**Healthy Dairy Products, Inc.**

**Background:**

Healthy Dairy Products Inc. (HDP) is a large milk processing company located in Ohio with sales of about $100,000,000 per year. Founded in 1890, HDP remained a small, privately held company until 1960. At that time, HDP was purchased by the regional milk cooperative which is owned and operated by and for dairy farmers. HDP's primary role in the cooperative is to provide an outlet for all surplus milk produced by member farmers. The U.S. government supports the price of milk by guaranteeing to purchase unlimited amounts of butter, powdered milk and cheese at set prices. Thus, HDP provides the means by which cooperative members ensure that they receive full price for all milk produced.

Any skim milk or cream that HDP is unable to use in products sold to commercial customers is either converted into nonfat dry milk and sold to the government or sold to a creamery. Although sales of surplus milk products to the government and the creamery are not profitable, HDP is able to remain moderately profitable due to its commercial business. Net income averages $1,000,000 per year and return on equity is about ten percent. Most of HDP's profits come from its mix business and sales of condensed skim and nonfat powdered milk. The condensed and powdered milk is sold to other dairies and food processors in truck-load quantities.

The dairy industry is plagued by a constant surplus of butterfat which is churned into butter and sold to the U.S. government at a loss. As a result, HDP sells its surplus butterfat to a creamery for $.20 per pound of butterfat less than its direct costs (milk cost plus transportation). About 40 years ago, HDP, in an effort to find a profitable market for some of its butterfat, began manufacturing ice cream, soft serve and milk shake mixes (referred to collectively as mixes) for wholesale markets. HDP offers all mixes in chocolate and vanilla flavors. The primary customers are ice cream stands and fast food chains, whose orders range in size from 5 gallons to 800 gallons per delivery. Management views the mix business as the most profitable part of HDP's operations, and wishes to expand the sales volume of this business. A schematic of HDP's production process is presented as figure 1.

**Marketing Information:**

HDP is the acknowledged quality leader in the market, and its prices are normally among the highest, as well. Mr. Smith, the general manager of HDP, attributed this reputation for quality to his firm's specialization in the production of mixes. HDP's competitors are dairies which produce a full line of products, including bottled milk, cottage cheese, butter, packaged frozen ice cream, and buttermilk. In addition, HDP has the best mix laboratory and quality control departments in the industry. It is also known for its excellent customer service. Although HDP does not hold a large market share in any major geographical market (30 percent is its largest market share), it is by far the largest manufacturer of mixes in Ohio. This volume allows HDP to produce relatively large batches of each type of mix almost daily, keeping costs down while ensuring the delivery of fresh products. A listing of HDP's mix products is presented in table 1.

**Figure 1**

**Schematic of Healthy Dairy Products’ Production Facility**



Mr. Smith is concerned that HDP's prices are considerably higher than those of most competitors, despite the apparent cost advantages it has relative to other dairies. HDP's prices seem particularly out-of-line for the 10 percent and l 2 percent ice cream mixes. In fact, these products with higher butterfat content represent a much smaller percent of sales than they did ten years ago. The high-butterfat mixes also are losing market share. Mr. Smith, holder of an engineering master's degree from Purdue University, suspects that competing dairies are selling at a loss to attract the business, because he is confident that HDP is a more efficient mix producer than any of his competitors.

Most mix customers are on three-day-per-week delivery schedules. Each customer is called the day before delivery and orders are recorded by order clerks. The mix products are packaged in 2.5 gallon plastic bags and sold in five gallon increments (two bags in a plastic milk crate). Each morning at 4:00 AM at least 12 trucks leave for either a Monday-Wednesday-Friday route or a Tuesday-Thursday-Saturday route. During the peak demand months of June, July and August, six routes on each cycle are split each day to meet the seasonal volume, resulting in 18 trucks leaving each morning. Each truck can carry 4,000 gallons of mix, and, except for the June-August surge, operate well below capacity. In the winter months, delivery trucks often leave the plant up to 70 percent empty. It is not possible to combine the routes in winter, however, because combined routes would take more hours than a driver is allowed to work in a day.

**Cost Accounting System:**

Target mix prices are set based on full manufacturing cost, plus delivery cost, plus direct selling and administrative cost, plus a markup. The controller's staff prepares monthly updates of mix costs, which then become the basis for pricing decisions. The April 2009 cost sheet for both the regular milk shake mix and 10% ice cream mix is presented in table 2. Raw material costs (butterfat, skim, sugar, other ingredients and packaging) are computed using the average actual cost of material for the month and the actual product formula used in making the product. Farmers are paid for milk on the basis of the butterfat and skim content of milk sent to HDP. Therefore, the cost of milk in the mix products is directly traceable to HDP's purchase cost. Overhead is applied to products using a predetermined overhead rate based on last year's costs and volume.

For pricing purposes, two nonmanufacturing costs are assigned to mix products: (1) delivery costs and (2) selling and administrative costs. Delivery costs of $1,908,000 in 2008 include all truck driver wages and benefits, maintenance, depreciation and fuel costs associated with delivery of mix products. The delivery manager estimates that each delivery stop costs HDP about $10 whether 5 gallons or 500 gallons are delivered. The $10 cost represents the average time it takes to drive from one customer location to next, as well as the time it takes to park, get the customer to open the cooler, small talk with the customer, and complete the paper work. At $10 per stop, the total 2008 "fixed" delivery costs total $840,000. Management believes that the rest of 2008's total delivery cost of $1,908,000 varies primarily with the volume of mix delivered.

The selling and administrative costs assigned to mix products include order, billing and sales costs related to the mix products. These costs totaled $293,600 in 2008. Each order takes about the same amount of time to process, bill and service. HDP processed 84,000 orders in 2008. General selling and administrative costs, including management salaries, finance and accounting costs, and laboratory costs, are not attributed directly to mix products. These costs are covered by the 15 percent markup on costs that HDP applies to mix products in setting target prices.

As shown in figure 1, the factory has three cost centers: (1) the condensing department, (2) the drying department where powdered milk is created from condensed milk, and (3) the rest of the plant's costs which include the mix department and the pasteurization and separation department. In the third cost center, which is the focus of this case, all costs are allocated to the mix products on the basis of pounds of butterfat (cream bears no overhead cost from the pasteurization and separation department even though it contains butterfat). Detailed costs for the third cost center are presented in table 3.

Whole milk is received from farmers and stored in one of six receiving towers with a capacity of up to one million pounds each. All milk is then pasteurized and separated. The cream (40 percent butterfat) is sold by the truckload or used in mix products. The skim is sent to the condensing department or used in mix products. The condensed skim milk is sold as is by the truckload or dried into powdered nonfat dry milk. HDP received and processed 600,000,000 pounds of milk in 2008. Management believes that pasteurization and separation costs vary with the volume of milk received.

The mix department is composed of several large mixing vats (up to 10,000 gallons in size) in which cream, skim, sugar, flavoring and other ingredients are combined into the final mix products. Each flavor of each mix product is produced in a separate batch. The primary conversion costs in the mix department consist of depreciation and substantial costs related to cleaning the vats and the extensive piping used to transport various milk product ingredients. Department capacity is constrained by the number of batches that can be produced in the existing vats and associated plumbing. Utility costs also are closely related to the number of mix batches produced, because for each batch the mixing, cleaning and cooling equipment must run for about the same amount of time.

The finished mix product is then pumped to the bottling area where plastic bags are filled, placed in crates and sent by conveyor to the cooler. Approximately $500,000 of the mix department labor costs, referred to as bottling costs, are related to filling the bags, placing the crates of mix in the cooler and loading them on the delivery trucks. Handling takes the same amount of time per crate regardless of the product involved. The remaining mix department labor cost is related to setting-up, mixing the ingredients and cleaning the equipment.

**The McDonald’s Order:**

HDP has an opportunity to bid on a contract to supply regular milk shake mix to all 30 McDonald's restaurants in the Cleveland area. Each restaurant will receive three deliveries per week. The contract is desirable because it is high volume, year-round business, and Mr. Smith is eager to win the contract. McDonald's has approached Mr. Smith and informed him that, because of its quality and service reputation, HDP will be awarded the contract if it will match a competing bid of $1.94 per gallon. Mr. Smith has asked you to prepare a cost analysis of the McDonald's offer.

HDP has just completed the installation of new equipment that will double its packaging capacity for mixes, the only constraint on the volume of mix produced. The McDonald's contract is expected to increase mix sales about 1,000,000 gallons per year. The increased volume will not increase the number of regular milk shake mix batches produced. The delivery manager estimates that the McDonald's order will require the purchase of three additional refrigerated delivery trucks at a cost of $150,000 each. They have useful lives of ten years. Additional trucks would only need to be operated during the three peak summer months (there is sufficient surplus space on trucks serving existing delivery routes to handle the McDonald's volume the rest of the year) with an incremental gas and maintenance cost of $2,000 per truck per summer month. Five additional summer drivers will also be needed at a cost of $3,500 per month per driver. The sales manager, who is pushing hard for the contract, argues that the McDonald's business is particularly good for HDP because it is much less seasonal than most of HDP's mix sales, and each store is a relatively high-volume customer.

**Instructions:**

Answer the following questions. Provide all necessary calculations to support your answers.

1) Why do you think that HDP selected pounds of butterfat as an allocation basis? Would you suggest a different allocation base?

2) Using cost estimates from the existing system presented in table 2, would you accept the McDonald's order? Why?

3) Perform a relevant cost analysis (i.e., determine the incremental cost per gallon) of the McDonald's order. What is the minimum price HDP can charge McDonald's and still increase net income by $.05 per gallon? Make any reasonable assumptions you deem necessary.

4) What is HDP's basic mix strategy? Is the McDonald's order consistent with HDP's strategy? Explain why or why not.

5. What are the consequences of the current allocation procedures? What suggestions, other than implementing activity-based costing (ABC), would you make to Mr. Smith about improving the product costing system used in determining target prices?

~~6. Without considering the impact on product costs of the McDonald's order, recalculate the cost of 10% and regular milk shake mix based on your answers to questions one and five above.~~

~~7. Select an ABC driver for each cost pool that applies to the mix business.~~

~~8. Based on the ABC drivers selected in question 7, compute the ABC per gallon cost of the McDonald's order.~~  DO NOT ATTEMPT QUESTIONS 6-8.

**Table 1**

**2008 Mix Product Information**

 **Percent Price Percent of Total Pounds of Annual**

 **Butterfat Per Mix Dollar Pounds Butterfat Batches**

 **Content Gallon Sales Sold Sold Produced**

**14% Ice Cream Mix** 14 $4.08 1 1,000,000 140,000 200

**12% Ice Cream Mix** 12 $3.74 6 5,000,000 600,000 300

**10% Ice Cream Mix** 10 $3.33 26 25,000,000 2,500,000 400

**Soft Serve Mix** 6 $2.68 43 50,000,000 3,000,000 400

**Regular Milk Shake Mix** 3.5 $2.17 21 30,000,000 1,050,000 400

**Low Fat Milk Shake Mix**  1 $1.80 3 5,000,000 50,000 300

**Totals 100 116,000,000 7,340,000 2,000**

Milk products weigh approximately ten pounds per gallon.

**Table 2**

**Cost Center Number Three 2008 Overhead Costs**

**Mix Department and Receiving, Pasteurization**

**And Separation Department**

 **Costs**

**Mix Department:**

 Depreciation $ 900,000

 Labor (all VC) 1,478,070

 Utilities and other 129,000

**Department Total** **$2,507,070**

**Receiving, Pasteurization and Separation:**

 Depreciation $ 421,000

 Labor (all VC) 672,550

 Utilities and other 18,000

**Department Total** **$1,111,550**

**Cost Center Three Total $3,618,620**

2008 butterfat pounds (from table 1) 7,340,000

2009 predetermined overhead rate per pound of butterfat $ 0.493

**Table 3**

 **Regular Milk Shake Mix and 10% Ice Cream Mix**

**April 2009 Cost Sheets**

 **Regular Milk Shake Mix 10% Ice Cream Mix**

 **Per Gallon** **Per Gallon**

**Direct Costs:**

 Butterfat (.35# @ .91) 0.319 (1# @ $.91) $0.910

 Skim (9.15# @ .12) 1.098 (8.5# @ $.12) 1.020

 Sugar 0.140 0.120

 Other Ingredients 0.020 0.020

 Packaging 0.030 0.030

 **Total Direct Costs $1.607** **$2.100**

Overhead:

 Factory Overhead**(a)** (.35# @$.493) 0.173 (1# @ $.493) 0.493

 Delivery(a) (.35# @$.26) 0.091 (1# @ $.26) 0.260

 Selling and Administrative**(a)** (.35# @$.04) 0.014 (1# @ $.04) 0.040

**Total Mix Cost** **$1.885** **$2.893**

Markup (15%) 0.283 .434

**Target Selling Price** **$2.168** **$3.327**

**(a):** Applied on the basis of butterfat content from table 2.