Pre-calving nutrition of beef females

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A photo of Liz Palmer.

Following weaning, a cow's energy requirements are at their all-time lowest within the production cycle. However, as pregnant cows advance into the third trimester of gestation, their energy requirements increase to meet the nutrient demand from the growing fetus. The last trimester of gestation is when 2/3 of fetal growth occurs. Further, late gestation is critical for the growth and development of economically important tissues (ie., muscle and fat). Therefore, changes to the maternal enviornment, including but not limited to nutrition, have an impact on the development of the calf during gestation and ultimately influence the life-time productive performance of that calf. Earlier studies in *Bos taurus* cows (for example, Angus and Hereford cows) found that offspring born to cows provided 1 lb daily of protein supplementation during the last trimester of gestation had weaning and carcass weights of about 18 and 29 lb greater, respectively, as well as improved marbling scores and percentage of calves grading choice compared to calves born from cows offered no pre-calving supplementation (Stalker et al., 2006; Stalker et al., 2007; Larson et al., 2009). While we know that pre-calving supplementation influences calf performance, we also understand that this comes at an added cost in terms of feed and labor. For that reason, our group is committed to identifying different cost-effective nutritional strategies that could optimize both cow reproduction and improve calf performance at a relatively low cost.

Our research group at the Range Cattle REC just completed a two-year study, funded by the Florida Cattle Enhancement Board, that evaluated three different pre-calving nutritional strategies for multiparous Brangus cows grazing bahiagrass. The study initiated when all cows were approximately 84 days before the expected calving day. At that time, cows were assigned to pastures and offered 1 of 3 supplementation strategies, which consisted of: **(1)** no pre-calving supplementation (**CONTROL**); **(2)** 4.5 lb per day of dried distiller's grains (DDG) during the first half of late gestation period (day 0 to 42 of late gestation; **LATE42**), or **(3)** 2.25 lb per day

of DDG during the entire late gestation (day 0 to 84 of late gestation; **LATE84**). This study was designed so that both supplemented groups received the same total amount of dried distiller's grains during the evaluation period (189 lb of DDG per cow). Our hypothesis was that by concentrating the total supplement amount during only the first half of late gestation (strategy called **LATE42**), we could potentially reduce the cost of labor associated with feeding without negative effects on calf performance following birth.

As expected, providing DDG supplementation before calving increased cow body condition score at calving (November) and at the start of the breeding season (January) compared to control cows which did not receive pre-calving supplementation (**Figure 1**). However, there were no differences in body condition score at calving between cows that were only provided supplementation during the first half of late gestation (**LATE42**) and those supplemented for the entire late gestation period (**LATE84**). When we followed the cows into the subsequent breeding season, there were no differences in the percentage of pregnant cows at the time of pregnancy diagnosis (June) or at calving (90, 90 and 87% for **CONTROL**, **LATE42**, and **LATE84**, respectively). Body condition score is one of the main factors influencing the cow's reproductive success in the subsequent breeding season and it is recommended that cows calve in a body condition score between 5 and 6. On average, all treatments calved in a body condition score above 5, explaining why we did not see a difference in the percent of pregnant cows. Nonetheless, cows that received supplementation for only the first half of late gestation calved earlier in the calving season compared to cows that received supplementation for the entire length of late gestation and also cows that received no pre-calving supplementation at all (**Figure 2**). These results suggest that it would be more cost-effective to only provide DDG supplementation during the first half of late gestation compared to the entire length, because we did not observe a difference in body condition score, but we improved the percent of cows calving earlier in the subsequent breeding season all while reducing labor costs. However, the results observed for calf performance tell us a different story…

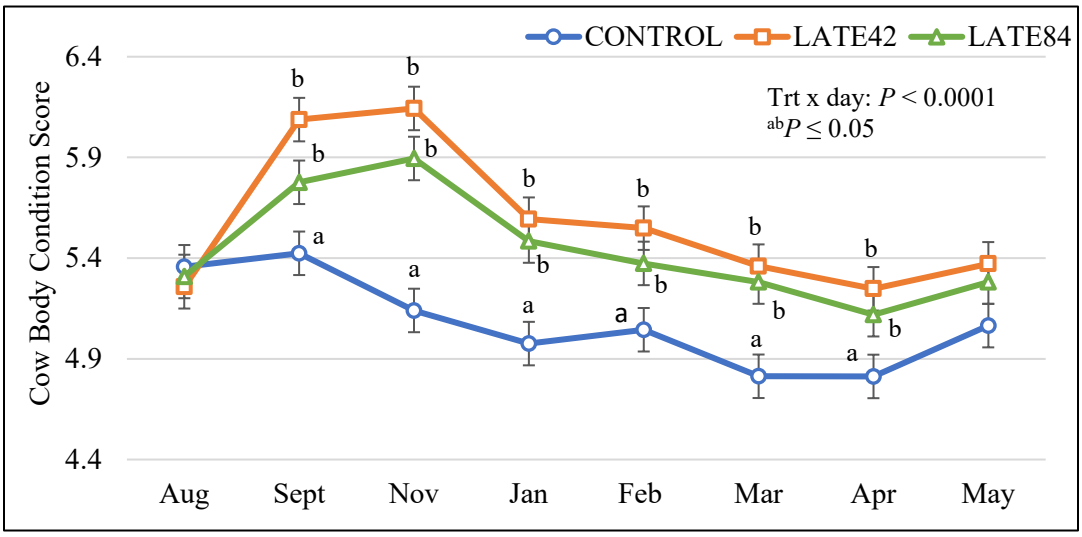

Figure 1. Cow body condition from the stary of the study (Aug) until pregnancy diagnosis (May). Calving occurred in November and the subsequent breeding season started in January. Treatments were: **(1)** no pre-calving supplement (**CONTROL**), **(2)** 4.5 lb per day of DDG

during only first half of late gestation (**LATE42**), or **(3)** 2.25 lb per day of DDG during the entire late gestation (**LATE84**).

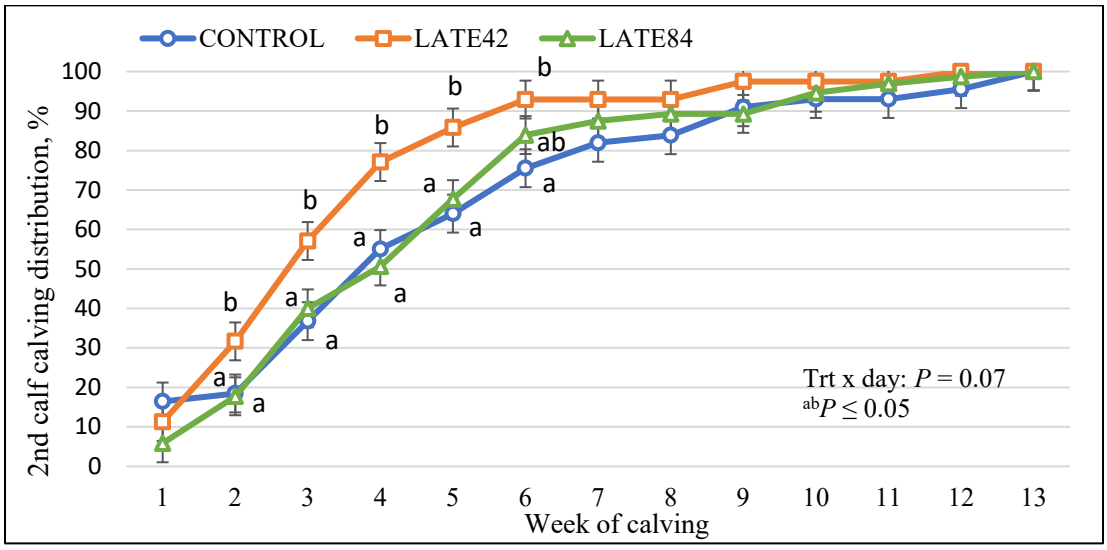

Figure 2. Distribution of the 2nd calf crop from the breeding season following supplementation. Treatments were: **(1)** no pre-calving supplement (**CONTROL**), **(2)** 4.5 lb per day of DDG during only first half of late gestation (**LATE42**), or **(3)** 2.25 lb per day of DDG during the entire late gestation (**LATE84**).

Pre-calving supplementation with DDG did not increase calf birth body weights (79, 82, and 80 lb for **CONTROL**, **LATE42**, and **LATE84**). Calves were 17 and 30 pounds heavier at weaning when cows were provided DDG supplementation for the entire length of late gestation compared to those born from cows offered DDG only the first half of late gestation and those offered no pre-calving supplement (**Figure 3**). Additionally, calves born from cows offered DDG for the first half of late gestation had a 15-pound advantage over the calves born to cows who were offered no pre-calving supplementation. Indicating, that the most cost-effective supplementation strategy to enhance calf body weight at weaning was to provide cows DDG supplementation for the entire length of late gestation. ***Interestingly, our data provides evidence that the best supplementation strategy for the cow was not the same for the calf, which indicates that supplementation strategies in FL cow-calf systems should be based on the combined impacts to cow + calf performance rather than just the impacts on cow performance.***

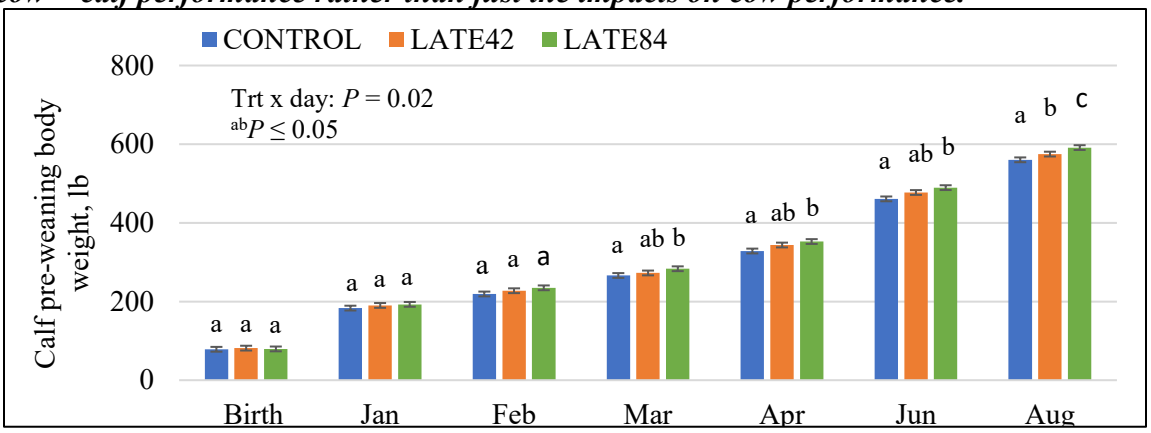

Figure 3. Calf pre-weaning body weights. Weaning occurred in August. Treatments were: **(1)** no pre-calving supplement (**CONTROL**), **(2)** 4.5 lb per day of DDG during only first half of late gestation (**LATE42**), or **(3)** 2.25 lb per day of DDG during the entire late gestation (**LATE84**).

Following weaning, steer calves were shipped to a feedlot facility at North Carolina State University where they were fed high-concentrate feedlot growing and finishing diets until the time of harvest. Feedlot body weight, average daily gain, or hot carcass weights did not differ ($P > 0.36$) among treatments. However, pre-calving nutrition altered carcass characteristics. Steers tended to have greater marbling scores and percentage of carcasses grading choice when their mothers were supplemented for the first half of late gestation compared to when their mothers did not receive pre-calving supplementation (**Table 1**). ***Results from our study indicate that manipulations to the maternal diet of Bos indicus-influenced cows during late gestation can modify the life-time productivity of their offspring by increasing calf weights at weaning and shifting the percentage of steers grading choice.***

Table 1. Feedlot body weight and carcass characteristics of steer calves.

	Treatments[1]				*P* - value	
Items	**CONTROL**	**LATE42**	**LATE84**	**SEM**	**Treatment**	**Trt × Time**
Feedlot Body Weight, lb						
Arrival	547	543	572	16.1	0.36	0.72
Feedlot Entry	544	533	568			
End of growing phase	877	867	903			
Feedlot exit	1242	1228	1245			
Carcass characteristics						
Hot carcass weight, lb	741	745	744	12.0	0.98	
Marbling	521[a]	570[b]	545[ab]	15	0.07	
Average choice, %	5[a]	36[b]	17[ab]	9.3	0.10	
Low choice, %	72	46	58	10	0.17	
Select, %	23	19	25	8	0.87	

[1]Treatments were: **(1)** no pre-calving supplement (**CONTROL**), **(2)** 4.5 lb per day of DDG during only first half of late gestation (**LATE42**), or **(3)** 2.25 lb per day of DDG during the entire late gestation (**LATE84**).

References

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