


USE OF RADIO-FREQUENCY IDENTIFICATION TECHNOLOGY TO ASSESS THE FREQUENCY OF CATTLE VISITS TO MINERAL FEEDERS

J. Ranches*, J. D. Arthington, U. Pardelli
 UF/IFAS Range Cattle Research and Education Center.
 Ona, FL.



INTRODUCTION

- Mineral deficiencies and imbalances for cattle are reported from almost all regions of the world (McDowell, 1996)
- Nearly all grazing cattle are deficient in sodium, thus supplemental salt has been recognized as vital to the health and performance of grazing livestock.
- In tropical and subtropical climates, where a large percentage of the World's beef is produced, cattle are typically enrolled in year-long grazing schedules.
- Free-choice, salt-based mineral supplements are offered with the anticipation of adequate intake to offset nutrient deficiencies.

INTRODUCTION

- Variation in free-choice intake, is a common problem impacting the efficacy of this management system.
- Variation of mineral-supplement intake depend on many factors, most notably, region, season, and weather patterns.
- Animal individual requirements, palatability, and salt content of the water also affects the consumption of mineral supplements (Arthington, 2015)
- Clearly a considerable challenge, the need to understand the factors impacting variation in free-choice, salt-based supplement intake is evident.

OBJECTIVE

The objective of this study was to **describe the behavior of beef cattle** related to mineral supplement consumption, **and to better understand the factors** that contribute to the **variation in intake** of free-choice salt based supplements.

MATERIAL AND METHODS

◦ **Three studies** were conducted at the Range Cattle Research and Education Center (Ona, FL) to **evaluate behavioral consumption** of mineral supplements among different cattle breeds.

- Exp. 1: Braford, Brahman, and White Angus heifers.
- Exp. 2: Brahman and Black Angus cows.
- Exp. 3: Spatial location of the mineral feeder.

MATERIAL AND METHODS

◦ **RFID (radio-frequency identification)** technology to accurately assess the frequency of individual animal **visits** to a mineral feeder

◦ Readers were set to read the same ID every 3 minutes, and capable of reading multiples but different IDs at the same time.



MATERIAL AND METHODS

Readers

- Readers were checked everyday day.
- Batteries were replaced twice weekly.
- Readings were collected every Monday. Review of the readings was completed weekly to ensure data accuracy.

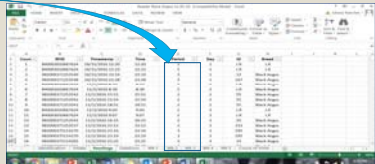


MATERIAL AND METHODS

Periods

- Visits to the mineral feeder were stratified according to the period of the day.

Period	From (h)	To (h)
Morning (1)	5:00	12:59
Afternoon (2)	13:00	20:59
Night (3)	21:00	4:59



MATERIAL AND METHODS

Animals

Exp. 1: 4 Braford, 4 Brahman, and 4 White angus heifers were utilized over a 47 d period. Heifers had access to a single mineral feeder.

Exp. 2: 15 Black Angus, and 19 Brahman cows were utilized over a 35 d period. Cows had access to a single mineral feeder.

Exp. 3: 48 heifers, divided in 3 groups of 16. Braford (n = 5, per group), Brahman-crosses (n = 3, per group), White angus (n = 4, per group), and Black-angus crosses (n = 4, per group). Heifers had access to a single mineral feeder during 42 d. Mineral feeder was rotated every week within the same pasture.

MATERIAL AND METHODS

Locations

- Exp. 3; mineral feeders were **moved every week** within the pasture; A) **Center** of the pasture, B) Under the **shade**, C) Near to **supplement and water**.



MATERIAL AND METHODS

Mineral supplement Intake

- Supplement consumption (9.1, 4.0, 62.5 % Ca, P, and NaCl, and 1,750 and 5,000 mg/kg Cu and Zn, respectively) was evaluated throughout the study and **intake** was calculated by the **disappearance rate of the supplement**.
- Mineral supplement **weight and samples** were collected every **Monday**.
- Additional mineral supplement was offered every **3 weeks**, or if the supplement weight was **below 10 lb**.

STATISTICAL ANALYSIS

- All data were analyzed using the MIXED procedure of SAS.
Visits were evaluated as the daily (or weekly) average by period.
- Visits were tested for breed, period and their interaction.
In Exp. 3, visits were tested for breed, location and the interaction.
- Results are reported as LSMEANS and separated using PDIFF. Significance was set at $P \leq 0.05$ and tendency at $P \leq 0.10$.

RESULTS AND DISCUSSION

Table 1. Effect of breed and period of the day on number of daily visits to the mineral feeder among yearling beef heifers on Exp. 1.

Breeds	Periods			Total of visits (visits/heifer daily)
	Morning	Afternoon	Night	
Braford	1.05 ^{a,d}	0.81 ^{b,d,e}	0.48 ^{a,b,e}	2.37 ^a
Brahman	1.19 ^{a,d}	1.24 ^{a,d}	0.32 ^{b,e}	2.74 ^{a†}
Ona White Angus	0.71 ^{b,d}	0.91 ^{b,d}	0.71 ^{a†,d}	2.34 ^a

^{a,b} Number of visits in a column with different superscript differs ($P \leq 0.05$).
^{d,e} Number of visits in a row with different superscript differs ($P \leq 0.05$).
[†] Brahman heifers tended to visits the mineral feeder more when compared to Braford ($P = 0.11$) and Ona White Angus ($P = 0.08$). On the night period, Ona White Angus tended ($P = 0.10$) to have a greater number of visits compared to Braford heifers.

RESULTS AND DISCUSSION

- Mineral supplement **intake** was recorded and calculated by the rate of disappearance.
- During the evaluation period, mineral supplement **intake ranged from 38 to 130 g/head daily**, which resulted in an average of 79 g/head daily.
- These data illustrate the expected **variation in free-choice mineral intake**.

RESULTS AND DISCUSSION

Table 2. Effect of breed and period of the day on number of weekly visits to the mineral feeder among gestating beef cows Exp. 2.

Breeds	Periods			Total (visits/ cow weekly)
	Morning	Afternoon	Night	
Black Angus	0.35 ^{a,d}	0.45 ^{b,d}	0.70 ^{a,d}	1.5 ^a
Brahman	0.70 ^{a,e}	1.70 ^{a,d†}	1.10 ^{a,d,e}	3.5 ^b

^{a,b} Number of visits in a column with different superscript differs ($P \leq 0.05$).
^{d,e} Number of visits in a row with different superscript differs ($P \leq 0.05$).
[†] Brahman cows to tended ($P = 0.07$) to made a greater number of visits to the mineral feeder in the afternoon when compared to the night period

RESULTS AND DISCUSSION

- The mineral supplement intake **ranged from 15 to 54 g/head daily** resulting in an average of 30 g/head daily.
- In this study, cows experimented a **fluctuation of mineral supplement intake**, where average intake never reach the recommended amount (50 g).

RESULTS AND DISCUSSION

Table 3. Effect of breed and location of the mineral feeder on the number of daily visits among yearling beef heifers on Exp. 3.

Breeds	Periods			Average of visits (visits/heifer daily)
	Center	Shade	Supplement	
Braford	1.49 ^{a,d}	0.80 ^{a,d}	2.34 ^{b,d†}	1.55 ^b
Black Angus-Cross	1.51 ^{a,d}	0.96 ^{a,d}	2.26 ^{b,d}	1.58 ^b
Brahman-Cross	1.79 ^{a,d}	1.13 ^{a,d}	2.70 ^{a,b,d†}	1.88 ^{a,b†}
Ona White Angus	1.94 ^{a,d}	1.02 ^{a,e}	3.03 ^{a,d}	2.00 ^a

^{a,b} Number of visits in a column with different superscript differs ($P \leq 0.05$).
^{a,b} Number of visits in a row with different superscript differs ($P \leq 0.05$).
[†] As the average daily visit, Brahman heifers tended ($P = 0.09$) to visit the mineral feeder more often than Braford heifers. Black Angus-cross and Brahman-cross tended ($P = 0.10$) to visit the mineral feeder more when it was near to supplement when compared to the shade location.

RESULTS AND DISCUSSION

- **Mineral supplement intake ranges:**
 Group 1 = 1.30 to 56.78 g/head daily; ave. = 29.0 g/head daily.
 Group 2 = 5.58 to 85.60 g/head daily; ave. = 36.1 g/head daily.
 Group 3 = 4.67 to 71.07 g/head daily; ave. = 35.2 g/head daily.
- Heifers experienced a **fluctuation in mineral supplement intake**, where average intake never reach the recommended amount (50 g).

SUMMARY

Principal Outcomes

Exp. 1

- Ona White Angus heifers did not show a preference for period of the day.
- Brahman heifers visits more the mineral feeder, and seems to prefer the afternoon period.
- Braford heifers visits the mineral feeder more frequently in the morning period.

SUMMARY

Principal Outcomes

Exp. 2

- Brahman cows made more visits to the mineral feeder than the Black Angus cows.
- Black Angus cows seems to prefer the night period, while Brahman cows seems to prefer the afternoon period.

SUMMARY

Principal Outcomes

Exp. 3

- Brahman and Ona White Angus heifers, made more visits to the mineral feeder than the other breeds.
- The visits to the mineral feeder are greater when the same is placed near to supplements and water.

ACKNOWLEDGEMENTS

Special thanks to the Florida Cattleman Foundation for the support from the 2015 FCA Beef Enhancement Grant.



Juliana Ranches
juranches@ufl.edu

Thank you!
