Summary
The objective of this study was to examine the effects of different forage and supplementation combinations on young beef cow performance. Seventy-two, 2-yr old cows (Angus, n = 48; Brangus, n = 24,) were stratified by body weight (BW) and breed to one of 12 pens. Pens were randomly assigned 1 of 4 treatments 1) Hay + wet brewers grains (WBG); 2) Hay + dried distillers grains (DDG); 3) round bale silage (RBS) + WBG; and 4) RBS + DDGS. Tifton 85 bermudagrass hay or RBS was fed free-choice and cows received WBG and DDGS supplements 3 d/wk at 0.5% of pen mean BW (dry matter-basis). Body weight and body condition score (BCS) were collected on d 0, 34, 69, and 97 of the experiment. Forage and supplement offered data were divided into 3 periods (d 0-34; d 35-69; and d 70-97). There was a treatment x day interaction for cow BW. On d 34 BW were similar, however, on d 69 and 97 cow BW was 73 and 79 lb, respectively, greater (P< 0.05) for RBS fed cows compared to hay fed cows. There was a day effect for cow BCS, on d 0 (mean = 5.63) and 97 (mean = 5.09). BCS were greater (P < 0.0001) than BCS on d 34 (mean = 5.35) and 69 (mean = 5.09). Total BW and BCS change were greater (P = 0.005 and 0.07) for RBS fed cows (BW = 58 lb; BCS= -0.07) compared to hay fed cows (BW= 3 lb; BCS= -0.50). Total forage DM amount offered and calculated daily forage DM offered did not differ (P = 0.62 and 0.84, respectively) between hay or RBS. A period x supplement type interaction (P < 0.0001) was observed for both total period supplement offered and calculated daily supplement offered.

Introduction
There are times during the year or during physiological demanding stages of the cow’s production when supplementation with energy and/or protein is required to achieve desired levels of animal production (Moore and Kunkle, 1998). In the fall and winter grazed perennial grass pastures experience a decline in forage quality that is compounded by limited forage availability during the winter months which can result in limited intake of this low-quality forage (Brown and Kalmbacher, 1998). Warm-season tropical forages can have low nutrition value which results in many fall and winter residual pastures and hays to having a TDN concentration less than 50% (Kunkle et al. 2004). Depending on the quality of the available forage, cattle must be offered additional energy and/or protein in the form of supplements in order to meet this energy and protein deficit of low forage quantity or quality.

Several options exist for beef cattle producers to conserve forage during the summer for use in the fall and winter. Traditionally, forage is conserved as dry hay. As an alternative to hay, forages can also be harvested and stored as RBS. Utilizing RBS as a conservation method
increases flexibility in timing of the harvest which is highly advantageous, especially in Florida, because of the heavy rainfall experienced during the summer (Hersom et al. 2007).

Cereal grains are high in nonstructural carbohydrates (i.e. starch and sugars) that are highly fermentable in the rumen and overall energy supply. However, large amounts of nonstructural carbohydrates can depress forage intake and digestibility. Co-products such as DDG and WBG are becoming more accessible. These co-products may be particularly advantageous in a forage-based diets because they offer an energy and protein source with a readily degradable fiber source. These characteristics may alleviate negative associative effects such as decreased forage intake and digestibility that have been observed when feeding cereal grains containing nonstructural carbohydrates. The objective of this study was to examine the effect of different forage and supplementation combinations on young beef cow performance.

Materials and Methods
Seventy–two, 2-yr old Angus and Brangus cows (1,073 lbs) were stratified by breed and BW, and allotted to 1 of 12, 2-acre bahiagrass-bermudagrass pastures. Cows in each pasture were randomly assigned to receive 1 of 4 dietary treatments. Treatments included: 1) Hay + WBG; 2) Hay+DDG; 3) RBS+WBG; 4) RBS+DDG. Hay and RBS were from similar cuttings of Tifton-85 bermudagrass and were fed free-choice in hay rings in each pasture. Cows were supplemented 3 d/wk with either WBG or DDG at the rate of 0.5% of pen mean BW (dry matter basis) per d. Water and free-choice loose mineral were provided in every pasture. Cow BW and BCS were collected at approximately 30-d interval from the initiation of the study in December 2008 to March 2009 (approximately 100 d) prior to the initiation of the breeding season.

Data were analyzed as a completely randomized design using the Mixed procedure of SAS. The model included fixed effect of treatment, day and the treatment x day interaction, random effect of pen(treatment) and experimental unit of pen. Repeated measures analysis was utilized for performance data using day as the repeated measure. Least squares means were determined and separated with the P-diff option.

Results
Cow BW data are reported in Figure 1. All cows started the study at approximately the same BW. Across the 100-d study, cow BW tended (P = 0.08) to exhibit a treatment x day interaction, which becomes evident from d 34 to 97. During this 60-d period forage type begins to affect cow BW in that cows offered RBS had greater BW compared to cows offered Hay. Also a re-ranking of cow BW based on supplement type is evident in that cows offered DDG tended to have heavier BW than cows offered WBG. The study ended after 100 d, but a BW was collected on all cows at d 140, after treatments had ceased. Cow BW declined after d 100, likely caused by the increased nutritional demands associated with lactation and growth required by these young cows. Cow BW change is depicted in Figure 2. From d 0 to 34 cows offered RBS+WBG had the greater (P < 0.10) increase in BW compared to Hay+DDG, Hay+WBG and RBS+DDG were intermediate. From d 0 to 69, cows offered RBS regardless of supplement type had positive BW gains (P < 0.10) whereas cows offered Hay had negative BW changes. Similarly, across the entire study, cows offered RBS regardless of supplement type had positive BW changes in contrast to cows offered Hay which had negative BW changes.

There was no treatment effect (P > 0.10) for cow BCS (Figure 3), however cow BCS did change over the course of the study (P < 0.001). Cow BCS was greater (P < 0.001) on d 0 (mean = 5.6) and 97 (mean = 5.9) compared to d 34 or 69 (mean = 5.4 and 5.1, respectively). Cow BCS was the lowest on d 69 which would have corresponded to the initiation of calving and early lactation for these cows. Similar to cow BW, BCS decreased after the termination of the study on d 100. The change in cow BCS (Figure 4) parallels the response in BW change. From the initiation of the study to d 34 cows offered Hay+DDG lost more (P < 0.10) BCS compared to cows offered RBS, Hay+WBG were
intermediate. A similar trend was observed for the period of d 0 to 69, but during this period all treatments lost BCS. In contrast, across the entire study cows offered RBS did increase BCS ($P < 0.10$), occurring after d 69 compared to cows offered Hay who lost BCS across the entire study.

Estimated daily (22.0 lb/d) and total forage DM (1,594 lb) offered per cow did not differ ($P > 0.62$) among forage types or supplement type. However, supplement DM offered did exhibit a type x period interaction ($P < 0.001$). Supplement amount offered was based upon cow BW, so as cow BW changed the amount of supplement offered changed. The amount of WBG offered was greater than DDG and supplement consumption was greatest from d 34 to 69. Supplement amounts offered were nearly 227 and 192 lb less from d 67 to 97 in DDG and WBG, respectively.

Cow reproductive performance was severely affected by the termination of the study after d 100 which was just prior to the initiation of the breeding season. As a result of the termination of the study the supplementation program was not continued at the same level and cow performance as previously mentioned suffered. Mean 30-d pregnancy rate in all cows was 44.2% and did not differ among treatments. The substandard reproductive performance highlights the need to adequately address the nutritional requirements of young cows, particularly when maintained on moderate to low-quality forage during early lactation and through the breeding season.

**Literature Cited**
Table 1. Composition of forages and supplements offered young cows

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<th>Hay</th>
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Figure 1. Effect of forage type and supplement on cow body weight (BW)
Figure 2. Effect of forage type and supplement on cow body weight (BW) change

- Hay+DDGS
- Hay+WBG
- RBS+DDGS
- RBS+WBG

Treatment effect (P<0.005)
Means with different superscripts differ (P<0.01)

Figure 3. Cow body condition score (BCS)

Day effect on cow BCS (P<0.001)
Means with different superscripts differ (P<0.05)
Figure 4. Effect of forage type and supplement on body condition score (BCS) change

- Treatment effect (P=0.07)
- *Means with different superscripts differ (P<0.10)*