Applying the Concept of Relative Age Effect to Our Calf Crop

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The Relative Age Effect is a term commonly used to describe how child athletes born early in the academic year tend to perform at a higher level than those born later. For example, softball athletes born between May and August are 40% more likely to play college softball compared with players born between September and December. Similarly, hockey players born between May and August are 56% more likely to play in college compared with athletes born between September and December. This disadvantage can likely be explained by the fact that those who are older are typically more physically, emotionally, or cognitively developed than those that are younger.

Interestingly, similar differences are observed when we evaluate performance records of our calf crops. Steer calves that are born in the beginning of the calving season have more time to gain weight between calving and weaning compared with steers born later in the calving season. Consequently, these steers are heavier at weaning compared with their counterparts. Research from the University of Nebraska indicates that steers born in the first 21 days of the calving season were 32 pounds heavier than those born in the second 21-day interval, and 80 pounds heavier than calves born more than 42 days after the beginning of the calving season (Table 1). In the same study from the University of Nebraska, heifers born in the first 21 days of the calving season were also heavier at weaning and heavier at the beginning of their first breeding season. Consequently, a greater proportion of the heifers born earlier reached puberty before their first breeding season, which resulted in greater pregnancy rates and greater percentage of heifers calving in the first 21 days of their first calving season and succeed as replacements (Funston et al., 2012; Table 1).

Table 1. Steer (n = 771) and replacement heifer (n = 1,019) performance based on calving date . Period 1 = calves born in the first 21 days of the calving season. Period 2 = calves born between days 22 and 42 of the calving season. Period 3 = calves born after day 42 of the calving season (Adapted from Funston et al., 2012)

	Calving Period, 21-day intervals*		
Item	**Period 1**	**Period 2**	**Period 3**
Steer weaning weight, lb	515[a]	483[b]	435[c]
Heifer weaning weight, lb	483[a]	470[b]	434[c]
Heifer prebreeding weight, lb	653[a]	644[b]	609[c]
Heifers cycling, %	70[a]	58[b]	39[c]
Heifer pregnancy rate, %	90[a]	86[a]	78[c]
Calved in 1[st] 21 d, %**	81[a]	69[b]	65[b]

The good news is that producers can actively manage cows and heifers to calve early by increasing the proportion of females that become pregnant in the beginning of the breeding season. This can be accomplished by: 1) Decreasing the length of the breeding season, 2) Culling non-pregnant and less fertile females, 3) Keeping replacements that conceive in the first 21 days of their first breeding season, and 4) Using estrus synchronization protocols. A case-study performed at the North Florida Research and Education Center has evaluated the long-term consequences of incorporating the abovementioned practices (Lamb and Mercadante, 2016). In 2007, this commercial herd was managed in a 120 days long breeding season without strict culling practices and without use of estrus synchronization. Starting in 2008, the length of the breeding season was gradually decreased and cows that failed to conceive during the breeding season were culled. In addition, all females were then exposed to estrus synchronization and fixed-time artificial insemination.

Over the course of 5 years, they were able to reduce the length of the breeding season from 120 to 70 days (approximately 10 days per year). Figure 1 shows the changes observed in calving distribution where cows calved earlier every year. Figure 2 summarizes the difference in average age at weaning relative to 2007, indicating that the average age of the calves at weaning increased as active reproductive management practices were incorporated.

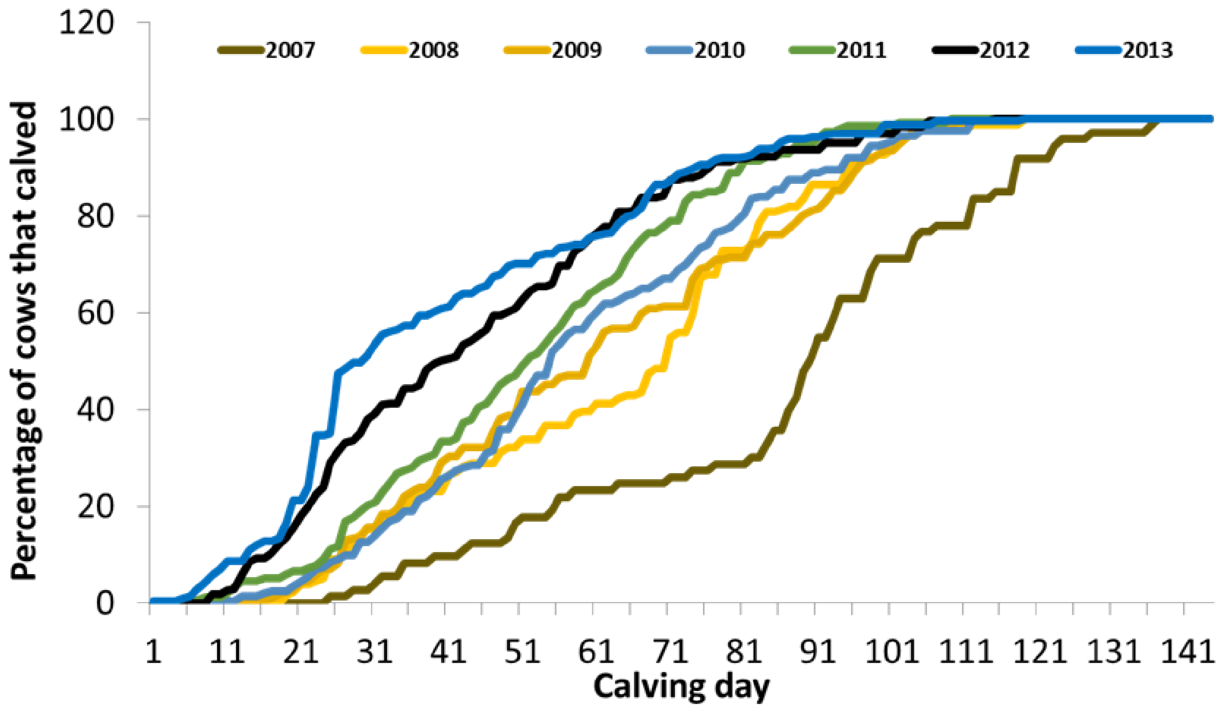

Figure 1. Changes in calving distribution per year after active reproductive management started in 2008. (Adapted from Lamb and Mercadante, 2016)

The gains in calf performance for this herd were substantial after active reproductive management was incorporated because of the utilization of superior genetics through artificial insemination. But for the purpose of this article, I will try to eliminate the genetic effect and explore the impact of changing the average age of calves at weaning. Commercial calves will commonly gain approximately 2 pounds per day from birth to weaning. In this operation, if we assume there were no genetic gains between 2007 and 2013, we would expect weaning weight to increase on average approximately 84 pounds per calf simply by increasing the age of the calf by 42 days (Figure 2). If these calves were hitting the market in September in Georgia and were sold for $178.2/cwt (MED&LGE 1 at the September USDA GA livestock report), the increase in age induced by active reproductive management would add approximately $74.7 per head ($1.78 per pounds * 42 pounds).

In summary, similarly to what is observed in young athletes, *when* calves are born has a significant impact on their performance. By actively managing females to conceive early in the breeding season, producers can explore the Relative Age Effect to add value to their calf crop.

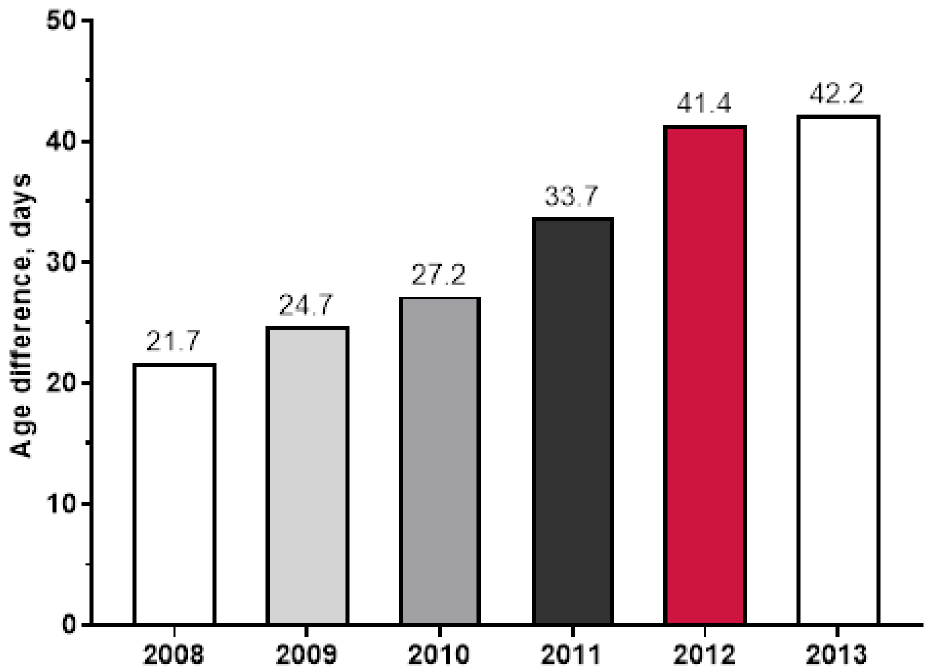

Figure 2. Differences in average calf age at weaning relative to 2007. Incorporating active reproductive management (starting in 2008) practices gradually increase average calf age. In 2013, calves were on average 42.2 days older than 2007. (Adapted from Lamb and Mercadante, 2016)

Literature cited:

Funston RN, Musgrave JA, Meyer TL, Larson DM. Effect of calving distribution on beef cattle progeny performance. J Anim Sci. 2012 Dec;90(13):5118-21. doi:10.2527/jas.2012-5263

Lamb GC, Mercadante VR. Synchronization and Artificial Insemination Strategies in Beef Cattle. Vet Clin North Am Food Anim Pract. 2016. 32:335-47. doi:10.1016/j.cvfa.2016.01.006

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