
Promoting *Canadian Agri-food* *Exports*

POULTRY PELLET PRODUCTION EQUIPMENT

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Introduction

Canada

Canada is the second largest country in the world, located in the northern part of North America. Canada's land mass covers 9,093,507 square kilometres and is home to more than 34 million people. (Statcan.gc.ca, 2005) Canada has a variety of land regions and climates within the country that spans across ten provinces and three territories. (Statcan.gc.ca, 2005) Agriculture in Canada is a huge component of the country with a variety of different forms spanning across the nation. The prairies (mainly Alberta, Saskatchewan and Manitoba) are host to some of Canada's flattest, most suitable farmland. This is where many crops are grown including wheat, flax, oats and canola. Alberta is also known for its production of beef cattle. More towards the eastern parts of Canada, Ontario and Quebec are both well known for dairy production systems, and the production of the crops corn and soybeans. Looking at the coasts of Canada (both to the west and to the east), British Columbia (west) New Brunswick (east) and Newfoundland and Labrador (east) have a considerable amount of aquaculture. (Agr.gc.ca, 2015)

In Canada, agriculture accounts for about 6.7% of the GDP. Agriculture also employs approximately 5.2% of the Canadian population. (Statcan.gc.ca, 2005) In terms of exports, the United States of America ranks number one with China coming in at number two. (International.gc.ca, 2015) This is for both the exports of grain and for livestock. (Statcan.gc.ca, 2005) Canada is currently ranked the 6th largest country in respect to agricultural exports in the world. (Statcan.gc.ca, 2005) As technology advances, the farming industry in Canada has become more efficient and has been producing more product than ever before.

Nepal

Nepal covers an area of 147,141 square kilometres and is located to the south of China and to the west and north of India. It is home to around twenty-seven million people. (Ministry of Agriculture Development, 2013) The country is composed of three land regions known as the Mountain, Hill and Terai regions that are classified based off of altitude, temperature, livestock and crop production systems. Many of these regions are not ideal for certain types of agriculture. The Terai region is where most of the agriculture productions in Nepal are most prevalent and successful. In the Terai region, crops such as barley, rice, wheat and oilseeds are grown. (Ministry of Agriculture Development, 2013) Agriculture makes up about 38% of Nepal's GDP and employs 70% of the total population. (Ministry of Agriculture Development, 2013) Nepal is an example of subsistence farming, with a main part of the population growing their own food. Many Nepalese rely on agriculture as a main source of food and income. (Ministry of Agriculture Development, 2013) In Nepal, the poultry sector is worth \$240 million. It employs around 70,000 people. (Ifc.org, 2015) Due to inefficiencies in production systems, producers lose about \$32 million. These inefficiencies exist mainly in the small and medium-sized producers of broiler chickens. (Ifc.org, 2015)

If you take a moment and ask any livestock farmer where the majority of their costs come from, they will tell you it comes from feeding their animals. In Nepal, this is especially true. Poultry producers in Nepal are competing in price with the neighbouring markets of India, therefore relying on imports of pellet from India to feed their flocks. Around 70% of a poultry farmer's investment in Nepal goes into obtaining pellet feed. (*Mena Report*, 2015) To try to offset these costs for getting pellet, Nepal farmers can invest in their own BN70-100 Industrial Pellet Mill.

Part 1

Product Description

The product that is being proposed for export to Nepal is the BN70-100 Industrial Pellet Mill. This pellet mill is made by a Canadian-based company called Lawson Mills Biomass Solutions Ltd. headquartered in Mt. Herbert, Prince Edward Island. (Lawson Mills, 2015) The BN70-100 Industrial Pellet Mill is a feed processing system that can be installed on-farm. Essentially, the BN70-100 Industrial Pellet Mill gives operators the ability to control the percentage of protein, fat and nutrient levels to their desired percentage content. (Lawson Mills, 2015) This system also gives operators the option of selecting variable pellet sizes to the preference of the farmer. (Lawson Mills, 2015) Due to the variety of variables the pellet mill has to offer, farmers can individually customize their batch of pellet. By using the BN70-100 Industrial Pellet Mill, farmers can customize their individual batch to their preference, ultimately reducing waste of feed, reducing the amount of fines within the feed and keeping the feed fresher.

Lawson Mills Biomass Solutions has six different sized pellet mill systems available. They range from five horse power to forty horse power. (Lawson Mills, 2015) The BN70-100 Industrial Pellet Mill that is being recommended for export to Nepal has a five to ten horse power three phase motor system. (Lawson Mills, 2015) This system includes a feed hopper with an anti-bridge mixer, a main feed auger, a mixing and conditioning arm with moisture injector, pellet press with a steam capture chamber and specialized floating rollers. The system also has a cooling drum with an integrated fan, a screening system to remove fines and a patented cast back system that returns all fines back to the main hopper to be re-pelleted. (Lawson Mills, 2015) The cost of this the BN70-100 Industrial Pellet Mill is \$10,500 Canadian. (Lawson Mills, 2015) This is equivalent to approximately Rs 838,288.60 Nepali rupees. (Exchangerates.org.uk, 2015) The

BN70-100 Industrial Pellet Mill is a patented product. The BN70-100 Industrial Pellet Mill weighs around three hundred pounds. (Lawson Mills, 2015) The mill can produce fifty to two hundred pounds of feed per hour. (Lawson Mills, 2015) In Figure 1.1, the BN70-100 Industrial Pellet Mill can be seen. In Table 1.2, the chart shows the available pellet mill systems that Lawson Mills offers. Highlighted in orange at the bottom of the table is BN70-100 Industrial Pellet Mill (the pellet mill recommended for export to Nepal).



Figure 1.1. The BN70-100 Industrial Pellet Mill being proposed for export to Nepal.

Image retrieved from: Lawson Mills Biomass Solutions - <http://www.lawsonmills.com/pellet-mills>

Table 1.2. The available pellet mill systems Lawson Mills has to offer.

Table retrieved from: Lawson Mills Biomass Solutions - <http://www.lawsonmills.com/pellet-mills>

Lawson Mills Technical Data - Pellet Mills										
Model Number	#Production rate And Item description	Total HP	Voltage Options*	Weight (Lbs)	Dimensions (Ft/ LWH)	Die sizes Available (mm)	**Maintenance time required per hour of operation	Cost	**Average operating S/ton (wear/tear/ electricity) Labor excluded	Accessories attached
XXT	800-1400lb/hr Full System Industrial production level—linked systems possible	45.5	*208/240/460/575	1400	18x5x7	2/3/3.5/4.5/6/8/10/14	5 minutes **	\$72,300	\$5	Water dosing/ fines removal/ feed hopper/ conditioning arm/pellet cooler
XTS	700-1000 lb/hr Full System Mid-Large scale production for feed /wood etc units can be linked	34.5	*208/240/460/575	1200	18x5x7	2/3/3.5/4.5/6/8/10/14	5 minutes**	\$63,400	\$8	Water dosing/ fines removal/ feed hopper/ conditioning arm/pellet cooler
XT	600-800 lb/hr Full System Mid scale feed/wood production-large hops farm	24.5	*220SP/208/240/460	1100	18x5x7	2/3/3.5/4.5/6/8/10/14	5 minutes**	\$51,350	\$10	Water dosing/ fines removal/ feed hopper/ conditioning arm/pellet cooler
72A	250-350lb/hr Full System Ideal for testing, small batch production	14.5	*220SP/208/240/460	900	18x5x7	2/3/3.5/4.5/6/8/10	5 minutes**	\$40,985	\$12	Water dosing/ fines removal/ feed hopper/ conditioning arm/pellet cooler
BN	50-200lb/hr Bonsai (Hobby/research/ personal/small shop/ farm)	5 or 10	*110SP/208/240/460	300	3x3x4.5	2/3/3.5/4.5/6/8/10	10 minutes**	From \$10,500	\$15	Feed hopper with feed control/anti bridge sweep/control board

Labour Requirements

To operate the BN70-100 Industrial Pellet Mill, the labour required is very minimal. The manual input of the feed components into the machine is required for the pellet mill to work. Also, ensuring that the pellet being produced and coming out of the machine is being captured most effectively in either a pail or burlap sack ensures that feed is not being wasted. (Lawson Mills, 2015) Maintenance of the machine is fairly uncomplicated. The mills are built to high industry standards. Lawson Mills uses high quality materials from North America and Europe (Lawson Mills, 2015). The BN70-100 Industrial Pellet Mill also comes with a year of warranty in case there is any problems with the product. The average operating cost per ton of feed is

around \$15. (Lawson Mills, 2015) This is equivalent to approximately Rs 1197.56 Nepali rupees. (Exchangerates.org.uk, 2015)

Inputs Required

For poultry, the typical inputs of feed source required are corn, sesame cakes, sunflower cakes and soybean meal for protein content. (Lundeen, 2006) The more soybean meal added, the higher the protein content of the ration. A variety of other additives such as linoleic acid, enzymes, vitamins and minerals are also combined into the feed. (Amerah, Ravindran, Lentle & Thomas, 2007) Based off of recent studies, the most effective pellet is large processed pellet as opposed to mash (finely ground pellet). (Lundeen, 2006) Particle size of the corn or sorghum incorporated into poultry diets plays a vital role in increased enzymatic digestion. This in turn results in an increase in grinding activity, with increased rate of nutrient digestion and higher gut motility. (Amerah, Ravindran, Lentle & Thomas, 2007) Overall, larger pellet size increases energy consumption in poultry resulting in optimal growth and production rates in birds. (World's Poultry Science Journal, 2007) By use of the BN70-100 Industrial Pellet Mill, Nepalese farmers can improve the quality of their birds by use of the variable pellet size settings.

Patent Restraints

Lawson Mills Biomass Solutions has two patents on their pellet production mills. They have one dated for 2008 and a more recent one dated for 2015. These patents apply to the BN70-100 Industrial Pellet Mill (the proposed product for export to Nepal). There is also a copyright on the company name and their website. All rights are reserved on the products. (Lawson Mills, 2015)

Market Opportunity

The market opportunity for the BN70-100 Industrial Pellet Mill is fairly limited due to the cost of the product and the number of poultry producers in Nepal. There is about 98 largescale hatcheries, 500 layer and 1000 broiler farms in Nepal. (Food and Agriculture Organization of the United Nations, 2014) This makes the marketability of this product fairly niche as poultry makes up only around 3.5% of GDP contribution in Nepal. (Food and Agriculture Organization of the United Nations, 2014)

Benefits to Canada

There are a couple of benefits to Canada that would result from the export of this product to Nepal. One of which would be the benefit to Lawson Mills Biomass Solutions. The expansion to Nepal is an international expansion for this Canadian owned and operated company. This increases the value of this company with international exposure and potentially more sales. It also provides the opportunity for long-term growth for the company. By expanding internationally, Lawson Mills Biomass Solutions will be reducing their vulnerability to fluctuations localized to within the Canadian market. (Britishcolumbia.ca, 2015) This allows Lawson Mills Biomass Solutions to have a greater sales base which could potentially help to finance added research and development into both current and into future products. (Britishcolumbia.ca, 2015)

Another possible benefit is to Canadian farmers. Canadian farmers looking to purchase the BN70-100 Industrial Pellet Mill would be getting the benefit of the cost of the mill being reduced as more units are being made. Based on supply and demand theory, as more units are being produced, the cost of the product reduces due to increased efficiency of production. This

ultimately makes the product more affordable for Canadian farmers. As more units are being produced, the ripple effect of the product will expand. More product being sold equals lower cost margins and essentially a lower price for the product. (Britishcolumbia.ca, 2015)

Environmental Sustainability in Canada

Lawson Mills Biomass Solutions is a Canadian owned and operated company headquartered in Mt. Herbert, Prince Edward Island. (Lawson Mills, 2015) Most of the components used to build the BN70-100 Industrial Pellet Mill come from North America and Europe. (Lawson Mills, 2015) In terms of environmental sustainability of this product, the logistics of importing these materials into Canada to make the pellet mill are not ideal. In the future, Lawson Mills Biomass Solutions should look to see if all of the components for the BN70-100 Industrial Pellet Mill can be manufactured in Canada or purchased from other Canadian companies. By making these smart business decisions, Lawson Mills Biomass Solutions can reduce their environmental impact of importing these materials, thus reducing the carbon footprint on each of these machines.

Part 2

Global Competition

The major players in the pellet mill industry are all out of China. China can manufacture the components for the pellet mills fairly close and therefore the cost of the mill is significantly less than a pellet mill produced in Canada. In Canada, the only major manufacturer of poultry pellet mills is Lawson Mills Biomass Solutions. (Alibaba.com, 2015) There only other companies involved in pellet mills in Canada are distribution companies that distribute mills from China. The company with the closest product to the BN70-100 Industrial Pellet Mill and the company

with the most credible reputation is a company called Azeus Pelletizing located in Zhengzhou, China. A full list of their pellet mills are listed in Table 1.3. The AZS120B pellet mill produces sixty to one hundred kilograms of feed per hour. It costs around \$6,500. (Azeuspelletmill.com, 2015) This is \$4,000 less than the BN70-100 Industrial Pellet Mill.

Table 1.3. The different products Azeus Pelletizing offers.

Table retrieved from: Azeus Pelletizing - <http://www.azeuspelletmill.com/feed-pelletizing/electric-feed-pellet-mill.html>

Model	Voltage	Dia.of flat die	Hole size	Moisture	Capacity	Packing size
AZS120B	Single phase: 220V 50HZ Threephase: 380V 50HZ Voltage: 3kw	120mm	2.5/3/4/5 /6/8/10mm	12%-20%	60- 100kg/h	75*35*65cm
AZS150B	Three- phase: 380V 50HZ Voltage: 4kw	150mm	2.5-10mm	12%-20%	90- 120kg/h	75*35*65cm
AZS200B	Threephase: 380V 50HZ Voltage: 7.5kw	200mm	2.5-10mm	12%-20%	200- 300kg/h	100*43*95cm
AZS230B	Threephase: 380V 50HZ Voltage: 11kw	230mm	2.5-10mm	12%-20%	300- 400kg/h	114*47*97cm
AZS260B	Threephase: 380V 50HZ Voltage: 15kw	260mm	2.5-10mm	12%-20%	400- 600kg/h	112*52*107cm
AZS300B	Threephase: 380V 50HZ Voltage: 22kw	300mm	2.5-10mm	12%-20%	600- 800kg/h	127*52*107cm
AZS360	Threephase: 380V 50HZ Voltage: 22kw	360mm	2.5-10mm	12%-20%	600- 800kg/h	134*58*106cm
AZS400C	Threephase: 380V 50HZ Voltage: 30kw	400mm	2.5-10mm	12%-20%	900- 1100kg/h	152*60*115cm

Transportation Logistics

Due to the price of the BN70-100 Industrial Pellet Mill, this is a very niche product. Ideally, around 5-10 units could be sold in Nepal in various regions of the country in attempts to cater to poultry producers around the country. At this time, it would not make very much sense to put a distribution centre in Nepal. Due to localized demand for the product, the BN70-100 Industrial Pellet Mill would need to be exported from Canada on an as-needed basis. To export the BN70-100 Industrial Pellet Mill via FedEx air transport services, on a FedEx International Economy® flight, the cost would be \$9,693.41. (Fedex.com, 2015) To ship a similar product from China to Nepal, the cost for transport is significantly less, costing only around \$500. (Alibaba.com, 2015) Figure 1.4 and 1.5 show the transportation chain for both products. By analyzing the transportation cost and the price of the product in Tables 1.6 and 1.7, one can see that the Pellet Mill from Azeus Pelletizing will be the cheaper overall product.



Figure 1.4. Transportation chain for Lawson Mills Biomass Solutions to Nepal



Figure 1.5. Transportation chain for Azeus Pelletizing to Nepal

Table 1.6. Comparing the cost of the product and the cost of transportation for the two main manufacturers of poultry pellet mills in Canadian dollars.

Company	<i>Lawson Mills Biomass Solutions</i>	<i>Azeus Pelletizing</i>
Cost of mill	\$10,500	\$6,500
Cost to Transport to Nepal	\$9,638.41	\$500
Total Cost to Nepalese Farmer	\$20,138.41	\$7,000

Table 1.7. Comparing the cost of the product and the cost of transportation for the two main manufacturers of poultry pellet mills in Nepali Rupees.

Company	<i>Lawson Mills Biomass Solutions</i>	<i>Azeus Pelletizing</i>
Cost of mill	Rs 838,288.60	Rs 517,937.62
Cost to Transport to Nepal	Rs 768,014.64	Rs 39,841.36
Total Cost to Nepalese Farmer	Rs 1,604,683.11	Rs 557,778.98

Cost Analysis

When trying to figure out the potential profitability, one can use the \$15 per ton of pellet produced to calculate the cost per bird to feed. There is approximately two thousand pounds in one ton of feed. The average chicken eats a quarter of a pound of feed per day. Therefore, a ton of pellet would feed approximately eight thousand chickens in a day. This makes the cost to feed one chicken for one day Rs 0.1497 Nepali rupees. The current selling price of a chicken in Nepal

is about Rs 250 Nepali rupees per kilogram. The price for chicken has dramatically increased since last year's selling price for chicken was approximately Rs 160 Nepali rupees per kilogram. This is an increase of about fifty six percent. (The Poultry Site, 2015) With the price of chicken going up, the need for lower feed costs to widen the revenue margin is necessary.

The BN70-100 Industrial Pellet Mill is priced at \$10,500 Canadian which is equivalent to about Rs 838, 288.60 Nepali rupees. For this product to make sense for export to Nepal, setting the pellet mill up in a local cooperative is the option that would work best. This is potentially a great business opportunity for local farmers in Nepal to invest in. The banks in Nepal have also recently increased initiatives for agricultural lending, making applying for a loan for the pellet mill more realistic. (Global Banking News, 2014) With multiple investors, the BN70-100 Industrial Pellet Mill would be a realistic product in Nepal as it would work to pay itself off. If the BN70-100 Industrial Pellet Mill works for ten years, this makes the price of the machine Rs 83,828.86 Nepali rupees per year. If there is at least thirty investors into the pellet mill, the price per investor or company investing is only around Rs 2,794.30 Nepali rupees.

Benefits to importing nation

There are many benefits that will come from Nepalese poultry farmers investing in the BN70-100 Industrial Pellet Mill. Firstly, by having access to local cooperatives with the pellet mill, poultry producers in Nepal can avoid the high cost of feed associated with importing pellet from India. By investing in local cooperatives, Nepalese poultry producers are supporting localized ventures, thus boosting the economy in Nepal by keeping their money local within the community. (Bhatta, Ishida, Taniguchi & Sharma, 2008) Poultry producers in Nepal potentially could also save quite a bit of money by having access to the BN70-100 Industrial Pellet Mill. Poultry producers can essentially save money on feed itself (as the cornered market of Indian

pellet is being avoided, thus making prices realistic), and also on money spent to acquire the feed. Because the pellet is being produced locally, there is no need to travel far out distances like to India. This saves on transportation costs, which significantly add to the overall cost of the pellet. By giving poultry farmers in Nepal the opportunity to invest in local cooperatives, they are being given an opportunity to expand their production system. There is the potential for many local poultry farmers in Nepal to gain this secondary source of income if they make the initial investment to fund the purchase of the BN70-100 Industrial Pellet Mill. By importing the BN70-100 Industrial Pellet Mill into Nepal, there will also be a benefit seen to the local transportation industry as they need to get the mills from Kathmandu to the cooperatives around Nepal.

The quality of the feed will also increase. This is a major problem in Nepal as the majority of production losses come from poor feed quality, which leads to the developmental problems in young chicks. (Ifc.org, 2015) Currently the International Finance Corporation (IFC) is working with poultry producers in Nepal to improve the poultry operations, with specific emphasis on improving feed, the quality of day-old chicks and the performance in growers. The goal is to reduce mortality in the birds and ultimately increase incomes of Nepalese poultry producers.

There is a large emphasis being placed on the women in Nepal, who are considered the backbone of the industry with thirty-eight percent of poultry producers in Nepal being female. IFC is currently training around one thousand Nepalese women. (Ifc.org, 2015)

Environmental Benefits to Nepal

As a result of purchasing the BN70-100 Industrial Pellet Mill, there are a couple environmental benefits that will be experienced directly by Nepal. Firstly, the elimination of having to drive to India to purchase the feed for one's birds is an easy way that greenhouse gas

emissions is reduced. Because the product is local, greenhouse gas emissions resulting from acquiring feed will dramatically decrease, therefore being more environmentally friendly.

Contact Information

There are several ways to contact Lawson Mills Biomass Solutions. They have a main headquarters, a delivery and manufacturing site, and a secondary distribution centre. The headquarters of Lawson Mills is located at 383 MacEachern Road, Mt. Herbert, Prince Edward Island, Canada, C1B 3P6. (Lawson Mills, 2015) The delivery and manufacturing site is located in Ebenezer Industrial Park (Rear Building), 605 New Glasgow Road, Route 224, C1E 0S8, Ebenezer, Prince Edward Island, Canada. (Lawson Mills, 2015) To contact the distribution centre; ask for Pierre Antoine (email: pa.stamour@biojoule.ca) when calling the Distribution centre. The location of the distribution centre is BioJoule Incorporated, 15 Gamble Road East, Office 105, J9X 3B6, Rouyn-Noranda, Quebec. (Lawson Mills, 2015) The telephone numbers for Lawson Mills Biomass Solutions are listed in Table 1.8 below.

Table 1.8. The telephone numbers to contact Lawson Mills Biomass Solutions.

Toll Free:	1-888-313-9424
From Canada call:	902-629-4977
From the United States call:	315-567-4352
Quebec Distribution Centre:	819-763-9543

Marketing Strategy

Marketing in Nepal will be one of the more challenging aspects of this project. In Canada, Lawson Mills Biomass Solutions markets the pellet mills at farm shows across the country. This

allows the company to demonstrate to farmers how the product works in a setting where the possible customer comes to the product. However, because farm shows are more of a North American concept, this way of marketing will not be as effective in Nepal. For marketing of the product in Nepal, having a demonstration day at a local community gathering may be the most effective way to market the BN70-100 Industrial Pellet Mill. Another possibility that would be less economically and environmentally efficient would be going around to the individual poultry producers in Nepal and pitching the product to them on site.

Required Documentation

To export the machinery to Nepal, conveyance reports, cargo reports and bills of lading must be filed prior to export. Also required is a Canadian Automated Export Declaration (CAED). (Canada Border Services Agency, 2009) With relatively flexible trading allowed in the agricultural industry in Nepal, there would be limited trade barriers associated with moving the mills into Nepal.

Loan and Grants Programs

To get this product launched internationally, applying for a Global Opportunities for Associations (GOA) may be beneficial in aiding the initial cost of exporting the mills (The Canadian Trade Commissioner Service, 2015)

Future Studies Required

At this time, there is no indication that a significant amount of Nepalese will be harmed by the import of the BN70-100 Industrial Pellet Mill because there really is not a product currently like it in Nepal. The only indirect impact that can be hypothesized is that a couple of small feed mills in Nepal that import pellet from India may experience a decline in sales. With that being

said, there can be future studies done to ensure that the BN70-100 Industrial Pellet Mill is not negatively effecting any part of the poultry industry in Nepal or any extending industry in Nepal.

A study into the quality of feed being produced by the local crops in Nepal is the next step in this project as the quality of crops in Nepal is very different than that of Canadian crops (Canadian crops being far superior in quality). This would hinder the potential of improving the quality of pellet in Nepal if the inputs into the feed are not meeting adequate quality standards. (Maharjan, 2003)

Critical Summary:

The BN70-100 Industrial Pellet Mill (an innovation by Lawson Mills Biomass Solutions located in Mt. Herbert, Prince Edward Island, Canada) is a great product with lots of potential in the international market. The next steps to make this product more suitable to developing countries like Nepal is to reduce the price. This would make it more realistic for poultry producers in Nepal to invest in the product. To reduce the price of the BN70-100 Industrial Pellet Mill, getting the exporting and/or importing governments to subsidize pellet mills would help to make the price more attainable for Nepalese poultry farmers. Also sourcing the materials to make the mills from Canadian companies would reduce the cost of the mill instead of importing the materials needed for the product from other countries.

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