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Estimating Live Weights of Dairy Cattle

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SUMMARY

Missouri Experiment Station Bulletin 351 explained how to compute the efficiency with which cows turn feed into milk from milk production and live weight records. Since live-weight records are not usually kept on account of the expense of scales and bother of weighing, this bulletin presents a simple method for estimating live weights of dairy cattle of all ages without actual weighing. This is done by measuring the heart girth with an ordinary tape measure and reading off the corresponding live weight from the given tables. When ages are not known, live weights are estimated from corresponding heart girths in Table 1. When ages are known, live weights are estimated from corresponding heart girths and ages from Table 2a (Jerseys) and 2b (Holsteins). While table 1 is based on Jersey and Holstein records, it can be used somewhat less accurately for other breeds of dairy cattle.

Estimating Live Weights of Dairy Cattle

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Dairymen of course want to know how efficiently their cows turn feed into milk. Missouri Agricultural Experiment Station Bulletin 351 explained how efficiency can be computed if milk production and live weight are known. Records of milk production are generally kept, but not records of live weights because cattle scales are not often available. It seems worthwhile therefore to present a simple method of estimating live weights of cattle without the trouble and expense of actual weighing. Incidentally the live weight estimates should also be helpful for other purposes such as figuring feed needs for maintenance from feeding standards, watching growth progress under different conditions, etc.

METHOD FOR ESTIMATING LIVE WEIGHTS OF CATTLE

It is generally known that the heavier the cow the greater the girth of her chest (heart girth). A careful study of 4513 sets of live weight to heart girth records, collected by the senior author during the past 14 years on cattle belonging to the Department of Dairy Husbandry, Missouri College of Agriculture, showed that the relation between these two is closer than between weight and any one of 21 other linear measurements. Moreover, the size of the heart girth¹ is quickly and easily determined with an ordinary tape measure. We therefore worked out the mathematical relation² between live weights and heart girths of the 4513 measurements, then constructed tables giving live weights for corresponding heart girths. To estimate the weight of a cow all one needs do is to measure the heart girth with a tape measure, then look in the table for the live weight corresponding to the given heart girth. The accuracy of such estimates of live weight will, generally speaking, in two cases out of three, not be below 7%. That is, a calf that weighs 100 pounds will (in 2 cases out of 3) be estimated to weigh not less than 93 pounds, nor more than 107 pounds; a cow that weighs 1000 pounds, will (in 2 cases out of 3) be estimated to weigh not less than 930, nor more than 1070. (The estimates from Tables 2 will be closer than from Table 1.) It is not possible to make closer estimates because natural weight fluctuations due to feeding, drinking, defecation, urination, etc. taken with variations due to inherent biological differences between animals amount to 7%.

1 The heart girth, or chest girth, is easily measured by placing the tape about 6 inches back of the front legs.

2 The mathematical relation between weight, W , and heart girth, G , was found to be $W = AG^n$, where A and n are equation constants.

It is interesting to note that during pregnancy the increase in live weight is associated with an increase in heart girth, so that the usual relation between live weight and heart girth is not greatly upset by pregnancy.

HEART-GIRTH—LIVE-WEIGHT TABLES FOR ESTIMATING LIVE WEIGHTS OF DAIRY CATTLE WHEN AGE IS NOT KNOWN

Table 1 gives live weight for corresponding heart girths of Jersey and Holstein cattle (females) of all ages between birth and

TABLE 1.—THE RELATION BETWEEN LIVE WEIGHT AND HEART GIRTH OF CATTLE OF ALL AGES WHEN AGES OF INDIVIDUAL ANIMALS ARE NOT KNOWN

Heart Girth in Inches	Estimated live weight in pounds		
	Jersey	Holstein	Average
25	50		
26	53		
27	57		
28	62	71	66
29	68	77	72
30	75	83	79
31	84	90	87
32	93	99	96
33	104	107	106
34	116	117	116
35	127	128	128
36	139	141	140
37	153	155	154
38	167	168	167
39	181	182	182
40	194	198	196
41	208	214	211
42	225	235	230
43	239	251	245
44	256	270	263
45	274	290	282
46	290	308	299
47	310	330	320
48	326	349	338
49	348	372	360
50	366	391	378
51	386	414	400
52	407	437	422
53	428	461	444
54	449	484	466
55	471	507	489
56	491	532	512
57	513	556	534
58	537	583	560
59	562	608	585
60	590	634	612
61	624	662	643
62	662	690	676
63	703	724	714
64	741	759	750
65	764	794	779
66	811	830	820
67	847	867	857
68	875	902	888
69	910	938	924
70	935	989	962
71	975	1040	1008
72	1000	1070	1035
73	1050	1120	1085
74	1070	1150	1110
75	1100	1170	1135
76	1130	1210	1170
77	1160	1240	1200
78	1180	1280	1230
79	1200	1310	1255
80		1340	
81		1370	
82		1410	
83		1450	

old age, but disregarding age. That is to say, the 4513 record pairs were grouped in accordance with heart girth regardless of the age of the animals, and their average weights computed. This way it was found, for example, that the average live weights of all Jerseys (regardless of age) measuring 53 inches around the chest was 428 pounds. So we put in Table 1, 428 pounds opposite 53 inches for Jerseys. Likewise 1210 pounds in Table 1 corresponds to 76-inch Holsteins; 935 pounds to 70-inch Jerseys, etc.

The first column in Table 1 is for Jerseys; the second for Holsteins, and the third is the average of the two breeds. It may be noted that there is relatively little breed difference in the weight-girth relation. It therefore seems that column 3 of Table 1 may be used for estimating live weights of any breeds of dairy cattle with only slightly smaller accuracy.

HEART-GIRTH—LIVE-WEIGHT TABLES FOR ESTIMATING LIVE WEIGHTS OF DAIRY CATTLE WHEN AGE IS KNOWN

Table 1 was designed to be used when age is not known; Table 2 (2a for Jerseys and 2b for Holsteins) was designed to be used when age is known. Table 2 will naturally give more accurate estimates of live weights than Table 1, since age influences to some extent the relation between live weight and heart girth. Table 2 corrects for this age influence, while Table 1 does not.

To use Table 2, locate the heart girth in the left column corresponding to the age in the upper row. The value in the intersection is the live weight. Thus from Table 2a, a Jersey heifer age 2 months with a heart girth 32 inches has a live weight of 98 pounds; a Jersey cow 61 to 72 months (5-6 years) with a heart girth of 70 inches has a live weight of 983 pounds. The black-face figures represent the approximate average heart girths and weights for corresponding ages.

TABLE 2A.—WEIGHT ESTIMATES FROM HEART GIRTHS OF JERSEY CATTLE WHEN AGES ARE KNOWN

Heart Girth Inches	Age in Months																														
	Birth	1	2	3	4	5	6	7	8	9	10	11	12	13 & 14	15 & 16	17 & 18	19 & 20	21 & 22	23 & 24	25 to 28	29 to 32	33 to 36	37 to 42	43 to 48	49 to 54	55 to 60	61 to 72	73 & over			
20	30																														
21	34																														
22	37	40																													
23	40	44																													
24	44	48	52																												
25	48	52	57																												
26	52	56	62	67																											
27	56	61	68	73																											
28	61	66	73	79	85																										
29	65	71	79	86	91																										
30	70	76	85	92	99	103																									
31	75	82	91	99	106	111																									
32	80	87	98	106	114	120	125																								
33	85	93	104	114	122	128	135	138																							
34	90	99	111	121	131	137	144	148																							
35	96	106	118	129	140	146	154	158	160																						
36	101	112	126	138	149	156	164	168	170																						
37		119	134	146	158	166	174	179	181	184																					
38		126	142	155	168	176	185	190	192	195	199																				
39			150	164	178	187	196	201	204	207	211	213																			
40			158	174	189	198	208	213	216	219	223	226																			
41			167	184	199	209	220	226	228	232	237	239	242																		
42			176	194	210	221	232	238	241	245	249	252	256																		
43			204	222	233	245	251	254	258	263	265	269	272																		
44			214	234	245	258	265	267	272	276	279	284	287																		
45					246	258	272	278	281	286	291	294	298	301	306																
46					258	271	285	293	295	300	305	309	313	317	321	331															
47						285	300	307	310	315	321	324	329	332	337	347															
48						299	314	322	325	330	336	340	345	348	353	364															
49							329	337	340	346	352	356	361	364	369	380	387														
50							345	353	356	362	368	372	378	381	386	399	405														
51							361	369	373	379	385	389	395	399	404	416	423														
52								386	389	395	402	406	412	418	422	435	442	446													
53								403	406	413	420	424	430	434	440	454	461	466													
54								420	424	431	438	442	449	453	459	473	480	485	499												

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