



# Early Postpartum Biochemical Parameters Related to Dairy Cow Removal

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## Introduction

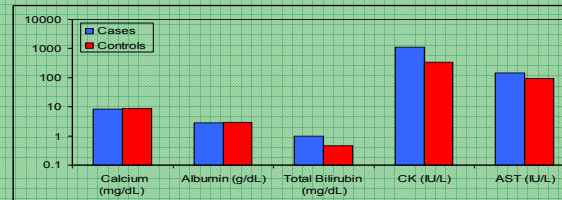
- A large proportion of dairy cow deaths are concentrated within the early postpartum period
- Appropriate detection of underlying diseases or physical derangements within this period is potentially useful for defining cows at risk for premature removal from herd
- This study explores the value of analyzing standard biochemistry, and individual or management characteristics of early postpartum cows, in determining features related to removal (death and culling)

## Materials and Methods

- Two Northern Colorado dairies: 1,600 and 2,600 head
- Serum collected from all fresh cows at 3 to 5 days postpartum
- Cows followed in a longitudinal study
  - Cows removed from the dairy within 30 days of parturition (cases)
  - Herd cohorts surviving through 100 days in milk (controls)
- Cases and controls matched by calving date and lactation
- Serum biochemistry panels analyzed
- For each biochemical parameter descriptive statistics were evaluated, and mean values in cases were compared to control animals using t-tests
- Univariable associations between dairy cow removal, 18 biochemical parameters and 4 animal management characteristics were evaluated via Chi-square test
  - Variables categorized dichotomously and those with chi-square p-value < 0.15 considered for additional analysis
    - Biochemical parameters
      - Creatinine, albumin, total bilirubin, CK, AST, SDH, potassium
    - Management characteristics
      - Antibiotic administration, calving intervention, drench administration
  - Ordinal logistic regression analysis performed using PROC LOGISTIC (SAS, Version 9.1, SAS Institute Inc, Cary, NC)
  - Forward and backward selection using stepwise logistic regression used to develop the best predictive model for herd removals
    - Variables with Wald F statistics where  $p < 0.1$  were considered significant
  - Additional interaction term combining potassium and the use of a drench was included

## Results

- Biochemistry panels evaluated for:
  - 47 removed cows
  - 60 matched controls.
- 19 parameters analyzed had significantly different means ( $p < 0.05$ ) between cases and controls
  - Calcium (Ca)
  - Albumin
  - Total Bilirubin (TB)
  - Creatine Kinase (CK)
  - Aspartate Aminotransferase (AST)
- Ca and albumin below the standard range
  - 36% and 17% of cases
  - 25% and 7% of matched controls
- TB, CK, and AST above the standard range
  - 79%, 66%, and 53% of cases
  - 40%, 22%, and 8% of controls



- Ordinal logistic regression performed using ten variables identified in the chi-squared test as significant
  - Creatinine, albumin, total bilirubin, CK, AST, SDH, potassium, calving intervention, antibiotic administration, and drench administration
- Variables of importance following completion of the regression analysis included: total bilirubin, CK, AST, and drench administration
- Odds of cow removal from the herd increase with elevated levels of total bilirubin, CK, and AST
- Odds of cow removal from the herd were increased for cows that were treated with a drench

Parameter	Code	Estimate	Pr > c2	Odds Ratio Estimates	95% Wald C.I.	
					Lower	Upper
Intercept	no	-3.57	<.0001			
Drench	yes	0				
Drench	no	1.74	0.0243	5.68	1.25	25.77
Tot. bili	normal	0				
Tot. bili	high	1.2	0.0214	3.33	1.20	9.27
CK	normal	0				
CK	high	1.02	<b>0.0536</b>	2.78	<b>0.98</b>	<b>7.88</b>
AST	normal	0				
AST	high	1.74	0.0058	5.70	1.66	19.60

## Discussion

- The ability to define discriminating characteristics in the early postpartum period may provide insight into cows at risk of premature removal
- Our study shows that cows that leave the herd within the first 30 days in milk demonstrate factors by 3-5 days in milk that are related to the risk of removal
- These factors include:
  - Biochemical variations
  - Recognizable derangements requiring systemic treatment
- Specifically the odds of removal are: 3.33, 2.78, and 5.70 times as high among cows with elevated total bilirubin, CK, and AST as among cows with normal total bilirubin, CK and AST
- The odds of removal are 5.68 times as high among cows that were drenched as among cows that were not assessed to need systemic treatment in the form of a drench



## Conclusions

- Appropriate fresh cow management may be guided through adjunctive analysis
- Biochemical analysis provides useful information highlighting areas that may require modification in an effort to improve postpartum health, including:
    - Transition cow and calving management
    - Post-partum cow-side evaluation and therapy protocols
  - Assessment that recognizes discriminating systemic characteristics (as evidenced by the application of the drench in this study) may provide insight for modifying individual sick cow management

## Acknowledgements

This research was funded by Integrated Livestock Management and College Research Council