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ISMT E-130 – Spreadsheets Models for Mangers

Course Project

###### HOTDOG Project

User Guide

## Overview

Our “HOTDOG” project is a simplified model providing a toolset for the Meat Processor to determine which ingredients to use and when to use them to make various types of Hot Dogs in order maximize overall Gross Profit. The model is based on the following two scenarios:

1. Scenario 1 – sharply falling prices with forecasted order uncertainty
2. Scenario 2 – same as Scenario 1, but with the addition of an aggressive fulfillment policy

Based on the input of various parameters (both known and forecasted), and a user-defined substitution policy, the model outputs the optimum mix of ingredients and calculates forecasted costs, sales and profits.

It is important to understand that the model is based on the structured use of meat to make Hot Dogs in which the least expensive and oldest meat is used up first, and only when it is fully used up is the more expensive and newer meat used. In the model, this task is represented by the Substitution Policy, which can be refined as needed by the Plant Manager.

Our model consists of the following eight worksheets:

1. INFO – provides information about Project Team
2. INPUTS – allows the user to input various types of known and forecasted data
3. PARAMETER – provides information and tools to input Fulfillment and Substitution policies
4. ORDERPLAN – calculates Order Plan and Production Schedule
5. ORDERFULFILL – shows how inventory is fulfilled
6. ALLBEEFHD – shows resources available for the production of All Beef Hot Dogs and builds a recipe chart based on available meat in order to maximize the profit
7. ALLMEATHD – shows resources available for the production of All Meat Hot Dogs and builds a recipe chart based on available meat in order to maximize the profit
8. HDPROFITS – calculates Forecasted Costs, Sales, and Profits in Hot Dog production

In order to use the model effectively, the user must have a clear understanding of how the model operates and the meaning of various input and output parameters. The following is a worksheet-by-worksheet explanation of the model’s functionality, presented to provide the maximum level of understanding to the end user without adding additional complication by explaining the underlying calculating mechanisms.

##### GENERAL RULES AND ASSUMPTIONS

1. The entire model is based on a 12-day period, where day one (“Today”) provides the actual data and the following 11 days (“Future”) provide the forecasted data. 12-day periods provide for 12 continuous days disregarding holidays or other non-working days.
2. All weights are provided in pounds, unless otherwise is indicated. For simplicity, “full rail carloads” and “hundredweight (cwt)” are not used.
3. Only cuts of meat are used in the model – offal (internal organs) and inedible parts (hoofs, hide, etc.) are disregarded altogether, even though too they can be sold for profit for various uses.
4. The model assumes that the available inventory is sufficient to fulfill the forecasted orders.

##### INPUTS WORKSHEET

The INPUTS worksheet allows the user to input the actual and forecasted data for the 12-day periods in the following tables:

1. **Live Stock Purchases (Gross lbs)** – allows the user to input data for the actual and forecasted purchases of Live Stock (Cattle and Hogs) to be processed into meat and hot dogs. Note that all inputs have to be made in gross pounds and not in number of carcasses.
2. **Orders** **(lbs)** – allows the user to input the actual and forecasted orders of various cuts of meat.
3. **Inventory (lbs)** – allows the user to input the actual and forecasted inventory of various cuts of meat.
4. **Inventory Plan** – calculates the sum of total inventory for each day in a 12-day period based on the input in the “Inventory” table.
5. **Production Schedule (lbs)** – allows the user to input the actual and forecasted production schedule for the 12-day period.
6. **Costs/lbs** – allows the user to input the actual and forecasted net cost per pound for the 12-day period and 5 preceding days.
7. **Prices/lbs** - allows the user to input the actual and forecasted sale price per pound for the two kinds of hot dogs produced.

##### PARAMETER WORKSHEET

The PARAMETER worksheet provides tools and input tables needed to develop effective policies to maximize profits from the sale of meat and hot dogs.

The PARAMETER worksheet consists of four tables.

1. **Parameters** – provides data on such parameters as Linear Regression, Grade Distribution, Yield and Shrinkage.
2. **Order Fulfillment Policy** – allows the user to input the desired fulfillment policy.
3. **All Beef Substitution Policy** and **All Pork Substitution Policy** – provide a substitution policy for meat selection priority in fulfilling the orders. The logic is to use the oldest and least expensive cuts first and once they are completely used up, move to the more expensive and newer meat gradually until all Hot Dog orders are completely filled. This will assure the lowest possible cost for the end product and optimize the inventory use.

**ORDERPLAN WORKSHEET**

The ORDERPLAN worksheet calculates the actual and forecasted Order Plan and Production Schedule for Beef, Pork and Hot Dogs and, by comparing them to the available Inventory, shows if (a) the inventory is adequate to fulfill the actual and forecasted orders in a 12-day period and (b) there is any leftover meat available from which to make Hot Dogs.

The ORDERPLAN worksheet consists of four tables:

1. **Order Plan (lbs)** – calculates the actual and forecasted Order plan based on the Orders and set forth Parameters.
2. **Production Schedule (lbs)** – provides the actual and forecasted Production Schedule based on the Live Stock Purchases and yield for each type of cuts.
3. **Order Coverage** – shows if the orders can be covered with available inventory and if there is any meat left from which to make hot dogs.
4. **Production Schedule Summary (lbs)** – shows the total weight of the daily cuts produced in pounds and translates it into the number of animals used.

**ORDERFULFILL WORKSHEET**

The ORDERFULFIL worksheet shows exactly how the orders are fulfilled based on the Production Plan, available Inventory and Order Fulfillment Policy. This worksheet runs through the available inventory showing which meat to use in order of priority set forth in the Fulfillment policy. Once the higher priority meat is completely used up, the lower priority meat is used and so forth until the order is completely filled.

**ALLBEEFHD WORKSHEET**

The ALLBEEFHD worksheet shows the inventory of Beef meat available to make the All Beef Hot Dogs after fulfilling all meat orders. It also shows the priority of meat use based on the Order Plan and the Substitution Policy set forth in the PARAMETER worksheet.

ALLBEEFHD worksheet consists of two tables:

1. **All Beef Inventory (lbs)** – shows Beef inventory available for making All Beef hot dogs after fulfilling all Beef orders
2. **All Beef Hod Dogs Recipies (lbs)** – shows how the different cuts should be used to meet the priority set forth by the substitution policy.

**ALLMEATHD WORKSHEET**

The ALLMEATHD worksheet is very similar to ALL BEEFHD worksheet and shows the inventory of Beef and Pork meat left after fulfilling all meat and All Beef hot dogs orders available to make the All Meat hot dogs from. It also shows the priority of meat use based on the Order Plan and the Substitution Policy set forth in the PARAMETER worksheet.

1. **All Meat Inventory (lbs)** – shows Beef inventory left after fulfilling all Beef orders and making ALL Beef hot dogs and Pork inventory left after fulfilling all Pork orders. This Beef and Pork inventory is available for making All Meat hot dogs.
2. **All Meat Hot Dogs Recipes (lbs)** – shows how the different cuts should be used to meet the priority set forth by the substitution policy.

**HDPROFITS WORKSHEET**

The HDPROFITS worksheet provides vital financial information of Forecasted Costs, Sales and Profits. The HDPROFITS worksheet consists of three output tables grouped separately for All Beef Hot Dogs and All Meat Hot Dogs:

1. **Forecasted Costs** – Calculates the total cost of production of All Beef and All Meat hot dogs in a 12-day period, and by comparing them to the total production shows the cost per pound.
2. **Forecasted Sales** – Calculates total gross sales based on Forecasted Sales and Forecasted Sale prices
3. **Forecasted Profits** – Calculates Total and Per Pound Profits as well as Profit margin on both types of hot dogs

This worksheet also provides three charts:

1. **All Beef Hot Dogs Sales VS Costs –** provides a graphical representation of profits in 12-day period for All Beef Hot Dogs.
2. **All Meat Hot Dogs Sales VS Costs –** provides a graphical representation of profits in 12-day period for All Meat Hot Dogs.
3. **Daily Profit Margin for 12-day Period –** provides a graphical representation of profit margin in 12-day period for All Beef Hot Dogs and All Meat Hot Dogs.

##### SCENARIOS

To demonstrate the functionality of the model, we have provided two sample scenarios:

**Scenario 1** – sharply falling prices with forecasted order uncertainty. This scenario shows a 2% decrease in Hot Dog forecasted sale prices *(Inputs worksheet*) with order uncertainty represented by a heavy (20%) padding (*Parameter worksheet*) of the forecasted orders.

**Scenario 2** – same as Scenario 1, but with the addition of an aggressive fulfillment policy. In addition to the previous scenario, the aggressive Substitution Policy is added (*Parameter worksheet*).

The Substitution Policy is changed to the following sequence: use the cheapest cut on day 5, then cheapest cut on day 4, then cheapest cut on day 3, cheapest cut on day 2, cheapest cut on day 1, then on the next pass – next cheapest cut on day 5, next cheapest cut on day 4, etc.

This change in Policy shows considerably improved overall profits.