Seminar 13

Relations factor-factor and product-product

Exercises

13.1. Relations F-F

1. Derive an isoquant function from the following two-factor production function:

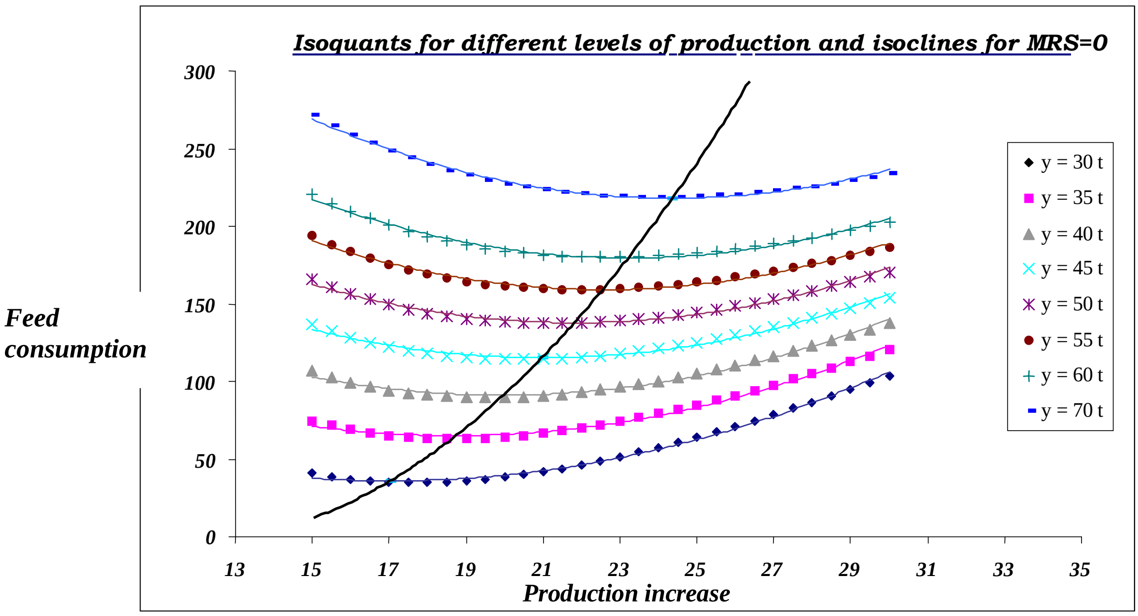
$$y = a + b_1 x_1 + b_2 x_2 - b_3 x_1^2 - b_4 x_2^2 + b_5 x_1 x_2$$

2. Following isoquant function was derived from two-factor production function estimated in seminar 12 (influence of feed consumption and weight on production):

$$x_2 = -10810{,}8 + 4{,}275x_1 + 0{,}004y - 0{,}000129x_1^2 + 8{,}734 \times 10e^{-6}x_1 y + 1{,}224 \times 10e^{-7}y^2$$

Calculate feed consumption required to reach production 50 t if average weight of each of 600 piglets is 28,5 kg.

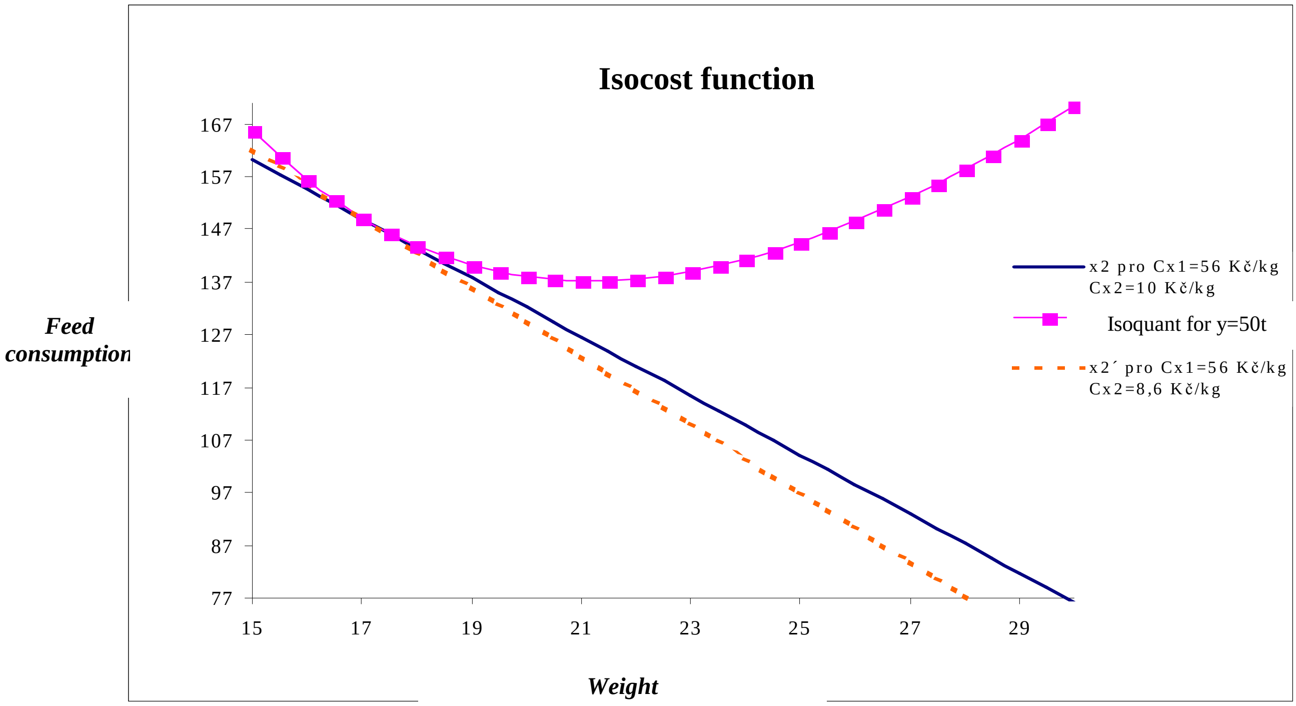
3. Make comments of following graph which includes isoquant functions for the relationship specified above.



4. Derive an isocline function for *MRS=0*, in case that weight (x_2) is influenced by feed consumption (x_1).

5. Calculate an optimal combination of factors x_1 and x_2 to reach production 30 t, in case of costs minimization if $Px_1 = 10$ *CZK/kg* and $Px_2 = 56$ *CZK/kg*.

6. Derive an isocost function based on optimal factors combination and calculate total costs. Then, explain the firm reaction on change of Px_2 to level 48 CZK/kg for the same criterion optimality (specified above), which means no change of factors amount.



13.2. Relations P – P

1. Following production functions describe relationship between costs and production for three different products:

$$y_1 = -8\,(x - 2{,}5)^2 + 50$$
$$y_2 = -7{,}2\,(x - 2{,}5)^2 + 45$$
$$y_3 = 3\,(x + 0{,}5)^2 – 0{,}75$$

costs/ha in thousand CZK	x	0,5	1,0	1,5	2,0	2,5	3,0	3,5
Production in q/ha	y_1	18,00	32,00	42,00	48,00	50,00	48,00	42,00
	y_2	16,20	28,80	37,80	43,20	45,00	43,20	37,80
	y_3	2,25	6,00	11,25	18,00	26,25	36,00	47,25

Calculate optimal combination of products y_1 and y_2 if total costs per 1 ha are 2,6 thousand CZK. Prices of products are following: Py_1 = 150 CZK/q, Py_2 = 140 CZK/q and Py_3 = 390 CZK/q.

2. Calculate MRPS, if y_1 = 9,5; 39,57 and 45,5. Then, according to calculated values describe the relationship among products.

3. Calculate marginal productions, set prices of products and calculate optimal costs allocation among all products.

4. Calculate cost profitability for each product.