

# Estimation of herd level risk of subacute ruminal acidosis on four commercial dairies on the Priority™ P-One Program

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## Abstract

Subacute ruminal acidosis (SARA) can often be found in well-managed dairy herds. To estimate herd risk for SARA on dairy farms, Oetzel (2004) recommended testing rumen fluid from 12 cows per group for incidence of ruminal acidosis (pH  $\leq$  5.5). Priority IAC has developed a program (the P-One Program) which combines ration balancing with feeding Direct-fed microbials containing a lactate and a glucose utilizer to optimize ruminal function and manage risk of SARA. The objective of this study was to estimate risk of SARA in herds on the P-One Program. Four independent dairy herds with 1000 to 4800 lactating cows on the P-One Program were selected for this study. On average, the rations contained 29.4% starch (SD=3.8), 43.5% NFC (SD=2.6), and 16.0% CP (SD=0.4) on a DM basis, and fed to achieve 25.5 kg (SD=3.11) DMI. Rumen fluid samples were collected at 4, 7 and 10 hours post-feeding via oro-ruminal probe from two groups of cows in each herd, 12 cows in early lactation (ELAC, 27 DIM) and 12 cows in peak lactation (PLAC, 92 DIM). Rumen fluid pH was measured on farm using a portable pH probe. Group risk was calculated as the proportion of the sample population with a threshold pH  $\leq$  5.5. Groups with  $\leq$  8.3% of the sample population at or below the threshold were not considered at risk. Groups with 16.6% to 33.3% of population at or below the threshold were considered borderline risk, and groups with sample populations  $>$ 33.3% were positive for SARA. Analysis of variance was performed comparing sample times to determine significant rumen pH fluctuations. Mean pH across all groups for all herds at times 4, 7, and 10 hours was 6.7 (SD=0.3) and not found to be significantly different ( $P=0.9371$ ). The proportion of cows declining to the threshold limit in both the ELAC and PLAC sample populations in all herds was 0 of 12 cows. The herds on the P-One Program in this study showed no clinical signs of ruminal acidosis and based upon the sample populations, not at risk for SARA.

## Introduction

Despite best management practices, Nocek (1997) notes that subacute ruminal acidosis (SARA) can often be found in well-managed high producing herds. Thus, dairymen and nutritionists are often cautious in feeding highly fermentable carbohydrates in high producing herds because of the potential increased risk of SARA. Elevated levels of highly fermentable carbohydrates may severely impact the transition dairy cow which has not adapted to ferment and absorb the increase in volatile fatty acids (VFA) (Kleen, et al., 2003). However, it is not just the transition cow that is at risk for SARA, Oetzel (2001) notes that cows in peak lactation can be at severe risk due to high dry matter intake and that cows at peak milk production can consume more highly fermentable carbohydrate than beef feedlot cattle. Most clinicians believe a cow is at risk for SARA at ruminal pH below 5.5 (Oetzel, 2001). To estimate herd risk for SARA on dairy farms, Oetzel (2004) recommended testing rumen fluid from 12 cows per group for incidence of ruminal acidosis (pH  $\leq$  5.5). Rumen pH guidelines for SARA however should be linked to clinical signs, impaired health and/or decreased production to be sure that low pH values truly represent a potential health risk (Duffield, 2004).

The Priority Program (the P-One Program) consists of feeding Priority DCP, Priority One and changes to the ration. Priority DCP contains naturally occurring ruminal lactic acid utilizing bacteria that colonize (seed) the rumen and convert lactic acid to VFA. Priority One is fed throughout lactation and contains proprietary strains (A2020 and A4000h) selected to transition ruminal energy efficiently. Together these insure rapidly fermentable carbohydrates in feedstuffs are utilized properly for optimal energy production. The ration changes include increasing starch, decreasing crude protein and changing the type of protein fed to include more rumen degradable true protein and less NPN. The data presented in this research demonstrates that despite feeding increased levels of RFC on commercial dairies, cows on the P-One Program are at low risk for SARA.

## Objective

To estimate the risk of SARA in early lactation cows and peak lactation cows in commercial dairy herds on the P-One Program.

## Materials & Methods

- Four dairy herds on the P-One Program were selected for analysis (Tables 1 and 2).
- Twelve cows were selected from an early lactation (ELAC) and a peak lactation (PLAC) group in each herd.
- Cattle were restrained and rumen fluid was collected from each cow at times: 4, 7, and 10 hours after the morning feeding.
- Rumen fluid was collected via a oro-ruminal probe.
  - Extra care was taken to avoid excess saliva contamination*
- Rumen fluid pH was measured using a calibrated pH meter on farm.
- Group level risk for SARA was calculated utilizing criteria indicated by Oetzel (2004) using a cutoff point of pH  $\leq$  5.5
  - $\leq$  8.3% of sample population = herd not at risk
  - 16.6% to 33.3% of sample population = herd borderline risk
  - $\geq$  33.3% of sample population = herd positive for SARA
- Analysis of variance was performed comparing sample times to determine significant rumen pH fluctuations. A P-value  $\leq$  0.05 was considered significant.

Table 1. Average DIM for ELAC and PLAC groups by farm.

Herd	Herd Size (Lactating Cows)	Group	N (Head)	Average DIM (SD)
1	2,700	ELAC	12	28.9 (0.9)
		PLAC	12	81.4 (13.1)
2	1,000	ELAC	12	23.6 (7.8)
		PLAC	12	106.3 (36.4)
3	4,800	ELAC	12	28.6 (0.5)
		PLAC	12	102.7 (15.3)
4	1,100	ELAC	12	26.6 (4.2)
		PLAC	12	79.0 (10.3)
Total	9,600	ELAC	48	27.3 (3.5)
		PLAC	48	91.8 (12.8)

Table 2. Ration nutrient analysis by herd.

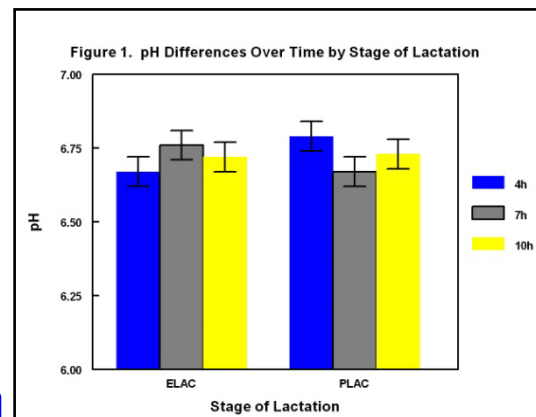
Nutrients	Herd				Average (SD)
	1	2	3	4	
DMI (kg)	23.7	26.2	22.8	29.8	25.5 (3.1)
CP (%)	16.5	16.2	15.9	15.5	16.0 (0.4)
RUP (%CP)	39.6	41.7	35.2	39.7	39.1 (2.8)
RDP (%CP)	60.4	58.3	64.8	60.3	60.9 (2.7)
Starch (%DM)	24.9	30.5	28.4	33.9	29.4 (3.8)
NDF (%DM)	33.6	28.2	30.2	29.4	30.4 (2.3)
ADF (%DM)	22.8	17.9	20.1	19.8	20.1 (2.0)
NFC (%DM)	40.4	46.1	42.6	45.1	43.5 (2.6)

## Results

Table 3. Number of cattle by farm at each sample time that experienced a pH  $\leq$  5.5.

Herd	Group	N (Head)	Sample Time		
			4 Hours	7 Hours	10 Hours
1	ELAC	12	0	0	0
	PLAC	12	0	0	0
2	ELAC	12	0	0	0
	PLAC	12	0	0	0
3	ELAC	12	0	0	0
	PLAC	12	0	0	0
4	ELAC	12	0	0	0
	PLAC	12	0	0	0

- Analysis of variance was performed to compare fluctuations in ruminal pH across time (Figure 1).
  - ELAC mean pH ranged from 6.67 to 6.76 at 4 and 7 hours respectively and was not significantly different ( $P = 0.4582$ ).
  - PLAC mean pH ranged from 6.67 to 6.79 and was not significantly different ( $P = 0.2714$ ).
  - Mean pH across all groups for all herds at times 4, 7, and 10 hours was 6.7 (SD = 0.3) and not found to be significantly different ( $P = 0.9371$ ).
- A subset of 12 cows in each population were sampled over time to determine the pen and herd risk for SARA with a threshold pH  $\leq$  5.5 indicative of SARA.
  - As indicated in table 3, a pH  $\leq$  5.5 was not detected at any time point in either the ELAC or PLAC groups on the four herds tested.



## Summary

The primary objective of this cross-sectional study was to estimate the risk of SARA in early lactation and peak lactation cows in commercial dairy herds on the P-One Program. Because part of the P-One Program contains a ration higher in energy than consistent with the industry standard, it is feared that cows are at higher risk for SARA and acute acidosis.

Despite these fears, the four herds on the P-One Program in this study showed no clinical signs of ruminal acidosis and, based upon the sample populations, were not at risk for SARA.

Additionally, cows on the P-One Program in ELAC and PLAC demonstrated static pH levels throughout the sample period consistent with optimal rumen function and eating behaviors.

## References

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