Farm and Agribusiness Management Lecture 4

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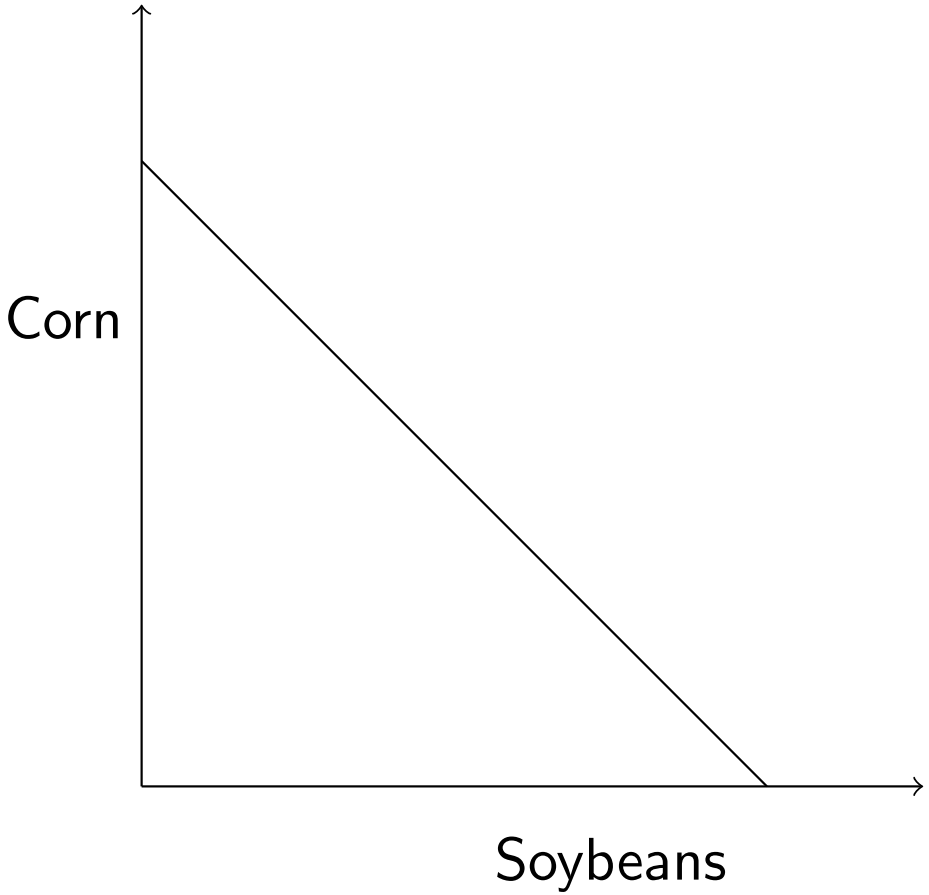
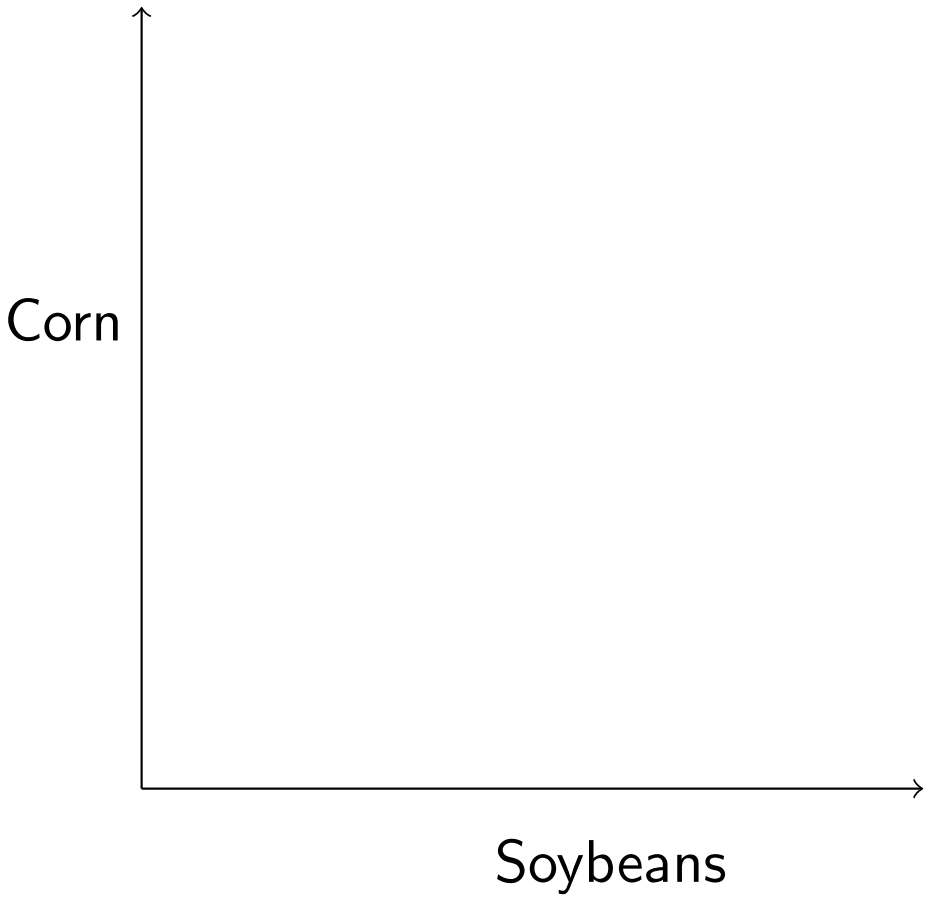
Output combinations - Production possibility curves




Corn
Soybeans

Substitution and profit ratios and farm planning decisions

$$\text{Output substitution ratio} = \frac{\text{quantity of output lost}}{\text{quantity of output gained}}$$

$$\text{Output profit ratio} = \frac{\text{profit of output gained}}{\text{profitof output lost}}$$

Decision rule

Output substitution ratio = output profit ratio

Note this is just a marginal benefits = marginal costs rule.

Cost concepts

Opportunity cost

1. The income that could have been earned by selling or renting the input to someone else, or
2. The additional income that would have been received if the input had been used in its most profitable alternative use.

Costs

1. Total fixed costs (TFC)
2. Average fixed costs (AFC)
3. Total variable costs (TVC)
4. Average variable costs (AVC)
5. Total cost (TC)
6. Average Total cost (ATC)
7. Marginal cost (MC)

Fixed costs

Depreciation

$$\text{Depreciation} = \frac{\text{purchase price - salvage value}}{\text{useful life}}$$

Average Asset Value

$$\text{Average Asset Value} = \frac{\text{purchase price} + \text{salvage value}}{2}$$

Interest

$$\text{Interest} = \text{current asset value} \times \text{interest rate}$$

Example

Purchase of a harvester

Purchase of a harvesting machine for $\$120,000$ with a salvage value of $\$50,000$ and a useful life of 5 years. Annual property taxes are estimated to be \$500 and the cost of capital is 8 percent.

Average Value =	$\frac{120{,}000+50{,}0000}{2} = 85{,}000$
Interest=	$85{,}000 \times 8\% = 6{,}800$
Depreciation =	$\frac{120{,}000-50{,}000}{5\text{years}} = 14{,}000$
Taxes =	400
Insurance =	500
Annual Total Fixed Cost	$\$21{,}700$

Average Fixed Costs

$$\text{Average Fixed Costs} = \frac{\text{Total Fixed Costs}}{\text{Output}}$$

Repairs and Maintenance

Are these fixed costs or not?

1. Preventative maintenance
2. Corrective maintenance

Former is fixed, latter is variable (depends on output).

Variable costs

$$\text{Average Variable Costs} = \frac{\text{Total Variable Costs}}{\text{Output}}$$

Note variable costs always depend on output fixed costs don't

Total costs

$$TC = TFC + TVC$$

$$\text{Average Total Costs} = \frac{\text{Total cost}}{\text{Output}}$$

Marginal costs

$$MC = \frac{\Delta \text{TC}}{\Delta \text{Output}} \text{ or } \text{MC} = \frac{\Delta \text{TVC}}{\Delta \text{Output}}$$

Stocking rate example

			Total costs			Average costs			Marginal costs		
No. of steers	Output	MPP	TFC	TVC	TC	AFC	AVC	ATC	MC	MR	Total profit
0	0		10,000	0	10,000	-	-	-			(10,000)
		7.5							132	< 175	
10	75		10,000	9,900	19,900	133.33	132.00	265.33			(6,775)
		7.5							132.00	<175.00	
20	150		10,000	19,800	29,800	66.67	132.00	198.67			(3,550)
		7.5							132.00	< 175.00	
30	225		10,000	29,700	39,700	44.44	132.00	176.44			(325)
		7							141.43	< 175.00	
40	295		10,000	39,600	49,600	33.90	134.24	168.14			2,025
		6.5							152.31	< 175.00	
50	360		10,000	49,500	59,500	27.78	137.50	165.28			3,500
		6							165.00	< 175.00	
60	420	10,000	59,400	69,400	23.81	141.43	165.24			4,100	
		5.5							180.00	> 175.00	
70	475		10,000	69,300	79,300	21.05	145.89	166.95			3,825
		4.5							220.00	> 175.00	