

Published in Proc. West. Sec. Am. Soc. An. Sci., Vol. 14. 1963.

Relationship Among Weights of Dam and Progeny Performance<sup>1/</sup>

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Size in beef cattle and its relationship to economical beef production has long been discussed by scientists and producers. Several studies concerning size in beef cattle and its relationship with preweaning, feedlot, and carcass performance have been reported in the literature over the years. The objectives of the present analysis were to study the relationship of the dam's 18-month and 5 1/2-year weights with progeny performance from birth through 18 months of age.

Materials and Methods

Individual records of birth weights, weight gains, feed consumption, and feed per unit of gain were obtained on 214 heifers and 16 steers over a ten-year period from 1951 to 1961. Test periods averaged about 120 days. Two levels of feeding, high (a good growing ration composed of 50 percent roughage and 50 percent concentrate) and low (a ration composed of 86 percent roughage and 14 percent concentrate), were used. During the summer following the feed test, the animals were grazed in common on a sagebrush-bunchgrass range. Individual records of weight gains on summer range and of final weights were obtained on all animals.

Native meadow hay composed chiefly of rush (Juncus spp.) and sedge (Carex spp.) made up the roughage portion of rations used in testing the heifers. The concentrates fed were barley and cottonseed meal.

During each testing period, rations were weighed to animals daily, and refusals were weighed at weekly intervals. Animals were tied to individual feed mangers from 7:00 a.m. until 3:00 p.m. daily and ranged in common lots during the remainder of the day. Individual weights were recorded at 14-day intervals. All weights were taken following an overnight restriction from feed and water.

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<sup>1/</sup> This study was conducted in cooperation with Agricultural Research Service, U.S.D.A. and State Experiment Station under Western Regional Research Project W-1 on Beef Cattle Breeding Research.

<sup>2/</sup> Jointly operated by the Oregon Agricultural Experiment Station and the Crops Research Division, Agricultural Research Service, U.S.D.A.

Technical Paper No. 1675. Oregon Agricultural Experiment Station.

The weights of the dams of these animals were obtained at 18 months and at 5 1/2-years of age. A part of the dams had also been individually fed as weaner calves under high and low levels of feeding while the remainder received a normal wintering ration as weaner calves.

The correlation and regression analyses among weights in the dam and traits in the calf were computed within birth year of dam--birth year of calf--level of feeding of calf and dam--sex subclasses. Analyzing the data by birth year of dam adjusts the 18-month and 5 1/2-year weights of the dam for the year in which the weight was taken and at the same time, adjusts traits in the calf for age of dam effects. Levels of feeding of calf and dam were divided into six classes according to high and low levels of feeding on the calves and high, low or normal level of wintering on their dams as weaner calves. By classing the data in this manner calf performance was adjusted for level of feeding while the weight of their dams was adjusted for level of winter feeding as weaner calves.

### Results and Discussion

The means and standard deviations for traits in the calf and cow weights are given in table 1. The standard deviations were computed within subclasses and described earlier.

Table 1. Means and Standard Deviations of Calf Traits and Weights of Dam

Trait	Number	Mean	Standard deviation
Birth weight, lb.	230	72.1	6.7
Suckling daily gain, lb.	230	1.44	.15
Daily gain on feed, lb.	230	1.29	.16
Daily TDN consumption, lb.	230	7.10	.57
TDN per unit gain, lb.	230	5.50	.92
Weight off feed, lb.	230	550	46
Daily gain on range, lb.	230	1.45	.26
Weight off range, lb.	230	673	53
Dam's 18-month weight, lb.	230	648	58
Dam's 5 1/2-year weight, lb.	230	997	98

The correlations of 18-month and 5 1/2-year weights of the dam with traits in the calf were computed within subclasses and are shown in table 2.

The correlations involving 18-month weight as compared to 5 1/2-year weight show exactly the same pattern with the correlations involving 5 1/2-year weight being slightly higher in every case. This would tend to indicate that 5 1/2-year weight of dam is a slightly more accurate indication of calf performance than is 18-month weight although the difference is very small in most cases. The correlation between 18-month weight and 5 1/2-year weight was 0.49 in these data.

Table 2. Within Subclass Correlations of Calf Traits With Weights of Dam

Calf traits	d.f.	Weights of dam	
		18-month weight	5 1/2-year weight
Birth weight	133	.32**	.44**
Suckling daily gain	133	.20*	.26**
Daily gain on feed	133	.19*	.21*
Daily feed consumption	133	.15	.17*
Feed per unit gain	133	-.10	-.21*
Weight off feed	133	.20*	.29**
Daily gain on range	133	.02	.07
Weight off range	133	.22**	.27**

\*  $P < .05$ \*\*  $P < .01$ 

These correlations indicate that heavier cows at 18 months and 5 1/2-years of age tend to produce calves that are heavier at birth and gain somewhat faster from birth to weaning. These correlations are in general agreement with similar studies reported in the literature. Marchello *et al.* (1960) obtained correlations of 0.267 and 0.239 between 18-month weight of the cow, and birth weight and weaning weight of the first calf, respectively. Brinks *et al.* (1962) reported correlations of 0.21 and 0.05 of fall weight of the dam with birth weight and 180-day preweaning gain of the calf, respectively. Marlowe (1962) obtained correlations of 0.28 and 0.24 between preweaning gain of calves and mature weights of sires and 0.23 and 0.20 for dams of the Angus and Hereford breeds, respectively. Gregory *et al.* (1950) reported a correlation of 0.32 between birth weight of the calf and weight of the cow on the last weigh-day before calving, and correlations of 0.20 and -.11 between calf and cow weights at weaning.

Heavier cows also tended to produce calves that gained faster in the feedlot, consumed somewhat more feed, and were more efficient in converting feed into pounds of gain. The daily gain of calves on range after the feed test was only slightly related to weights of their dams whereas the correlations between the final weight of calves off range and the 18-month and 5 1/2-year weights of their dams were 0.22 and 0.27 respectively.

The regressions of the various calf traits on weights of the dam are given in table 3. The regressions are shown as the change per 100 pounds of change in weight of the cow.

Table 3. Within Subclass Regression of Calf Traits on Weights of Dam

Calf traits	d.f.	Weights of dam	
		18-month 100 pound	5 1/2-year weights 100 pound
Birth weight, lb.	133	3.7	3.0
Suckling daily gain, lb.	133	.053	.040
Daily gain on feed, lb.	133	.052	.034
Daily feed consumption, lb.	133	.148	.102
Feed per unit of gain, lb.	133	-.155	-.198
Weight off feed, lb.	133	16.3	13.7
Daily gain on range, lb.	133	.008	.018
Weight off range, lb.	133	19.8	14.6

The regressions of the traits on 18-month and 5 1/2-year weights of the dam are very similar in magnitude, with the regressions on 18-month weight generally being somewhat larger. This indicates that one hundred pound change in 18-month weight is associated with a slightly larger change in the calf traits than a corresponding 100-pound change in 5 1/2-year weight. However, a change of one standard deviation in 5 1/2-year weight (98 lb.) is associated with a greater change in the calf traits than is a one standard deviation change in 18-month weight (58 lb.) in every case as shown earlier by the correlations. On the average, dams that weigh one standard deviation above the average for 18-month and 5 1/2-year weight would be expected to produce calves that weigh about 9 and 13 pounds above average at the end of the feed test at about a year of age. The regressions of suckling daily gain on weight of dams is similar to the findings of Marlowe (1962) who reported changes in preweaning daily gain of calves for each 100 pound change in mature weight of the parent to be 0.034 and 0.030 for sires and 0.061 and 0.052 for dams of the Angus and Hereford breeds, respectively.

Although the correlations and regressions obtained in this study are fairly small, they do indicate that larger cows tend to produce offspring that gain faster and weigh more from birth through approximately 18 months of age and although these faster gaining offspring consume more feed, they are still more efficient than slower gaining animals. The results shown here and in similar studies could be used as a guide to the breeder in selecting or buying female replacements.

## Summary

Data on 230 cow-calf records collected at the Squaw Butte Experiment Station, Burns, Oregon, were used to study the relationship between cow weights and calf performance from birth through 18 months of age. Although the relationships were fairly low, correlations and regressions dealing with the relationship of cow weights with calf performance indicated that heavier cows tend to produce calves that gain faster and are heavier from birth through 18 months of age. Calves from larger cows also tended to gain faster in the feedlot, consume more feed, and convert feed into pounds of gain more efficiently. Correlations involving 5 1/2-year weights of cows with calf performance were slightly higher than those involving 18-month weights of cows.

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