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Indexing Beef Cattle

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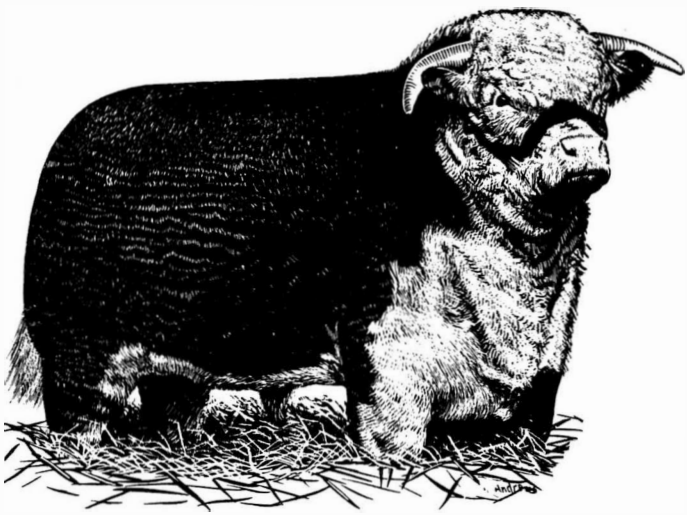

ANIMAL SCIENCE DEPARTMENT
AGRICULTURAL EXPERIMENT STATION
SOUTH DAKOTA STATE UNIVERSITY, BROOKINGS

DAY OF THE YEAR CHART FOR CALCULATING AGE AT WEANING

Day of month	Jan.	Feb.	Mar.	Apr.	May	Jun.	July	Aug.	Sept.	Oct.	Nov.	Dec.	Day of month
1	1	32	60	91	121	152	182	213	244	274	305	335	1
2	2	33	61	92	122	153	183	214	245	275	306	336	2
3	3	34	62	93	123	154	184	215	246	276	307	337	3
4	4	35	63	94	124	155	185	216	247	277	308	338	4
5	5	36	64	95	125	156	186	217	248	278	309	339	5
6	6	37	65	96	126	157	187	218	249	279	310	340	6
7	7	38	66	97	127	158	188	219	250	280	311	341	7
8	8	39	67	98	128	159	189	220	251	281	312	342	8
9	9	40	68	99	129	160	190	221	252	282	313	343	9
10	10	41	69	100	130	161	191	222	253	283	314	344	10
11	11	42	70	101	131	162	192	223	254	284	315	345	11
12	12	43	71	102	132	163	193	224	255	285	316	346	12
13	13	44	72	103	133	164	194	225	256	286	317	347	13
14	14	45	73	104	134	165	195	226	257	287	318	348	14
15	15	46	74	105	135	166	196	227	258	288	319	349	15
16	16	47	75	106	136	167	197	228	259	289	320	350	16
17	17	48	76	107	137	168	198	229	260	290	321	351	17
18	18	49	77	108	138	169	199	230	261	291	322	352	18
19	19	50	78	109	139	170	200	231	262	292	323	353	19
20	20	51	79	110	140	171	201	232	263	293	324	354	20
21	21	52	80	111	141	172	202	233	264	294	325	355	21
22	22	53	81	112	142	173	203	234	265	295	326	356	22
23	23	54	82	113	143	174	204	235	266	296	327	357	23
24	24	55	83	114	144	175	205	236	267	297	328	358	24
25	25	56	84	115	145	176	206	237	268	298	329	359	25
26	26	57	85	116	146	177	207	238	269	299	330	360	26
27	27	58	86	117	147	178	208	239	270	300	331	361	27
28	28	59	87	118	148	179	209	240	271	301	332	362	28
29	29	**	88	119	149	180	210	241	272	302	333	363	29
30	30		89	120	150	181	211	242	273	303	334	364	30
31	31		90		151		212	243		304		365	31

** In leap years, after February 28, add 1 to the tabulated number.

Indexing Beef Cattle

C. A. DINKEL and J. A. MINYARD[1]

The primary purpose of this circular is to furnish some simplifications in the procedure presently in use in South Dakota for indexing beef cattle. As more data become available, these methods may change and in that event, supplements will be distributed. Such differences as exist between the short-cut methods presented here and those presently in use will be pointed out as they are taken up in the circular. The methods presented here are based on data taken in private herds in the state as well as in Experiment Station herds. Where there appeared to be a difference, data from private herds were used so that the results would be more widely applicable. This publication is not intended to replace the present Extension Service circular dealing with methods and procedures of performance testing. For details concerning methods, the reader should consult the circular available through the Extension Service.

1. WEANING WEIGHT INDEXES

Information Needed:

1. Birth date (within a week)
2. Weaning date
3. Weaning weight
4. Sex
5. Age of dam (not completely necessary but strongly recommended for very young and very old cows)

Procedure: (Calculations should be made in the order given.)

1. Calculation of Age at Weaning

A day of the year chart is provided on the inside front cover for calculating age. Read the number of the weaning day where the month of weaning column intersects with day of weaning row. Read the number of the birth day where the birth month column intersects with the day of birth row. Subtract the number of the birth day from the number of the weaning day to get age at weaning. In Leap Year, if February 29 falls between birth and weaning, add 1 to the calculated number.

2. Calculation of Age-Adjusted Weaning Weight

Use nomograph on page 8 for this calculation. Place a ruler on age at weaning on the left hand scale and on actual weaning weight on the right hand scale. Read adjusted weaning weight on the middle scale. The accuracy of these computations depends only on the accuracy in aligning the ruler and in reading the scales. For calves outside the age limits of this nomograph, the correction factors previously used are recommended. Copies of these factors can be obtained from the Agricultural Experiment Station.

[1]Professor and Assistant Professor, South Dakota Agricultural Experiment Station.

3. Sex Adjustment

A. Adjusting to a bull basis (for purebred herds where bulls are kept)

(1) Add 35 pounds to heifer weights

(2) Add 10 pounds to steer weights

B. Adjusting to a steer basis (for herds not keeping bull calves)

(1) Add 25 pounds to heifer weights

4. Age of Dam Adjustment[2]

Age of dam	Presently used in computer program	Suggested for hand calculation
2	65	70
3	29	35
4	17	20
5	9	15
6	0	0
7	–1	0
8	–4	0
9	5	10
10	19	25
11	20	25
12	34	40
13	37	40

The weights have now been adjusted for age, sex, and age of dam. These represent all the adjustments presently recommended, and comparison of these weights is more indicative of producing ability of the cow and genetic worth of the calf. To further simplify these comparisons, the following indexes may also be used.

5. Calculating Weaning Weight Index

1. First calculate the average adjusted weaning weight for the herd.

2. Determine how many pounds each calf is above or below the average adjusted weaning weight for the herd. This difference is the "deviation" listed in the first column of table 1. The second column gives the index for below average calves and the third column the index for above average calves.

   Example: If a calf is 50 pounds above average, enter the table at 49-52 in the left hand or "deviation" column and under the heading "above average" read off the index of 87.

Discussion of Index

For most herds, this table yields an index value within 1 or 2 points of the value obtained by previously recommended procedures. In herds that are extremely uniform or extremely variable the difference will be greater; however, the calves will still be ranked the same under the two different methods.

Under this method the heaviest calf will not always index at exactly 100. For most herds it will be close to that figure but again in those extremely uniform or extremely variable herds it may be further off. This is not a disadvantage since all calves are ranked in the same order and the extremely good or bad animal is allowed to index according to his net value.

This type of indexing places the animal much like show ring judging places the animal, only in this particular case it is placed on

[2]These adjustment factors are from "The Study of Factors Influencing Weaning Weights of Beef Calves" by J. A. Minyard (Unpublished M.S. Thesis, 1959).

Table 1. Weaning Weight Indexes

Deviation	Index: Below Average Calf	Index: Above Average Calf
0-2	75	75
3-6	74	76
7-10	73	77
11-14	72	78
15-18	71	79
19-23	70	80
24-27	69	81
28-31	68	82
32-35	67	83
36-40	66	84
41-44	65	85
45-48	64	86
49-52	63	87
53-56	62	88
57-61	61	89
62-65	60	90
66-69	59	91
70-73	58	92
74-77	57	93
78-82	56	94
83-86	55	95
87-90	54	96
91-94	53	97
95-99	52	98
100-103	51	99
104-107	50	100
108-111	49	101
112-115	48	102
116-120	47	103
121-124	46	104
125-128	45	105
129-132	44	106
133-136	43	107
137-141	42	108
142-145	41	109
146-149	40	110
150-153	39	111
154-158	38	112
159-162	37	113
163-166	36	114
167-170	35	115

To calculate the index of calves with deviations larger than those listed above, multiply the deviation from average by .24 and add to 75 for calves above average or subtract from 75 for below average calves.

weaning weight and given a number to indicate the placing. All placings are relative to 75 as average and in most herds the average index will be within rounding error of 75. This means that the net merit of a calf indexing 110 is further above the average than a calf indexing 95 to 100. It should also be indicated that the earlier method of indexing is similarly affected by the amount of variation in the herd; however, because the top animal is forced to fall at 100 regardless of his value with respect to the rest of the herd the effects of extreme variation may not be as apparent.

Type Score Index

The type score index can be obtained from table 2 in the same manner in which weaning weight indexes were obtained in table 1. Calculate the average type score for each calf after coding each score according to the following system:

Type Score	Code Number
1+	15
1	14
1—	13
2+	12
2	11
2—	10
3+	9
3	8
3—	7
4+	6
4	5
4—	4
5+	3
5	2
5—	1

Then obtain the average type score of all calves in the herd. The deviation of each calf from the herd average will indicate his type score

Table 2. Type Score Indexes

Deviation	Index: Below Average Calf	Index: Above Average Calf
.0- .06	75	75
.07- .19	74	76
.20- .32	73	77
.33- .46	72	78
.47- .59	71	79
.60- .72	70	80
.73- .86	69	81
.87- .98	68	82
.99-1.12	67	83
1.13-1.25	66	84
1.26-1.38	65	85
1.39-1.51	64	86
1.52-1.64	63	87
1.65-1.78	62	88
1.79-1.91	61	89
1.92-2.04	60	90
2.05-2.17	59	91
2.18-2.30	58	92
2.31-2.44	57	93
2.45-2.57	56	94
2.58-2.70	55	95
2.71-2.83	54	96
2.84-2.96	53	97
2.97-3.10	52	98
3.11-3.23	51	99
3.24-3.36	50	100
3.37-3.49	49	101
3.50-3.62	48	102
3.63-3.76	47	103
3.77-3.89	46	104
3.90-4.02	45	105
4.03-4.15	44	106
4.16-4.28	43	107
4.29-4.42	42	108
4.43-4.55	41	109
4.56-4.68	40	110
4.69-4.81	39	111
4.82-4.94	38	112
4.95-5.08	37	113
5.09-5.21	36	114
5.22-5.34	35	115

To calculate the index of calves with deviations larger than those listed above, multiply the deviation from average by 7.58 and add to 75 for calves above average or subtract from 75 for below average calves.

Table 3. Rate of Gain Indexes

Deviation	Index: Below Average Calf	Index: Above Average Calf
.0	75	75
.01-.02	74	76
.03-.04	73	77
.05-.06	72	78
.07-.08	71	79
.09-.10	70	80
.11-.12	69	81
.13-.14	68	82
.15-.16	67	83
.17-.18	66	84
.19-.20	65	85
.21-.22	64	86
.23-.24	63	87
.25	62	88
.26-.27	61	89
.28-.29	60	90
.30-.31	59	91
.32-.33	58	92
.34-.35	57	93
.36-.37	56	94
.38-.39	55	95
.40-.41	54	96
.42-.43	53	97
.44-.45	52	98
.46-.47	51	99
.48	50	100
.49-.50	49	101
.51-.52	48	102
.53-.54	47	103
.55-.56	46	104
.57-.58	45	105
.59-.60	44	106
.61-.62	43	107
.63-.64	42	108
.65-.66	41	109
.67-.68	40	110
.69-.70	39	111
.71-.72	38	112
.73	37	113
.74-.75	36	114
.76-.77	35	115

To calculate the index of calves with deviations larger than those listed above, multiply the deviation from average by 52 and add to 75 for calves above average or subtract from 75 for below average calves.

index. For example, if three judges scored two calves as follows:

Calf No.	Judge 1	2	3
1	3—	3—	4+
2	2	2+	2+

The coded scores would be:

Calf No.	Judge 1	2	3
1	7	7	6
2	11	12	12

The average score for calf 1 would be 20/3 or 6.67 and the average score for calf 2 would be 35/3 or 11.67. If the average score for all calves from this calf crop was 8.0, the deviation of calf 1 would be 1.33 below average and the deviation of calf 2 would be 3.67 above average. From table 2 the index for calf 1 is read as 65 and for calf 2 as 103.

Discussion

Selection of calves at weaning or culling of cows on the basis of the weaning performance of their calves can be based on any of the following methods:

1. Weaning weight and type score of the calf
2. Type score alone
3. Weaning weight alone.

If the first method is used a simple average of the weaning weight and the type score indexes will rank the calves according to both weaning weight and type score.

This method of indexing type score differs from the previously used method in that each calf is ranked according to the average type score of the herd. Previously the score of the calf determined the index. There are advantages and disadvantages for both methods, but if the indexes obtained are to be used for improvement within the herd, the present method seems to hold the greatest advantage.

Rate of Gain Index

(For Purebred Herds Feeding Bull Calves on Performance Test)

Obtain the average rate of gain for all calves on test. Using the deviation of each calf from average, obtain the index from table 3.

Calculating Average Index for Performance Tested Bulls

Type scores given at the end of the performance test may be indexed as outlined under "Type Score Index" or according to previous recommendations. Previous indexing procedures have included weaning weight, rate of gain, and type score in the average index, and this average index is obtained by averaging the indexes for each characteristic. For example, a bull with a weaning weight index of 80, a rate of gain index of 85, and a type score index of 90 would have an average index of 85.

NOMOGRAPH FOR ADJUSTING WEANING WEIGHTS TO A STANDARD AGE OF 190 DAYS

AGE IN DAYS

155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240 245 250

ADJUSTED 190 DAY WEIGHT

650 640 630 620 610 600 590 580 570 560 550 540 530 520 510 500 490 480 470 460 450 440 430 420 410 400 390 380 370 360 350 340 330 320 310 300 290 280 270 260 250 240 230 220 210 200

ACTUAL WEIGHT

650 640 630 620 610 600 590 580 570 560 550 540 530 520 510 500 490 480 470 460 450 440 430 420 410 400 390 380 370 360 350 340 330 320 310 300 290 280 270 260 250 240 230 220 210 200