP, 2016; Zoetis, 2016).

Figure 9: Retrieved from http://www.qcsupply.com/540051-eazi-breed-cidr-applicator.html

Transportation Logistics:

Due to the light weight of this product, 300 grams for a package of 10 CIDR® 1380 and 150 grams for a package of 20 CIDR ® 330, air transportation can be used to import into Nepal

(DAH, 2016; Department of Business, Innovation, and Skills (DBIS), 2013). Air transport is beneficial, as this product is more sensitive, especially in terms of temperature, which is best controlled via this method of transport (DBIS, 2016).

Figure 10: Retrieved from http://archive.fortune.com/magazines/fortune/best-companies/2013/snapshots/98.html

FedEx ® (Figure 10) offers services that will benefit the exporting process, through picking up the product from the manufacturer and transport it directly to the importer (FedEx, 2016). With anytime pickup and online label maker ability, Zoetis Canada Inc. will be able to ship the product whenever, allowing for greater control over the exporting process (FedEx, 2016). The exporting process, is considerably efficient, with an estimated five-day period after which it will arrive in Kathmandu, Nepal (FedEx, 2016).

FedEx® will pick-up product from the Zoetis location in Kirkland, Quebec, and transport it to its processing plant, where it will be prepared for air transport (FedEx, 2016). After which, the inserts will arrive at the Montréal-Pierre Elliot Trudeau International Airport and then transport to Kathmandu, Nepal. CIDR ® 1380 and 330, will then be transported to the distributor, located in Kathmandu (FedEx, 2016). To transport one package of CIDR® 1380 or 330, it will cost $187.41 CAD; however, realistically, the product will be shipped in bulk, primarily small lots. (FedEx, 2016). For transport of 10 packages, via the transportation process called FedEx International Priority ®, it will cost $714.36 CAD (FedEx, 2016).

Beneficially, FedEx will also refund the customs value, the market value of the products, if lost or damaged through transportation (FedEx, 2016). Thus, limiting revenue lost, further benefiting Zoetis. Additionally, if this company is used for the exportation of these supplements, the necessary export documentation, mainly the International Airway Bill, will be provided, and completed by FedEx® (FedEx, 2016). Ultimately, this is the most economically sensible, and most beneficial exporting lane available for this product.

Transportation Benefits:

Through the use of air transport, the need to plan for additional transporting process through either China or India can be avoided. The ability to avoid transportation through China is beneficial as it bypasses the need to travel through the Himalayas, which are along the Chinese-Nepalese border. The travel through the Himalayas is near impossible, which could cause issues within trade through this lane (Patel, 2013). Additionally, air transport prevents Nepalese consumers from relying on India as an access point, as it does for most international trade, for the trade of this product (Patel, 2013).

Additional Transportation Costs:

Although the transportation quotes given by FedEx include multiple fees, such as fuel surcharges, and base rates, which includes employment costs, additionally fees are needed to be paid (FedEx, 2016). Primarily, the importing country's and region's duties. Two duties are required to be paid for the importation of hormone-based products. One duty is required by the South Asian Association for Regional Cooperation (SSARC), which costs five percent of purchase cost (Ministry of Finance, 2012). The other is required by the Nepalese government, which is also five percent. (Ministry of Finance, 2012).

Support for Exportation of Product:

The Canadian government provides financial aid to companies looking to expand their market, as financial strain could be a side effect (Export Development Canada, n.d.; Canada Business Network, n.d.). For instance, the Canadian Trade Commissioner Service offers funding for Canadian businesses expanding business activities into the international scheme (Canada Trade Commissioner Service (CTCS), 2016). Funding ranges between $20,000 to $250,000. Similarly, Agriculture and Agri-Food Canada funds a program, agri-marketing program, making $341 million dollars available for Canadian companies (Agriculture and Agri-Food Canada (AAFC), 2016). The aim of this program is to help agricultural industry to seize international opportunities (AAFC, 2016). Within this additional funding, Zoetis would be able to open exporting avenues more easily, giving CIDR® inserts a competitive advantage.

Import/Export Documentation:

Ensuring that the correct documentation is obtained before international exportation is crucial. The Canadian Border Services Agency (CBSA) requires an export declaration, as well as a license for the product before exporting (CBSA, 2016). For air transportation, an International Airway Bill is required to be completed upon exportation (FedEx, 2016).

Importer/Distributor:

After the product arrives in Nepal, the intravaginal inserts will arrive at the Gurans International Pvt. Limited. facilities in Kathmandu. Gurans International is an importer and distributor of veterinary products within Nepal, with facilities in numerous Nepalese cities, such as Kathmandu, Pokhara, and Janakpur (Gurans International P. Ltd., 2010). Distribution chains of veterinary products already exist, as Gurans is involved in the importation of this sort. Additionally, this importer currently has an importing and distribution deal with Pfizer Overseas

LLC (Gurans International P. Ltd., 2010). This could prove to beneficial, as Zoetis is a subsidiary company of Pfizer, enhancing the possibility of Zoetis Canada's ability to access preexisting shipping chains used by Pfizer ("Pfizer split", 2013).

Storage and Refrigeration Issues:

CIDR® inserts have a specific temperature range of which they must be stored at, 15°C to 30°C, causing issues during the transportation to and storage in Nepal (CVP, 2016). Fortunately, through the use of air transportation these temperature requirements can be meet during transport. Although Nepal's climate is varies depending on the regions. Cool summers and harsh winters are experienced in the northern regions, while warm, subtropical summers as well as mild winters in the south (CIA, 2016). Figure 11 outlines the annual average temperature of the capital, Kathmandu, ranging from 2.4°C to 29.1°, thus quite mild. (Department of Hydrology and Meteorology, n.d.). Nevertheless, control temperature storage is necessary to store the inserts properly due to the temperature fluctuations. However, the storage after the product reaches Nepal may be difficult, as near sixty-one percent of the population do not have

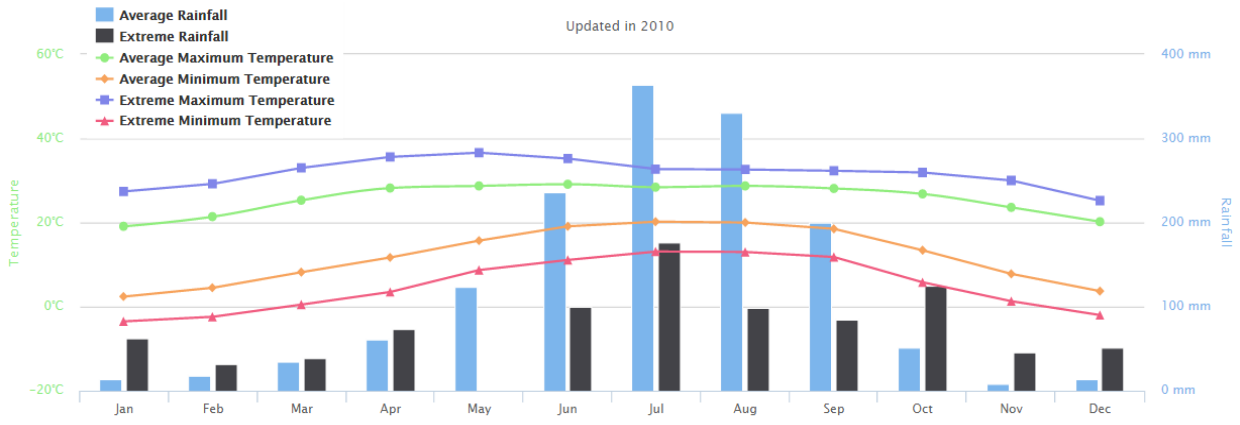


Figure 11: Retrieved from http://www.mfd.gov.np/city?id=31

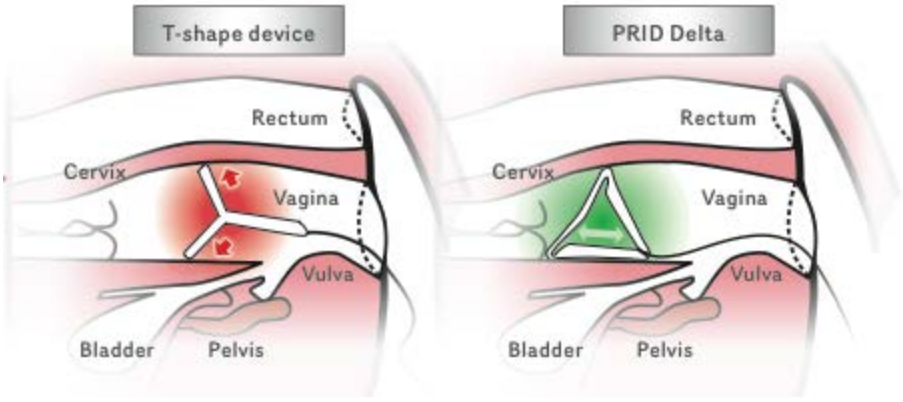
access to electricity, primarily those in rural areas (Mainali & Silveria, 2011). Thus, a controlled temperature setting is unlikely, which would result in incorrect storage of CIDR ® 1380 and 330.

Trade Barriers:

Nepal is a trade-dependent country, much more than its neighboring countries (World Bank, n.d.). 1965 marked the establishment of Canadian and Nepalese bilateral relationships, those including trade and investments (Gov. of Canada, 2013). Nonetheless, with more than fifty years of strong relations, Canada and Nepal have yet to establish a free trade agreement (FTA), which causes the prices of imports increase. (Global Affairs Canada, 2016). Without an FTA, tariffs exist, increasing purchasing cost, ultimately, making the product less attractive. Trade barriers are not limited to finances, as lack of infrastructure is a challenge in terms of transport of inserts into rural areas, where specific consumers are commonly located (Donnages, 2005).

Competing Products:

Controlled internal drug release inserts produced by Zoetis Canada are not the only product on the market fulfilling this specific niche. PRID® (Progesterone Releasing Intravaginal Device) Delta, are similar devices; however, the major difference is the shape of the insert (Robinson, 2016). CIDR® inserts have a T-Shape structure, while PIRD® inserts have a triangular shape (Figure 12), which is linked to decreasPed discomfort and irritation of vaginal lining (Ceva, 2016). Identical CIDR ®1380 devices being produced by Zoetis China (Zoetis China, 2016). Through the production of these devices in



http://www.reprodaction.com/uk/Products/PRID-DELTA

China, it is more economically sensible for Nepal to import this veterinary product from its northwestern neighbour. Moreover, as 10 percent of Nepal's imports is currently comprised of Chinese trade, shipping lanes are already available (Patel, 2013). Ovsynch is quite similar to CIDR® 1380, as both are progesterone supplements that are used over a week period (De Rensis & López-Gatius, 2007). Although they are not as effective as CIDR inserts. Induced pregnancy rates for Ovysnch and CIDR ®, 31% and 41%, and ovulation synchronization, 49% to 69% respectively (De Rensis & López-Gatius, 2007).

Marketing Strategy:

According to the World Bank, Nepalese farmers lack access to agricultural education, hence, emphasizing the need for marketing strategies (World Bank, 2013). Farmers would need to understand the benefits of using CIDR ® inserts for livestock reproduction. A possible method of doing so, is through utilizing a Nepalese Veterinary School, such as the Himalayan College of Agricultural Sciences and Technology in Kathmandu, to display the benefits (Robinson, 2016). The school could perform studies on local producers' herd or flock to determine the benefits of the product while providing farmers with a "free-trial" (Robinson, 2016). If farmers like the result, demand could increase. This possible marketing strategy benefits students through a study the impacts of the inserts, while producers can reap the benefits (Robinson, 2016).

Conclusion:

Price Point Realism:

The estimated total cost of a box of ten CIDR® 1380 or a box of twenty CIDR ® 330, including transportation costs, purchase cost, and tariffs, could be 32,571.22NPR or 27,583.31 NPR respectively. The average Nepalese citizen earns an annual GDP of 274,424.80 NPR, equivalent to $2500 USD (CIA, 2016). If the farmer has an income similar to that of the average

GDP per capita, up to eleven percent of their income would be spent on these inserts. This cost is considerably high; however, the benefits could outweigh the cost. As ninety percent of the population are subsistence farmers and forty-six percent unemployed, approximately half of the farmers are solely reliant on agriculture, as a result, earn less than the average income. By which, product is a nonrealistic item for this part of the population. Thus, putting these farmers at a disadvantage as their production of animal byproducts, as well as their herd size, will be considerably less than those who could afford CIDR® inserts.

CIDR® inserts could be used twice; however, the second use is not as effective, hence, benefits could vary (Robinson, 2016). The reuse of this product could make the purchase more plausible for the local farmers. Nonetheless, if reused, there is a potential for the spread of disease and infection such as vaginitis (Robinson, 2016).

Unknowns:

To properly evaluate the benefits of the possible exportation exporting CIDR® inserts to Nepal from Canada additional information is needed. The price of production, including materials and labour, are needed to properly determine the market price of the products if purchased directly Zoetis. Costs mentioned in previous sections; CIDR® 1380 and CIDR® 330, are quotes from a second party, Dundas Animal Hospital. Labour force is also unknown, which impacts the ability to properly analyze the possible benefits that decrease Canadian employment, through the exporting of inserts. Zoetis Canada Inc. is a subdivision of Zoetis, which has facilities in multiple countries. This may impose restrictions on Zoetis Canada to export products as similar products may be produced in different countries. Such could be the circumstances for CIDR® 1380 as it is produced in Canada and China (Zoetis, 2016).

Recommendations:

CIDR® 1380 and 330 could prove to be beneficial for Nepalese animal agriculture, specific cattle and sheep agriculture. Through economic benefits, reproduction control, and possible herd or flock increase, Nepalese farmers could increase their wellbeing. However, in order for the product to be as effective in countries such as Canada, Nepal would need to invest in artificial insemination (AI) (Robinson, 2016). A study of Nepalese production systems determined that one out of eighty-five farms used AI as a common breeding practice (Redding et al., 2012). Nevertheless, natural breeding techniques, such as using a bull to inseminate, could work; however, this could cause transfer disease between females, as commonly there is only one male for multiple females (Robinson, 2016). Additionally, if animals breed before insert can be removed, it may be pushed farther into the vagina, making it harder to remove and increasing animal discomfort (Robinson, 2016).

Company Contacts:

For more information about Zoetis's controlled internal drug release (CIDR ®) inserts, both 1380 and 330, the Compendium of Veterinary Products provides a clear description of the products, http://www.inspection.gc.ca/animals/chief-veterinary-officer/cvo-statements/compendium-of-veterinary-products/eng/1445518020503/1445518021643 (CVP, 2016) . The Zoetis Canada can be reached directly by email, order_desl@zoetis.com or through a toll-free number, 1-800-663-8888 (Zoetis Canada, 2016). Gurans International P. Limited can be, for more information on the distribution chain (Gurans International, 2010. Finally, for more information on transportation logistics, customer service personnel are available twenty-four hours a day, every day of the week. A FedEx customer service representative can be contacted by a toll-free number, 1-800-238-4461 (FedEx, 2016).

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