UBC Social Ecological Economic Development Studies (SEEDS) Student Report

Baseline Inventory of the UBC Food System: GHG Emissions of Food Products and Action Plan (Meats)

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Scenario 2: Baseline Inventory of the UBC Food System: GHG Emissions of Food Products and Action Plan (Meats)

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Abstract:

We, LFS 450 Group 4, took up the task of examining the GHG emission rates generated by UBC Food Services from their sales of various meat products on campus. A total of nine meat products were isolated from the UBC Food Services' Velocity Report and selected according to type and yield to date in weight. Standardized GHG emission values for processing, production, packaging and transportation were extrapolated through extensive literature research. We determined that the total GHG emission from the nine items were 117993.63 kg of CO2e with Chicken FLT BRD Crunchy Ruffled FZN ZTF as the most significant contributor. The greatest limitations we faced where the multiple assumptions which had to be made and lack of GHG emissions information available from suppliers. Although our primary source of data, the Velocity Report, was extremely accurate, the values isolated from various scholarly articles did not account for all possible emission factors. This means that our numeric values are underestimated and overly generalized. From our research and calculations, to lower the overall GHG emissions from UBC Food Services, we would recommend reducing travel miles for the products where possible by selecting local food processors. Purchasing less beef products and replacing them with other lower emission intensive items such as chicken as well as selecting less processed food items would improve UBC's carbon footprint.

Introduction:

We are a group of LFS students conducting research on the greenhouse gas (GHG) emissions from UBC Food Services. In 2008, UBC launched an intensive climate action planning process to engage campus partners and students (UBC, 2012). The plan aims to reduce GHG emissions in the areas of campus development, energy supply and management, fleets and fuel use, business travel and procurement, transportation and food. One of the plan's goals for the near future is to reduce GHG emission to 33% below 2007 levels by 2015 (UBC, 2012). In order to achieve this goal, it is crucial to identify which factors contribute the most to it. In terms of GHG emissions from foods in Canadian households, statistics show that fresh and frozen meat emits the most at 23%, followed closely by prepared foods at 21% (Statistics Canada, 2012).

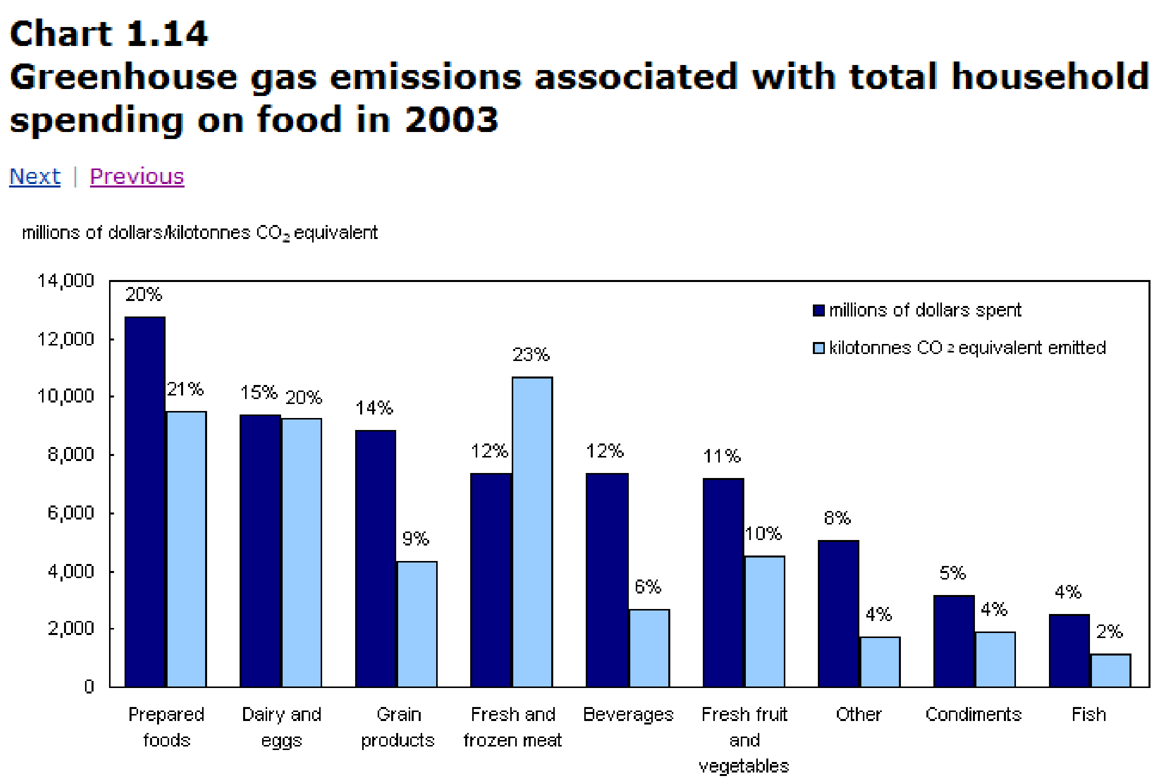

Figure 1 - In 2003, meat products contributed the most kilotonnes of CO2e
Source: Food In Canada report 2009 http://www.statcan.gc.ca/pub/16-201-x/2009000/ct058-eng.htm

For this project, we will be investigating several meat products served through UBC Food Service outlets and carrying out a quantitative analysis on each meat product's GHG emissions. We will be working closely with our stakeholders and community partners, Lillian Zaremba and Victoria Wakefield, as well as communicating with the project coordinator, Sophia Baker-French, and our teaching team for advice and guidance.

In previous years, the evaluation of the UBC GHG emissions has always been carried out using standards set by external organizations such as STARS and the Sustainable Endowments Institution (SEI) (UBCFSP, 2012). However, these organizations use limited indicators; therefore the total GHG emissions from the food sector cannot be accurately determined. In relation to the UBC food system, we want to identify what are the major contributors to GHG emissions from meat products. In addition, we want to know which aspects of food production (production, processing, packaging, and transportation) produce the most GHG. After communicating with our stakeholders, we were informed that the previous LFS 450 groups conducted life-cycle assessments of pork; however, this information was not applicable in assessing all of the different meat products offered at the UBC campus. Therefore, our aim was to develop a comprehensive GHG inventory to show the climate impact of the UBC food system.

Through reviewing the UBC Food Systems Project (UBCFSP) Vision Statement, our group found that although initiatives have good intentions, many of the goals may be impractical. As a community, UBC wants to work towards becoming a more eco-friendly system. However, UBC has many affiliations and contracts with corporations, such as Gordon Food Services and Coca Cola, companies that lack transparencies, making the process much more complicated. Besides being an academic institution, UBC also oversees many business operations and choices are made based on economic feasibility rather than social responsibility. However, UBC is always improving its sustainability status such as the on-site composting system, which has earned them good standing in the STARS report.

At the start of this project, we had hypothesized that the majority of GHG emissions from the food sector would come from transportation, but after researching several review papers, we found that food production produces the most GHG emissions. After reviewing the UBCFSP Vision Statement, we thought that it would be easier to

Methodology:

Keeping the goal of this project in mind and after meeting with our stakeholders, we began to examine the UBC Velocity Report which provided us details about all the purchases made in 2010. This report was solely for UBC Food Services and excluded statistics for AMS Food Services and any of the independent outlets found on the campus.

The Velocity Report was our only source of primary data which contained the following information for each food product ordered: Product Class (Description), Item Number, Item Description, item count, size, brand name, vendor name, manufacturer number, average price, quarterly numbers in sales and weight, sales amount, yield to date quantity, yield to date weight and yield to date sales ($).

During the examination of the UBC Velocity Report, we considered the requests from S. Baker-French, L. Zaremba and V. Wakefield, and isolated nine specific meat items from the Velocity Report. The products were determined by, first sorting them by meat type - beef, pork or chicken - followed by level of processing involved and finally the actual weight of each product ordered within a year as indicated by the Yield to Date (YTD) column. The items chosen had the highest weight within their individual categories.

Products	YTD wt. (kg)
SAUSAGE ITAL MINI CKD SKNLS 1.6Z	13.62
BEEF STK SALISBURY 3Z CKD FZN	29.00
BACON BIT CKD DCD 1/4IN FZN	51.40
PORK RIB PATTY CKD W/BBQ BNLS FZN	200.16
MEATBALL OVEN BKD TRAD 1Z 160CT FZN	826.68
CHICKEN BRST 4Z CORDON ROYALE FZN	274.04
MEATBALL CHICK 150-156CT ORIENTAL TFC	959.04
CHICKEN DCD 1/2IN 60WHT/40DK CKD FZN	2943.18
CHICKEN FLT BRD CRUNCHY RUFFLED FZN ZTF	10485.00

Table 1 - Nine meat products selected for GHG Calculations

Research for processing, production, packaging and transportation emission values was conducted via Google Scholar and UBC Summon. The keywords entered in various combinations included: “GHG emissions”, “emission factors”, “meat”, “transportation”, “processing”, “packaging”, “production”, “Canadian Industry”, “beef”, “Pork”, “poultry” and “food processing”.

Our methodology has several limitations which are significant and should be noted. In regards to transportation, we assumed that the products were produced and shipped within North America. The cause for this assumption was because of a lack of transparency from the suppliers with company websites providing only basic information, such as processing plant location and primary ingredients in products. This forced us to assume all processing occurred in Canada or the United States with the primary mode of transportation being Light Duty Commercial Vehicles with diesel engines, as reported by Transport Canada in 2011. Another large area of assumption occurred in our processing emission value. Due to limitations in data available, we were unable to determine the GHG emission factors for animal feed and waste disposal but these were considered in the production and processing emission reports (Hamerschlag & Venkat, 2011). The packaging emission factor was taken from a study on life cycle assessments of meats in Japan (Roy et al., 2011).

The calculation method selected was rather simple and standardized across all scholarly articles as well as Transport Canada (sample calculation provided in the Appendix section). Since emission rates were reported in kg per CO2 emitted, we were only required to multiply our products weights with the collected emission rates to gain a total GHG emissions value. Again, we must stress that these values are overly generalized and under estimated.

Findings and Outcomes:

It was requested by S. Baker-French that we focus on the emissions for a select number of meat product of which we chose nine. Of these selections, the following was noted: four chicken products, three pork products and two beef products. Estimations of carbon emissions were calculated and can be viewed in detail in the appendix.

Production:

The top three products that emitted the most CO2 were: CHICKEN DCD 1/2IN 60WHT/40DK CKD FZN, MEATBALL OVEN BKD TRAD 1Z 160CT FZN (beef based) and CHICKEN FLT BRD CRUNCHY RUFFLED FZN ZTF and their respective emissions from production were: 6857.61 kg CO2/kg meat, 12590.34 kg CO2e/kg meat and 24430.05 kg CO2e/kg meat. The lowest emission from production was pork based SAUSAGE ITAL MINI CKD SKNLS 1.6Z at 62.92 kg CO2e/kg meat.

Processing:

Processing was only considered from farm to processor. Estimations from food processors/manufacturers/CPG were not obtained. The following were of the top three products with the highest total processing emissions respectively : CHICKEN FLT BRD CRUNCHY RUFFLED FZN ZTF, CHICKEN DCD 1/2IN 60WHT/40DK CKD FZN and MEATBALL CHICK 150-156CT ORIENTAL TFC. All three are chicken products and emissions were respectively calculated to be 38689.65 kg CO2e/kg meat, 10,860.33 kg CO2e/kg meat and 3538.86 kg CO2e/kg meat. The least significant contributor was the SAUSAGE ITAL MINI CKD SKNLS 1.6Z item which was of pork base at 46.04kg CO2e/kg meat.

Packaging:

All packaging factors were the same across the meat products available, therefore the emissions were correlated with the total weight ordered. The top three were: CHICKEN FLT BRD CRUNCHY RUFFLED FZN ZTF, CHICKEN DCD 1/2IN 60WHT/40DK CKD FZN and MEATBALL OVEN BKD TRAD 1Z 160CT FZN and emitted respectively, 6291.00 kgCO2e/kg meat, 1765.91 kg CO2e/kg meat and 496.01 kg CO2e/kg meat. The lowest contribution from packaging came from SAUSAGE ITAL MINI CKD SKNLS 1.6Z and emitted a total of 8.17 kg CO2e/kg meat from packaging.

Transportation:

The CHICKEN BRST 4Z CORDON ROYALE FZN manufactured by Barber Foods was furthest sourced from Portland, ME with an estimated distance traveled of 3314.00 miles, and the closest sourced were the MEATBALL CHICK 150-156CT ORIENTAL TFC sourced from Sofina (Cuddy) located on Fraser St, Vancouver, BC (distance of 9.69mi). If these products were transported by Light Duty Commercial Vehicles with a diesel engine, their total carbon emissions from transportation would respectively be: 828.50 kg CO2e and 2.445 kg CO2e.

Discussion:

UBC Food Services purchased 15782.12 kg of the 9 products and spends approximately $143,500.00 on these purchases annually. Based on the calculations, the total annual CO2 emitted is estimated to be 117,993.63 kg. This is approximately 0.20% of annual UBC Vancouver Campus CO2 emissions, which is minimal compared to the 2010 total GHG emissions (58,353 tonnes) in UBC Vancouver (UBC, 2012). However, the values obtained in our report are an underestimation since many assumptions were made while calculating emissions from production, processing, packaging and transportation.

From our results we can clearly see that the greatest GHG emissions contributor of the nine meat products was from the CHICKEN FLT BRD CRUNCHY RUFFLED FZN ZTF with 24430.05 kg CO2/kg at an average of 6.68 kg of C02 emitted per kg. The primary reason to this would be because of the high yield to date weight of 10485 kg. Interesting enough, the SAUSAGE ITAL MINI CKD SKNLS 1.6Z with yield to date weight of only 13.62 kg had the greatest CO2 emission rate per kg of item at 48.98 kg . We should note here that the greatest contributor for such a heavy CO2 emission by the SAUSAGE ITAL MINI CKD SKNLS 1.6Z was due to the distance travelled for this product. It is similar for the MEATBALL OVEN BKD TRAD 1Z 160CT FZN where by the order weight was not the greatest, but due to the travelled distance it was among the highest in the CO2 generated per kg of item.

The results from the calculations revealed that out of all the 4 stages, the majority of the GHG emissions came from the processing stage (Roy et al., 2011). This is supported within claims of literature, however, our calculations from data in which we have collected does not reflect this specific claim which could result from a number of reasons, but primarily from the assumptions we have made. Within the processing stage the assumption made were that the numerical values from scholarly articles included GHG emissions from animal feed and waste disposal at various stages. This would imply that the processing emission values for our nine products would also be high, especially for products that must undergo multiple stages of processing. This fact was not reflected within our tabulated results.

As you can see there is only a single processing value for each meat category. This value remains unchanged regardless of the level of processing to the product. This would mean that our calculated results were based on weight alone disregarding all other factors involved within the processing phase resulting in numeric values that were not true reflections of the actual GHG emission rates. A case and point is the CHICKEN FLT BRD CRUNCHY RUFFLED FZN ZTF which had a high processing GHG emission simply because of its weight value while MEATBALL OVEN BKD TRAD 1Z 160CT FZN and SAUSAGE ITAL MINI CKD SKNLS 1.6Z had only emission values of 2314.70 kg CO2 and 46.04 kg CO2, respectively, despite the fact that both products are far more heavily processed. A similar situation also were reflected in packaging emissions calculations since we had one generalised emission factor for all meats derived from a Japanese study that investigated the rising meat consumption in Japan (Roy et al., 2011). This would mean for both processing and packaging GHG emissions, our total GHG values of 57,392.26 kg CO2 emitted and 9,467.27 kg CO2 emitted, respectively, were underestimated as the extent of our research could not isolates these variables.

The most reliable emission factors in this report were obtained from Transport Canada which provided the most recent 2011 emission factors for commercial vessels using diesel fuel. However, as UBC only sources from specific distributors such as Gordon Food Services, there is an uncertainty of the total mileage the food product has taken before arriving at UBC campus. Our calculated numbers for transportation are limited to calculating emissions based on the total distance from the processing plant to UBC Campus. As an example, the farthest distance travelled product to UBC is CHICKEN BRST 4Z CORDON ROYALE FZN travelling 3314 miles from Portland, Maine. This gave us a transportation emission of 828.50 kg CO2.

Overall, although we were able to obtain the desired numeric values, these values were very limited in scope. They are an over generalization of the actual emission factors and should be considered as an under estimation of the actual GHG emission rates. In fact, we were even unable to provide higher and lower limits for each emission factor because there were simply insufficient amount of scholarly sources available that actually contained such information. Indeed, it appears that the only method of obtaining reliable emission rates for processing, packaging and production, is through conducting independent measurements by the UBC themselves.

Challenges Encountered

We encountered several limitations to this project as we progressed to its final stages of the assessment. Emission factors were extracted from different countries including Canada, the United States and Japan. Since the numbers and equations used were not from the same source, there is a possibility that numbers are not standardized and inconsistent with the activities in the UBC Food System Project.

Our group was also challenged with gathering information from distributors and food processors. These companies were reluctant to share information about the GHG associated with their operation to a group of UBC students. Without this information, we cannot accurately assess or even estimate whether the suppliers are helping UBC progress towards the UBCFSP visions. Furthermore, no viable farm source or intermediate suppliers were disclosed even after direct calls to the companies which limited our analysis.

Coincidentally, another struggle that the team encountered was the inability to extrapolate processing emission factors from multiple reports and we acknowledge that this may skew our reported values. Pork, beef, and poultry each have their own emission factor and academic literature review papers often use the terms processing and production interchangeably in equations. As for processing, we were unable to determine emissions thoroughly in this assessment and should have looked into factors derived from processed/prepared foods for a better understanding. With that in mind processing numbers were purely simplified generalizations from farm to the food processing plant.

After thorough discussions within the team, it has come to our attention that UBC does not have the autonomy to control the source of suppliers from their distributors. In addition, V. Wakefield informed us that many companies working in conjunction with UBC Food Services offer rebates and loyalty programs in which UBC receives highly favourable prices for purchasing products in bulk (2012). The question also remains, if UBC Food Services transitions to more sustainable and socially responsible food products, are the student body and staff willing to pay the extra cost that often comes with these changes? UBC food prices are considered relatively costly for students and with the increase in costs, the price changes may not be accepted by all. There are many unanswered questions in regards to processed meats and their contribution to GHG emissions; however, what is known is that there is a global demand for meat products which is undoubtedly a popular choice among UBC food consumers (Roy et al., 2011; V. Wakefield, 2012).

Stakeholder Recommendations:

In order to have a better understanding of the carbon contributions from UBC Food Services, some transparency from distributors is required. As students, it was a challenge for us to gather emission numbers from distributors and an inevitable limitation in our project. We recommend that our stakeholders approach distributors for these numbers in order to calculate the numbers accurately and precisely. Further research should be focused on the GHG emissions from food processing plants since many of the meat products ordered by UBC Food Services are highly processed items such as meatballs, stuffed chicken and sausage. Ultimately, this would give a better understanding of the emissions from processing and show the real percentage from this category.

If this cannot be done, we would recommend that out stakeholders begin to order less beef since it is the most GHG intensive meat. Also, cutting out products that travel far but are not ordered at large amounts would decrease the GHG from transportation. There may be closer options for items like SAUSAGE ITAL MINI CKD SKNLS 1.6Z which was minimally ordered yet sourced from Chicago, IL. With the help of future LFS groups, alternates may be found for such products that are sourced closer to UBC and less processed.

Scenario Evaluation and Feedback:

The process for evaluating our project started with contacting and communicating with our stakeholders: Lillian Zaremba and Victoria Wakefield. In addition, as part way through the project, we consulted with the teaching team. All communication was delivered by group meeting and e-mail.

Lillian Zaremba, Climate & Energy Engineer, had one meeting with our team on Mar 7, 2012. After meeting with her, we were able to better understand her expectations and goals. Lillian suggested that we spend more efforts on assessing the production and transportation emissions rather than packaging and processing on 3 to 5 items on the velocity spreadsheet, since packaging and processing had minor contribution on emissions. L. Zaremba also provided us a generic spreadsheet that showed what types of information she would like to see in our calculations. Through communicating with L. Zaremba, we asked her for the appropriateness of the information we had collected and how our research process could be improved.

V. Wakefield, Purchasing Manager of UBC Food Services, provided valuable feedback on our work through emails. After showing her the items of processed meat we wanted to focus on, she quickly pointed out that two of our items had very low yield to date quantity. She suggested that we should choose items that had high usage and sales which would give higher impact on GHG emission. Her comments provided information for our group in order to make any necessary adjustments; however, we decided to continue with the meat products selected by S. Baker-French in interested of the limited time remaining.

Our stakeholders did not attend the final presentation and we will not be able to see this project through to evaluation.

Successes and Challenges

During the process of working on our project, finding information from suppliers was the most challenging issue. Our group members had tried to contact 6 different suppliers listed on the Velocity Report via phone call and e-mail. Without any luck, we resorted to obtaining information through the suppliers' websites. This lack of transparency from suppliers resulted in limited data, which left us to make assumptions on processing and transportation. On the other hand, we were able to extrapolate information from different sources successfully to estimate GHG emissions and complete our calculations.

Recommendations for the next year's scenario

1) Find alternatives to processed meat items that generate lower carbon emissions
2) Find out more accurate GHG emission from processing and packaging of the prepared meat products.
3) Further investigation on GHG emission on the rest of the prepared meat items on the UBC Food service menu

Recommendations for the LFS teaching team

1) It is virtually impossible to obtain any information from suppliers due to the time constraints. We suggest the teaching team get consent from the various suppliers before future LFS 450 students start their projects
2) Have an earlier evaluation on the outline of the project to ensure students find focus on their projects

Recommendations for future generations of LFS 450 students

1) Further investigation on GHG emission is required for processing and packaging since little information was obtained from suppliers
2) Assist UBC Food Service to find out replacements to meat items that generated high GHG emission
3) Start contacting with stakeholders to find out their goals and expectations as soon as possible so that your team can focus on the project objectives

4) Consult with the teaching team if your team has difficulties to focus on the project objectives

5) Try to review past LFS 450 student reports because much information on products is available

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Appendices:

1. Formulas for calculations

Sample calculations: Rosina Foods
Product: Meat Ball Oven Baked Traditional 1Z 160CT (Fzn)

- **Transport** = Distance (mile) x diesel engine emission factor (250g CO_2e/mile)
- **Packaging** = YTD (kg) x packaging emission factor (0.6kg CO_2e/kg meat)
- **Processing (Pork)** = YTD (kg) x processing emission factor (2.22kg CO_2e/kg meat)
- **Production (Pork)** = YTD (kg) x production emission factor (4.62kg CO_2e/kg meat)

CO_2e = Carbon Dioxide Emitted

2. Tables for emission factor calculations: Production, Processing, Packaging and Transportation

Production		
Meat Products	**kg CO2/kg meat**	
Pork	4.62	
Beef	15.23	
Poultry (broiler)	2.33	
Products	**YTD wt (kg)**	**Production emissions**
SAUSAGE ITAL MINI CKD SKNLS 1.6Z	13.62	62.92
BEEF STK SALISBURY 3Z CKD FZN	29.00	441.67
BACON BIT CKD DCD 1/4IN FZN	51.40	119.76
PORK RIB PATTY CKD W/BBQ BNLS FZN	200.16	924.74
MEATBALL OVEN BKD TRAD 1Z 160CT FZN	826.68	12590.34
CHICKEN BRST 4Z CORDON ROYALE FZN	274.04	638.51
MEATBALL CHICK 150-156CT ORIENTAL TFC	959.04	2234.56
CHICKEN DCD 1/2IN 60WHT/40DK CKD FZN	2943.18	6857.61
CHICKEN FLT BRD CRUNCHY RUFFLED FZN ZTI	10485.00	24430.05

Table 2 - Production emissions

Processing

Meat	kg CO2 /lb	lb:kg	kg CO2 E/kg meat
Pork EF	1.52	2.22	3.38
Beef EF	1.26	2.22	2.80
Chicken EF	1.66	2.22	3.69

Products	meat emission factor	YTD wt (kg)	TOTAL EF from packaging (kg CO2)
SAUSAGE ITAL MINI CKD SKNLS 1.6Z	3.38	13.62	46.04
BEEF STK SALISBURY 3Z CKD FZN	2.80	29.00	81.20
BACON BIT CKD DCD 1/4IN FZN	3.38	51.40	173.73
PORK RIB PATTY CKD W/BBQ BNLS FZN	3.38	200.16	676.54
MEATBALL OVEN BKD TRAD 1Z 160CT FZN	2.80	826.68	2314.70
CHICKEN BRST 4Z CORDON ROYALE FZN	3.69	274.04	1011.21
MEATBALL CHICK 150-156CT ORIENTAL TFC	3.69	959.04	3538.86
CHICKEN DCD 1/2IN 60WHT/40DK CKD FZN	3.69	2943.18	10860.33
CHICKEN FLT BRD CRUNCHY RUFFLED FZN ZTI	3.69	10485.00	38689.65

Table 3 - Processing emission factors

Packaging

Product	YTD wt (kg)	EF (kg CO2/kg meat)	TEF 2011
SAUSAGE ITAL MINI CKD SKNLS 1.6Z	13.62	0.60	8.17
BEEF STK SALISBURY 3Z CKD FZN	29.00	0.60	17.40
BACON BIT CKD DCD 1/4IN FZN	51.40	0.60	30.84
PORK RIB PATTY CKD W/BBQ BNLS FZN	200.16	0.60	120.10
MEATBALL OVEN BKD TRAD 1Z 160CT FZN	826.68	0.60	496.01
CHICKEN BRST 4Z CORDON ROYALE FZN	274.04	0.60	164.42
MEATBALL CHICK 150-156CT ORIENTAL TFC	959.04	0.60	575.42
CHICKEN DCD 1/2IN 60WHT/40DK CKD FZN	2943.18	0.60	1765.91
CHICKEN FLT BRD CRUNCHY RUFFLED FZN ZTI	10485.00	0.60	6291.00

Table 4- Generalized packaging emissions

Transportation

PRODUCT	Company	Route	Distance (mi)	Vehicle	engine (gCO2/mi)	Total emissions for distance traveled (g CO2)	kg CO2 E
SAUSAGE ITAL MINI CKD SKNLS 1.6Z	Rose Packaging	Chicago, IL	2199.78	Light Duty Commercial Vehicle	250.00	549945.00	549.95
BEEF STK SALISBURY 3Z CKD FZN	King Command	Kent, Washington	157.83	Light Duty Commercial Vehicle	250.00	39457.50	39.46
BACON BIT CKD DCD 1/4IN FZN	GFS	Annacis Island - Delta,	18.60	Light Duty Commercial Vehicle	250.00	4650.00	4.65
PORK RIB PATTY CKD W/BBQ BNLS FZN	King Command	Kent, Washington	157.83	Light Duty Commercial Vehicle	250.00	39457.50	39.46
MEATBALL OVEN BKD TRAD 1Z 160CT FZN	Rosina Foods Product	Buffalo, New york	2738.38	Light Duty Commercial Vehicle	250.00	684595.75	684.60
CHICKEN BRST 4Z CORDON ROYALE FZN	Barber Foods	Portland, ME	3314.00	Light Duty Commercial Vehicle	250.00	828500.00	828.50
MEATBALL CHICK 150-156CT ORIENTAL TFC	Sofina (Cuddy)	Fraser st, Vancouver	9.69	Light Duty Commercial Vehicle	250.00	2422.50	2.42
CHICKEN DCD 1/2IN 60WHT/40DK CKD FZN	GFS	Annacis Island - Delta,	18.60	Light Duty Commercial Vehicle	250.00	4650.00	4.65
CHICKEN FLT BRD CRUNCHY RUFFLED FZN ZTI	Janes	Mississauga, ON	2713.00	Light Duty Commercial Vehicle	250.00	678250.00	678.25

Table 5 - Transportation emission factors