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Red Arrow Products Smokin' Into the Future: Facing Changing Diets and New Challenges in the Food Industry¹

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Abstract

This case study is intended for use by undergraduates studying agribusiness and agricultural economics. The case introduces a firm whose products are minor ingredients for an iconic, but declining food item. The learning outcomes sought from this case is to: i) understand the structural changes in the meat industry and its implications on the production and demand for hot dogs; ii) examine the sources of competitive advantage faced by ingredient suppliers; and iii) analyze the elements of organizational change and the adaptive solutions in a declining market. The study, inter alia, includes concepts from agribusiness strategic management (i.e., industry driving forces, economic market structure, and competitive advantage), and supply chain management to examine the firm and industry.

Keywords: supply chain, agribusiness strategy, market structure, transaction costs

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The Challenge

Red Arrow produces and markets liquid smoke and browning solutions to the processed meat industry. In recent years profits increased, but the outlook for continued growth was uncertain. Though expenditures had been steady in recent years, the future demand for hot dogs is expected to decline (Ollinger et al. 2005). Sales of hot dogs and sausages reached \$8.2 billion in 2012 and are forecasted to increase to \$9.6 billion by 2019 (Convenience Store News 2013). On average, hot dog sales are expected to increase 2.5% annually, which is slightly ahead of the 1% forecasted population growth (U.S. Census 2014). Children are the primary market drivers for hot dog demand and the average number of children per family dropped from 1.3% in 1970 to 0.9% in 2013, resulting in overall smaller families (Mintel 2014). There are parental concerns about childhood obesity and issues related to product quality and freshness is not encouraging industry news. Furthermore, meat processors' profitability is strained by volatile raw material price changes, and a dramatic shift in American food choices from pork and beef to chicken. Suppliers to the processed meat industry, such as Red Arrow, received some good news. In 2003, The Food Safety Inspection Service (FSIS) an agency of the United States Department of Agriculture (USDA) published a final rule (68 FR 34207), which mandates that ready-to-eat (RTE) producers prevent product adulteration from the pathogenic environmental contaminant *Listeria monocytogenes*. The ruling effectively helped Red Arrow to promote liquid smoke for its antimicrobial efficacy along with application flexibility and quality enhancing properties such as flavor and appearance.

Red Arrow is faced with how it will compete for profits in a mature industry. Should it diversify its products or add complementary services? If so, on which of the firm's current resources should diversification be based? Should it continue to dedicate its resources that will deliver a cost advantage? Or is it time for Red Arrow's owners to consider selling its business?

Introduction

Since 1970, the per capita consumption of processed pork has been moderately unchanged. Beef demand of all types, fresh or processed had weakened relative to chicken. Some reports suggested the decline in the U.S. per capita consumption of processed meat contributes to the industry's structural changes (Table 1). Former U.S. Department of Agriculture (USDA) Secretary Dan Glickman stated "the meat supply is safer today than it's been in a long time, but that the potential for something going wrong is greater than ever" (Frontline 2002). Although the comment was not directed at any one firm, Mark Crass, Executive Vice President of Sales and Marketing for Red Arrow Products, understood that profits don't sit still. If the future growth in the demand for hot dogs were doubtful, then a subsequent decline in demand for his company's principal product was logical and rational. The structural changes in the meat processing industry and changes in consumer taste and preferences indicated that changes were inevitable. Mark has been with Red Arrow since 1985 and had experienced the ups and downs of economic cycles on liquid smoke. The market demand fundamentals seemed different this time. He anticipated changes in his firm's product mix, but selling a highly differentiated product into a cost-driven processed meat industry would lead to potential misalignment across the liquid smoke supply chain. Red Arrow is a privately owned company with corporate headquarters in Manitowac, Wisconsin. It has about 230 employees and is the largest producer and marketer of liquid smoke to the processed meat industry (Associated Press 2014). Its customers, industrial meat processors,

could choose to use traditional smoking methods, liquid smoke pioneered by Red Arrow, or a combination of these methods to smoke processed meats, such as sausages, hot dogs, hams, and luncheon meats (American Meat Institute 2005). Red Arrow is the world's largest producer and marketer of liquid smoke. Its products are water and oil soluble, produced as aqueous or free flowing powders, and they dissolve in concentrated brine. Still, Mark was concerned about the future growth of Red Arrow's flagship product—liquid smoke. His company understands the stiff competition for a place in the product formulation of one of America's favorite foods—hot dogs. Yet another larger issue, which extended beyond the hot dog segment, could affect his company's future profits.

Table 1. Per Capita Consumption of Processed Meat and Revenue

| Year | Revenue (\$m) | Per capita processed meat consumption |
|-------------|----------------------|--|
| 2006 | 177,131.70 | 276.6 |
| 2007 | 184,109.90 | 276.0 |
| 2008 | 192,310.50 | 268.6 |
| 2009 | 183,128.00 | 262.3 |
| 2010 | 194,670.20 | 259.9 |
| 2011 | 212,692.50 | 253.9 |
| 2012 | 212,675.80 | 251.3 |
| 2013 | 218,746.80 | 251.3 |
| 2014 | 236,660.70 | 250.0 |
| 2015 | 249,884.60 | 250.6 |
| 2016 | 256,861.50 | 251.9 |
| 2017 | 258,295.10 | 252.4 |
| 2018 | 258,759.70 | 254.9 |
| 2019 | 258,199.60 | 257.3 |
| 2020 | 257,788.50 | 258.7 |

The National Hot Dog and Sausage Council (NHDSC), however, was more optimistic about hot dog demand. The retail sales channel account for more than 60% of the market for hot dogs (Mintel 2012). NHDSC's press releases boasted that 837 million packages of hot dogs—totaling \$1.8 billion—were sold in the U.S. in 2012. Companies similar to Hillshire Brands, Bar-S Foods, Oscar Mayer and Hebrew National have made hot dogs and luncheon meats a summer-time staple at ballparks and cookouts. Red Arrow is a supporter of NHDSC. However, there was some uneasiness about the future demand for hot dogs and the structural industry changes for its primary meat ingredients—beef and pork—could eventually hurt liquid smoke sales.

Industry observers believe that liquid smoke products are now used on 75% of the hot dogs produced in this country, and are distributed by most major ingredient suppliers. Mark carefully viewed the structural changes in the processed meat industry and the effect on hot dog sales. He pondered: Should Red Arrow focus its resources on lowering costs in order to withstand the downward path of hot dog demand? Or should they expand their boundaries beyond the hot dog segment of processed meat industry to create and capture value in a different market? In either case, Red Arrow had to adjust before company profits eroded.

Red Arrow History

Dr. Clifford Hollenbeck invented the process to manufacture liquid smoke, and would later found Red Arrow Products Company in Manitowoc, Wisconsin. Dr. Hollenbeck's 1963 invention allowed the capture, in water, of all of the components of smoke that are needed to provide smoke flavor, flavor stability, color and bacteriostatic characteristics to meat products without undesirable carcinogens and environmental pollution (Red Arrow Website). He originally patented a process of producing smoke flavors through pyrolyzing hardwood sawdust and capturing the wood smoke in a water solution. It uses a smoke condensate process using phase separation and condensing technologies (Exhibit 1). The sawdust is a byproduct of the lumber industry. The modern manufacturing process emulated the flavors of traditional smoking and with the guidance of food scientist, food processors were able to enhance foods or create authentic tastes. The almost transparent liquid smoke imparts a range of browning effects to meat and food products (Exhibit 2). The liquid smoke's flavoring component has been optimized to achieve browning, without an overpowering smoke taste and the smoke aids in improving the firm texture of hot dogs.

Over the years, Red Arrow constantly improved the purified primary smoke products. In 1998, the international division was established to meet the demand for smoked food outside of the United States. In 2014, Dale H. Hanke, the company's President and CEO, said, "exports have always been an important part of Red Arrow's strategy for growth and now represents more than one-third of the company's sales" (Matthews 2014). Red Arrow's products are distributed to more than 100 countries, are available worldwide through a network of technically trained, in-country distributors, and Red Arrow's international staff.

Red Arrow added a processing equipment subsidiary in 2010. It was established to provide its customers with advanced solutions to apply liquid smoke and browning agents. Customized application includes drenching, spraying and atomizing equipment, which are designed to produce efficient and consistent smoke and browning capabilities. The equipment subsidiary is a complement to the liquid smoke. Initially customers purchased liquid smoke without using Red Arrow's liquid smoke application equipment. To entice the equipment purchase, Red Arrow would lease the equipment at no cost to the hot dog manufacturer. The equipment provided supply chain costs savings related to transportation, storage, and order fulfillment benefits for both Red Arrow and the hot dog manufacturers. To finance the lease, Red Arrow would keep the supply chain savings until the lease was paid. For example, if the equipment cost \$10,000 and the estimated supply chain savings equaled \$.05/gallon, then the lessee would have to purchase 200,000 gallons of liquid smoke from Red Arrow. Once the 200,000 gallon purchase requirement was met, the price would be reduced by \$.05/lb. The combination of equipment and

liquid smoke expertise provided its customers a single point of contact when developing plant operational efficiencies and new products. The liquid smoke system helps to control the concentration of smoke being applied, which is used to maintain the bacteriostatic and preservative qualities of the traditional smoking process. Red Arrow's business model includes: 1) a solid value proposition; 2) an enterprise organized to deliver a product below its cost to produce it; and 3) and a way to appropriate profits to its ownership.



Exhibit 1. The Production of Liquid Smoke



Exhibit 2. Images of hot dogs with and without liquid smoke.

Note. Hot dogs on the left treated are with liquid smoke and hot dogs on the right are not treated with liquid smoke.

Structural Changes Fresh Meat and Poultry

The meat and poultry industry is the largest segment of United States agriculture (American Meat Institute 2012). Total meat and poultry production in 2014 reached more than 93.1 billion pounds. Annual sales for 2015 are estimated at more than \$249.8 billion among the meatpacking, meat processing and poultry processing industries (IBIS World 2015). Supporting the industry is a network of suppliers. Their value added activities enhance flavor, texture, color, and shapes processed meats. For instance, ingredient, casings, and packaging suppliers play a role in sustaining the product's profitability.

Scherer (1990) argued that a growth in demand leads to an increase in the number of operating firms, while a decline in demand leads to a contraction in the number of firms. Technological change, however, can either reduce or increase the number of firms. If a technological change reduces production or administrative costs, then plant size likely would grow, the number of firms would drop, and the concentration ratio would rise. However, if technological change reduces barriers to entry, such as high transportation costs, then the number of firms that a market can profitably sustain may rise and concentration ratios will drop. Thus, new entrants will have a lower threshold of output at which they can profitably produce. Slow growing market demand, and food safety concerns have forced older and inefficient plants out of the processed meat industry. Since 1972, the number of plants are moderately unchanged and the market concentration ratios have increased for processed meat companies (Tables 2 and 3).

Table 2. Number of processed meat plants

| | 1972 | 1977 | 1982 | 1987 | 1992 | 2002 | 2007 | 2012 |
|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Meat processing | 1,311 | 1,345 | 1,311 | 1,343 | 1,260 | 1,335 | 1,381 | 1,346 |

Source. USDA, Statistical Handbook; Agricultural Statistics, various issues.

Table 3. Four-firm concentration ratios for meat processing industry

| | 1972 | 1977 | 1987 | 1992 | 1997 | 2002 | 2007 | 2015 |
|-----------------|------|------|------|------|------|------|------|------|
| Meat processing | 16.0 | 18.0 | 19.0 | 20.0 | 23.0 | 24.2 | 27.9 | 35.7 |

Source. USDA Statistical Handbook and IBIS World 2015

The processed meat industry is comprised of firms that slaughter animals, process and market meat, but also firms that wholesales and retails exclusively. As a supplier to the processed meat industry, Red Arrow was keenly aware of positive and negative influences in the hot dog segment. For instance, nutrition and consumption, country of origin labeling (COOL), animal handling and welfare, and slow growth represented negative externalities for upstream supply chain partners. Studies have demonstrated that smoking is effective at reducing or suppressing *Listeria* and other food-related bacteria associated with ready-to-eat foods (Estrada et al. 1998). Using condensates for smoke application allows the meat processor to dictate the concentration of smoke being applied more readily than using gaseous smoke (Maga 1988, Sunen et al. 2001).

The NHDSC sponsored a contest to increase industry sales with promotional ideas and slogans. It selected the 2012-winning slogan Hot dog “Relish the Moments”. In spite of their effort, the increased food safety regulations and consumer demand shapes the market. As such, utilizing liquid smoke in processing hot dogs offer Red Arrow’s customers a means of complying with new rules addressing environmental contamination from *Listeria monocytogenes*.

Structural Change Processed Meat-Changes in Demand

The demand for hot dogs can be traced to the consumption of its principal ingredients —pork and beef— and eating habits. The 1994-96 and 1998 the Continuing Survey of Food Intakes by Individuals (CSFII) survey data indicate that 38% of the pork consumed was fresh and 62% processed (USDA 1996). The processed pork category was disaggregated into lunchmeats, hot dogs, bacon, sausage, smoked ham, and other processed pork. Processed pork dominates U.S. pork use. The average person consumed more smoked ham (14.4 pounds) than any other processed pork product. The second-most-consumed processed pork products were smoked sausage (6.5 pounds) and processed nonspecified pork (4.9 pounds). Hot dogs are the fourth-most-consumed processed pork product at 2.8 pounds per person (Davis 2005). In 1999, the number increased slightly to 2.9 pounds per person.

CSFII data indicated that 87% of beef consumed was fresh and 13% was processed. Fresh products are those muscle cuts of beef that are purchased from wholesale markets by food services or from grocery meat counters directly by consumers and are cooked just before eating. Processed beef products are transformed by curing, smoking, or seasoning prior to cooking; beef is a primary ingredient for hot dogs and smoked sausage, which can be further differentiated by its product quality attributes (Raikes et al. 2000). These quality attributes encompass the manner in which products are produced, for example, organic production and animal welfare concerns.

Hot dogs are made from all types of meat trimmings (pork, beef, chicken, and turkey), including mechanically separated meat. Chicken hot dogs, turkey hot dogs and all possible combinations can be found in a supermarket; however, consumers largely prefer beef and pork hot dogs (Mintel Group 2012). The processed meat eating habits of Americans has changed. The per capita consumption between 2006 and 2015 declined and the future consumption of processed meats are expected to increase marginally between 2015 and 2019 (Table 1). The U.S- hot dog market is driven primarily by demographic factors, including households with children, which factor heavily into sales. The decline in families with children and the general increase in healthier eating have had a negative impact on the hot dog segment (Mintel 2014).

Structural Changes - Food Standards and Competition

Foodborne illnesses caused by *Listeria Monocytogenes* and *Escherichia-coli* 0157:H7 can severely damage the meat industry. The deadly pathogens are found in RTE processed meat and poultry and ground beef. *Listeria* is an environmental microorganism that thrives in cold temperatures and can be found in the water droplets on ceilings and floor drains. It is killed during pasteurization and heating, so prepared meats that are contaminated during processing and are not re-cooked are most susceptible (hot dogs and deli meats, for example). *E-coli* can be linked to beef, as cattle are one of the primary hosts. Cross-contamination and transmission can occur when cattle are harvested and a hide with cattle feces comes in contact with a carcass, and meats are undercooked (National Cattlemen's Beef Association 2011). There are higher costs to control pathogens and maintain a company's reputation for food safety and quality. The processed meat sector employs several layers of safety interventions and works cooperatively with government inspectors to prevent this from occurring.

This threat of lost sales led to market-driven efforts to provide safe food. Major buyers of food products, such as supermarkets, fast foodservice chains and major food processors use their own private standards for strategic reasons including to reduce their supply chain costs, to use as barriers of entry, or self-regulation before governments or international organizations do. The main cost reduction comes from using process standards to coordinate procurement chains and systems. Farina et al. (2005) and Gutman (2002) for example, illustrate these cost savings in the case of supermarkets and dairy products in Brazil and Argentina. Suppliers complement private standards with other elements of "quality management metasystems", such as branding and system governance structures (Caswell et al. 1998). Building trust and reputation around the visible symbol of a brand name and label make standards systems credible to consumers (Henson and Reardon 2005). To build consumer confidence through consistency in standards implementation and thus build market volume and reduce market risk, tight vertical coordination is needed, especially in the case of process standards.

The structural changes lead to other impacts as well. For example, a leveling or declining per capita consumption of meat led to a contraction, acquisitions, or divestitures of meat processing operating firms. Increased productivity reduces production costs, leading to lower commodity and retail prices. Since 1982, there have been constant changes in the top 10 producers of meat and poultry (Table 4). For instance from 2001 to 2013, there has been a 40% change in the makeup of the top 10 processing firms. Trends toward free-range, grass-fed, and organic products will likely lead to ongoing changes in the leading players in the processed meat and poultry industries. In addition to broad trends related to consumer preference, disease outbreaks have limited industry growth during specific years. In 2013, for example, Porcine Epidemic

Diarrhea (PED) virus began decimating pig litters, depleting the supply of hogs. Reduced herd numbers have pushed prices up, slightly inhibiting consumption of pork products.

Table 4. Top 10 meat and poultry companies by net sales

| Rank | 1982 | 1991 | 2001 | 2013 |
|------|---------------------------|----------------------------|-------------------------|------------------------|
| 1 | Iowa Beef Processors Inc. | ConAgra, Inc. | Tyson Food | Tyson Foods, Inc. |
| 2 | Amour & Co. | IBP, Inc. | ConAgra Inc. | JBS |
| 3 | Swift & Co. | Excel/Cargill | Excel/Cargill | Cargill Meat Solutions |
| 4 | Wilson Foods | Tyson Foods, Inc. | Smithfield Foods Inc. | Smithfield Foods Inc. |
| 5 | John Morrell & Co. | Sara Lee Packaged Meats | Farmland | Sysco |
| 6 | Swift Indep. Packing Co. | Geo. A Hormel & Co. | Sara Lee Packaged Meats | Hormel Foods Inc. |
| 7 | Oscar Mayer & Co. | Oscar May Foods Corps. | Hormel Foods Inc. | ConAgra Foods Inc. |
| 8 | MBPXL Corp. | John Morrell & Co. | Oscar Meyer | National Beef |
| 9 | Geo. A Hormel & Co | Beef America Operating Co. | Perdue Farms | Keystone Foods |
| 10 | Land O'Lakes | International Multifoods | Pilgrim's Pride | OSI Food Group |

Source. Compiled from various sources

The Decision to Compete: How and Where

Red Arrow's liquid smoke offers RTE meat processors a valuable option for complying with the USDA/FSIS final rule of employing a "post- pasteurization process" and increases production output. Processed meat spends less time inside the industrial smokers as compared to natural smoking methods (Exhibits 3-5, see Appendix). The price per unit of liquid smoke is higher than natural smoke. However, when industrial buyers consider the marginal social costs, along with opportunities for cost containment, process efficiency and quality improvement, its overall cost of use is lower. Industrial buyers recognize Red Arrow for its ability to continuously improve. In order to take advantage of its strength and reputation, Red Arrow considered changing from 'how to compete' to 'where to compete'. The management team at Red Arrow was aware of the production and distribution synergies between flavors and liquid smoke. Expanding the firm capabilities would require recognizing the structural changes happening across the industry and reallocating the firm's resources would require a sales approach different than the liquid smoke product line. Meeting the standards of service and expertise is a part of its value proposition. Its sales force would need to be transformed from a highly technical sales group with expert knowledge in meat science and equipment design and application to a sales force with terrific knowledge about complex flavors often used to enhance or mask unpleasant qualities. It now must answer the question "how to compete" with flavors.

Market Structure and Differentiation Strategies

There are two companies selling liquid smoke to the industrial meat and poultry processing industries and other smaller companies selling liquid smoke in small containers through the retail sales channel. The two-firm market concentration ratio (CR2) is estimated to be .80. CR2

indicates two organizations supply 80% of the market; as such Red Arrow enjoys monopoly profits. Red Arrow's customers in the processed meats industry have a CR4 ratio of .279. The concentration ratios suggest a somewhat fragmented group of buyers of liquid smoke.

The flavors and extracts industry has CR4 of .296 and the CR8 was .42 in 2007 (United States Census Bureau 2013). The top buyers for flavors represented a CR4 of .25. Thus, the market is less concentrated for the purchase and production for flavors compared to the market structure for liquid smoke. Considering the structural challenges ahead of the processed meats industry, Red Arrow sought out to diversify its company and enter a market segment that is more competitive (more buyers and sellers) and larger.

Organizational Constraints and Adaptable Solutions

Red Arrow considered expanding the boundaries of its firm of "where to compete" by investing its resources into savory flavors. The market for savory flavors is more competitive than liquid smoke. A decision to expand its operations into savory flavors would require either acquiring a flavoring company, entering into a strategic alliance to sell flavors or develop its own product line of flavors. Red Arrow had to determine if it could use its current resources to enter into the flavorings market. If successful, it would create a favorable market position where its own resources made it more difficult for others to catch up. To achieve this, Red Arrow would need to use its resources of meat science knowledge, liquid smoke production expertise, and equipment design for liquid smoke and savory flavors. Mark and his sales staff needed to assess their capability to sell flavors. Mark expected savory flavors sales would require sales skills beyond the composition, nutritional value, wholesomeness, and consumer acceptability expectations for processed meat. A comparison of the organizational elements of transformation—people, process, technology—for selling the cost driven product (liquid smoke) to selling a differentiated product (savory flavors), provided a framework to assess Red Arrow's organizational readiness.

Red Arrow's liquid smoke sales tactic targets industrial buyers that value strong technical sales representation from its suppliers. The customer's key decision makers, purchasing and manufacturing personnel, often want competitive prices and efficient operations. Flavors warrant a sales approach different than the liquid smoke product line.

Unlike liquid smoke, personnel from R&D, Sales and Marketing Departments are the key decision makers when purchasing flavors. This group's objective is tied closely to increasing revenue, new products, changes to existing products, and higher levels of customer service.

Liquid Smoke Sales versus Savory Flavoring Sales

Red Arrow found there were a number of differences in selling liquid smoke and flavors. At the same time, there were synergies. Red Arrow's sales team believed that only 10% of its customers viewed Red Arrow as commodity supplier. The other 90% viewed its products as highly specialized. This was important because savory flavors are value added and highly differentiated products and a 'people challenged' organization is akin to a sales staff with outdated skills. It was apparent to Mark the same sales staff that helped the liquid smoke business is capable of doing the same with a highly differentiated product like flavors.

Table 5. Elements of Organizational Transformation — Liquid Smoke and Savory Flavors

| A Comparison Liquid Smoke and Savory Flavors | | | |
|---|-----------------------------------|---|--|
| Transformation Elements | Cost Oriented Liquid Smoke | Differentiation Oriented Savory Flavors | |
| Red Arrow's Approach | People | A technically driven sales staff focused on operational improvements through the value chain. | Technical sales needed; however, meat science is not the key value proposition. Sales personnel involved in other sales skill sets i.e. maneuvering and collaborating skills. |
| | Process | Highly standardized products. Liquid smoke is produced in anticipation of a customer order (push) i.e. smoke is held in inventory in anticipation of a customer order. | Highly differentiated products. Flavors are requested as needed (pull), i.e. flavors are not held in inventory and produced for actual customer orders. |
| | Technology | Fast burning technology to capture the attributes of the desired smoke components. | Uses tools to identify and then measure the taste profile. |
| | Bottom Line | Sales staff has expertise on reducing costs for its customers. | Increases sales and profits. |
| Customer Impact | People | Initial contact is with R&D, but ongoing involvement is with plant operations personnel mainly smoke room employees, production supervisors, and occasionally quality assurance. | A different set of stakeholders than liquid smoke: R&D, Marketing, and to a lesser degree Purchasing Departments. Each group has a different objective to meet the company's overall goal. |
| | Process | Telemetry systems for automated replenishment of supply—TankLink. Application systems involving atomization, drenching, brine injection for water soluble, aqueous, oil, and dry smokes. | Involves more testing to reach organoleptic objectives. Taste panels, focus groups, foodservice chefs, and etc. |
| | Technology | The uses of bulk tanks drench cabinets and add back systems to apply liquid smoke. The development of more than 100 different types of smoke to produce flavor characteristics associated with flavor, color and aroma. | Try to make a very subjective area very objective to market a particular flavor. |
| | Bottom Line | There are more costs savings than revenue gains. | New products generate sales. Cost savings is not the impetus for change. |

Note. Red Arrow's liquid smoke sales tactic targets industrial buyers that value strong technical sales representation from its suppliers. The customer's key decision makers, purchasing and manufacturing personnel, often want competitive prices and efficient operations. Flavors warrant a sales approach different than the liquid smoke product line.

A rigid and process-laden approach to product delivery constitutes a 'process challenge' that often leads to delays in product delivery. Red Arrow's customers were seen as competing more and more in markets that called on its supply chain to be responsive to changes in demand. Its focus on efficiency was important, but now there is increasing evidence that responsiveness is important to its customers. However, continuous improvement requires newer technologies or processes to produce the essence of a flavor.

Red Arrow did not face a 'technology challenge'. Although the manufacturing requirements for liquid smoke and flavors are vastly different, the research and development are similar. Its customers often made its own product attribute decisions, like taste, color, odor, and mouth feel. In the early stages of product development they typically did not involve suppliers like Red Arrow. Unlike liquid smoke, however, flavors present an entirely different supply chain problem.

Mark was proud of Red Arrow's accomplishments. Its innovations on product development and process improvements create a solid business model. If Red Arrow builds a similar business model for flavors, it could experience another profitable revenue stream. In order to accomplish this, it must take a page from its liquid smoke playbook and develop techniques to increase supplier switching costs, gain access to new information, and position its flavors as specialized product in a fragmented market. If successful, it could gain market power and influence as it had accomplished with liquid smoke.

References

- American Meat Institute 1991. Meatfacts: A Statistical Summary about America's Largest Food Industry. <https://searchworks.stanford.edu/view/10036263> [accessed October 15, 1990].
- American Meat Institute. 2005. Meat & Poultry Facts. About meat: facts and figures about the meat packing industry and its products. <https://www.meatinstitute.org/index.php?ht=/sp/i/286/pid/286> [accessed October 20, 2015].
- American Meat Institute. 2012. Meatfacts: A Statistical Summary about America's Largest Food Industry. www.meatinstitute.org [accessed July 1, 2015].
- Associated Press. 2014. ManitoWoc company flavors foods worldwide. <http://fox11online.com/2014/05/29/manitowoc-company-flavors-foods-worldwide/> [accessed July 23, 2015].
- Caswell, Julie A., Maury E. Bredahl, and Neal H. Hooker. 1998. How quality management metasystems are affecting the food industry. *Review of Agricultural Economics*: 547-557.
- Crews, Joel. 2013. Top 100. *Meat + Poultry*. March 18. Online: http://www.meatpoultry.com/articles/news_home/Business/2013/03/Top_100.aspx?ID={11DAE3B5-1782-4907-BC91-9FD65C5839D4}&cck=1.
- Davis, C. G., & Lin, B.H. 2005. Factors affecting US beef consumption. *U.S. Department of Agriculture, Economic Research Service*. [http://webarchives.cdlib.org/wayback.public/UERS_ag_1/20110915064436/http://ers.usda.gov/publications/ldp/Oct05/ldp_m13502/ldpm13502.pdf](http://webarchives.cdlib.org/wayback/public/UERS_ag_1/20110915064436/http://ers.usda.gov/publications/ldp/Oct05/ldp_m13502/ldpm13502.pdf) [accessed June 15, 2015].

- Estrada-Munoz, Boyle R., Marsden JL. 1998. Liquid smoke effects on Escherichia coli O157:H7, and its antioxidant properties in beef products. *Journal of Food Science* 63 (1): 150-153.
- Farina, Elizabeth MMQ, Rubens Nunes, and Guilherme F. de A. Monteiro. 2005. Supermarkets and Their Impacts on the Agrifood System of Brazil: The Competition among Retailers. *Agribusiness* 21 (2): 133–47.
- Frontline©. 2002. Is Your Meat Safe? Interview – Dan Glickman. www.pbs.org/wgbh/pages/frontline/shows/meat/.../glickman.html [accessed January 21, 2015].
- Gutman, Graciela E. 2002. Impact of the Rapid Rise of Supermarkets on Dairy Products Systems in Argentina. *Development Policy Review* 20 (4): 409–27.
- Henson, Spencer, and Thomas Reardon. 2005. Private Agri-Food Standards: Implications for Food Policy and the Agri-Food System. *Food Policy* 30 (3): 241–53. doi:10.1016/j.foodpol.2005.05.002.
- IBIS World. 2015. Meat, Beef, & Poultry Processing in the U.S. Industry Report 31161.
- Maga, JA. 1988. Smoke in Food Processing. Boca Ration, FL. CRC Press Inc.
- Meat and Poultry Magazine. 1991. Meat & Poultry Magazines' 15th Annual Top 100. 39 (7): 21
- Meat and Poultry Magazine. 2013 Meat & Poultry Magazines' Top 100. Online: http://www.meatpoultry.com/articles/news_home/Business/2013/03/Top_100.aspx?ID={11DAE3B5-1782-4907-BC91-9FD65C5839D4}&cck=1 [accessed May 10, 2015].
- Mintel Group LTD. 2012 Global Market Research & Market Insight | Mintel.com. (n.d.). Online: <http://www.mintel.com/> [accessed May 10, 2015].
- Mintel Group LTD. A Look at Hot Dogs & Sausages. 2013 *Convenient Store News October General OneFile Web*. <http://go.galegroup.com/ps/i.do?id=GALE%7CA345236271&v=2.1&u=ksu&it=r&p=ITOF&sw=w&asid=c67bdc54657669d591e321e51d15349a> [accessed October 19, 2015]
- Mintel Group LTD. 2014. Global Market Research & Market Insight | Mintel.com. (n.d.). Online: <http://www.mintel.com/> [accessed April 14, 2015].
- National Cattlemen's Beef Association. 2011. A Basic Look at E. coli - e.coli_final.pdf. (n.d.). http://www.beefresearch.org/cmdocs/beefresearch/safety_fact_sheets/e.coli_final.pdf [accessed October 20, 2015].
- Mathews, Charlie. 2014. Red Arrow Wins Governor's State Export Award. *Gannett Wisconsin Media*, June 2. Online: <http://www.greenbaypressgazette.com/story/money/2014/06/02/red-arrow-wins-governors-state-export-award/9922391/> [accessed October 15, 2015].

Ollinger, Michael, Sang V. Nguyen, Donald Blayney, Bill Chambers, and Ken Nelson. 2005. Structural Change in the Meat, Poultry, Dairy, and Grain Processing Industries. *U.S. Department of Agriculture, Economic Research Service*. <http://core.kmi.open.ac.uk/download/pdf/6472642.pdf>.

Safe, Affordable, Varied and Abundant Meat and Poultry: Our Competitive Industry's Mission. 2015. Online: <http://www.themarketworks.org/> [accessed April, 15 2015].

Scherer, Frederic M., and David Ross. 1990. Industrial Market Structure and Economic Performance. *University of Illinois at Urbana-Champaign's Academy for Entrepreneurial Leadership Historical Research Reference in Entrepreneurship*. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1496716.

Raikes, P., Friis Jensen, M., & Ponte, S. 2000. Global commodity chain analysis and the French filière approach: comparison and critique. *Economy and Society* 29 (3): 390–417. [accessed October 23, 2015].

Red Arrow Website. Online: <http://www.redarrowusa.com/> [accessed March 15, 2015].

Scherer, F. M., & Ross, D. 1990. Industrial market structure and economic performance. *University of Illinois at Urbana-Champaign's Academy for Entrepreneurial Leadership Historical Research Reference in Entrepreneurship*. Online: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1496716 [accessed June, 2015].

Sunen, E, Aristimuno, C, Fernandez-Galian, B. 2001. Antibacterial activity of smoke wood condensates against *Aeromonas hydrophila*, *Yersinia enterocolitica* and *Listeria monocytogenes* at low temperature. *Food Microbiology* 18 (4): 387-393.

The Food Institute Report. 2001. Top Meat & Poultry Companies. <http://bi.galegroup.com/essentials/article/GALE%7CA76639070/41d402ed42bf0e6cc6317dbecaf9f15b?u=ksu> [accessed October 20, 2015].

U.S. Bureau of Census Reports. 2014. Online: <http://www.census.gov>

U.S. Bureau of Census Reports. 2013. Online: <http://www.census.gov>

U.S. Department of Agriculture. 1996. CSFII/DHKS 1995 Data Set and Documentation: The 1995 Continuing Survey of Food Intakes by Individuals and the 1995 Diet and Health Knowledge Survey.

U.S. Department of Agriculture, Agricultural Statistics, U.S. Department of Agriculture, various issues (1972-2010).

Appendix



Exhibit 3. An Industrial-Sized Smoke House



Exhibit 4. Hot dogs in an Industrial-Sized Smoke House being sprayed with liquid smoke



Exhibit 5. Hot dogs leaving the Industrial-Sized Smoke House