EXTENSION

BEEF CATTLE RESEARCH UPDATE
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Effect of Dam Age on Heifer Progeny Performance and Longevity

Selection and development of heifers can have long-term impacts on production and profitability. Developing females to replace cull cows is costly and one of the most expensive management decisions for cow–calf producers. Research shows it takes 5 calves to pay for the development costs and annual maintenance of a replacement heifer. Thus, reducing heifer investment costs while maintaining reproductive performance is important for profitability. Research has clearly demonstrated that heifers that calved early in their first calving season had increased longevity and weaned more calves, compared with heifers that calved later in the calving season.[1, 2] Producers selecting replacement females place emphasis on both reproduction and growth value. Mature beef cows typically wean heavier calves compared with younger cows which may increase the percentage of heifers to reach puberty by breeding. However, younger cows are thought to be genetically superior to older cows due to the rate of genetic progress. Little information is known regarding the optimal dam age for selecting replacement females. Thus, University of Nebraska researchers conducted a study evaluating the effect of dam age on female progeny performance and herd longevity.[3] They hypothesized that heifer progeny from moderate (4 to 6 years old) and mature (≥ 7 years old) cows would have increased growth during development, reproductive performance, and longevity in the cow herd.

In this study, cow and calf performance data were collected from 2005 through 2017 at the University of Nebraska, Gudmundsen Sandhills Laboratory near Whitman, NE. Cow and calf performance data were obtained from both March and May calving herds at to determine the impact of dam age on subsequent heifer progeny performance and longevity. The cows used in this study (1,059 head) were Red Angus x Simmental ranging from 2 to 11 years of age. The cows were classified by age groups as young (2 to 3 years old), moderate (4 to 6 years old), and old (≥ 7 years old). Heifer calves were weighed at birth and weaning each year. Weaning weights were adjusted for a 205-day weaning weight with no adjustments for sex of calf or age of dam. Each year, all heifers were managed together within their respective breeding group. March-born heifers grazed meadow until early June then moved to upland native range, and May-born heifers continuously grazed upland native range. In each year, heifers were weighed at pre-breeding and at pregnancy diagnosis. Heifers were synchronized with a single prostaglandin F2 alpha (Lutalyse, Zoetis, Parsippany, NJ) injection 5 days after bull placement for a 45-day breeding season. Calving distribution in 21-day intervals was calculated with the start of the calving season coinciding with the first day two or more heifers calved.

The effect of dam age on heifer progeny growth performance is shown in Table 1. Heifer calves born to young cows had lighter ($P \leq 0.01$) birth weights (70 vs. 74 lb) and 205-day weights (438 vs. 454 lb) than heifer calves born to moderate and old cows. The increase in 205-day weights might be expected since milk production has been shown to increase with cow age, plateauing between 6 and 10 years of age.[4] Although pre-weaning weight differences occurred, heifer pre-breeding and pregnancy determination weights did not differ ($P \geq 0.17$) among dam age groups.

The effect of dam age on the heifer progeny reproductive performance is shown in Table 2. Female progeny born to moderate (69.64%) and old (74.06%) cows had a greater ($P < 0.01$) percentage reach puberty before breeding compared with heifers born to young cows (51.55%). However, dam age did not influence ($P = 0.15$) heifer progeny pregnancy rates. These authors suggested that this could be attributed to post-weaning growth, as no weight differences were observed among the groups suggesting heifer postweaning intake and plane of nutrition affected reproduction success. In the subsequent calving season, there were no differences ($P = 0.28$) among age groups for

percentage of heifers who calved within the first 21 days of calving. However, the average number of calf crops from progeny within dam age was different among all groups (P < 0.01), with heifer progeny from young dams having more calves (3.1) than moderate (2.8) and old (2.2). This finding suggests as dam age increases, retention and productivity of female progeny decrease.

Table 1. Effect of dam age on heifer progeny growth performance.

	Dam Age[1]			
Item	Young	Moderate	Old	P-value
Heifer Weight, lb				
Birth	70[a]	75[b]	73[b]	< 0.01
205 day	438[a]	455[b]	453[b]	0.01
Pre-breeding	612	625	621	0.21
Pregnancy diagnosis	820	820	809	0.17

[1]Dam age = dam age at time of calving, Young (2 to 3 years of age), Moderate (4 to 6 years of age), and Old (≥ 7 years of age).
[a,b]Means with different superscripts differ P ≤ 0.05.
Source: Beard et al., 2019.

Table 2. Effect of age of dam on heifer progeny reproductive performance.

	Dam Age[1]			
Item	Young	Moderate	Old	P-value
Puberty, %	51.55a	69.64[b]	74.06[b]	< 0.01
Pregnancy, %	80.44	84.08	85.89	0.15
Calved in first 21 days, %	73.34	77.88	78.94	0.28
Calf crop[2], #	3.1	2.8	2.2	<0.01

[1]Dam age = dam age at time of calving, Young (2 to 3 years of age), Moderate (4 to 6 years of age), and Old (≥ 7 years of age).
[2]Number of calf crops produced within age of dam groups.
[a,b]Means with different superscripts differ P ≤ 0.05.
Source: Beard et al., 2019.

These researchers concluded that results from this study suggest that age of dam will impact heifer progeny growth and reproductive performance. Heifer progeny from moderate and older dams tended to have increased performance up to first calving. However, heifer progeny from young dams had increased calf crops and productivity compared with their older counterparts. Thus, depending on production goals, age of dam may need to be considered for selecting replacement females with the goal of increased productivity and long-term profitability.

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[2] Damiran, D., K. A. Larson, L. T. Pearce, N. E. Erickson, and B. H. A. Lardner. 2018. Effect of calving period on beef cow longevity and lifetime productivity in western Canada. Transl. Anim. Sci. 2:S61-S65.
[3] Beard, J. K., J. A. Musgrave, K. J. Hanford, R. N. Funston and J. T. Mulliniks. 2019. The effect of dam age on heifer progeny performance and longevity. Transl. Anim. Sci. 3 (Suppl. 1): 1710-1713.
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