Gobbling Time
A Turkey Order Optimization System

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Introduction

Kea's Meats handles a high volume of turkey and ham orders every Christmas. Staff currently rely on handwritten notes, order tags, and verbal communication to keep track of customer orders, which becomes difficult as the holiday rush increases. They are a mom and pop butcher that does not like change and is hesitant with technology. Having run a successful business themselves for close to 50 years they are confident and satisfied with the status quo. Currently these orders are processed in the following three steps.

1. Taking Orders

Leading up to Christmas, Kea's Meats takes turkey orders in person or over the phone. For each order, the customer's name, preferred turkey weight, phone number, and pickup date are written on individual slips of paper (order tags). The phone number is used for any clarifications, while the pickup date helps plan when customers want to collect their turkeys. All the order tags are stacked together, with the position in the stack representing first-come, first-served priority once the turkeys arrive.

2. Organizing and Preparing Turkeys

When the shipment of turkeys arrives, they come in boxes with unknown weights. Each turkey is removed, weighed manually, and labeled with its weight. The turkeys are then grouped by size. Using the order tags and some brain power, assigning each turkey to a specific customer, writing the customer's name on the turkey. The labeled turkeys are then loaded onto racks, roughly organized by weight to make them easier to find. About one-third of turkey sales are walk-in or last-minute orders, which are added manually, sometimes making the organization as racks will fill up.

3. Customer Pickup

When a customer arrives, staff ask for their name and search through the stack of order tags to find the correct slip. After locating the order, the staff member must find the corresponding turkey on the racks, estimating its location based on weight and labeling. This process can be slow and stressful, especially when multiple customers are waiting. Searching through the stack and finding the turkey often takes several minutes, creating longer wait times and a bottleneck during the busy holiday season. Where customers are entering the store faster than we can help them.

Improvements

The current method of taking orders works well and has been effective for many years. Orders are taken gradually over a long period of time.. Because this system is straightforward, reliable, and easy for staff to use, no changes or improvements are necessary at this stage. The focus for improving efficiency should be on the later steps, where sorting and retrieving turkeys can create delays during the busy holiday season.

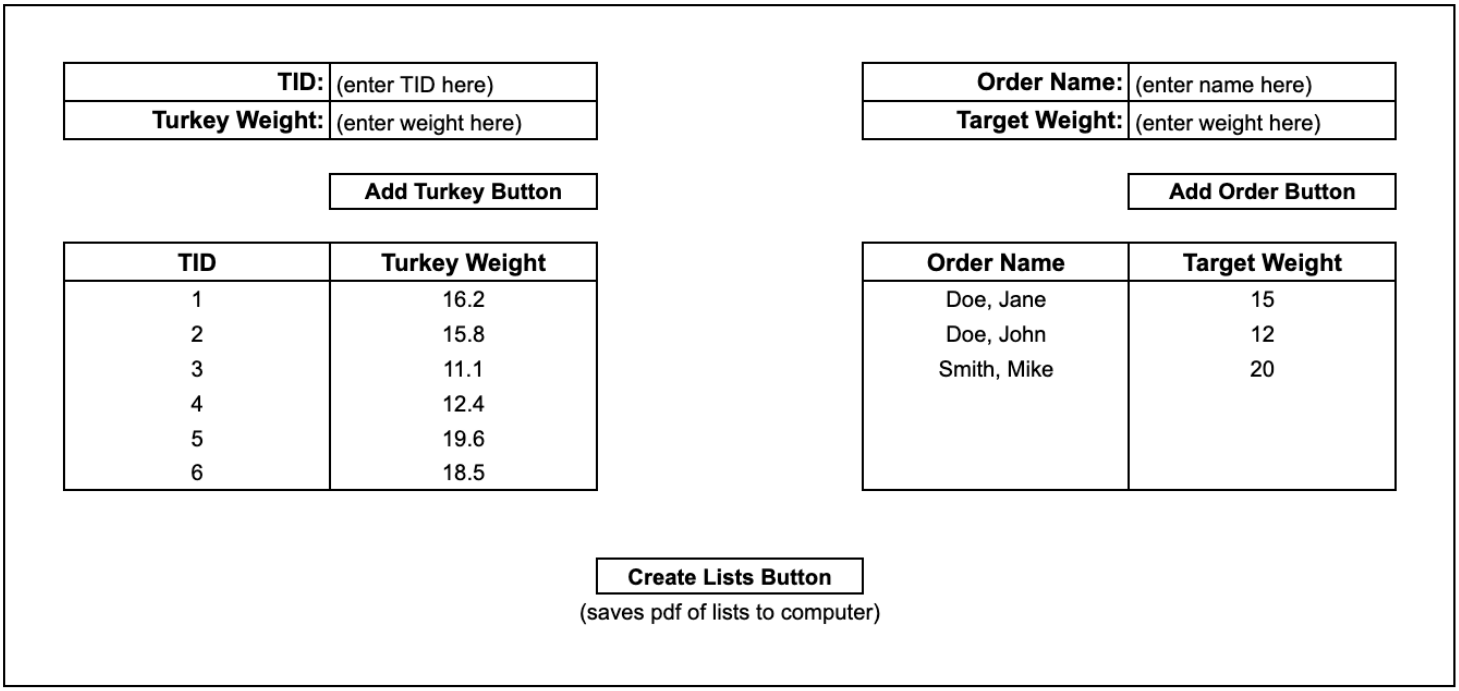
Step 2 and 3 is where changes to the system are beneficial. Instead of weighing the turkeys and placing them on the counter for immediate sorting, each turkey should be labeled with a unique Turkey Identifier (TID). As each turkey is weighed, the TID and weight are recorded on a sheet of paper. The turkeys are placed on racks sorted by TID, from left to right and top to bottom. This TID system enables

multiple improvements. First, it makes locating turkeys on the racks much easier, as the numbers are in sequence and provide a clear reference on where to look for a turkey. Secondly, sorting no longer needs to be done manually with the turkeys themselves. The order information, along with TIDs and weights, can be entered into a simple program that automatically matches turkeys to orders, saving time. Finally, having all the order and turkey information in one program allows for the creation of multiple lists: one showing all orders and their assigned turkeys, and another showing any unassigned or available turkeys for walk-ins or last-minute orders. This list of orders and assigned turkeys allows for faster search time of turkey orders. The free turkeys list is where the biggest time gain is. No longer do we have to leave the customer to confirm what turkeys we have left, we can simply look at the list and tell the customer the exact sizes we have left.

Functionalities of Program

1. Insertions of turkeys (TID and weight in lbs)
2. Insertion of order(name and target weight)
3. Automatically sorting
4. List of matched turkeys
5. List of free turkeys

User Interface of Program



For the ease of input the data the pickup date and phone number are not put into the program. If future reference to these is needed they can be looked up using the stack of orders tags. The create lists button saves a printable pdf of the two lists to the desktop. Another thing of note is the input order of the turkeys orders should be the order of customers' orders. Meaning the first order to be imputed should be the first order that was taken that year.

Lists (would be printed on paper)

ORDERS			
Order Name	**Target Weight(lbs)**	**Assigned Turkey (TID)**	**Weight(lbs)**
Doe, Jane	15	**2**	15..8
Doe, John	12	**4**	12.4
Smith, Mike	20	**5**	19.6

FREE TURKEYS			
Order Name	**Target Weight(lbs)**	**Assigned Turkey (TID)**	**Weight(lbs)**
		1	16.2
		3	11.1
		6	18.5

For a customer picking up an order. We look in the orders list and find the matching name. Get the TID. Search for turkey using the TID system to quickly find it in the cooler. Cross out the order to signify that it is picked up.

For new orders or walk-ins we can go to the Free Turkeys list to see all turkeys that are available to sell them. If it is an order we can write down their name and weight for their assigned turkey they want. This assignment will be done manually. If it is a walk-in customer that is taking the turkey right away, crossing out the turkey on the free turkey list to signify the sale.

Sorting Algorithm

Although turkeys orders are first come first serve In practice to satisfy all customers that is not always the case. The turkey distributor gives a range of turkeys usually from 8-20 lbs. The distribution of these turkeys is a standard distribution skewed to the larger sizes. The majority of turkeys are in the mid sizes 13-17 lbs. On the edges of weight ranges there are less. But there are more large turkeys than small ones. A purely first come first served method is not always the best. For example, say you have two orders: the first order wants a 19lb bird, the second one wants a 20lb bird. There is a 18.5lb bird and a 19.3lb bird left. If it was first come first serve the first order gets the 19.3lb as it is the closest bird to their desired target. The second person gets a 18.5lb bird. 0.3lbs and 1.5lbs from their targets respectively. Adding together 1.8lbs of missed target. A human could easily see if we saved the 19.3lb bird for the 20lb order. Giving the 19lb order the 18.5lb bird. 0.5lb and 0.7lbs from their targets. The total missed target is 1.2lbs. Another aspect that makes this ordering better is that that max miss is 0.7lbs instead of 1.5lbs.

The algorithm assigns turkeys to orders one pound range at a time.

1. Start with the smallest and largest turkey orders.
2. Look at all orders that fall within a 1-pound range (for example, 19–20 lbs).

3. Within that range, sort the orders by first come, first served principles.
4. For each order, give the closest turkey.

This way, people who ordered big turkeys still get big ones, and those who ordered small ones get small ones. It also keeps the process mostly fair to the order time, while reducing the total difference between what customers want and what they get. Increasing the pound range gives more preference to those who order first. While the smaller the range the less total miss there is but those who came first might not get a bird as close to their target weight.

Conclusion

The store takes quite a few ham and roast beef orders. Adding those orders too to the application could be helpful in the future. The primary goal is to create a simple program and system to help increase the efficiency come the busy time of the year. Once completed, the system requires no updates, provided the store's scale and workflow remained consistent and the initial program was bug free.