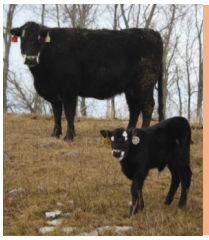

Central Grasslands Research Extension Center Herd Performance from 2012 to 2017

Carl Dahlen[1]
[1]Department of Animal Sciences, North Dakota State University, Fargo, ND
[2]Department of Animal Science, Texas A&M University, College Station, TX

Data from breeding, pregnancy determination, calving, and weaning from the Central Grasslands Research Extension Center (REC) were compiled to represent production cycles beginning with breeding in 2011 (i.e., 2012 calf crop) and continuing until breeding of 2016 (i.e., 2017 calf crop). Once aligned within individual females, data were analyzed across years to evaluate trends over time. In addition, performance of calves sired by artificial insemination (AI) and natural service were compared. Calf birth weights peaked in 2013 with an average of 89.6 lbs., with lower ($P < 0.001$) birth weights observed in 2014, 2015, and 2017, and lowest ($P < 0.001$) birth weights observed in 2016 (77.8 lbs.). A steady increase ($P < 0.001$) in weaning weight was observed beginning in 2015 and continuing yearly through 2017, with an increase of nearly 110 lbs. In addition, 205-day adjusted weaning weight had a steady increase ($P < 0.001$) from 2014 to 2017, with a magnitude of nearly 130 lbs. Comparing AI with natural service revealed a nearly 4 lb. reduction ($P < 0.001$) in birth weight and an increase ($P < 0.001$) in weaning weight (+74.4 lb.), adjusted weaning weight (+27 lb.), and average daily gain (+0.12 lb./day) for calves sired by AI. Overall, the CGREC has observed enhanced growth performance over time, and some of that impact is due to inclusion of AI into their commercial beef herd. Further evaluations will evaluate performance of calves from females born from AI and natural service, as well as longevity and lifetime productivity.

Introduction

Since 2011, our research group has been conducting efforts related to enhancing productivity of cow-calf production systems. One of the common elements of this work has been inclusion of artificial insemination (AI) in a majority of the females at the CGREC. Though several different efforts have been conducted, the goal of this brief report is to summarize total herd performance from the calf crops of 2012 to 2017 and compare performance among years. In addition, a comparison of calves sired by AI and calves sired by natural service is presented.

Experimental Procedures

All procedures were conducted in accordance with the rules of the North Dakota State University Institutional Animal Care and Use Committee.

Information from spreadsheets established at breeding, pregnancy checking, calving, and weaning was compiled for each year beginning with breeding in 2011 (i.e., 2012 calf crop) until 2016 (i.e., representing 2017 calf crop). Data collected on breeding spreadsheets included heifer/cow age, previous calving date, breeding date, and AI sire. Data collected at pregnancy examination included whether female was pregnant to AI or to a herd bull. Data collected at time of calving included date, calf sex, calving ease, and birth weight (BW). Data collected at weaning included date and weaning weight (WW). All data were compiled within a yearly production cycle and aligned to each female present at breeding to follow her calf performance through birth and weaning.

Calculations included gain from birth to weaning (WW – BW), calf age at weaning (weaning date – birth date) and average daily gain (gain ÷ calf age at weaning). An adjusted 205-day weaning weight (205 d. Adj WW) also was calculated according to the Beef Improvement Federation's Uniform Guidelines (2010) to account for calf weaning with respect to variation in calf birthdate within a calving season and the variation in age of females weaning calves:

$$\text{Adj. 205-Day Weaning Weight} = (\text{WW-BW})/\text{Weaning Age} \times 205 + \text{BW} + \text{Age of dam Adj.}$$

Age of dam adjustments were as follows:

	Calf Sex	
Age of Dam at Birth of Calf	Male	Female
2	+60	+54
3	+40	+36
4	+20	+18
5 – 10	0	0
11+	+20	-18
Adapted from BIF, 2010		

Data were analyzed using the GLM procedure of SAS to compare respective performance (BW, WW, Gain, average daily gain (ADG), 205 d. Adj WW) across years from calf crops of 2012 to 2016. An additional model was developed to compare performance of calves sired by AI sires with those calves sired by cleanup bulls.

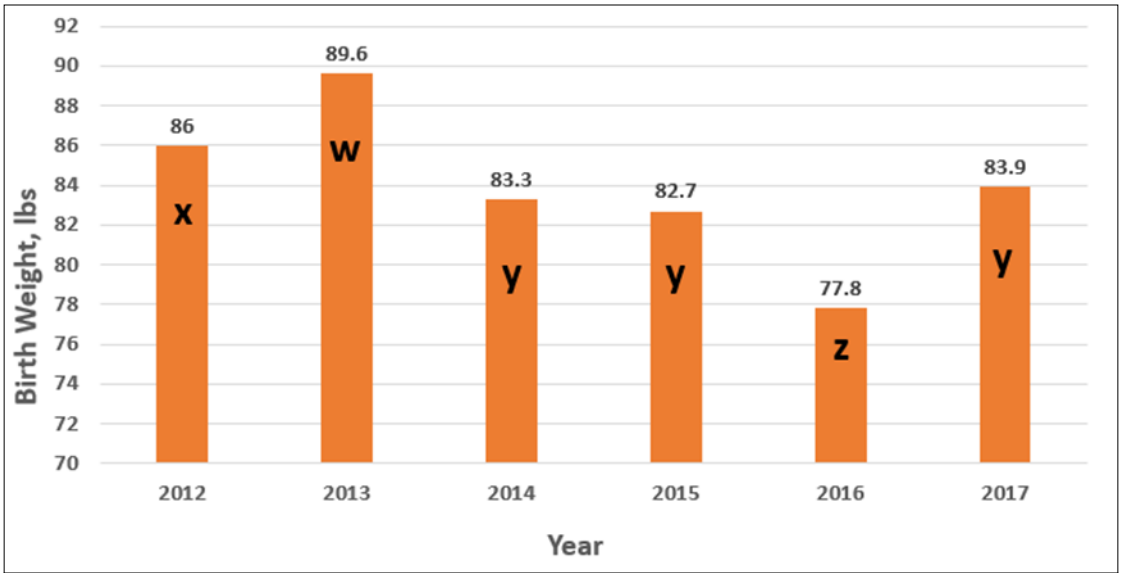

Figure 1. Calf birth weights at CGREC from 2012 to 2017.

Results

Birth Weight

Calf birth weights peaked in 2013 with an average of 89.6 lbs., with lower ($P < 0.001$) birth weights observed in 2014, 2015, and 2017, and lowest ($P < 0.001$) birth weights observed in 2016 (77.8 lbs.; Figure 1).

Weaning Weight

A steady increase ($P < 0.001$) in weaning weight was observed beginning in 2015 and continuing yearly through the end of the evaluation period (Figure 2). By 2017, weaning weights had increased by nearly 110 lbs. compared with the average weaning weights from 2012 to 2014.

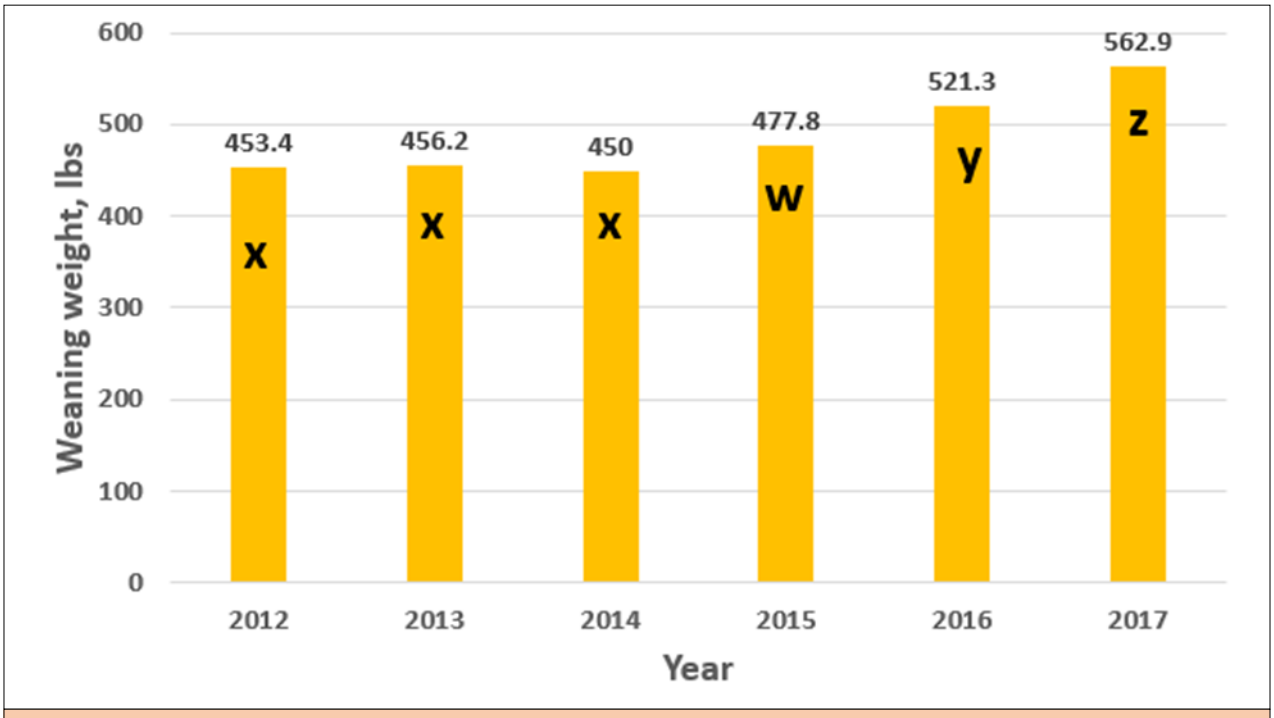

Figure 2. Calf weaning weights at CGREC from 2012 to 2017.

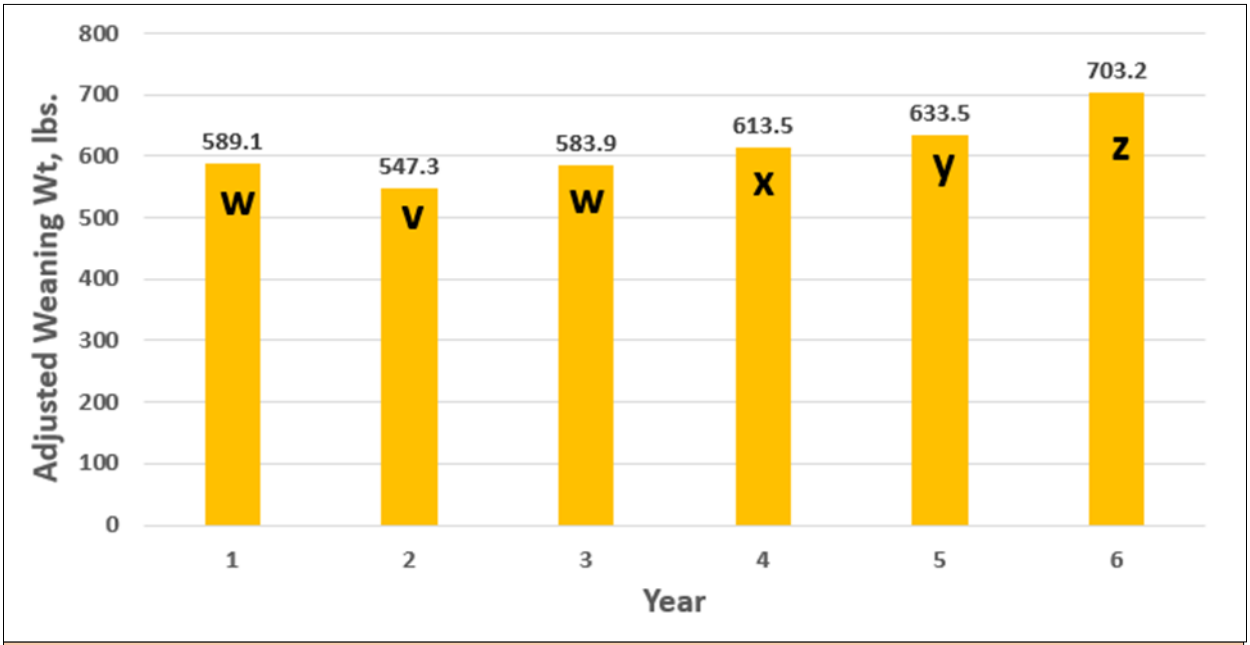

Figure 3. Adjusted 205-day weaning weights at CGREC from 2012 to 2017.

205-day adjusted weaning weights

The adjusted weaning weights were calculated to account for age differences among calves and for changing age structures of females in the herd. Here, too, we observed a steady increase ($P < 0.001$) from 2014 to 2017, with a magnitude of nearly 130 lbs (Figure 3).

Impact of Artificial Insemination

The model that compared performance of calves sired by AI with those sired by herd cleanup bulls revealed major changes associated with implementing reproductive technologies. Birth weight of AI-sired calves was nearly 4 lbs. lighter ($P < 0.001$) than those sired by natural service bulls (Table 1). Weight traits, however, were all greater ($P < 0.001$) for calves sired by AI compared with natural service, with a WW advantage of 74.4 lbs., an adjusted WW advantage of 27 lbs., and an ADG advantage of 0.12 lbs/day. The cause of specific changes resulting from AI is likely due to a combination of factors: bulls used for AI may have favorable expected progeny difference (EPD) values, accuracy associated with EPDs of AI bulls is greater than that of cleanup bulls, and calves born from AI are older at weaning compared with calves born from cleanup bulls.

Data presented in this report are just the beginning of a thorough evaluation of changes over time and the impacts of artificial insemination into a commercial beef herd. This dataset also contains information related to female body condition score, days postpartum, gestation length, and calving distribution that can be helpful in understanding why specific changes are occurring. In addition, as data continue to be generated, the long-term impacts of implementing AI can become clearer. Items such as reproductive and calf performance from females sired by AI vs. natural service and longevity of the respective groups of females in the herd continue to be monitored as they are critical components of overall herd profitability.

Table 1. Impact of artificial insemination on herd performance characteristics: Summary of 2012 to 2017 calf crops.

Item	Natural Service	Artificial Insemination	SE	P-Value	Difference
Birth Weight, lbs.	86.0	82.1	0.38	<0.001	-3.9
Weaning Weight, lbs.	447.5	521.9	1.96	<0.001	+74.4
Gain from Birth to Weaning, lbs.	361.4	439.9	1.96	<0.001	+78.5
Average Daily Gain, lbs./d	2.42	2.54	0.01	<0.001	+0.12
205 d Adj. Weaning Weight, lbs.	596.3	623.3	2.40	<0.001	+27