

**Using Average Monthly Item Usage to Set Par  
Levels and Control Food Costs in a Correctional  
Facility**

**Process Improvement Project**

**Food Service Management**

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## Table of Contents

<b>Section I Abstract .....</b>	<b>3</b>
<b>Section II Introduction .....</b>	<b>3</b>
<b>Section III Materials and methods.....</b>	<b>5</b>
<b>Section IV Results.....</b>	<b>7</b>
<b>Section V Discussion and Recommendations .....</b>	<b>10</b>
<b>Section VI References .....</b>	<b>13</b>
<b>Section VII Appendix.....</b>	<b>14</b>
<b>Sample of original Order Form.....</b>	<b>14</b>
<b>Survey tool.....</b>	<b>15</b>
<b>PERT chart.....</b>	<b>16</b>
<b>Sample of new order form .....</b>	<b>17</b>
<b>Substitution costs.....</b>	<b>18</b>

## **Section I: Abstract**

The purpose of this study was to determine a better way to manage inventory and control costs through standardized ordering methods in a correctional services central warehouse. A 5-question interview was administered to the CDRM to determine what changes would be needed to standardize the current procurement methods. A revised ordering form was created, which included item name and number, cost, pack size, average monthly usage, par level and end of month inventory. The new par level was set with the formula: average usage + 5 = par level. This number was then rounded up to the nearest multiple of 5 and entered into the new form in the par level column. The CDRM suggested adding 5 cases of stock to the average usage to ensure a safety stock at all times. At the end of February, remaining inventory was calculated by the CSOS and entered into the "end of month inventory" column. An additional column, entitled "suggested order quantity", was created to calculate the suggested quantity to order at the end of April (suggested order quantity = par level – end of month inventory). The Excel formula in the "suggested order quantity" column calculated a number that would show how many cases of an item should be ordered. A cost analysis of 10 standard menu items were compared to 10 replacement items to assess a cost-benefit ratio to the facility when standard menu items run out. Results showed that the new ordering forms greatly reduced the order quantity of most menu items, including those that had previously run out of stock. The pilot study found 8 out of 10 items would be under ordered with the suggested ordering forms for the month of April when compared to the actual April order. The cost-analysis found that replacing 10 items could increase total food costs by \$753 a week in an institution of 2,429 inmates. For example, the cost to feed applesauce to 2,429 inmates would be \$534.38 and the replacement item, sliced apples, would cost \$582.96. This results in a cost increase to the facility of \$48.58. The piloted forms would likely underestimate the number of items needed, lead to further menu substitutions and increase costs. It is not recommended to implement these new order forms at this time as they will not accurately predict the correct quantities of items to order. More investigation into usage and par levels could help create a more accurate order form.

## **Section II: Introduction**

Purchasing and controlling inventory is a central area in controlling costs in a food service organization.<sup>1</sup> According to The Association of Nutrition and Foodservice Professionals (ANFP) practice standards, the certified dietary manager is responsible for reducing waste in food service through the use of proper monitoring of food usage.<sup>2</sup> This standard can be achieved through purchasing standards such as par inventory amounts that are established and utilized.<sup>2</sup> Periodic automatic replenishment (par) level is the amount of a product that must continually be

Amy Elsasser

in stock from one delivery to the next.<sup>8</sup> Due to the low dietary budget for the correctional institutions, it is especially important to properly manage inventory.<sup>5</sup> Different purchasing methods can be used, but in a facility where the menu does not frequently change and the number of customers being served does not vary widely, then par level, or stock, is one of the most commonly used methods to determine quantities of non-perishable items that should be purchased.<sup>1</sup> The central warehouse is a good example of this type of facility. The number of facilities that the food is shipped to never changes, and the number of inmates does not fluctuate significantly. The institution menus follow a 5-week cycle and do not change from year to year, except for occasional special buys or seasonal produce.<sup>4</sup>

Inventory management is important because excess inventory can increase waste due to food spoilage and also increase theft.<sup>3</sup> High inventory levels increase the amount of storage space needed, tie up financial resources, and make it hard to control waste.<sup>3</sup> In a facility that is staffed by inmates, and a high ratio of inmates to officers, theft is always a concern. Larger amounts of stock make it easier for things to go missing unnoticed. According to State of Maryland correctional facility guidelines, there should not be more than 3-4 months worth of inventory for high dollar volume items, or more than 12 months supply of low dollar volume items.<sup>6</sup> Another concern of poorly planned inventory is low levels of product. If inventory of products gets too low, products that were on the menu may become substituted.<sup>3</sup> This can make costs harder to control because substitute items may be more expensive. With the ordering system that is currently in place, items have run out of stock and institutions are not able to get what they need from the warehouse. Because an item needs to be substituted with something similar, food costs may rise. For example, when pancakes run out they are replaced with waffles. A case of waffles costs approximately \$2 more than a case of pancakes. When thousands of

inmates must be served, these costs add up quickly. In a correctional setting, these menu replacements will not hurt service, but menus are standardized for all facilities so it is expected for each facility to serve the same items. The best way to achieve optimal inventory levels is for a manager to plan carefully, including standardizing procedures and then monitoring any current or new procedures.<sup>3</sup> By creating a new standardized form for ordering, inventory levels should be more accurate and eliminate excess or deficits in inventory.

This study looked at improving the ordering methods of the central warehouse for a correctional facility. The current ordering method was based on handwritten forms created by the person who held the job of ordering for approximately a decade, but who has recently left the position (Appendix A). The chosen methods were mainly based off of years of experience with ordering for the warehouse and to a lesser extent, the product usage. The CDRM mentioned that there are several problems with the current ordering method. One big problem is that the previous person in charge of ordering did not provide anyone with guidance on how to continue her method after leaving the position. Also, this method occasionally allowed foods to run out of stock. Because the central warehouse provides food to the institutions in the Western region, when an item was out of stock it had to be replaced with a different food item of a different cost. Because usage was not looked at either, there were excesses in stock at times. The goal of this study is to help control food costs by setting par levels based off of average monthly usage to help standardize ordering.

### **Section III: Material and methods**

A program evaluation and review technique (PERT) chart was developed to establish a time frame for each step (Appendix C). A 5-question interview was administered to the correctional dietary regional manager (CDRM) to determine what changes would be needed to

Amy Elsasser

standardize the current procurement methods. The original order form contained the following columns: Line number item and price, starting inventory, inventory received, ending inventory, quantity last ordered, usage and order. A revised ordering form was created, using Excel, but no data was entered at this time. An ordering form was created for each vendor which included item name and number, cost, pack size, average monthly usage, par level and end of month inventory. Item name and number were obtained from the previous month's order form and entered into the new form. The cost and pack size were obtained from the electronic inventory management system (eIMS) and entered into the appropriate columns. The correctional supply officer supervisor (CSOS) used eIMS to find each item on the list, added up usage for the past year and divided that by 12 to get the average monthly usage. This information was entered into the new form as average usage, which was then used to set the new April par levels using the formula:  $\text{par level} = \text{average usage} + 5$ . Par level was rounded up to the nearest multiple of 5 and then entered into the new form in the par level column. The CDRM suggested adding 5 cases of stock to the average usage to ensure a safety stock at all times. At the end of February, remaining inventory was calculated by the CSOS and entered into the "end of month inventory" column on the updated form. February's end of month inventory was used because the April order must be placed before April 1<sup>st</sup>, and March's end of month inventory is not completed until the last day of the month. An additional column, entitled "suggested order quantity", was created to calculate the suggested quantity to order at the end of April ( $\text{suggested order quantity} = \text{par level} - \text{end of month inventory}$ ) (Appendix D). The Excel formula in the "suggested order quantity" column calculated a number that would show how many cases of an item should be ordered. A negative number meant nothing should be ordered because there was an inventory surplus. The updated order form was piloted for the month of April to forecast the suggested order quantity for 10

standard food items that frequently run out. The forecasted order number was then compared to the previous month's order form (April) for the same 10 items to determine accuracy and reliability of the new form.

A cost analysis of the 10 selected standard menu items was compared to 10 replacement items to assess cost-benefit ratio to the facility if standard menu items run out. The cost per portion for each item being assessed was multiplied by the total inmate population of the largest prison in the region (n= 2,429) (Appendix E). The largest prison population was used to determine the biggest impact a substitution would have.

#### **Section IV: Results**

The CDRM interview revealed the need for an updated form and additional columns were made to create new par levels and estimate a suggested order quantity for April. The pilot study revealed that the piloted order forms underestimated the quantities to order. The comparison of the suggested order quantity and previous order quantity indicated that for the month of April the suggested quantity to order was below needs for 8 out of 10 standard menu items. Hash brown potatoes were the only items that the new form recommended increasing on the order, with the suggested order quantity of 361 cases and the actual order quantity of 250 cases. Order quantities varied widely. The suggested order quantity of carrots was 370 cases and the actual order quantity was 728 cases. For some items with a recommended order of zero, the actual order was also zero. Table 1 compares the 10 standard items that frequently run out. It contains the amount that was actually ordered for April and the amount that the new ordering form suggested. The pilot study found 8 out of 10 items were under ordered.

Table 1:

<b>Item</b>	<b>Actual order from old method (cases)</b>	<b>Recommended order with new method (cases)</b>	<b>Difference (cases)</b>
Applesauce	280	250	-30
Pancakes	500	307	-193
Veg. Chicken Nuggets	50	25	-25
Kidney beans	112	0	-112
Hash brown potatoes	250	361	+111
Egg substitute	80	0	-80
Deli Franks	20	0	-20
Green beans	448	28	-420
Carrots	728	370	-408
Grillers Frozen veg patty	0	0	0

The cost-analysis found that replacing 10 items could increase total food costs by \$753 a week in an institution of 2,429 inmates (Table 2). For example, the cost to feed applesauce to 2,429 inmates would be \$534.38 and the replacement item, sliced apples, would cost \$582.96. This results in an increase in cost to the facility of \$48.58. Chart 1 below shows the comparison of the costs for 10 items that frequently run out of stock and the costs for the items that are often used to replace them.



Chart 1

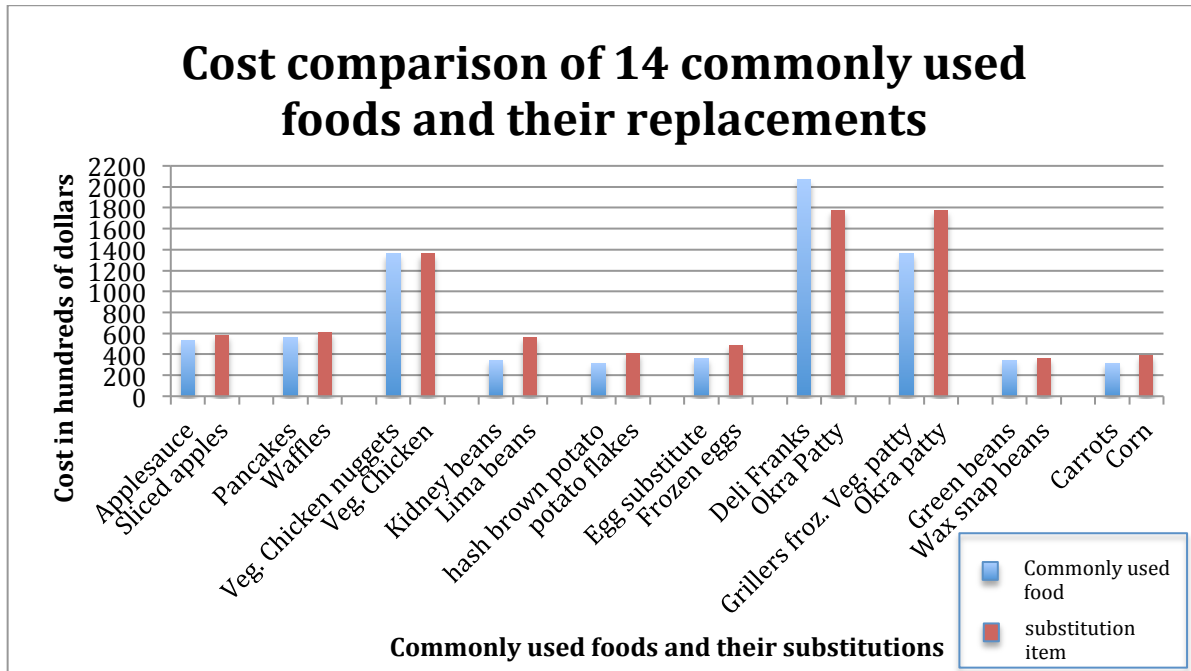


Table 2:

Cost to substitute out of stock items to serve 2,429 inmates in a single institution

Original item	Cost/por.	servings	extended cost	new item	cost/por.	servings	extended cost	Cost Difference
applesauce	\$0.22	2429	534.38	sliced apple	\$0.24	2429	582.96	48.58
Pancakes	\$0.23	2429	558.67	Waffles	\$0.25	2429	607.25	48.58
Veg. Chicken nuggets	\$0.56	2429	1360.24	veg. chicken	\$0.56	2429	1360.24	0
kidney beans	\$0.14	2429	340.06	lima beans	\$0.23	2429	558.67	218.61
hash brown potato	\$0.13	2429	315.77	potato flakes	\$0.17	2429	412.93	97.16
Egg substitute	\$0.15	2429	364.35	Frozen eggs	\$0.20	2429	485.8	121.45
Deli Franks	\$0.85	2429	2064.65	Okra patty	\$0.73	2429	1773.17	-291.48
Grillers frozen veg patty	\$0.56	2429	1360.24	Okra patty	\$0.73	2429	1773.17	412.93
Green beans	\$0.14	2429	340.06	wax snap beans	\$0.15	2429	364.35	24.29
Carrots	\$0.13	2429	315.77	corn	\$0.16	2429	388.64	72.87

1 week total 752.99

Amy Elsasser

A positive cost-benefit is seen when standard menu items do not need to be replaced by more expensive menu items, but on average most replacement items are \$0.01 - \$0.17 a portion more than the original menu item. The only substitution item that resulted in a lower cost was the okra patty (\$0.73/portion) when it replaces the deli frank (\$0.85/portion). This resulted in a cost savings of \$291.48 when feeding a population of 2,429 inmates.

## **Section V: Discussion and Recommendations**

The current ordering practices of the central warehouse do not meet the recommendations of The Association of Nutrition and Foodservice Professionals (ANFP). ANFP recommends using purchasing standards such as par level to determine appropriate ordering needs for a facility.<sup>2</sup> Currently, no purchasing standards are in place for ordering inventory for the central warehouse and the facilities it serves.

The creation of a new ordering system to help implement these standards and prevent surpluses and deficiencies in inventory was not successful. The new ordering forms often recommended ordering much less of the food items than the old ordering system did. While this may have some benefit in preventing surplus items, it most likely will lead to increased deficits. The previous ordering system allowed some standard menu items, such as applesauce and canned vegetables, to run out of stock. The new ordering forms actually ordered even less of these items, meaning they are even more likely to run out of stock. Both ordering forms recommended not ordering any of the Grillers frozen vegetable patties, however this is a concern because this item frequently runs out of stock. The new form should have increased the order of these items that run out of stock, not decreased it. It is not recommended to use these ordering forms at this time because it would most likely cause greater numbers of menu substitutions and increased food costs.

The newly created order form will not correct the current problems in ordering. Going forward, there are several recommendations to improve the ordering process. In discussing the new order form with the correctional supply officer supervisor (CSOS), it was determined that the newly created par levels were too low, resulting in low suggested order quantity. There needs to be a safety stock of items for the beginning of each month because the full orders will not arrive on the first of the month. Orders usually arrive during the first week, but orders may also be missing items. Items need to remain in stock during this time to prevent deficits in items. To help ensure there is enough safety stock during the month, a higher par level should be used. The recommendation from the CDRM for creating the par level did not follow the proper formula for setting par levels. The proper formula to determine par level is:  $\text{par level} = \text{item usage} \times \text{lead time} \times \text{safety stock factor}$ .<sup>9</sup> Lead time is the length of time into the future that production forecasts are made.<sup>8</sup> By taking this information into account, par levels would be set higher and may be more accurate. It would be recommended to add this new par level to the order form with the information from March and recalculate the suggested order quantity for April. This could provide information on whether this new par level would suggest a more accurate order or not.

Having the CSOS from the warehouse help the CDRM with the ordering would be beneficial. The CSOS is aware of what is on hand, how much usually goes out, and how much is usually needed. He also knows how much inventory the warehouse can hold at a time. Working together, they should be able to figure out better order numbers to prevent surpluses and deficiencies in inventory. Another area to look at is the eIMS, which currently monitors inventory and suggests an order for dietary supplies such as scoops and trays. This may be able to be implemented for the food items, too. eIMs will not look at average usage though, so it is recommended that every 6 months average usage of items be calculated. This will help monitor

Amy Elsasser

for variances in usage and ordering needs. Then, when the CDRM and CSOS sit down every month to do the order, they could look at the system's recommendations along with the 6-month item usage average and the correct par levels to determine the best possible order.

The newly created system would have benefited the correctional facility budget had it worked. It was free to implement, and it may have prevented costly menu substitutions. While the CDRM and CSOS are working to create a more accurate ordering system, one recommendation to decrease costs would be to replace the deli franks with the okra patty. The okra patty is commonly a replacement for the deli frank, but it actually costs less. By using the okra patty as the common item, there would be a \$0.12 saving per portion. Unfortunately, at this time, this new ordering system would not work properly and would most likely have increased overall costs and menu substitutions.

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Amy Elsassser

**Section VII: Appendix**