



DIFFERENCES IN RANGELAND USE PATTERNS OF YOUNG COWS WITH DIFFERENT STRESS COPING STYLES: PRELIMINARY RESULTS



Robert L. Wesley¹, Andres F. Cibils¹, Emily R. Pollak¹, Shad H. Cox², J. Travis Mulliniks¹, Mark K. Petersen¹, and Ed L. Fredrickson³
¹ Department of Animal and Range Sciences, New Mexico State University, Las Cruces, NM 88003, ² Corona Range and Livestock Research Center, Corona, NM 88318, and ³USDA-ARS Jornada Experimental Range, Las Cruces, NM 88003



Introduction

Individuals in most animal groups exhibit consistent behavioral differences within or across situations (feeding, mating, predator avoidance, etc.) known as *behavioral syndromes* (Sih et al. 2004). Proactive (more nervous) vs. reactive (calmer) behavioral syndromes have been observed in many animal species and have been shown to influence how individuals cope with stress (Koolhaas et al. 1999). A cow's response to stressful situations (such as individual confinement), could be indicative of a suite of behaviors which could be associated with distinct rangeland use patterns and consequent animal production levels. To date, no research has been conducted that relates behavioral syndromes of rangeland-raised livestock with landscape use and animal performance.

Objective

Our objective was to describe the relationships between animal stress coping style, patterns of rangeland use, and performance of rangeland-raised beef cows.

Materials & Methods

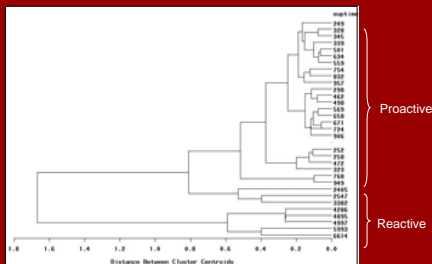
Thirty-six 3-year-old cows were classified into two groups on the basis of their stress coping style. Multiple criteria were used to classify individuals into such groups using Cluster Analysis and Discriminant Function Analysis (Table 1; Figure 1). Cows were tracked with Lotek® GPS collars (Lotek Wireless, Newmarket ON) for approximately 45 days during the calving seasons of 2006 and 2007. Eighteen cows were tracked in each season. Randomly selected calves were fitted with lightweight, custom built, GPS collars containing Garmin Legend® GPS units (Garmin Inc. USA) during the 2007 season. A number of cow and calf production parameters were measured on each individual (Table 1).

Table 1: Suite of variables measured on each animal

Variables Measured	Units	Year	
		2006	2007
Supplement Feeding Rate	sec	X	X
Risk Counts	sec	X	X
Acting Slightly Grumpy Behav. (Standing, Standing, Lying, Lying)	sec	X	X
Chute Exit Voluntary	min:sec	X	X
Social Dominance	index of displacement	X	X
Serum Cortisol	ng/ml	X	X
Subacute Cortisol	ng/ml	X	X
Body Weight	kg	X	X
Length of Post Partum Anestrus	days	X	X
Days to First Pregnancy	days	X	X
Adjusted 205day Weaning Weight	kg	X	X
Average Distance Traveled per day	m	X	X
Daily Area Explored	ha	X	X
Distance Traveled per Hectare Explored	m/ha	X	X
Maximum Distance From Water	m	X	X
Average Time Spent at Water	min	X	X
Average Time Spent in Juniper per Day	min	X	X
CAF - Average Distance Traveled per day	m	X	X
CAF - Daily Area Explored	ha	X	X
CAF - Average Time Spent at Water	min	X	X
CAF - Average Time Spent in Juniper per Day	min	X	X
Average Distance From Water and CAF	m	X	X
Maximum Distance From Water and CAF	m	X	X
Maximum Distance From Water and CAF when Greater than 100m Apart	m	X	X
Average Distance From Water and CAF when Less than 100m Apart	m	X	X
Average Distance From Water and CAF when Less than 100m Apart	m	X	X



Figure 1 (Below): Cluster analysis results showing segregation of groups on the basis of a suite of behaviors. Supplement feeding rates (SFR) measured in confinement best explained segregation of individuals and were used as a surrogate for stress coping styles.



Results

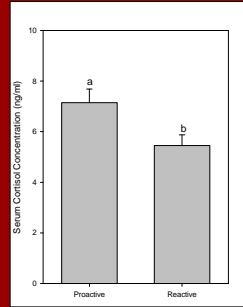


Figure 2: Mean serum cortisol levels of cows classified as proactive and reactive. Means were statistically different (P<0.05).

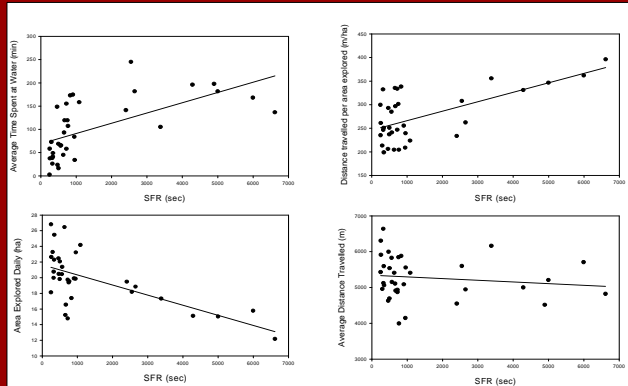
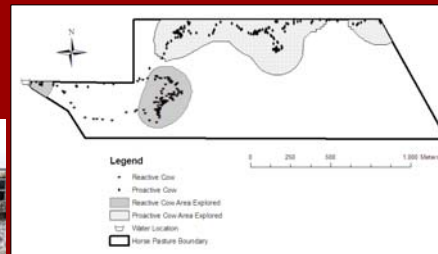


Figure 3: Relationship between supplement feeding rate in confinement (which was used as a proxy for stress coping style) and pasture use of young cows

Figure 4: Example of the daily area explored by a reactive and proactive cow (23 March 2006). Shaded areas represent 95% kernel volume density estimates



Results

Figure 5: (Below) Relationship between supplement feeding rate (proactive cows exhibit faster SFRs and vice versa) and calf weaning weights of young cows. (Right) Example of the daily area explored by a proactive and a reactive cow and their calves (10 April 2007). Shaded areas represent 95% kernel volume density estimates.

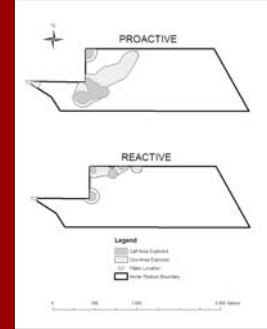
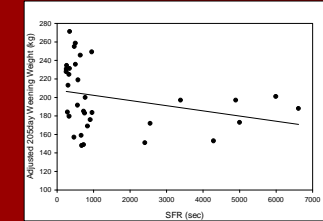


Table 2: Means and SE of variables used to classify cows into groups based on stress coping styles

Response variable	Proactive (n=25)		Reactive (n=8)	
	mean	SE	Mean	SE
Supplement Feeding Rate, sec	561	45.6	4390	542.4
Body Weight, kg	955	14.4	869	21.9
Social Dominance, index of displacement	0.50	0.04	0.49	0.09
Blood Cortisol, ng/ml	8.77	0.9	5.51	0.5
Adjusted 205day weaning weight, kg	207	7.4	179	7.1
Length of postpartum anestrus, days	44	2.8	68	6.4
Time to reach body weight nadir, days	72	4.2	89	6.4
Time in Juniper, min/day	23	3.0	39	8.1
Average distance traveled, m/day	5323	127.2	5194	207.4
Average distance from water, m/day	885	16.2	835	43.1
Maximum distance from water, m/day	1376	22.8	1308	36.8
Average time spent at water, min/day	73	10.0	172	15.6
Average area explored, ha/day	20.48	0.6	17.25	1.5
Average distance traveled per area explored, m/ha/day	264	8.8	313	25.8

Conclusions

Our results strongly suggest that behavioral syndromes do exist in range beef cattle and that cattle distribution and production may be influenced by these behavioral constraints.

Cows classified into the reactive and proactive behavioral syndrome groups showed differences in productivity and pasture use patterns.

Stress coping style could eventually be used as an additional herd selection criterion to achieve specific landscape use and livestock production objectives on rangelands.

Acknowledgements

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