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## Overview

American’s eat over 20 billion hot dogs per year. That’s about 75 hot dogs per person. It’s quite a big business, and small changes in the mix of ingredients that are used to make them can mean millions of dollars to the producers. But would you be surprised to find out that in many cases, using the best, most expensive cuts of meats is the most profitable way to make them? It’s true. And it results from the volatility of the meat products used to make them. Let us explain (simplified picture).

**Sample Only**

This document was submitted by students in a previous class. Their requirements were different from yours. We offer it only as a sample of what a project was for that class. Copying this document, in whole or in part, and submitting the result as your own work, would be a violation of the honor code.

The process starts when a Meat Processor (e.g., ConAgra, Tyson) purchases animals and begins the process of converting them into meat products like steaks and hot dogs. Not only does the meat processor pay hundreds of dollars for the animal, but now he must also expend additional dollars to feed, house, and keep them healthy. Should they lose weight, become ill, diseased or die, his investment takes a loss. So he wants to processes them as quickly as possible … the longer he doesn’t, the more they cost him to maintain and the more likely it becomes that something happens that diminishes his investment. He chooses the number of animals to purchase and process by examining the forecasted demand for the type and quality meat products he will get from the animal.

The animals are sent to the “abattoir” (slaughterhouse) where they are “processed” (slaughtered and butchered) into three products: (1) large pieces or cuts of meat[[1]](#footnote-1) (e.g., whole, half or quartered carcasses; pork shoulders, loins, etc); (2) offal[[2]](#footnote-2) (internal organs); and (3) inedible parts (hoofs, hide, and etc). The meat is then hung in large cooling rooms[[3]](#footnote-3), waiting to be sold[[4]](#footnote-4), delivered or processed further into the cuts that you and I buy at the retail store. So as those large pieces hang there, they represent so many pounds of T-bone steaks ($5.99/lbs), Tenderloin ($10.59/lbs), Pork Roasts ($4.95/lbs), etc.

However, as the meat hangs there a funny thing begins to happen: it begins to lose water (shrinkage) and the quality begins to degrade as the air oxidized the surface of the meat. And as Martha Stewart might say, this is not “a good thing”. Remember, a pound of the T-bone **water** is worth $5.99. So once you slaughter the animal the meat needs to be sold quickly since the longer it hangs there the less it is worth. And that’s where Hot Dogs come in.

As the value and quality remaining in the meat product continues to decrease with time, at some point it will become lower than the value of making Hot Dogs out of it. At this point, it makes more sense to use the meat product in Hot Dogs than to continue trying to use it to satisfy future orders for more expensive meat cuts.

Most recipes[[5]](#footnote-5) for Hot Dogs combine together a blend of meats (pork, beef, chicken, or turkey), meat fat, a cereal filler which could be either bread crumbs, flour, or oatmeal, a little bit of egg white, and an array of herbs and seasonings including garlic, pepper, ground mustard, nutmeg, salt, and onion.

Once these ingredients are ground together, the stuffing is squeezed into sausage casings. Following the stuffing process is the pre-cooking cycle in which the Hot Dog links are tossed into boiling water for approximately 15 minutes. Finally, the dogs are packaged, loaded on delivery trucks, and sent off to food markets.

At the end of each day, the meat processor matches the orders he received for various kinds of products that day, against the meat types/cuts he has on hand, and he matches his abattoir schedule and livestock-purchasing plan against forecasted future orders. His costs are increasing, his products are degrading and shrinking, and the price[[6]](#footnote-6) of livestock and the prices he can charge his customers are always in flux. In this environment, maximizing his profits can be quite formidable.

We propose, then, to build a model, named “HOTDOG”, that helps the Meat Processor determine which ingredients to use and when to use them, to make the various types of Hot Dogs and maximize his overall Gross Profit. We plan to deal with two different scenarios: (1) sharply falling prices with forecasted order uncertainty, and (2) the same, with the addition of an aggressive substitution policy.

Meat processors have systems, software and models worth millions of dollars to solve this problem. It is not our intent to try to replace these expenditures with an Excel model developed for the CSS 408 project assignment. Rather we will substantially limit our scope, approach and work to enable us to complete the project in the timeframes allowed and within the capabilities and resources in our control.

1. First, we will restrict the meat types/cuts/grades/age to a handful.

2. We will deal only with “All-beef”, “All-meat” types of Hot Dogs.

3. We will limit orders to wholesalers in sizes of full rail carloads for carcasses, and hundredweight (cwt) for cuts

4. We will minimize the research time required by estimating prices, shrink rates, etc. And while a real processor would use tools like Linear Programs and optimization capabilities (e.g., Excel SOLVER) we will only use substitution policies and guidelines to comply with the sprit of the CSS 408 assignment.

5. We will limit our scope to one fictitious US region rather than deal with the differences across the country or with materials that may be from other countries (e.g., Australia, new Zealand, etc.).

6. Last, we will limit our model to examining 12 days with no special events during those days (4th of July, summer vs. winter, etc).

Major inputs to this model will be the Orders received, the Current Inventory, Forecasted Prices and Forecasted Costs for the next 12 days. Parameters will include Order Forecast Parameters, Yield Parameters, Shrinkage parameters, and Substitution Policy and Order Fulfillment policy Parameters. And Outputs will include All Beef Hot Dog Plan And Profits and All Meat Hot Dog Plan and Profits.

**Budget**

|  |  |  |
| --- | --- | --- |
| Stage | Min Hrs | Max Hrs |
| ***Planning*** | 15 | 20 |
| ***Modeling*** | 30 | 35 |
| ***Documents*** | 20 | 30 |
| ***Execution & Testing*** | 15 | 30 |

Holidays: Dec22 – Jan 1

**Team**

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**Schedule and Milestones**

|  |  |
| --- | --- |
| **Milestone** | **Date** |
| Project Course Proposal | 10/23/02 |
| Project Course Proposal (Revision) | 10/30/02 |
| Modeling Requirements 1st Draft | 11/06/02 |
| Final Development Schedule | 11/06/02 |
| Mid-Point Report 1st Draft | 11/06/02 |
| Mid-Point Report | 11/13/02 |
| Model 80% Completed | 12/04/02 |
| First Scenario 80% Completed | 12/11/02 |
| Second Scenario 80% completed  | 12/18/02 |
| Holidays / Catch up time | 11/22/02-1/1/03 |
| Project Completed (Alpha release for testing) | 1/2/03 |
| Testing Comments Due | 1/6/03 |
| User Guide 1St Draft | 1/6/03 |
| Reference Guide 1st Draft | 1/6/03 |
| Project Report 1st Draft | 1/6/03 |
| User Guide Completed | 1/10/2 |
| Reference Guide Completed | 1/10/2 |
| Project Report Completed | 1/10/2 |
| Buffer Time | 1/11/2 – 1/14/2 |
| Project Completed/Integrated/Submitted | 1/15/2 |

1. A 1,000 pound Angus steer yields 465 pounds of retail beef cuts from a 600-pound carcass: 25% are steaks, 25% are roasts, 25% is burger and ground beef, and 25% is lost due to bone, fat, hide, etc. [↑](#footnote-ref-1)
2. You gotta love the names these guys come up with. [↑](#footnote-ref-2)
3. The meat is not frozen since that may degrade its quality. [↑](#footnote-ref-3)
4. Large Meat processors usually sell to wholesalers, retailers, and food service distributors who order by the rail carload and/or hundredweight (cwt). [↑](#footnote-ref-4)
5. The content of Hot Dogs is regulated by Law in the U.S. “All-beef” or “beef” Hot Dogs can contain only beef with no soybean protein or dry milk solid fillers added. “Kosher” Hot Dogs can only be all-beef. “All-meat” Hot Dogs are a mixture of only pork and beef, usually 40% pork and 60% beef with no fillers. “Frankfurters” can be made from a combination of meats and can contain up to 3.5% fillers. [↑](#footnote-ref-5)
6. See Chicago Mercantile Exchange Livestock futures options prices [↑](#footnote-ref-6)