



FEEDER CATTLE: Determining Optimal Selling Time



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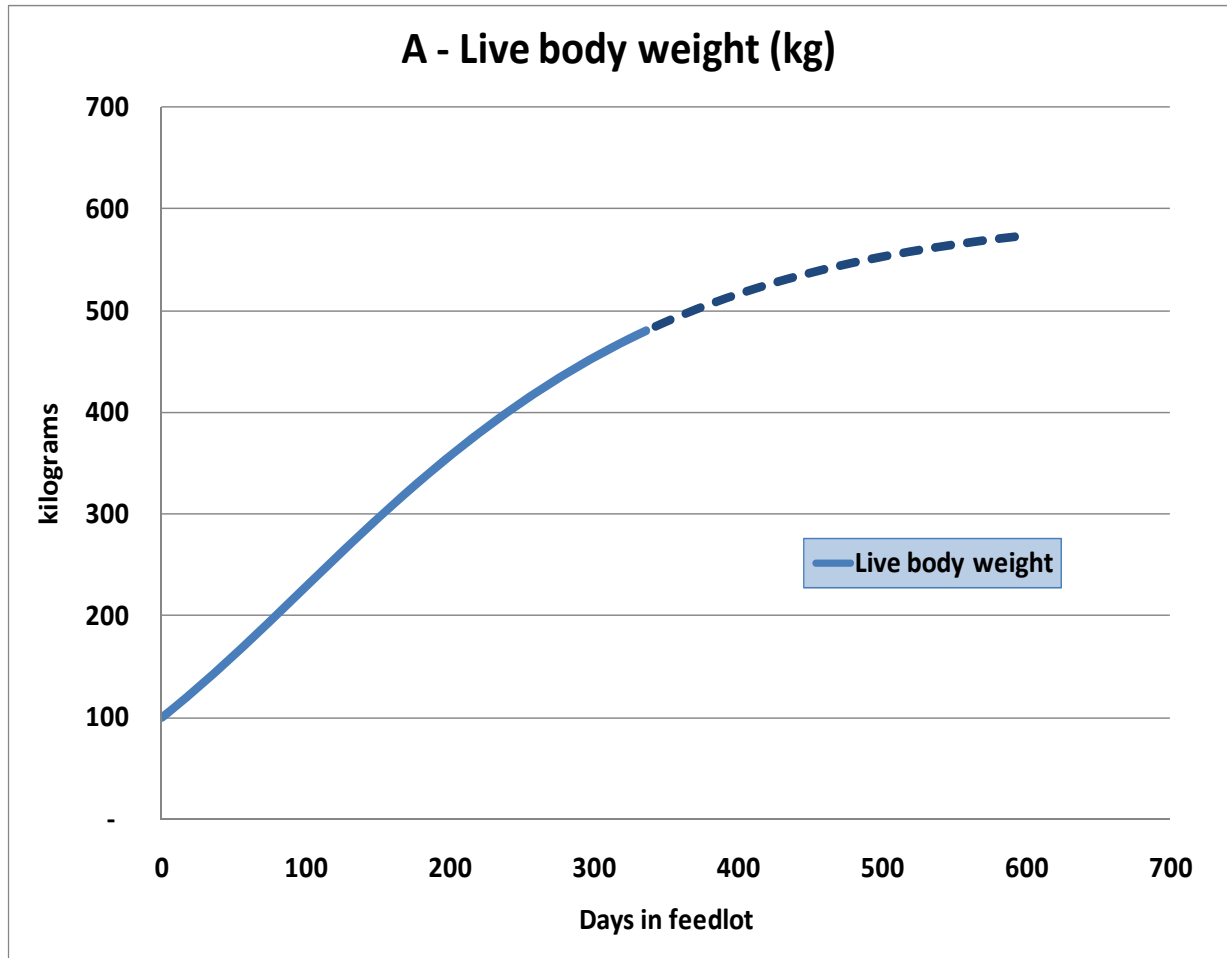
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Introduction

Feeder cattle operations involve raising livestock for meat and commercial resale. One of the critical business decisions that managers of feeder cattle enterprises must make is when to send feeder cattle to the abattoir. This paper explains the basic procedure needed to make such a decision, based on the observed growth performance and feed consumption of feeder cattle in a lot.

One of the key decisions a feedlot operator must make is when to sell feeder cattle in each corral. Maintaining good health, ensuring adequate nutrition, and providing a proper environment are essential factors for a successful feedlot operation, but equally important are management decisions regarding costs and benefits of feeding animals. Animals can be healthy and strong and gaining weight every day but feeding costs are continuously and imperceptibly increasing and beyond a certain point the feed cost can exceed the value of weight gained. “Too much of a good thing” can lose money.

We do not know when is the optimal time to send feeder cattle to market under Iraqi conditions because we do not know growth performance of locally available cattle, or the cost and composition of the ration. This is a decision that each feedlot operator makes based on the actual growth performance and observed feed consumption in each corral, and the decision can be different for different lots of animals and at different times. Here we try to provide the basic principles to use in making the decision of when to sell.



The blue line in this graph shows the increase in live body weight while feeder cattle are on feed. In the initial period, the growth curve appears as a straight line but gradually shows diminishing rates of gain, as animals approach adult weight. Feeder cattle should be sold before the point where daily weight gain becomes negligible.

Growth performance assumptions for feeder cattle

	100	Weight, initial, kilograms
	600	Weight, adult, kilograms
	400	Weight, target at sale time, kilograms
	240	Days in feedlot to sell at target weight
\$	5.00	Price per kilogram live body weight, dollars
\$	0.35	Price per kilogram of feed, per kg dry matter
	3.0%	Daily dry matter feed intake, percent of body weight
\$	50.00	Initial cost to start a new corral, dollars per head
	14	Days needed to prepare a corral for a new batch

We use a numerical example to illustrate the problem of deciding when it is time to sell cattle in a feedlot. We make here certain assumptions about the expected growth performance of feeder cattle in Iraq. We start with male calves of six to eight months of age, weighing 100 kilograms, and expect that properly fed the same animals will reach 400 kilograms of weight in eight months (240 days) in the feedlot. We also expect that if they were fed to adult weight these animals could reach a maximum weight of 600 kilograms.

The expected sale price is \$5.00 per kilogram of live weight, equivalent to about \$10 per kilogram of beef. The feed ration, a combination of dry alfalfa and barley or other feed grain will cost \$350 per ton of dry matter, or \$0.35 per kilogram. We assume that feeder cattle consume 3 percent of their body weight in dry matter feed equivalent every day.

Finally, we assume that it costs \$50 to process a new animal entering the feedlot in transport, marking, and vaccinations. And, it requires two weeks after selling to prepare a corral for a new batch of feeder cattle.

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A	B	C	D	E	F	G	H	I	J	K
DAYS	Live body weight	Last-weeks' daily gain	Overall average daily gain	Value of Last-week's daily gain	Value of overall average daily gain	Last week feed consumed per day, kg	Value of last-week's daily feed consumed	Net daily value gain last week	Cumulative net value gained	Average daily profit
0	100									
7	108	1.13	1.13	5.64	5.64	3.24	1.13	4.51	32	(0.88)
14	116	1.16	1.15	5.82	5.73	3.48	1.22	4.60	64	0.49
21	124	1.20	1.16	5.98	5.81	3.73	1.31	4.68	96	1.33
28	133	1.23	1.18	6.13	5.89	3.99	1.40	4.74	130	1.90
35	142	1.25	1.19	6.27	5.97	4.25	1.49	4.78	163	2.31
42	151	1.28	1.21	6.39	6.04	4.52	1.58	4.81	197	2.62
49	160	1.30	1.22	6.50	6.10	4.79	1.68	4.82	230	2.86
56	169	1.32	1.23	6.59	6.16	5.07	1.77	4.81	264	3.06
63	178	1.33	1.24	6.66	6.22	5.35	1.87	4.79	298	3.22
70	188	1.35	1.25	6.73	6.27	5.63	1.97	4.75	331	3.35
77	197	1.35	1.26	6.77	6.32	5.92	2.07	4.70	364	3.45
84	207	1.36	1.27	6.81	6.36	6.20	2.17	4.64	396	3.53
91	216	1.37	1.28	6.83	6.39	6.49	2.27	4.55	428	3.60
98	226	1.37	1.28	6.83	6.42	6.78	2.37	4.46	459	3.66
105	235	1.37	1.29	6.83	6.45	7.06	2.47	4.35	490	3.70
112	245	1.36	1.29	6.81	6.47	7.35	2.57	4.23	520	3.73
119	254	1.36	1.30	6.78	6.49	7.63	2.67	4.10	548	3.75
126	264	1.35	1.30	6.73	6.50	7.92	2.77	3.96	576	3.76
133	273	1.34	1.30	6.68	6.51	8.20	2.87	3.81	603	3.76
140	283	1.32	1.30	6.62	6.52	8.48	2.97	3.65	628	3.76
147	292	1.31	1.30	6.55	6.52	8.75	3.06	3.49	653	3.74
154	301	1.29	1.30	6.47	6.52	9.02	3.16	3.31	676	3.73
161	310	1.28	1.30	6.39	6.51	9.29	3.25	3.13	698	3.70
168	319	1.26	1.30	6.29	6.50	9.56	3.34	2.95	718	3.67
175	327	1.24	1.30	6.19	6.49	9.82	3.44	2.76	738	3.64
182	336	1.22	1.30	6.09	6.48	10.07	3.53	2.56	756	3.60
189	344	1.20	1.29	5.98	6.46	10.32	3.61	2.37	772	3.56
196	352	1.17	1.29	5.87	6.44	10.57	3.70	2.17	787	3.51
203	360	1.15	1.28	5.75	6.41	10.81	3.78	1.96	801	3.46
210	368	1.13	1.28	5.63	6.39	11.05	3.87	1.76	814	3.41
217	376	1.10	1.27	5.50	6.36	11.28	3.95	1.56	824	3.35
224	383	1.08	1.27	5.38	6.33	11.50	4.03	1.35	834	3.29
231	391	1.05	1.26	5.25	6.29	11.72	4.10	1.15	842	3.23
238	398	1.02	1.25	5.12	6.26	11.94	4.18	0.94	849	3.17
245	405	1.00	1.24	4.99	6.22	12.15	4.25	0.74	854	3.10
252	412	0.97	1.24	4.86	6.19	12.35	4.32	0.54	857	3.04
259	418	0.95	1.23	4.73	6.15	12.55	4.39	0.34	860	2.97
266	425	0.92	1.22	4.60	6.11	12.75	4.46	0.14	861	2.90
273	431	0.90	1.21	4.48	6.06	12.93	4.53	(0.05)	860	2.82
280	437	0.87	1.20	4.35	6.02	13.12	4.59	(0.24)	859	2.75
287	443	0.84	1.20	4.22	5.98	13.29	4.65	(0.43)	856	2.68
294	449	0.82	1.19	4.10	5.93	13.47	4.71	(0.62)	851	2.60
301	454	0.79	1.18	3.97	5.89	13.63	4.77	(0.80)	846	2.53
308	460	0.77	1.17	3.85	5.84	13.79	4.83	(0.98)	839	2.45
315	465	0.75	1.16	3.73	5.79	13.95	4.88	(1.15)	831	2.37
322	470	0.72	1.15	3.61	5.75	14.10	4.94	(1.33)	822	2.30
329	475	0.70	1.14	3.49	5.70	14.25	4.99	(1.49)	811	2.22
336	480	0.68	1.13	3.38	5.65	14.39	5.04	(1.66)	800	2.14
343	484	0.65	1.12	3.27	5.60	14.53	5.08	(1.82)	787	2.06
350	489	0.63	1.11	3.16	5.55	14.66	5.13	(1.97)	773	1.99
357	493	0.61	1.10	3.05	5.50	14.79	5.18	(2.12)	758	1.91
364	497	0.59	1.09	2.95	5.45	14.91	5.22	(2.27)	742	1.83
371	501	0.57	1.08	2.84	5.41	15.03	5.26	(2.42)	725	1.75

Every feeder animal will be identified with a tag and every week all animals in a corral will be weighed, keeping track of the weight of individual animals. The above table shows the hypothetical case of feeder cattle in a corral. Columns A and B show the expected body weight every week for a period of one year after arrival in the feedlot, starting with 100 kg, and every seven days thereafter. Column C gives the daily gain during the last week, that is to say the difference between this week's and last week's weights divided by seven days. Column D is the average daily gain since the beginning, i.e., the weight gained from day one divided by the number of days on feed.

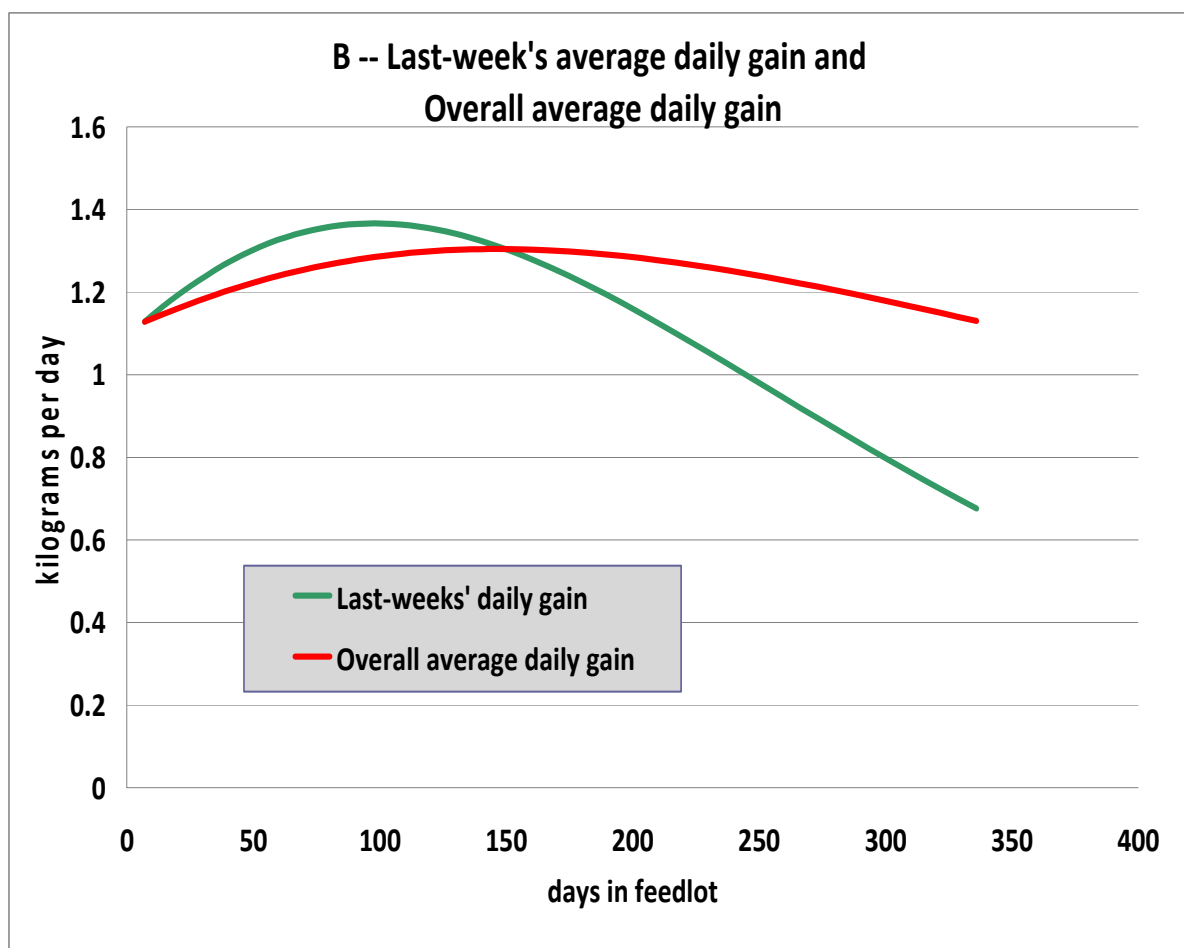
Columns E and F show the dollar value of columns C and D, respectively multiplied by the price per kilogram of body weight. For example, after 105 days in the feedlot, the weight was 235 kilograms compared with 226 kg the week before, for an average daily gain of 1.37 kg last week, and an average daily gain of 1.29 kg during the 105 days in the feedlot. The value of the average daily weight gained last week is \$6.83. The value of the average daily gain over the entire feedlot stay is \$6.45.

Feed consumption in the last week is estimated at 7.06 kilograms of dry matter (3 percent of body weight) shown in Column G, which is valued at \$2.47 per day at a cost of \$0.35 per kilogram; this is shown in column H.

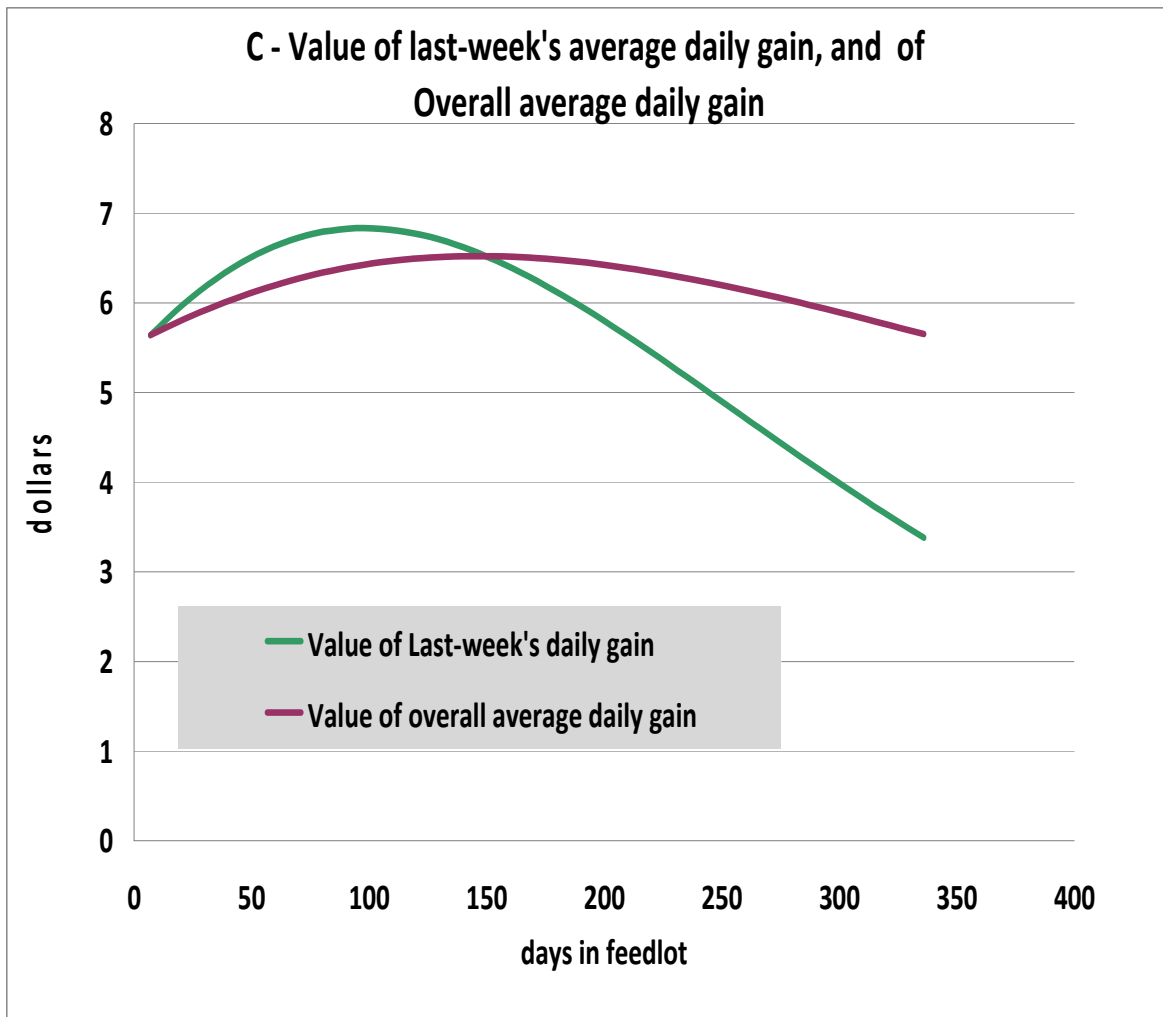
Column I, shaded yellow, shows the net daily gain in value over the previous week (the difference between the values of the daily gain last week minus the cost of the daily feed consumption last week). On day 105 the animal yielded a net gain of \$4.35 per day, the difference between \$6.83 the value of weight gained, less the cost of feed \$2.47. Column I is Column E minus Column H.

Notice how quickly the values in column I change over time. At first the values increase slightly, but then begin a rapid descent from near \$5 per day to less than \$3 per day in a few weeks. This is because

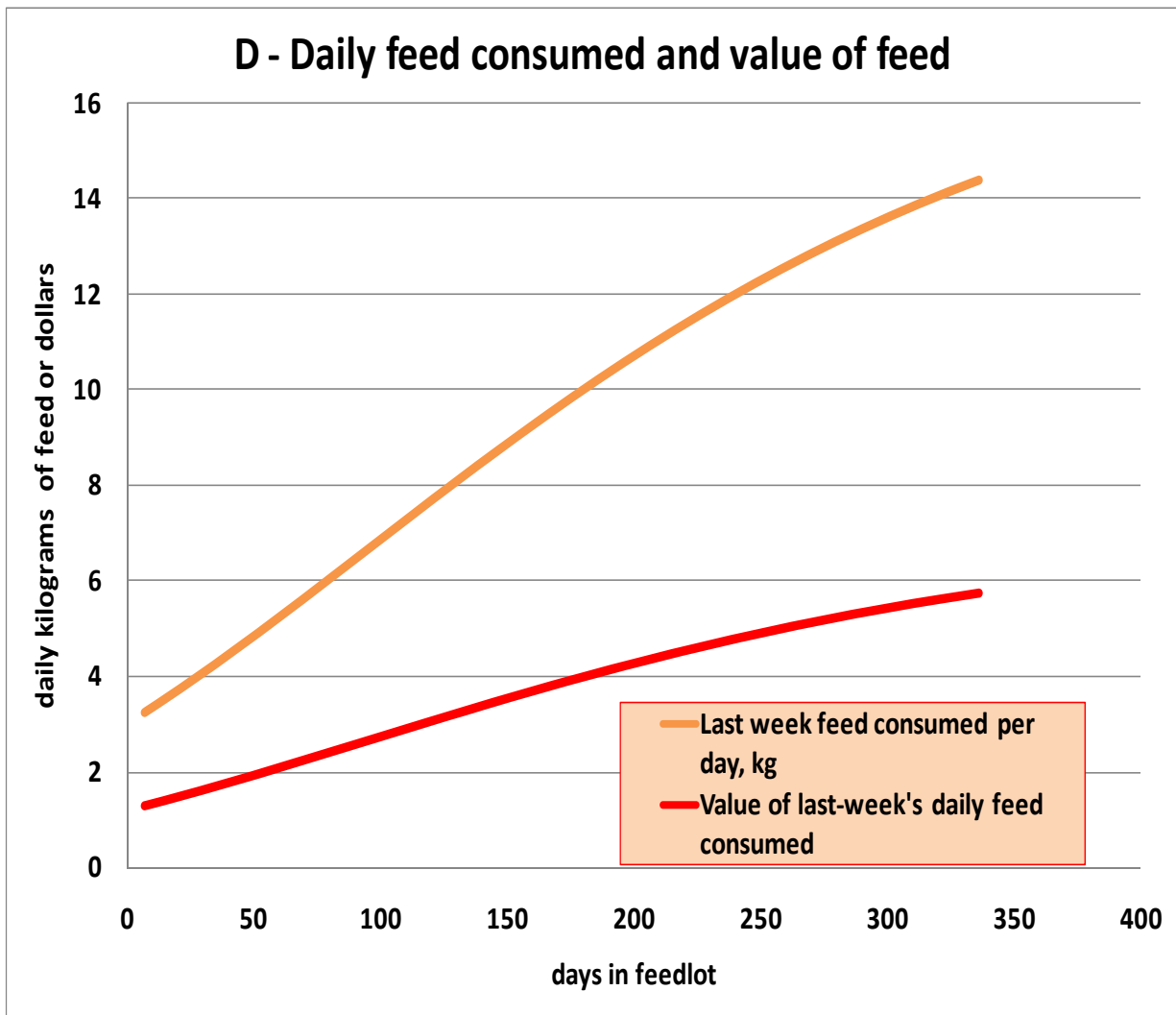
the cost of feed increases rapidly as the animal gets bigger, while daily gain gradually diminishes. After nine months (270 days) the value in column I become negative, indicating that the cost of feed exceeds the value of daily gain.



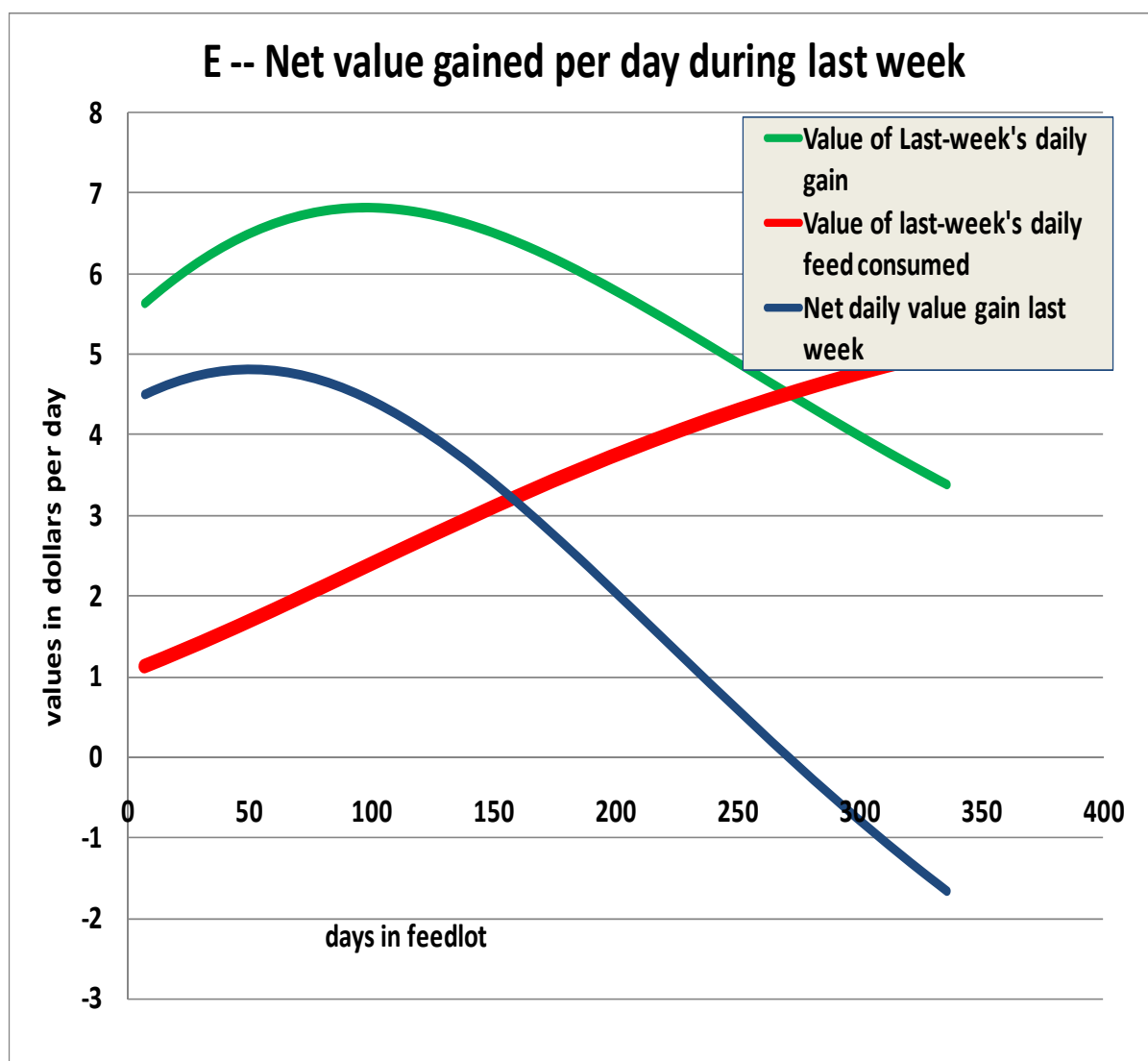
This chart show Columns C and D in the tables, namely the average daily gain in the previous week, and the average daily gain over the stay in the feedlot. Note how much faster the green curve for last week daily gain drops while the brown line for the average daily gain over the entire feedlot stay remains rather stable. For this reason, the last week's daily gain is far more important for decision making than the average daily gain over longer periods.



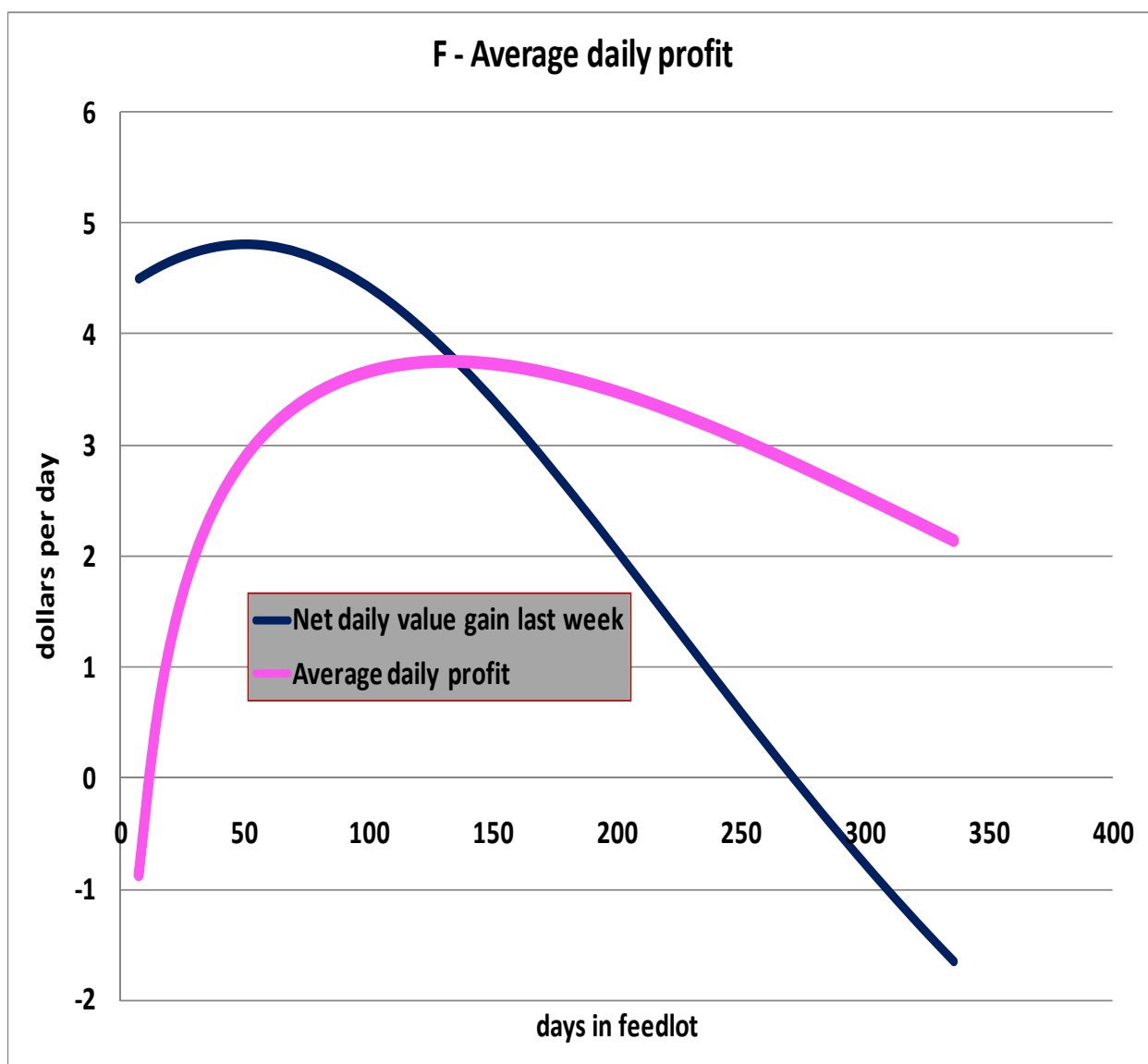
These curves track the same weight gains as the previous chart, but in dollars instead of in kilograms. The value of last week's daily gain drops from nearly \$7 per day at about 100 days to less than \$4 per day after 10 months. The value of the average daily gain over the duration of feedlot stay remains over \$6 per day throughout almost the entire period.



Feed consumption increases in the same proportion as body weight. This chart tracks dry matter feed intake as feeder cattle grow starting with over 3 kg when the daily animals weigh 100 kilograms to over 12 kilogram of feed after 240 days in the feedlot, when they weigh over 400 kg. The value of that feed, at \$0.35 per kilogram of dry matter, is shown by the red line. The values correspond to columns G and H in the table.



This chart summarizes the evolution of daily margins over feed costs. The green line is the value of the daily weight gain in the last week and the red line is the value of the average daily feed intake in the last week. The difference between the two is the net margin over feed costs, or the value of the average net daily gain over the last week, and is shown by the blue line. Note that when the green and red lines intersect the blue line equals zero, because at that point the value of the daily gain and the daily feed cost over the last week are the same, i.e., the net margin is zero. This point is reached at about 270 days (nine months) after the animals enter the feedlot (for this particular hypothetical numerical example).



We don't really want to wait until the net margin over feed costs is zero because we can start a new batch of feeder cattle in the same corral and make higher daily margins.

The purple line shows how daily profit evolve over the duration of the stay of a group of animals in a corral, taking into account that it costs \$50 per head to process a new batch of feeder calves, and two weeks to prepare the corral for a new batch. In this example the maximum average profit per day in a corral is reached at about 150 days, at about \$3.75 net margin per day per animal. Beyond that

point the daily average profit begins to decline and it is time to sell. From this numerical example it seems that the most profitable time to sell this batch of cattle is between 150 and 200 days. Again, this is a hypothetical example based on assumptions about the growth and feeding performance of one batch in a corral. These are not recommendations for actual feedlots. Real-time decisions must be made based on the actual performance of cattle in each corral.



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