

Production and Cost in the Long Run

Production with 1 tractor wagon combination

x_1	x_2	y TPP	Average			TFC	TVC	TC	AFC	AVC	ATC	Average	
			APP 1	MPP 1	MPP 1							MC	MC
0.0	1.0	0.0			0.00	20.0	0.00	20.00					
1.0	1.0	38.0	38.00	38.00	74.00	20.0	6.00	26.00	0.526	0.158	0.684	0.158	0.081
2.0	1.0	144.0	72.00	106.00	136.00	20.0	12.00	32.00	0.139	0.083	0.222	0.057	0.044
3.0	1.0	306.0	102.00	162.00	186.00	20.0	18.00	38.00	0.065	0.059	0.124	0.037	0.032
4.0	1.0	512.0	128.00	206.00	224.00	20.0	24.00	44.00	0.039	0.047	0.086	0.029	0.027
5.0	1.0	750.0	150.00	238.00	250.00	20.0	30.00	50.00	0.027	0.040	0.067	0.025	0.024
6.0	1.0	1008.0	168.00	258.00	264.00	20.0	36.00	56.00	0.020	0.036	0.056	0.023	0.023
7.0	1.0	1274.0	182.00	266.00	266.00	20.0	42.00	62.00	0.016	0.033	0.049	0.023	0.023
8.0	1.0	1536.0	192.00	262.00	256.00	20.0	48.00	68.00	0.013	0.031	0.044	0.023	0.023
9.0	1.0	1782.0	198.00	246.00	234.00	20.0	54.00	74.00	0.011	0.030	0.042	0.024	0.026
10.0	1.0	2000.0	200.00	218.00	200.00	20.0	60.00	80.00	0.010	0.030	0.040	0.028	0.030
11.0	1.0	2178.0	198.00	178.00	154.00	20.0	66.00	86.00	0.009	0.030	0.039	0.034	0.039
12.0	1.0	2304.0	192.00	126.00	96.00	20.0	72.00	92.00	0.009	0.031	0.040	0.048	0.063
13.0	1.0	2366.0	182.00	62.00	26.00	20.0	78.00	98.00	0.008	0.033	0.041	0.097	0.231
14.0	1.0	2352.0	168.00	-14.00	-56.00	20.0	84.00	104.00	0.009	0.036	0.044		

Production with 2 tractor wagon combinations

x_1	x_2	y	Average			TFC	TVC	TC	AFC	AVC	ATC	Average	
			APP 1	MPP 1	MPP 1							MC	MC
0.0	2.0	33.0			200.00	40.0	0.00	40.00					
1.0	2.0	271.0	271.00	238.00	274.00	40.0	6.00	46.00	0.148	0.022	0.170	0.025	0.022
2.0	2.0	577.0	288.50	306.00	336.00	40.0	12.00	52.00	0.069	0.021	0.090	0.020	0.018
3.0	2.0	939.0	313.00	362.00	386.00	40.0	18.00	58.00	0.043	0.019	0.062	0.017	0.016
4.0	2.0	1345.0	336.25	406.00	424.00	40.0	24.00	64.00	0.030	0.018	0.048	0.015	0.014
5.0	2.0	1783.0	356.60	438.00	450.00	40.0	30.00	70.00	0.022	0.017	0.039	0.014	0.013
6.0	2.0	2241.0	373.50	458.00	464.00	40.0	36.00	76.00	0.018	0.016	0.034	0.013	0.013
7.0	2.0	2707.0	386.71	466.00	466.00	40.0	42.00	82.00	0.015	0.016	0.030	0.013	0.013
8.0	2.0	3169.0	396.13	462.00	456.00	40.0	48.00	88.00	0.013	0.015	0.028	0.013	0.013
9.0	2.0	3615.0	401.67	446.00	434.00	40.0	54.00	94.00	0.011	0.015	0.026	0.013	0.014
10.0	2.0	4033.0	403.30	418.00	400.00	40.0	60.00	100.00	0.010	0.015	0.025	0.014	0.015
11.0	2.0	4411.0	401.00	378.00	354.00	40.0	66.00	106.00	0.009	0.015	0.024	0.016	0.017
12.0	2.0	4737.0	394.75	326.00	296.00	40.0	72.00	112.00	0.008	0.015	0.024	0.018	0.020
14.0	2.0	5185.0	370.36	224.00	144.00	40.0	84.00	124.00	0.008	0.016	0.024	0.027	0.042
16.0	2.0	5281.0	330.06	48.00	-56.00	40.0	96.00	136.00	0.008	0.018	0.026		
18.0	2.0	4929.0	273.83	-176.00	-304.00	40.0	108.00	148.00	0.008	0.022	0.030		

Alternative ways to produce 2,000 bales of hauled hay

Workers	Tractor-Wagons	Total Cost	Average Cost
10	1	80	0.04
6.45	1.66	71.94	.03597
5.48	2	72.8658	0.0364
3.667	3	82.0015	0.041
2.636	4	95.8167	0.0479
1.9786	5	111.872	.0559

Optimal input combinations, total costs and average costs for alternative levels of output (bales of hay) in the long run and for alternative levels of fixed inputs (tractors-wagons)

Output	Workers	Tractor-Wagons	Cost	LAC	AC - 1000	AC - 5000	AC - 50000
500	3.7	1.07	43.62	0.0872333	0.08809		
1,000	4.91	1.27	54.89	0.05488	0.05488		
1,500	5.777	1.47	63.99	0.0426627	0.04296		
2,000	6.45	1.66	71.94	0.0359713	0.03893	0.03929	
2,500	7.034	1.85	79.14	0.03165		0.03351	
3,000	7.544	2.03	85.783	0.02859		0.02959	
3,500	8	2.2	92.01	0.02629		0.02678	
4,000	8.416	2.37	97.901	0.02448		0.02467	
4,500	8.799	2.54	103.513	0.023003		0.02305	
5,000	9.155	2.7	103.891	0.0217783		0.021778	
6,000	9.8026	3.01239	119.163	0.0198439		0.020018	
7,000	10.383	3.315	128.608	0.01837		0.019202	
10,000	11.853	4.17	154.543	0.0154543			0.027668
20,000	15.303	6.67	225.129	0.0112564			0.0149885
30,000	17.77	8.85	283.595	0.00945317			0.0107744
40,000	19.7795	10.8502	335.68	0.00839201			0.00872874
50,000	21.509	12.73	383.708	0.00767416			0.00767416
52,500	21.9099	13.1889	395.238	0.00752835			0.00757569
75,000	25.1297	17.11	493.003	0.00657			

Optimal input combinations, total costs and average costs for alternative levels of output (bales of hay) in the long run

Output	Workers	Tractor-Wagons	Cost	Average Cost
500	3.70	1.07	43.62	0.087
1,000	4.91	1.27	54.89	0.055
1,500	5.78	1.47	63.99	0.043
2,000	6.45	1.66	71.94	0.03597
2,500	7.03	1.85	79.14	0.03165
3,000	7.54	2.03	85.78	0.02859
3,500	8.00	2.20	92.01	0.02629
4,000	8.42	2.37	97.90	0.02448
4,500	8.80	2.54	103.51	0.023003
5,000	9.16	2.70	108.89	0.0217781
6,000	9.80	3.01	119.16	0.0198439
7,000	10.38	3.32	128.61	.01837
10,000	11.85	4.17	154.54	0.0154543
20,000	15.30	6.67	225.13	0.0112564
30,000	17.77	8.85	283.60	0.00945317
50,000	21.51	12.73	383.71	0.00767416
75,000	25.13	17.11	493.00	0.00657338
100,000	28.18	21.22	593.50	0.00593498
150,000	33.48	29.17	784.20	0.00522799
200,000	38.41	37.36	977.58	0.00488791
240,000	42.54	44.70	1149.36	0.00478899
243,500	42.93	45.41	1165.87	0.00478798
244,000	42.99	45.52	1168.26	0.00478795
244,500	43.04	45.62	1170.65	0.00478795
245,000	43.10	45.72	1173.06	0.00478798
246,000	43.21	45.93	1177.88	0.00478814
250,000	43.67	46.77	1197.51	0.00479003
275,000	46.86	52.80	1337.08	0.00486212
290,000	49.39	57.69	1450.07	0.00500025
300,000	52.13	63.14	1575.65	0.00525218
301,000	52.64	64.17	1599.25	0.00531311

