Effects of Age of Dam on Weight Traits in the Simmental Population

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EFFECTS OF AGE OF DAM ON WEIGHT TRAITS IN THE SIMMENTAL POPULATION[1]

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ABSTRACT

Records on birth weight, weaning weight and postweaning gain from weaning to yearling from 839,292 Simmental calves were used to study age-of-dam effects. Estimates of age-of-dam effects were obtained simultaneously with bull effects using a multiple trait evaluation procedure. Large age-of-dam effects were found for birth weight and for weaning weight for young dams relative to mature (5- to 8-yr-old) cows. Age-of-dam effects for birth weight and weaning weight were smaller in base (non-Simmental) dams than in Simmental dams. Also, age-of-dam effects for birth weight and weaning weight were smaller for female calves than for male calves. Different age-of-dam correction factors should be used for males and females within base and Simmental dams. Age-of-dam effects for postweaning gain were less important than those for birth weight and weaning weight. There was evidence of compensatory growth, especially in calves reared by Simmental dams.

(Key Words: Age, Growth, Weight.)

Introduction

Bull evaluations for weight traits in beef cattle are aimed at obtaining expected progeny differences (EPD) of bulls using field data. The computation of the EPD is based on comparisons among uniform progeny groups of bulls. Uniform groups in these data consisted of calves being of the same sex, percent Simmental, and born within a range of 90 d (the definition of a contemporary group). Age-of-dam effects are not included in the contemporary group definition. Age-of-dam effects are important for birth weight (Smith et al., 1976; Gregory et al., 1978; Reynolds et al., 1980) and for weaning weight (Rutledge et al., 1971; Smith et al., 1976; Gregory et al., 1978; Anderson and Willham, 1978). Age-of-dam effects might also be important for postweaning gain performance (e.g., Young et al., 1978).

The American Simmental Association (ASA) until 1985 followed the Beef Improvement Federation recommendations to adjust only birth weight (BW) and weaning weight (WW) records for age-of-dam effects. The factors used were additive. Separate factors were used for males and females (regardless of percent Simmental) within four age-of-dam categories: 2 yr of age and younger, 3 yr of age, 4 yr of age, and 5 yr of age and older. However, the Simmental data contains records on calves produced by mating Simmental bulls to non-Simmental females (base dams), 50% Simmental females (F_1 dams) and 75% and greater Simmental females (Simmental dams). In addition, bulls were used differently depending on the age of dam and the percent Simmental of the female (Elzo et al., 1987). Bulls used on heifers and base cows had lower EPD for BW, WW, and postweaning gain (GW) than those used on cows. Nonrandom usage of bulls to cows based on age or percent Simmental can bias the differences estimated for these effects unless accounted for. Consequently, the objectives of this research were to compute age-of-dam effects within sex of calf and percent Simmental of dam for BW, WW, and GW, accounting for the genetic merit of the sire of the calf.

Materials and Methods

Birth weight, weaning weight and postweaning gain information from 839,292 Simmental calves born between 1968 and 1985 were used

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to compute age-of-dam effects within sex of calf and percent Simmental of the dam. Data were provided by the ASA. This is the same data set that was used to compute the bull evaluations published in the 1986 ASA Sire Selector. There were 538,320 records for BW, 756,184 records for WW and 141,844 records for GW. The large numbers of observations, especially for BW and WW, allowed the construction of a finer partition of age-of-dam categories within sex of calf and percent Simmental of dam than those previously used. There were 12 age-of-dam categories. The first one included 2-yr-old and younger females. Categories 2 through 7 were defined by increments of 6 mo (e.g., 2 yr to 2.5 yr, 2.5 yr to 3.0). Category 8 consisted of cows older than 5 yr up through 8 yr of age. This category was defined to be mature cows. Categories 9 to 11 were defined at yearly intervals, e.g., category 9 represented cows older than 8 yr up to 9 yr of age. Lastly, category 12 contained cows older than 11 yr of age.

The age categories were fit within sex-of-calf and percent-Simmental-of-dam subclasses. Sex-of-calf categories for BW were males and females. For WW and GW, bulls and steers were considered separately. Dams were divided into three groups according to their Simmental percentage: base dams (non-Simmental), F_1 dams (50% Simmental) and Simmental dams (greater than or equal to 75% Simmental). The numbers of records in each one of the age-of-dam within sex-of-calf x dam-percent-Simmental subclass are shown in table 1 for BW, table 2 for WW and table 3 for GW. Records from female calves accounted for 63 and 69% of all BW and WW records, respectively, but only for 38% of the GW records. Male calves represented 37% of the BW records, 25% of the WW records, and 60% of the GW records. Steers contributed only 6% of the WW records and 3% of the GW records. Considering all three traits, calves from base females had the smallest fractions of records (29% for BW, 34% for WW, 34% for GW) and calves from Simmental females the largest ones (39% for BW, 34% for WW, 45% for GW). Thus, accuracies of the estimates of the age-of-dam effects were on the average expected to be greater for subclasses involving females and Simmental dams for BW and WW. For GW, more accurate age-of-dam effects were expected for those subclasses containing males out of Simmental dams.

Age-of-dam effects within sex of calf and percent Simmental of the dam were computed together with the bull evaluations for the 1986 ASA Sire Selector. The procedure was a multiple trait system (Henderson, 1976; Henderson and Quaas, 1976; Quaas and Pollak, 1980) involving BW, WW and GW. Direct and maternal effects were considered as well for BW and WW. Only direct genetic effects were assumed to be important for GW. The model for each trait had contemporary groups, age-of-dam within sex-of-calf x percent-Simmental-of-dam subclass, ge-

TABLE 1. NUMBER OF BIRTH WEIGHT RECORDS BY AGE-OF-DAM X PERCENT-SIMMENTAL-OF-DAM X SEX-OF-CALF SUBCLASS

Age of dam, yr	Percent Simmental of dam					
	0		50		≥75	
	Bulls	Heifers	Bulls	Heifers	Bulls	Heifers
<2	140	248	5,257	9,643	9,023	12,731
2–2.5	2,770	5,819	7,675	14,770	15,074	22,145
2.5–3	558	1,458	3,686	6,781	6,770	10,404
3–3.5	4,756	10,896	8,083	13,712	12,813	17,634
3.5–4	904	2,213	3,448	5,858	5,739	8,854
4–4.5	996	2,394	3,069	5,028	4,467	6,588
5–8	18,395	45,234	19,277	27,912	20,123	27,873
9–10	3,139	6,892	2,382	3,138	962	1,372
10–11	4,765	10,497	2,466	3,029	494	730
>11	549	2,503	41	700	69	241
All ages	45,988	109,975	65,713	105,808	86,701	124,135
%[a]	29.49	70.51	38.31	61.69	41.12	58.88

[a]Percent of records within percent Simmental of dam.

TABLE 2. NUMER OF WEANING WEIGHT RECORDS BY AGE-OF-DAM X PERCENT-SIMMENTAL-OF-DAM X SEX-OF-CALF SUBCLASS

Age of dam, yr	Percent Simmental of dam								
	0			50			≥75		
	Bulls	Heifers	Steers	Bulls	Heifers	Steers	Bulls	Heifers	Steers
<2	113	313	34	4,697	13,589	1,242	8,230	14,677	1,165
2–2.5	2,056	9,279	995	7,612	23,795	1,968	14,903	28,427	1,981
2.5–3	394	2,046	215	3,634	10,716	872	7,124	14,001	709
3–3.5	3,383	18,403	2,081	7,694	22,047	2,295	12,579	23,033	1,723
3.5–4	770	3,993	316	3,511	9,590	815	6,256	12,063	494
4–4.5	3,659	23,151	2,270	6,610	16,894	1,839	9,193	16,579	1,164
4.5–5	900	4,168	330	3,139	7,997	638	4,910	9,017	371
5–8	14,275	87,440	8,782	19,045	42,061	4,298	21,041	37,372	2,222
8–9	3,350	16,896	1,955	3,440	6,933	678	2,036	3,834	250
9–10	2,442	11,965	1,421	2,308	4,416	489	928	1,712	132
10–11	3,738	18,107	2,223	2,238	4,205	519	448	851	65
>11	243	2,041	153	38	282	6	23	261	0
All ages	35,323	198,162	20,775	63,966	162,525	15,659	87,671	161,827	10,276
%[a]	13.89	77.94	8.17	26.42	67.12	6.46	33.75	62.30	3.95

[a]Percent of records within percent Simmental of dam.

TABLE 3. NUMBER OF POSTWEANING GAIN RECORDS BY AGE-OF-DAM X PERCENT-SIMMENTAL-OF-DAM X SEX-OF-CALF SUBCLASS

Age of dam, yr	Percent Simmental of dam								
	0			50			≥75		
	Bulls	Heifers	Steers	Bulls	Heifers	Steers	Bulls	Heifers	Steers
<2	29	40	10	2,286	1,273	132	4,301	2,424	114
2–2.5	1,003	882	128	3,273	1,756	148	7,403	3,425	99
2.5–3	128	119	23	1,533	1,036	64	3,769	1,608	41
3–3.5	1,351	1,780	387	2,887	2,293	164	5,795	2,969	92
3.5–4	368	359	28	1,318	976	67	3,382	1,303	27
4–4.5	1,414	2,054	332	2,444	1,957	128	4,281	2,088	65
4.5–5	405	336	54	1,320	891	53	2,769	982	26
5–8	5,842	6,397	1,157	7,953	5,306	251	10,110	4,210	148
8–9	1,238	1,386	234	1,447	916	53	902	432	12
9–10	854	1,054	189	930	611	54	378	203	2
10–11	1,389	1,515	292	843	598	46	170	80	0
>11	71	272	34	17	16	1	20	19	0
All ages	14,092	16,194	2,868	26,251	17,629	1,161	43,280	19,743	626
%[a]	42.50	48.85	8.65	58.28	39.14	2.58	68.00	31.02	.98

[a]Percent of records within percent Simmental of dam.

netic group of sire and of maternal grandsire as fixed effects. The remaining effects, considered random, were the genetic effects of the sire and the maternal grandsire and residual effects. Sire effects contained direct genetic effects. Maternal grandsire effects reflected both direct and maternal effects, except for GW, which was assumed to represent direct genetic effects only. Bull genetic groups were obtained by first considering the individual's pedigree information [i.e., either, neither or both his sire and maternal grandsire (MGS) identified] and within pedigree information by grouping 100 bulls sorted by registration number. The rationale for defining groups based on pedigree information is given in Pollak and Quaas (1981). Grouping by registration number within pedigree information attempts to account for trend over time.

The definition of contemporary groups for the three traits was the same as that used in previous ASA bull evaluations (e.g., ASA, 1985). Firstly, a contemporary group for BW (BCG) included calves of the same sex and percent Simmental, coming from the same breeder and born within 90 d of each other. Secondly, a contemporary group for WW (WCG) considered all the conditions specified for a BCG plus the same preweaning management and the same weaning weight date. Thirdly, a GW contemporary group (GCG) required the same postweaning feeding management and the same yearling weight data, in addition to all the factors mentioned for a WCG. Thus, GCG were nested within WCG which, in turn, were nested within BGC.

Age-of-dam effects were expressed as deviations from mature cows (category 8) within each sex-of-calf × percent-Simmental-of-dam subclass. There were 72 age-of-dam within sex-of-calf × percent-Simmental-of-dam subclasses for BW and 108 for WW and GW. As all calves had the sire identified, age-of-dam effects were adjusted for sire direct genetic effects.

Maternal grandsire effects were fitted in the model for all calves having the maternal grandsire identified. Ninety-eight percent of the calves from F_1 and Simmental dams had known maternal grandsires. On the other hand, none of the calves born out of base dams had the maternal grandsire identified. As a consequence, given the high percentage of identification in F_1 and Simmental dams, their age-of-dam effects were partially adjusted for the merit of the maternal grandsire. For the base cows and for the other 2% of calves from F_1 and Simmental dams with unknown maternal grandsires, unknown maternal grandsire groups were fitted. These groups were defined by the year of birth and percent Simmental of calf. There were 11,130 bulls in the data set as either sires or maternal grandsires or both sire and maternal grandsire.

Results and Discussion

Age-of-Dam Effects for Birth Weight. Table 4 shows the age-of-dam effects for BW for males and females born out of base, F_1 and Simmental dams. Age-of-dam effects for F_1 dams were similar to those of Simmental dams; hence, discussion will consider only base vs Simmental dams. Age-of-dam effects relative to mature age (5 to 8 yr) within sex of calf and percent Simmental of the dam were the largest (e.g., −3.4 kg in 75% cows with male progeny) between heifers and mature cows. The differences decreased as females matured. Age effects past maturity were again negative. This trend is probably a reflection of a greater ability by mature cows to provide the fetus with the necessary nutrients and environmental conditions for its development. It also suggests a reduction of this ability in cows older than 8 yr of age. Age-of-dam effects within percent Simmental of the dam were usually larger for male than for females calves. In Simmental dams, for example, the estimates of the age-of-dam effects of 2-yr-old and younger dams were −3.4 kg for males and −3.2 kg for females. This is probably related to size of the calf: larger calves require a better uterine environment than smaller ones (female calves were, on the average, lighter at birth than male calves, table 5). The difference between age-of-dam effects for males and females tended to disappear as cows reached mature age.

Age-of-dam effects within sex were larger for F_1 and Simmental dams than for base dams before they reached mature age. For instance, the age-of-dam effects for 2-yr-old Simmental and base heifers producing females calves were −3.2 kg and −2.0 kg, respectively. This may be due to a larger difference in size between young and mature cows in F_1 and Simmental dams than in base dams. After mature age, however, age-of-dam effects were in general larger for base dams than for F_1 and Simmental dams (e.g., the age-of-dam effects on male calves born out of 8- to 9-yr-old base and Simmental cows were −.2 kg and −.1 kg). This might be an indication of an ability of F_1 and Simmental

TABLE 4. AGE-OF-DAM EFFECTS WITHIN SEX-OF-CALF AND PERCENT-SIMMENTAL-OF-DAM SUBCLASS FOR BIRTH WEIGHT (KG)[a]

Age of dam, yr	Percent Simmental of dam: 0				50				≥75			
	Males	SE	Females	SE	Males	SE	Females	SE	Males	SE	Females	SE
<2	−1.99	.53	−2.03	.37	−3.48	.10	−3.04	.07	−3.40	.07	−3.15	.06
2–2.5	−2.17	.13	−1.89	.09	−3.05	.09	−2.64	.06	−2.82	.05	−2.55	.05
2.5–3	−2.98	.31	−2.30	.18	−2.19	.10	−1.96	.08	−2.00	.08	−1.79	.06
3–3.5	−1.25	.09	−1.08	.06	−1.78	.08	−1.54	.06	−1.73	.06	−1.53	.05
3.5–4	− .81	.20	− .99	.13	− .94	.10	− .69	.08	− .85	.08	− .82	.06
4–4.5	− .39	.09	− .37	.05	− .75	.08	− .57	.06	− .77	.07	− .60	.05
4.5–5	− .50	.18	− .31	.12	− .02	.10	− .25	.08	− .13	.09	− .21	.07
5–8	0	0	0	0	0	0	0	0	0	0	0	0
8–9	− .23	.09	− .08	.06	− .10	.10	.09	.08	− .10	.12	.06	.10
9–10	− .30	.10	− .37	.07	− .10	.12	− .15	.10	− .10	.17	.09	.14
10–11	− .93	.09	− .64	.06	− .54	.12	− .47	.11	− .40	.24	− .27	.19
>11	− .26	.44	− .65	.23	−2.84	.77	−1.37	.60	−4.90	1.11	−2.20	1.09

[a]Age-of-dam effects were computed as deviations from the mature dams (5 to 8 yr of age).

TABLE 5. AVERAGE BIRTH WEIGHT (BW), WEANING WEIGHT (WW) AND POSTWEANING GAIN (GW) IN KILOGRAMS WITHIN SEX-OF-CALF AND PERCENT-SIMMENTAL-OF-DAM SUBCLASS FOR CALVES FROM MATURE FEMALES

Trait	Percent Simmental of dam: 0			50			≥75		
	Bulls	Heifers	Steers	Bulls	Heifers	Steers	Bulls	Heifers	Steers
BW	40.1	36.8		41.5	38.4		42.4	39.3	
WW	241.9	211.3	234.0	267.6	238.7	260.1	278.3	249.9	267.4
GW	178.2	119.5	152.5	211.1	114.8	151.5	193.0	115.8	177.8

dams to maintain higher productivity past our definition of mature age than of base dams. However, the standard error of the last four age-of-dam subclasses (8 to 9 yr old, ···, greater than 11 yr old) is rather high, especially for F_1 and Simmental dams.

Age-of-Dam Effects for Weaning Weight. Estimates of age-of-dam effects for weaning weight in base, F_1 and Simmental females rearing bulls and heifers are presented in table 6. The results obtained for F_1 dams again were similar to those of Simmental dams. Also, the age-of-dam estimates for steers within dam percent Simmental were similar to those computed for bull calves. The patterns of age-of-dam effects for weaning weight closely resembled the ones found for birth weight. The largest age-of-dam effects relative to mature age were observed in 2-yr-old and younger dams (e.g., −36.9 kg for males from Simmental dams). The magnitude of these effects decreased almost linearly to maturity (e.g., −2.3 kg for males out of 4.5- to 5-yr-old Simmental dams). After maturity, age-of-dam effects were again negative. e.g., age effects for 10- to 11-yr-old Simmental dams rearing males were 5.1 kg lower than mature (5- to 8-yr-old) Simmental dams. Milk production of the female has been found to be one of the major factors affecting weaning weight of the calf (Rutledge et al., 1971; Notter et al., 1978; Robison et al., 1978). Thus, differential milking ability probably accounted for most of the difference in age-of-dam effects between young and old cows relative to mature cows found in this study.

Age-of-dam effects relative to mature cows for weaning weight were markedly larger for females rearing bulls and steers than heifers. The largest differences were observed in 2-yr-old and younger dams (e.g., −36.9 kg for males and −27.4 kg for females from Simmental dams). These results indicate that young and old cows met the maintenance and preweaning growth requirements of female calves to a larger extent than those of males calves (table 6). In addition, age-of-dam effects for weaning weight were substantially larger in F_1 and Simmental dams than in base dams. For instance, the age-of-dam effects of 2-yr-old dams rearing males were −36.9 kg for Simmental dams and −28.1 kg for base dams. These differences in age effects between base and Simmental dams probably reflect the higher milk producing ability of Simmental cows than that of base cows. Base cows were mostly Hereford and Angus. Research in breed evaluations has shown that Hereford and Angus produced less milk than Simmental (e.g., Notter et al., 1978). The larger age-of-dam effects found in 2-yr-old and younger Simmental cows relative to base cows of the same age indicate that differences in milk production between 2-yr-old and mature Simmental cows are larger than the ones found in base dams. Age-of-dam effects for weaning weight after mature age were larger in bulls out of base dams than F_1 or Simmental dams (e.g., −7.6 kg and −5.1 kg for bulls from base and Simmental cows). For heifers and steers there were little differences in estimates of age-of-dam effects after maturity (e.g., −5.5 and −6.2 kg for heifers of base and Simmental females).

Age-of-Dam Effects for Postweaning Gain. Age-of-dam effects for postweaning gain are indirect environmental effects. They are a consequence of environmental effects of a dam on her calf during pregnancy and during the preweaning growth period. Hence, if a dam gave her calf an environment adequate for its preweaning growth potential, then the calf's postweaning gain should depend only on its ability to grow. In other words, if a calf grew to its full potential to weaning, its postweaning gain would be independent of the age of its dam. If the preweaning environment provided by the dam was insufficient, a calf may experience postweaning compensatory growth. Conversely, if the maternal environment was overly abundant these calves may gain less weight in the postweaning period than adequately fed calves (e.g., Young et al., 1978). Table 7 contains the age-of-dam effect for base and for Simmental females that reared bulls and heifers. Age-of-dam effects for postweaning gain in F_1 females resembled closely those of Simmental dams. Also, age-of-dam effects for steers tended to follow those for bulls. However, they were much more variable and had substantially higher standard errors of estimation than those of bulls. For example, the effect of 2-yr-old Simmental dams for postweaning gain in bulls was 1.6 kg ± .5 kg and in steers was 2.8 kg ± 4.5 kg.

The age-of-dam effects for postweaning gain were slightly positive for bulls from young Simmental dams. The largest estimate was 1.6 kg for bulls from 2-yr-old and younger Simmental dams. For the base dams, there were three positive values only. They corresponded to the 2- to 2.5-, 2.5- to 3- and 3- to 3.5-yr-old dam subclasses (e.g., the 2- to 2.5-yr-old dam subclass

TABLE 6. AGE-OF-DAM EFFECTS WITHIN SEX-OF-CALF AND PERCENT-SIMMENTAL-OF-DAM SUBCLASS FOR WEANING WEIGHT (KG)[a]

Age of dam, yr	Percent Simmental of dam: 0 Bulls	SE	Heifers	SE	50 Bulls	SE	Heifers	SE	≥75 Bulls	SE	Heifers	SE
<2	−28.08	3.13	−15.32	1.63	−35.97	.50	−28.29	.31	−36.90	.36	−27.35	.27
2–2.5	−22.59	.75	−14.64	.34	−32.55	.44	−24.29	.27	−31.95	.31	−22.93	.22
2.5–3	−18.19	1.77	−11.84	.72	−21.30	.51	−16.14	.31	−22.08	.38	−15.70	.26
3–3.5	−10.82	.53	− 7.43	.23	−18.34	.39	−13.32	.25	−17.69	.31	−12.95	.22
3.5–4	− 6.15	1.05	− 5.25	.53	− 9.79	.50	− 7.79	.32	− 9.83	.39	− 6.87	.27
4–4.5	− 2.89	.49	− 2.34	.21	− 7.22	.38	− 5.02	.25	− 6.47	.33	− 4.51	.24
4.5–5	− 2.60	.98	− 1.96	.48	− 2.72	.50	− 2.77	.33	− 2.27	.41	− 2.66	.30
5–8	0	0	0	0	0	0	0	0	0	0	0	0
8–9	− 1.32	.49	− 1.16	.22	− .23	.49	− .48	.35	− .73	.60	− 1.25	.43
9–10	− 3.62	.57	− 2.40	.26	− 1.79	.59	− 1.45	.44	− 2.51	.86	− 3.35	.62
10–11	− 7.55	.50	− 5.49	.23	− 7.12	.65	− 4.84	.48	− 5.14	1.25	− 6.19	.88
>11	−10.79	2.63	− 3.80	.98	− 7.10	3.96	−10.62	2.65	−17.05	5.77	−20.47	4.52

[a]Age-of-dam effects were computed as deviations from the mature dams (5 to 8 yr of age).

TABLE 7. AGE-OF-DAM EFFECTS WITHIN SEX-OF-CALF AND PERCENT-SIMMENTAL-OF-DAM SUBCLASS FOR POSTWEANING GAIN (KG)[a]

Age of dam, yr	Percent Simmental of dam: 0				≥75			
	Bulls	SE	Heifers	SE	Bulls	SE	Heifers	SE
<2	−10.45	6.26	2.20	4.20	1.57	.54	4.96	.70
2–2.5	2.55	1.20	8.48	1.08	.15	.47	5.46	.65
2.5–3	4.68	2.90	−3.15	2.98	1.17	.54	2.83	.76
3–3.5	2.77	.87	3.13	.76	.30	.47	2.98	.63
3.5–4	− 1.71	1.52	− .96	1.64	1.50	.55	1.56	.81
4–4.5	− .12	.81	1.85	.70	− .62	.50	1.45	.67
4.5–5	− 1.00	1.49	−2.44	1.60	.69	.58	− .41	.90
5–8	0	0	0	0	0	0	0	0
8–9	− 1.04	.81	.35	.76	−1.90	.94	−1.44	1.25
9–10	.56	.97	− .59	.85	− .90	1.39	.10	1.77
10–11	− 2.37	.83	−1.26	.76	−8.39	2.11	−6.30	2.76
>11	− 2.55	5.23	−2.61	2.49	5.60	6.19	−5.88	11.79

[a]Age-of-dam effects were computed as deviations from the mature dams (5 to 8 yr of age).

had a value of 2.6 kg). The other young-cow subclasses were all negative, e.g, −10 kg for the 4.5-to 5-yr-old dam subclasses. Thus, the positive values for some of the age-of-dam effects for postweaning showed some small compensatory growth in some dam subclasses. However, most of the estimates were close to zero, suggesting that preweaning environment was adequate for the growth of most male calves. Female calves, on the other hand, showed more evidence of compensatory growth. Most of the estimates of age-of-dam effects for postweaning gain were positive for daughters of F_1 and Simmental dams. Younger cows had larger values than older cows, e.g., 4.6 kg and 5.0 kg for 2-yr-old and younger F_1 and Simmental dams. The corresponding estimates for 4- to 4.5-yr-old F_1 and Simmental females were 1.3 kg and 1.5 kg. Age-of-dam effects on daughters of base dams showed a zigzagging pattern of positive and negative values from 2-yr-old dams to mature cows. For instance, the values for 2- to 2.5-, 2.5- and 3- and 3-to 3.5-yr-old base cows were 8.5 kg, −3.2 kg and 3.1 kg. The majority of the age-of-dam effects for cows older than the mature age range was negative for male and for female calves. For instance, the estimates for 8- to 9-yr-old dams for bulls and heifers were −1.0 kg and .4 kg for base dams and −1.9 kg and −1.4 kg for Simmental dams. This would indicate that calves out of old dams were overfed during the preweaning period. However, the standard errors for most of the postweaning gain estimates of age-of-dam effects are large. More data are required to draw firm conclusions about postweaning age-of-dam effects using field data.

Conclusions

Important age-of-dam effects were found for BW and for WW in the Simmental population. Age-of-dam effects were different for male and female calves and for base and Simmental females. Thus, if BW and WW records were to be adjusted for age-of-dam effects, separate correction factors should be used for males and females within base and Simmental dams.

Age-of-dam effects for GW were less important than those for BW and WW. Also, there was no clear pattern for these effects in different sexes. However, there was some evidence for compensatory growth in calves (especially Simmental females) from young dams.

Literature Cited

Anderson, J. H. and R. L. Willham. 1978. Weaning weight correction factors from Angus field data. J. Anim. Sci. 47:124.

ASA. 1985. Sire Selector. Amer. Simmental Assoc., Bozeman, MT.

Elzo, M. A., E. J. Pollak and R. L. Quaas. 1987. Genetic trends due to bull selection and differential usage in the Simmental population. J. Anim. Sci. 64:983.

Gregory, K. E., L. V. Cundiff, G. M. Smith, D. B. Laster and H. A. Fitzhugh, Jr. 1978. Characterization of biological types of cattle – cycle II: I. Birth and weaning traits. J. Anim. Sci. 47:1022.

Henderson, C. R. 1976. Multiple trait sire evaluation using the relationship matrix. J. Dairy Sci. 59:769.

Henderson, C. R. and R. L. Quaas. 1976. Multiple trait evaluation using relatives' records. J. Anim. Sci. 43:1188.

Notter, D. R., L. V. Cundiff, G. M. Smith, D. B. Laster and K. E. Gregory. 1978. Characterization of biological types of cattle. VII. Milk production in young cows and transmitted and maternal effects on preweaning growth of progeny. J. Anim. Sci. 46:908.

Pollak E. J. and R. L. Quaas. 1981. Definition of group effects in sire evaluation models. J. Dairy Sci. 66:1503.

Quaas, R. L. and E. J. Pollak. 1980. Mixed model methodology for farm and ranch beef cattle testing programs. J. Anim. Sci. 51:1277.

Reynolds, W. L., T. M. DeRowen, S. Moin and K. L. Koonce. 1980. Factors influencing gestation length, birth weight and calf survival of Angus, Zebu and Zebu cross beef cattle. J. Anim. Sci. 51:860.

Robison, O. W., M.K.M. Yusuff, and E. U. Dillard. 1978. Milk production in Hereford cows. I. Means and correlations. J. Anim. Sci. 47:131.

Rutledge, J. J., O. W. Robison, W. T. Ahlschwede and L. E. Legates. 1971. Milk yield and its influence on 205-day weight of beef calves. J. Anim. Sci. 33:563.

Smith, G. M., D. B. Laster and K. E. Gregory. 1976. Characterization of biological types of cattle. I. Dystocia and preweaning growth. J. Anim. Sci. 43:27.

Young, L. D., L. V. Cundiff, J. D. Crouse, G. M. Smith and K. E. Gregory. 1978. Characterization of biological types of cattle. VIII. Postweaning growth and carcass traits of three-way cross steers. J. Anim. Sci. 46:1178.