Setting Staffing Levels for Poultry Further Processing Operations

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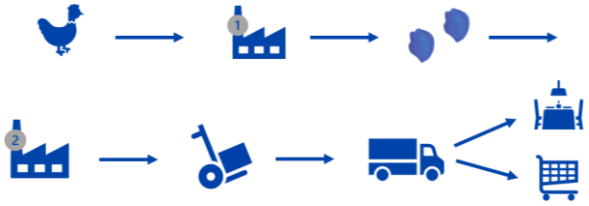
Simmons

Founded in 1949 and headquartered in Siloam Springs, Arkansas, Simmons Foods is a family-owned poultry supplier generating $3 billion in annual sales. It operates three sectors: Simmons Pet Foods, Simmons Animal Nutrition, and Simmons Prepared Foods. Our focus is Simmons Prepared Foods' Van Buren Further Processing facility where poultry is either cooked and packaged as ready-to-eat or partially-cooked and packaged as ready-to-cook.



Current Staffing Process

Currently, Simmons lacks a data-driven methodology to set appropriate staffing levels for products at its Van Buren facility. To set staffing levels for a new product, Simmons begins by identifying an existing product within the same family with similar specifications. Once a similar product is found, the staffing number from the existing product is copied to the new product, and they begin running production with this number. This approach relies on historical numbers that may not align with the unique requirements of the product or capabilities of the production line.

Find product with similar specifications in same product family → Copy staffing number from identified similar product → Apply staffing number to production line

MTM-1 Task Breakdown

We conducted motion studies using MTM-1, a predetermined time system that breaks down operator tasks into basic motions like reach, grasp, and move. We observed how workers intervene with defects and categorized movements based on actions and reach and calculated a standard time for each task using MTM-1 (the tables below show only the type A movements).

A = Within Reach	Data Block	TMUs	Standard Time (sec)
A1	EF1, R16C, APA	28.2	1.02
A2	EF3, R16C, G4A, M16B, T180S, RL1	60.1	2.16
A3	EF3, R16C, G4A, M55B, M2A, G2, M55B, RL1	87.5	3.15
A4	EF2, R16C, G1B, M65B, RL1, M55B	71.2	2.56
A5	EF3, R16C, G4A, M55B, TBC1, M30B, RL1, TBC1	111.2	4.00
A6	TBC1, R30B, G4C, TBC1, G3, M30B, RL1, M30B, G3, M30B, RL1, M30B, G3, M30B, RL1	152.2	5.48

After categorizing all observed tasks, we identified the proportion of total pieces that required manual handling. We then determined how frequently each specific task occurred within the total set of interventions.

		Frequency of Movement Type				
Movement Type	Standard Time (seconds)	Pre-Press	Pre-Dusting	Pre-Breading	Pre-Fryer	Pre-Freezer
A1	1.02	100%	45.7%	11.4%	10.1%	21.8%
A2	2.16	0%	28.1%	51.8%	58.9%	48.1%
A3	3.15	0%	0%	11.8%	5.3%	14.9%
A4	2.56	0%	1.0%	0%	4.8%	3.3%
A5	4.00	0%	0%	0%	9.6%	0%
A6/B6	5.48	0%	0%	0%	3.0%	0%

Our Staffing Model

We applied two core equations to calculate staffing needs. First, we calculated how much time a single employee would need per minute to handle the expected interventions. The final staffing equation determine how many employees are required at each station to maintain throughput and quality.

$$\text{Throughput Rate of Pieces (pieces/minute)} \times \text{Fraction of Pieces Needing Intervention (\%)} \times \text{Weighted Average Employee Handle Time per Piece (seconds/piece)} = \text{Employee Workload (seconds/minute)}$$

$$\frac{\text{Employee Workload (seconds/minute)}}{\text{60 seconds/minute} \times \text{Target Employee Utilization (\%)}} = \text{Number of Employees Needed (employees)}$$

We created a decision support tool using VBA macros in Microsoft Excel to determine staffing levels. The tool used specific product information and user input about throughput and worker utilization to calculate new estimates based on the MTM-1 tasks, intervention proportions, and staffing model equations. The resulting estimate was higher than the current staffing level for the designated product.