Comparison of reproductive and early growth performance of an F1 USDA Prime yield grade one carcass clone sire and an industry-leading purebred sire in the beef x dairy production system

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INTRODUCTION

- In dairy production, a shift towards utilizing beef-breed semen for non-replacement matings has allowed for the qualitative improvement of the resulting beef by dairy composite carcasses.
- Possibility of reproductive repercussions of these matings remains a producer concern, as dystocia associated with heavier birth weights can negatively impact milk production and postpartum interval of dams (Dematawewa and Berger, 1997; Berry et al., 2019).
- In 2012, the WTAMU PrimeOne project was initiated to determine if breeding individuals cloned from Prime, yield grade (**YG**) one carcasses could produce a comparable carcass outcome in their offspring.
- Though proven successful when bred to beef breeds (Sperber, 2018; Francis, 2019), the merit of the PrimeOne genetic line has yet to be evaluated in the beef x dairy production system.

OBJECTIVES

- The objectives of this study were to determine if the F1 USDA Prime YG one sire from the WTAMU PrimeOne project was a reproductively competitive sire for producing dairy composites when compared to a purebred Angus sire and to evaluate any subsequent reproductive impact of these sires on the dam.

MATERIALS AND METHODS

BREEDING PROCEDURE

- Study was conducted at a commercial dairy in the Texas Panhandle.
- 1,930 straws of frozen semen were used to artificially inseminate Jersey, Holstein and HolsteinxJersey cows.
  - 984 straws from the F1 clone sire (**AxG1**)
  - 946 straws from the purebred Angus sire (**Foundation**)
- Breeding period began in March 2020 and continued through June 2020 until all project semen was utilized.
- Cows were randomly assigned to sire group according to chute order on breeding day. Any cow exhibiting signs of estrus was eligible to enter the project.
- Breeding technicians alternated between sire for each insemination.
- Pregnancy was determined by blood on d 28 of gestation, confirmed by rectal ultrasound on d 80 and 200.
- Cows were eligible for a maximum of 5 services before being removed from project and culled from production. After conception, cows could be culled from production at any point during remainder of project.

CALF DATA COLLECTION

- At parturition, calves were removed from dam. Birth weight (**BW**), sex and calving ease (**CE**) score were recorded.
- Calves were housed indoors for 24 hr. Bull calves were band castrated, and all calves dehorned.
- After 24 hr, calves were housed in individual calf hutches from d 2 to 80, 20 hd pens d 80 to 120, 40 hd pens d 120 to 150. Sire groups were mixed within pen.
- Individual calf weights were recorded on d 60 and 120, and average daily gains (**ADG**) calculated.
- DNA was also collected from project calves for third party sire verification.

DAM DATA COLLECTION

- Following parturition, dams were moved to group recovery pens until first signs of estrus. Date of first estrus was recorded to determine post-partum interval (**PPI**).
- Dams were bred after first estrus and at subsequent estruses until conception or maximum number of services was reached. Service records were used to determine time from first estrus to conception, average number of services to conception and dams culled before conception.

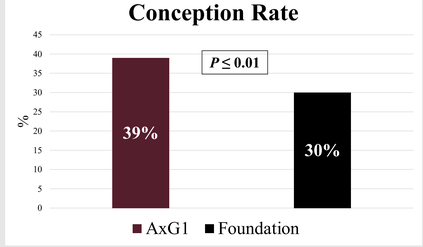
STATISTICAL ANALYSIS

- Data were analyzed as a complete randomized design using the PROC MIXED and PROC GLIMMIX procedures in SAS 9.4.
- Individual animal was the experimental unit.
- Sire served as the fixed effect. Breeding technician, lactation and number of services to conception were considered random effects.
- Effects were considered significant at *P*-value of ≤ 0.05, with tendencies declared at $P > 0.05$ and $P \leq 0.10$.

RESULTS

Table 1. Breeding distribution and performance.

	Sire	
Item	AxG1	Foundation
Cows, *n*	948	908
Total services, *n*	984	946
Conceptions, *n*	433	331



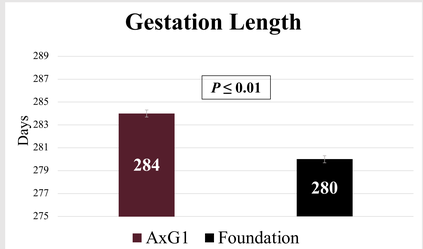
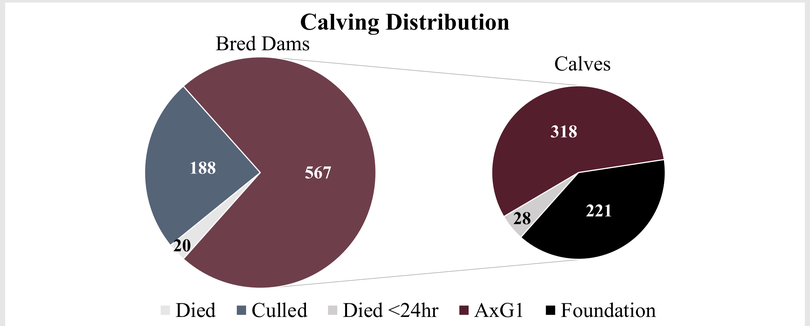


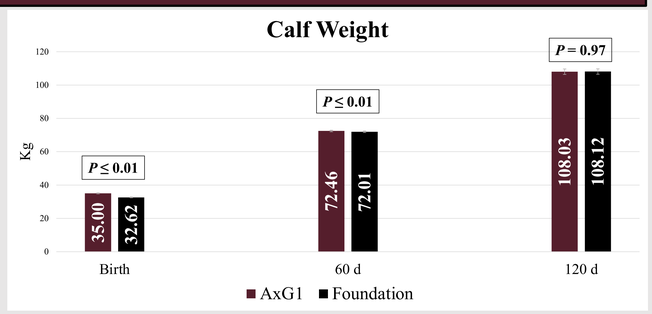
Figure 1. AxG1

Breed composition: 50% Wagyu, 43% Angus, 7% Brahman

Figure 2. Foundation

EPD summary: BW – 10%, YW – 65%, Marb – 3%, REA – 20%, Fat – 35%





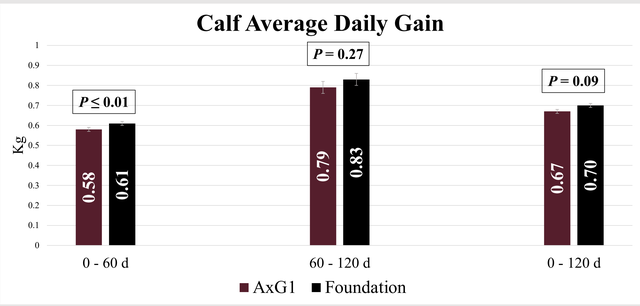


Table 2. Calf performance.

	Sire			
Item	AxG1	Foundation	SEM	*P*-Value
Calves, *n*	318	221		
Sex, %				
Steers	55.03	55.20	-	-
Heifers	44.07	44.80	-	-
CE[1,2]	1.04	1.02	-	0.24
Culled, %	2.52	0.91	-	0.17
Morbidity, %				
Scours	62.23	79.38	-	< 0.01
Pneumonia	59.79	43.30	-	< 0.01
Bloat	2.50	0.00	-	0.03
Total	86.12	89.69	-	0.25
Mortality, %	1.89	0.45	-	0.15

[1] Calving ease score

[2] Scale: 1-no assistance, 2-minor assistance, 3-hard pull

Table 3. Dam performance by sire.

	Sire			
Item	AxG1	Foundation	SEM	*P*-Value
Cows, *n*	323	234		
PPI[1], d	67	68	0.70	0.35
Conceived on first service, %	10.92	12.10	-	0.79
Time from estrus to conception, d	56	52	2.83	0.32
Services to conception, *n*	2.66	2.57	-	0.37
Culled preconception, %	8.72	9.97	-	0.64

[1]Post-partum interval

CONCLUSIONS AND IMPLICATIONS

- AxG1 had significantly higher conception rates than Foundation, likely a benefit of increased heterosis when mated to dairy dams.
- Foundation progeny delivered shorter than breed average gestation lengths, lower BW and outperformed AxG1 progeny in all observed growth metrics.
- AxG1 progeny performance exhibited in this study was similar to progeny performance in previous trial with beef breed dams. Increased performance over competitors was observed during post-harvest grading (Francis, 2019).
- Neither sire had a significant negative effects on the subsequent reproductive performance of the dams.

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