

Linear Programming

The Fahlendaundronk Brewery makes Dark beer (D), Lite Beer (L) and Green Beer (G). The 4 most limiting resources are Burned malt, Rice, Labor, and Kentucky Fescue. Each barrel of Dark Beer uses 20 pounds of burned malt, 2 pounds of rice, and two hrs. of labor. Each barrel of Lite beer uses 10 pounds of dark malt, 5 pounds of rice and two hrs. of labor. Green Beer uses 5 pounds of dark malt, 5 pounds of rice, five hrs. of labor and 50 pounds of Fescue. Dark beer gives profits of \$100 per barrel, Lite gives \$75 per barrel, and Green gives \$150 per barrel. There are 40,000 pounds of burned malt, 15,000 pounds of rice, 5,000 hours of labor and 10,000 pounds of Fescue available per month.

1) What is the optimal production plan and what would the profit be for that plan?

2) If you could sell your labor for \$4 per hour, How much are you sure it would be worthwhile to sell?

3) How much burned malt are you sure you should sell if the price were \$5?

4) Suppose you could buy more rice for \$6 per pound? How many pounds are you sure you should buy?

5) If everything else remained the same, how low could the profit on dark beer go before you would change to a different solution?

6) Suppose someone offered to buy your Fescue for 80 cents per pound. How many pounds are you sure you should sell?

Computer Printout--the model

	Dark	Lite	Green	RHS= Available
Unit Profit-->	100	75	150	
constraint				
Malt	20	10	5	<= 40,000
Rice	2	5	5	<= 15,000
Fescue			50	<= 10,000
Labor	2	2	5	<= 5,000

Computer Printout--Range of Optimality for Objective Function Coefficients

Variable	Value	Current Coefficient	Lower Limit	Upper Limit
Dark	1,900	100	93.75	150
Lite	100	75	50	77.78
Green	200	150	137.5	infinity

Objective Function Value = 227500

Computer Printout--Range of Validity for Shadow Prices

Constraint	RHS	Slack	Shadow Price	Lower Limit	Upper Limit
Malt	40,000	0	2.5	21,000	41,000
Rice	15,000	9,700	0	5,300	infinity
Fescue	10,000	0	0.25	0	11,111
Labor	5,000	0	25	4,900	7,425