



Farm-co is a agricultural corporation that wants to plan their farming operations for the next 10 years. Farm-co owns a farm consisting of 10 blocks of land. The size of each block of land can be found in the table below.

Block of land	size ( $\text{m}^2$ )
1	100
2	250
3	500
4	125
5	800
6	75
7	900
8	360
9	465
10	90

Farm-co can plant three different crop types in these blocks, namely grain, beans and wheat. The yield, sewing cost and selling price for each food type can be found in the table below.

crop	yield ( $\text{kg}/\text{m}^2$ )	Sewing cost ( $\text{£}/\text{m}^2$ )	Selling price $\text{£}/\text{kg}$
grain	3	15	4.5
beans	2	10	6
wheat	3.5	12	5

Alternately, Farm-co can also decide to purchase cattle to rear on their farm. A single cow takes up  $5\text{m}^2$  and is purchased as a calf for  $\text{£}200$  per calf. Farm-co can only purchase calf's and sell all of the cows at the end of the 10 year time period. The price for selling  $t$ -year old cow is provided in the table below.

Age of cow	Selling price ( $\text{£}/\text{cow}$ )
1	350
2	450
3	550
4	600
5	700
6	950
7	1100
8	1250
9	1400
10	1700

Additionally, in order to rear a cow, Farm-co requires 15kg of grain per cow. They can either use grain which was grown in the previous year or they can purchase grain at a price of £50 per kg. Furthermore, suppose that Farm-co does not want to use more than 50% of their land usage for any individual activity (eg rearing cattle).

**Exercise 1** *Model (10 marks)*

Write a linear optimisation model that maximises Farm-co's profits. Present your findings in a well organised consultancy report.

**Exercise 2** *Solve (10 marks)*

Write a Mosel file for this model and solve the problem with Xpress. Print your results in a suitable format.