The effect of cow udder score on subsequent calf performance in the Nebraska Sandhills

Joslyn K. Beard, Jacki A. Musgrave, Richard N. Funston, and J. Travis Mulliniks[1]

University of Nebraska, West Central Research and Extension Center, North Platte, NE 69101

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INTRODUCTION

Selection pressure for increased production has caused producers to remove cows based on factors that include reproductive failure, structural issues, poor health, and disease. Producers emphasize improved growth by selecting genetically superior animals through increased milk yield and calf growth. Udder conformation and milk yield have been shown to impact calf preweaning ADG (Neville, 1962; Gleddie and Berg, 1968). However, beef cows with poor udder conformation may decrease production by decreased calf BW at weaning and increased labor costs, leading producers to cull females with mammary problems. Cows with poor udder confirmation at calving are at greater risk of developing mastitis (DeGroot et al., 2002). Although mastitis is more prevalent in dairy herds, it does affect 12% to 20 % of beef females (Haggard et al., 1983; Watts et al., 1986), which reduces longevity within the cowherd. Mastitis-infected females have decreased milk production and altered milk components that effect overall calf growth (Crossman et al., 1950; Paape et al., 2000). Research has shown defects in teat shape and size inhibits the calf's nursing ability thus negatively impacting intake and gain. Frisch (1982) reported a correlation between cows with long teats and high calf mortality; however, that same study concluded that a calf would survive if the cow had one functional teat due to dams with poor teat conformation having greater milk yield. In addition, Edwards et al. (2017) reported that milk production level did not influence calf BW at weaning and ADG preweaning. Thus, we hypothesized that cows classified with poor udders would produce calves with similar preweaning and postweaning growth. The objective of this study was to evaluate the effect of beef cow udder score within two calving seasons on preweaning and postweaning progeny performance.

MATERIALS AND METHODS

Cow and calf performance data on 812 cows were collected from 2013 through 2017 at the Gudmundsen Sandhills Laboratory (Whitman, NE). All animal procedures and facilities were approved by the University of Nebraska Animal Care and Use Committee.

Cow/Calf Management

Cow and subsequent calf performance were obtained from the March (n = 500) and May (n = 312) calving herds at Gudmundsen Sandhills Laboratory. Each year at calving, udder scores were recorded from a 1 to 5 as reported in the Intergrade Resource Management Guide (National Cattlemen's Beef Association, 2013). Cows were grouped by udder scores and classified as either BAD (udder score 1 or 2, n = 223) or GOOD (udder score 3 or 4, n = 1,742). An udder score of 5 was not recorded

[1]Corresponding author: travis.mulliniks@unl.edu
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during the course of the study. The udder score uses a combination of udder conformation and teat score system. Calf data was stratified by calving season.

Calves were vaccinated at 2 mo of age with an infectious bovine rhinotracheitis, parainfluenza-3 virus, bovine respiratory syncytial virus, and bovine viral diarrhea type I and II vaccine (BoviShield 5, Zoetis, Florham Park, NJ). Calves were also weighed, branded, and male calves were castrated. Calves were then moved with cows to native upland range pastures. At weaning, calves were weighed and vaccinated against bovine rotavirus–coronavirus clostridium perfringens types C and D and *Escherichia*. After weaning, March-born steer calves were placed in a drylot and consumed ad libitum hay for 2 wk postweaning after which they were transported to the West Central Research and Extension Center (**WCREC**). After weaning, May-born steers grazed subirrigated meadow with 0.45 kg supplement or received ad libitum hay with 1.8 kg supplement until approximately 1 yr of age then relocated to WCREC. Steers were then placed in a GrowSafe feeding system (GrowSafe Systems Ltd., Airdrie, Alberta, Canada) approximately 2 wks after arrival at WCREC. All steer BW was measured on two consecutive days before GrowSafe entry and again 10 d after GrowSafe entry to account for the acclimation period to the feeding system. The average of the 2-d BW after the acclimation period was considered the initial feedlot entry BW and data concerning feedlot performance (BW change, DMI, and ADG) was calculated from the average BW. All calves experienced a 21-d transition period allotted for a common finishing diet of 48% dry rolled corn, 40% corn gluten feed, 7% prairie hay, and 5% supplement. At feedlot entry, all calves were implanted with 14 mg estradiol benzoate and 100 mg trenbolone acetate (Synovex Choice, Zoetis). Approximately 100 d before slaughter, calves were implanted with 28 mg estradiol benzoate and 200 mg trenbolone acetate (Synovex Plus, Zoetis). March-born steer calves were managed similarly during finishing as the May-born calves; however, steer calves were fed as a group in drylot pens. Each year, steer calves were sent to a commercial slaughter facility (Tyson Fresh Meats, Lexington, NE) when estimated visually to have 1.3 cm fat thickness over the 12th rib. Carcass data were collected 24 h post slaughter and final BW was calculated from HCW based on average dressing percentage of 63%. Carcass data included HCW, marbling, yield grade, backfat, and LM area.

Statistical Analysis

Data were analyzed using the PROC MIXED and GLIMMIX procedure of SAS (SAS Inst. Inc., Cary, NC). A mixed-model ANOVA accounted for correlations within udder score and udder score within calving season. Models included the effect of treatment, cow age, calving season, and calf sex for all appropriate data. Data are presented as LSMEANS and P values ≤0.05 were considered significant and tendencies were considered at a $P > 0.05$ and $P \leq 0.10$.

RESULTS AND DISCUSSION

Calf Preweaning Performance

Calf BW, weaning, and adjusted 205-d BW is reported in Table 1. Influence of sex was not significant in any of the parameters ($P \geq 0.10$), thus, heifer and steer data were pooled together in all preweaning variables. Calf BW was similar between udder score groups ($P = 0.95$) along with calf weaning BW ($P = 0.40$), and adjusted 205-d BW ($P = 0.28$). In agreement, Frisch (1982) reported no differences in calf BW at weaning in relation to dam's teat conformation which indicates that udder conformation does not limit calf growth up to weaning through decreased suckling ability or milk yield. However, these results contradict Goonewardene et al. (2003) who reported dams with pendulous udders and bottle teats weaned lighter calves compared with well-attached udder and even quarter dams.

Feedlot Performance

Feedlot performance of steer calves is reported in Table 2. There were no differences between dam udder score group when evaluating postweaning calf feedlot entry BW ($P = 0.41$), final feedlot BW ($P = 0.30$), DMI ($P = 0.54$), ADG ($P = 0.60$), and G:F ($P = 0.70$). Cafe et al. (2006) reported cattle that entered the feedlot at similar BW performed with similar growth rates, despite being on a slow or rapid rate of gain from birth to weaning. Moreover, Hennessy and Arthur (2004) evaluated the effect of high and low preweaning growth on calf efficiency in the feedlot, reporting no differences in ADG between the two groups.

Carcass Characteristics

Carcass performance is reported in Table 3. Calves suckling GOOD udder dams had greater HCW ($P = 0.04$) and backfat ($P = 0.02$) compared with BAD udder counterparts. Calves consuming a greater plane of nutrition a few months after birth

Table 1. Effect of calving season and cow udder score on calf growth to weaning

	Treatments[a]			
Item	BAD	GOOD	SEM	*P* value
Birth BW (kg)	32	32	0.5	0.95
Weaning BW(kg)	204	202	3	0.40
Adj. 205 d BW(kg)	154	156	3	0.28

[a]Treatments are BAD (udder score of 1 or 2) and GOOD (udder score of 3 or 4).

Table 2. Effect of cow udder score on calf feedlot performance

	Treatments[a]			
Item	BAD	GOOD	SEM	*P* value
Entry wt (kg)	269	276	8	0.41
Final wt (kg)	617	628	10	0.30
DMI (kg)	12.5	12.3	0.25	0.53
ADG (kg)	1.67	1.70	0.03	0.60
G:F (kg/kg)	0.14	0.14	0.003	0.85

[a]Treatments are BAD (udder score of 1 or 2) and GOOD (udder score of 3 or 4).

Table 3. Effect of calving season and cow udder score on calf carcass traits

	Treatments[a]			
Item	BAD	GOOD	SEM	*P* value
HCW (kg)	375	389	7	0.04
Yield grade	2.3	2.7	0.20	0.10
LM area (cm^2)	89.7	90.9	1.87	0.63
Marbing score	454.5	461.2	23.2	0.85
Backfat (cm)	1.27	1.45	0.08	0.02

[a]Treatments are BAD (udder score of 1 or 2) and GOOD (udder score of 3 or 4).

have increased fat deposition, carcass merit, and heavier carcass weight than those managed on a lower plane of nutrition (Stuedemann et al., 1968; Hennessy and Morris, 2003). Although, feedlot entry and final BW were not different between Good and Bad udder suckling calves, steer feedlot BW were numerically increased, which may have increased HCW.

IMPLICATIONS

Calves suckling dams classified as having BAD udders at calving performed similarly during the preweaning period with GOOD udder counterparts, with no differences in overall feedlot performance between udder groups. However, steer calves suckling GOOD udder cows did have heavier carcass weights after the finishing period. Further research is required to define the effects of udder score on generational effects of female progeny and how calving season influences the proportion of BAD udder cows.

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