

Summary of Extension Program Activities (Oct/2013 – Apr/2019)

Activity	Total Career Amount 2013 to present	Since UF Employment 2016 to present
State/County meetings	97	47
In-service trainings	6	2
Webinars	11	11
Field days	7	5
Contacts and YouTube views	6,106	3,208
EDIS publications	6	6
Proceedings/Popular press articles	60	25
Websites developed	2	1
Extension awards	2	2

University of Florida Extension (June 2016 – present)

- A. **Program Title:** Increasing the knowledge and adoption of nutritional evaluation and management practices for beef females

Situation: Critical events that determine the economic success of a cow-calf operation (i.e. late gestation and breeding season) occur during periods of low forage quality and availability (Winter), but highest nutrient demand for the growing fetus and cow milk production. In addition, reproduction has the lowest nutrient priority and is often impaired by the mismatch between nutrient demand and availability. Increased reproductive performance can be achieved by increasing **body condition score (BCS)**. Body condition score is a practical and inexpensive indicator of fat (energy) reserves in a beef cow that can be easily implemented by producers. Surprisingly, surveys delivered at 3 of the largest cow-calf counties in FL (Polk, Okeechobee, and Hendry; over 100 surveys collected) indicated that **69% of attendees do not keep records of cow BCS**. Also, because BCS is a subjective measurement, **the disparity among scores selected for the same animal was large** (1- to 2-point difference using a 1 to 9 scale), leading to under- or over-estimations of cow energy reserves and misjudgment-induced economic losses. Therefore, **it is crucial that standardized BCS trainings and tool are developed to assist stakeholders on properly estimating cow's energy reserves**.

In addition, most FL cow-calf operations only provide protein/energy supplementation during Winter to alleviate cow weight loss through early-lactation. However, nutrient deficiency during late-pregnancy lowers reproduction even if adequate nutrient supply is provided after calving. Recent studies showed that preventing nutritional insults during gestation might also enhance fetal development during pregnancy and future offspring growth and health. Assuming that pre-calving supplementation of beef cows in FL will achieve similar improvements compared to other parts of US, steer weaning weight could increase by 17 lb and heifer pregnancy rate by 10%, which combined could lead to an increase on annual calf production of 4.6 million pounds (assuming that 20% of FL producers would adopt pre-calving supplementation).

Another major determinant of cow-calf profitability is the pregnancy success of young replacement beef heifers. Surveys delivered at 3 of the largest cow-calf counties in FL (Polk, Okeechobee, and Hendry; over 122 surveys collected) indicated that **75% of attendees develop rather than purchase their replacement beef heifers.** Beef industry in FL is dominated by *Bos indicus*-influenced cattle due to its high tolerance to heat and parasites, which allows these animals to be managed extensively on pasture and reduce production costs. However, late attainment of puberty for these heifers decreases reproductive efficiency. *Bos indicus*-crossbred heifers need to reach a greater proportion of their mature size before becoming pubertal compared to *Bos taurus* heifers. The same surveys described above also indicated that **59% of attendees provide 1 to 3 lb/day of supplement to replacement beef heifers, which is an insufficient amount of supplemental energy and protein to properly develop heifers.** A previous study done at Range Cattle REC reported greater pregnancy rates (89 vs. 70%) when heifers achieved 73 vs. 64% of mature body weight at the start of breeding season. Also, puberty induction protocols decreased age at puberty by 24 days, increased overall pregnancy rate (64 vs. 57%) and percentage of heifers that calved during the first 8 weeks of the calving season (98 vs. 82%) compared to not using a puberty induction protocol.

Thus, the major efforts of our research/extension program are important components of the **Initiative Team 1 – Priority Group 1.1 - Animal Systems**, and include:

- (1) develop and implement body condition score training tools and activities to standardize the scoring procedure and improve the accuracy those scores among stakeholders;**
- (2) promote producer implementation of strategic nutritional practices to enhance reproduction of beef females and optimize future calf growth and health.**

B. Target Audience: Livestock agents and beef cattle producers.

C. Objectives:

- **Objective 1:** Immediately after attending our annual trainings, knowledge and skills of beef cattle producers and livestock agents on body condition score and nutritional management of beef females will increase by at least 20% as determined by pre- and post-training surveys.
- **Objective 2:** Within 3 years of attending our annual trainings, 20% of beef cattle producers will adopt at least one pre-breeding supplementation strategy to increase annual calf production as measured by annual follow-up surveys, phone interviews, or on-farm visits.

D. Educational Methods & Activities:

The activities described below are assisting stakeholders to better understand the importance of 4 major topics:

- basic concepts of nutrition and supplementation strategies;
- economic impact of beef female infertility on cow-calf profitability;
- use of body condition scoring to assess nutritional status of beef females;

- impact of body condition score and supplementation strategies on reproductive performance of beef females and subsequent offspring growth and health.

These activities are also being used as an opportunity to share the recent ongoing research data collected by our group and to clarify potential questions of producers about this new information that was generated.

Activity #1 = Livestock agents are being educated on topics described above using phone calls, emails, on-farm visits as requested, and annual in-service trainings (face to face or webinar). Specific examples include:

- **11 webinars** for producers and agents since 2016 (YouTube views = 659; attendees = 483).
- **2 in-service trainings** in 2017 and 2019 (to be scheduled): 28 attendees in 2017.
- **1 multi-state webinar series** in 2016: designed to assist livestock agents in the entire Southeast US

Activity #2 = Producers are being educated via annual webinars, online trainings (Body Condition Score Training Modules), and articles at the FL Cattlemen and Livestock Journal and EDIS documents. Producers are also educated via face to face presentations requested by livestock agents for their own educational programs as part of the efforts of the **Initiative Team 1 – Priority Group 1.1: Animal Systems**. Specific examples include:

- **11 webinars** for producers and agents since 2016 (YouTube views = 659; attendees = 483).
- **35 people** completed the online BCS training since 2018 ([BCS training link](#)).
- **2 field days** on projects funded by FL Cattlemen’s Association since 2016 (>400 attendees)
- **1 multi-state summit** at the 2017 Southern Section of American Society of Animal Science (leader organizer) designed to provide producers a summary of applied research findings on protein and energy delivery systems for producers in Southeast US (100 attendees)
- **9 popular press, 16 proceedings, and 6 EDIS publications** since 2016
- **39 county extension presentations** since 2016 (total attendees = 1,960)

Activity #3 = Annual, intensive trainings for producers and agents capturing educational materials and research data collected throughout the year (named Annual Nutrition for Beef Females). These trainings consist of multiple face-to-face presentations on topics described above using UF state and county faculty, as well as, hands-on demonstrations on body condition scoring. A take-home proceeding that includes research updates and reading materials (i.e. EDIS and popular press articles) are provided at each training. All trainings are free of charge for the public but funded by private industry donations (total donations since 2016 = \$5,050). Specific examples include:

- **9 multi-county trainings** delivered since 2018 (counties visited: Sarasota, Manatee, Hendry, Polk, Okeechobee, Highlands; total attendees since 2018 = 311 people outreached).

- **2 youth trainings** since 2018 (Ona Youth Field Day: 150 children - 5 to 15 years of age; Manatee Livestock Show: 50 children - 5 to 15 years of age)
- **2 face-to-face BCS trainings delivered by county extension agents** since 2018 (Laura Bennet - Pasco county; Lindsey Wiggins - Hendry county)

E. Outcomes and Impacts:

Number of program evaluation forms answered = 100 in 2018 and 68 in 2019.
Average evaluation form recovery = 56%.

Short Term - Knowledge, Attitudes, Skills, Aspirations

- Pre- and post-training evaluation forms delivered to attendees in 2018 and 2019 have indicated a:

Skill increase

- 46% on **selecting the proper cow body condition score** after the online training.
- 20% on **selecting the proper cow body condition score** after the face-to-face training (see Table below).

County	Attendees	% of people selecting the correct answer		
		Pre-training	Post-training	% change
Hendry 2019	38	37.3	60.1	22.8
Polk 2019	42	45.0	66.0	21.0
Okeechobee 2019	42	46.6	66.3	19.7
Hendry 2018	25	49.5	60.0	10.5
Highlands 2018	37	46.7	68.0	21.3
Okeechobee 2018	37	44.7	61.5	16.8
Polk 2018	60	53.7	64.4	10.7
Manatee 2018	10	45.7	74.2	28.5
Sarasota 2018	20	46.6	74.0	27.4
Mean	311	46.2	66.1	19.9

Knowledge increase

- 52% on **impacts of body condition score on cow performance.**
- 56% on **impacts of body weight and age needed to induce puberty in heifers.**
- 62% on **impacts of age at puberty on heifer performance.**
- 72% on **impacts of estrus synchronization on heifer performance.**
- 48% on **impacts of cow nutrition on calf performance.**
- 79% on **previous research studies on cow nutrition** from the Range Cattle REC.
- 80% on **on-going research studies on cow nutrition** from the Range Cattle REC.
- 65% on **previous research studies on heifer nutrition** from the Range Cattle REC.
- 74% on **on-going research studies on heifer nutrition** from the Range Cattle REC.

- 57% on **forage management practices to improve cow body condition score.**
- 53 and 96% on **existing supplementation strategies for beef cows and heifers.**
- 100% on **availability of existing body condition score trainings.**
- 71% on **reproductive strategies available to induce puberty in heifers.**

Aspirations

- 98% of attendees will **utilize the body condition scoring tools delivered to them.**
- 83 and 68% of attendees will **implement at least one supplementation strategy for cows and heifers, respectively, presented to them.**
- 51% of attendees will **implement a puberty induction protocol to improve heifer reproductive performance.**
- Attendees of the 2nd Annual Nutrition for Beef Females expect that heifer **pregnancy rates will increase from 71% to 82%** with the information provided during the trainings.

Medium Term - Behavior Change

Livestock extension agents:

- The number of teaching events on nutritional management of beef females increased from 2 events in 2017 to 6 events in 2018 and 3 events in 2019 (up to this moment), respectively.

Beef cattle producers:

- Annual follow-up evaluation forms reported that 92% of attendees will implement body condition scoring more often to evaluate animal nutritional status and at least one of the pre-breeding supplementation strategies presented to them.

Long Term – Impact and Adoption of Management Strategies (Estimative only)

- Adoption rate: Within 3 years of attending this educational program, 20% of beef cattle producers will adopt cow or heifer pre-breeding supplementation strategies to increase annual calf production as measured by annual follow-up surveys, and phone interviews, or on-farm visits.
- Year-round supplementation strategy: Year-round supplementation of molasses (5 lb of molasses/cow for 365 days) increased annual calf production by 40 lb/cow compared to winter supplementation of molasses (5 lb of molasses/cow for 130 days; Chapman et al., 1965; Florida Agr. Exp. Sta. Bull. 701). Assuming FL has 1 million cows, the potential impact of this nutritional strategy could achieve 8 million pounds of additional calf production per year.
- Late-gestation supplementation strategy: Potential impact could achieve 4.6 million pounds of additional calf production per year (400,000 beef steers weaned in FL × 17 lb × 20% producer adoption rate = 1,360,000 lb; 400,000 beef heifers weaned in FL × 10%

greater pregnancy rate \times 80% weaning rate \times 500 lb weaning weight \times 20% producer adoption rate = 3,200,000 lb of additional calf weaning weight).

- Heifer development strategies: Potential impact could achieve 4.6 million pounds of additional calf production per year (200,000 replacement beef heifers in FL \times 21% increase on pregnancy rate \times 80% weaning rate \times 500 lb weaning weight \times 20% producer adoption rate = 3,360,000 lb of additional calf weaning weight).