

Econ 301  
Deiter  
W IC #3 (10 pts)  
F09

Name Key  
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In an article by Moschini and Meilke published in the American Journal of Agricultural Economics, the demand for processed pork in Canada is approximately given by the following equation:

- $Q = 171 - 20p + 20p_b + 3p_c + 2Y$  where
- $Q$  = million kg of pork demanded per year
- $p$  = price of pork (\$/kg)
- $p_b$  = price of beef (\$/kg)
- $p_c$  = price of chicken (\$/kg)
- $Y$  = per capita consumer income (\$ 000)

1. During the period studied,  $p_b = 4$ ,  $p_c = 3 \frac{1}{3}$ , and  $Y = 12.5$ . Given these values,

a) rewrite the demand for pork equation as a function of only the price of pork and

$$Q = 171 - 20p + 20(4) + 3(3\frac{1}{3}) + 2(12.5)$$
$$\Rightarrow Q = 171 - 20p + 80 + 10 + 25$$
$$\Rightarrow Q = 286 - 20p$$

b) derive the 'inverse' demand equation (i.e. solve for  $P$  as a function of  $Q$ ).

$$Q = 286 - 20P$$
$$\Rightarrow 20P = 286 - Q$$
$$\Rightarrow P = 14.3 - .05Q$$

2. Moschini and Meilke also estimated the supply of processed pork to be  $Q = 178 + 40p - 60p_h$ .

a) Mathematically, derive the Canadian market equilibrium quantity and corresponding equilibrium price for processed pork if  $p_h$  (price of hogs) = 1.50,

$$Q_s = 178 + 40p - 60p_h$$
$$= 178 + 40p - 60(1.50)$$
$$= 88 + 40p \quad (\Rightarrow P = -2.2 + .025Q)$$

Equil  $\Rightarrow Q_d = Q_s \Rightarrow 286 - 20p = 88 + 40p$

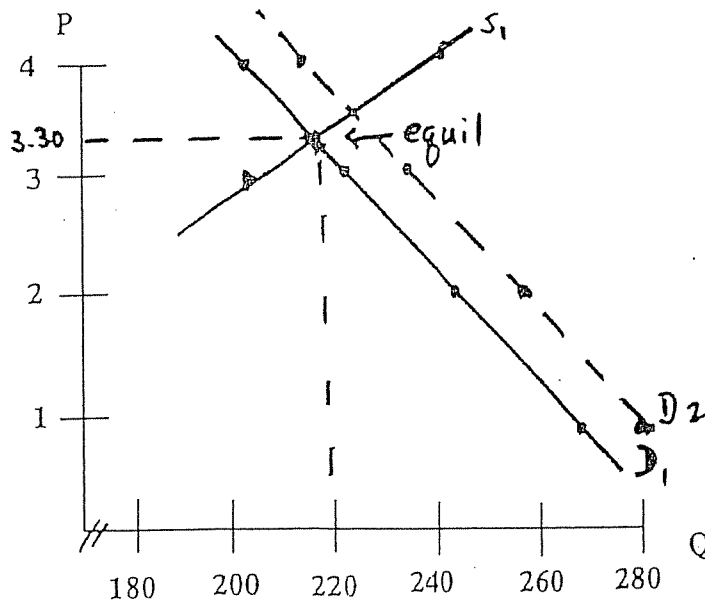
$$\Rightarrow 60p = 198 \Rightarrow P = 3.30$$
$$\Rightarrow Q = 286 - 20(3.30) = 210$$

b) circle the following term that best describes the relationship between "hogs" and "processed pork": substitute products, complementary products, input and output or joint inputs.

3. Using your demand and supply equations above, complete the following table:

P(\$)	Q <sub>d</sub>	Q <sub>s</sub>
4	206	248
3	226	208
2	246	168
1	266	128

4. Plot the price and quantity combinations (from Q. #3) and connect to draw the demand curve and label D<sub>1</sub> (based on equation in Q. #1) and the supply curve and label S<sub>1</sub> (see Q. #2) in the graph below. Label the equilibrium point (see Q. #2).



5. What is the dollar value of consumer surplus at the equilibrium price?

$$\begin{aligned}
 &= \frac{1}{2} Q (a - P) \\
 &= \frac{1}{2} (220) (14.30 - 3.30) \\
 &= \underline{\underline{\$1.21 \text{ billion}}}
 \end{aligned}$$

6. Assume that the price of beef increases to \$4.60 (an increase of .60¢ from Q. #1. Derive the new demand curve equation (P as a function of Q).

$$Q = 171 - 20P + 20(4.60) + 3(3\frac{1}{3}) + 2(12.5)$$

$$\Rightarrow Q = 298 - 20P$$

$$\Rightarrow P = 14.9 - .05Q$$

7. Draw the new demand curve (see Q. #6) and label as  $D_2$  in the graph to Q. #4. Describe the D curve change and using the concept of "substitute a product" explain the reason for the change.

P	Q
4	218
3	238
2	258
1	278

The demand curve for pork has shifted to the right (increased) due to an increase in the price of a substitute product (beef).

8. Calculate the new market equilibrium Q and P based on the change in  $P_b$  (see Q. #6).

$$\Rightarrow \text{new } Q_d = Q_s$$

$$\Rightarrow 298 - 20P = 88 + 40P$$

$$\Rightarrow 60P = 210$$

$$\Rightarrow P = 3.50$$

$$\Rightarrow \text{new } Q = 298 - 20(3.50) = 228$$

9. Suppose the price of hogs increases .25¢ to \$1.75 (from \$1.50 in Q. #2). Explain the likely economic impacts of this change on  $D_1$  and  $S_1$ .

No shift in  $D_1$  as  $P_h$  is not a D curve shifter.

S would shift to the left (parallel), due to ↑ price of an input

$$\text{New } Q_s = 178 + 40P - 60P_h = 178 + 40P - 60(1.75) = 73 + 40P$$

$$\Rightarrow P = -1.825 + .025Q$$

10. Indicate whether you agree or disagree with this statement and why. The increase in  $P_h$  of .25¢ in Q. #9 should not have any impact on consumers of processed pork because it does not change the demand curve for processed pork.

Disagree. ↑  $P_h$  does Not shift D curve

But it does shift S curve to left

which  $\Rightarrow$  ↑ equal P (to 3.55 from 3.30) which does

impact consumers