

Precision dairy cattle nutrition: statistics of rumen pH in commercial cattle.

What is the effect of husbandry system on rumen pH ?

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Survey of rumen pH

Background to the study

How data was collected and filtered

Results and conclusions

Is there a correlation between level of milk yield and rumen pH ?

What do we know about rumen pH ?

Low pH is strongly correlated to energy density and high digestibility

Higher yielding cows are thought to be at risk of SARA

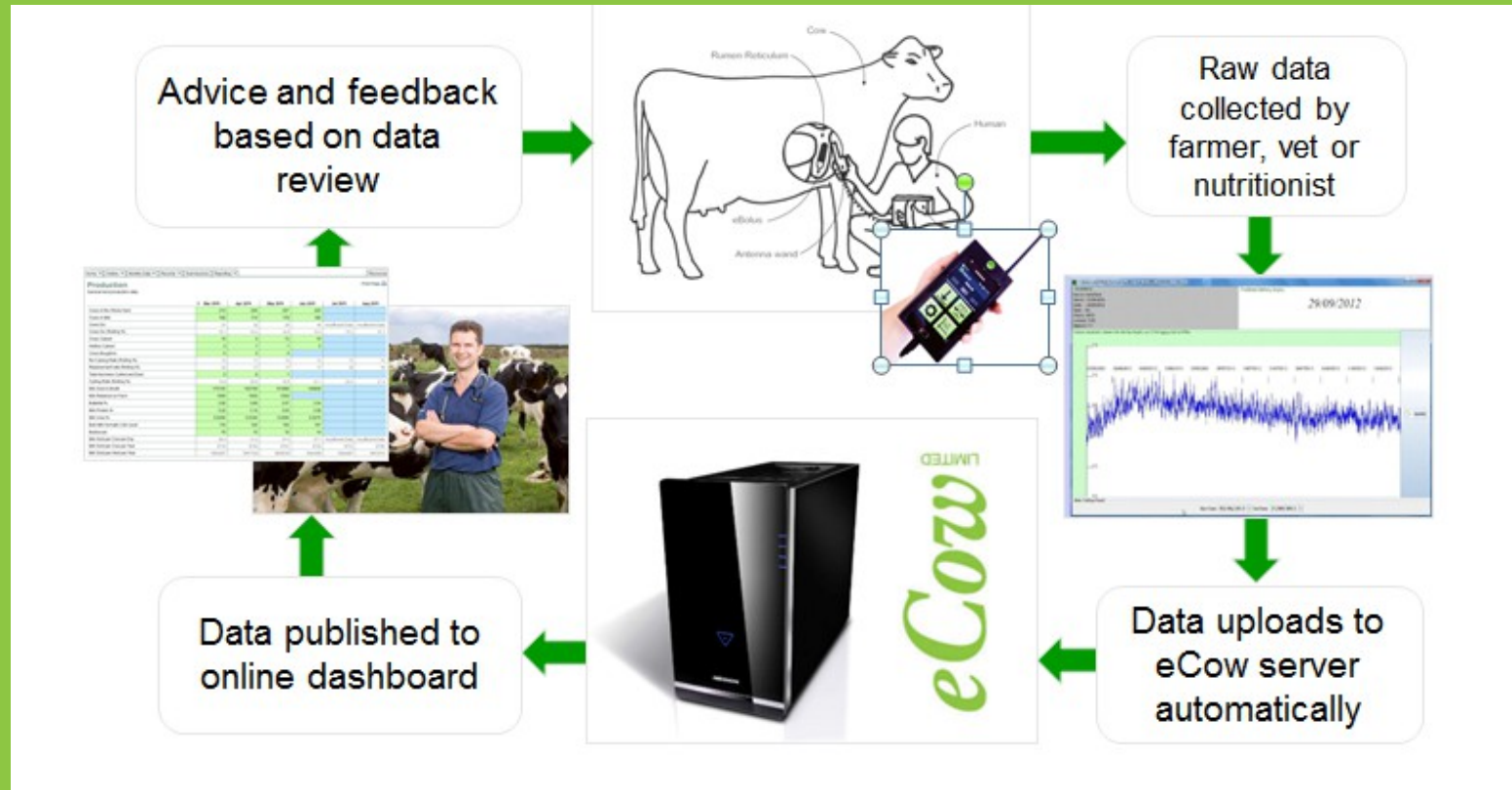
So we would expect high yielding herds to have lower mean pHs and more time below a threshold

Rumen pH Bolus

- Retained in Reticulo-rumen
- Raw data (pH & T) downloaded to handset
- Handset Uploads to internet
- Bolus lasts over 100 days before sensor fails
- Accurate +/- 0.1 pH per 30 days
- Used >3 per group



Rumen pH data flow



eCow now has thousands of daily pH profiles on our server

The problem of accurate metadata

Annual Average Milk Yield

System descriptions

- Total Mixed Rations + Concentrate
- Grass, Silage Cake
- Robotic Milking (subset of TC)
- Silage and Cake

Bolus files selected for metadata

Ten farms from over 30 users in SW England

No research farms

Yield categories spreading from 7 to 12 k

Clear classification of husbandry

Data Selected for this study

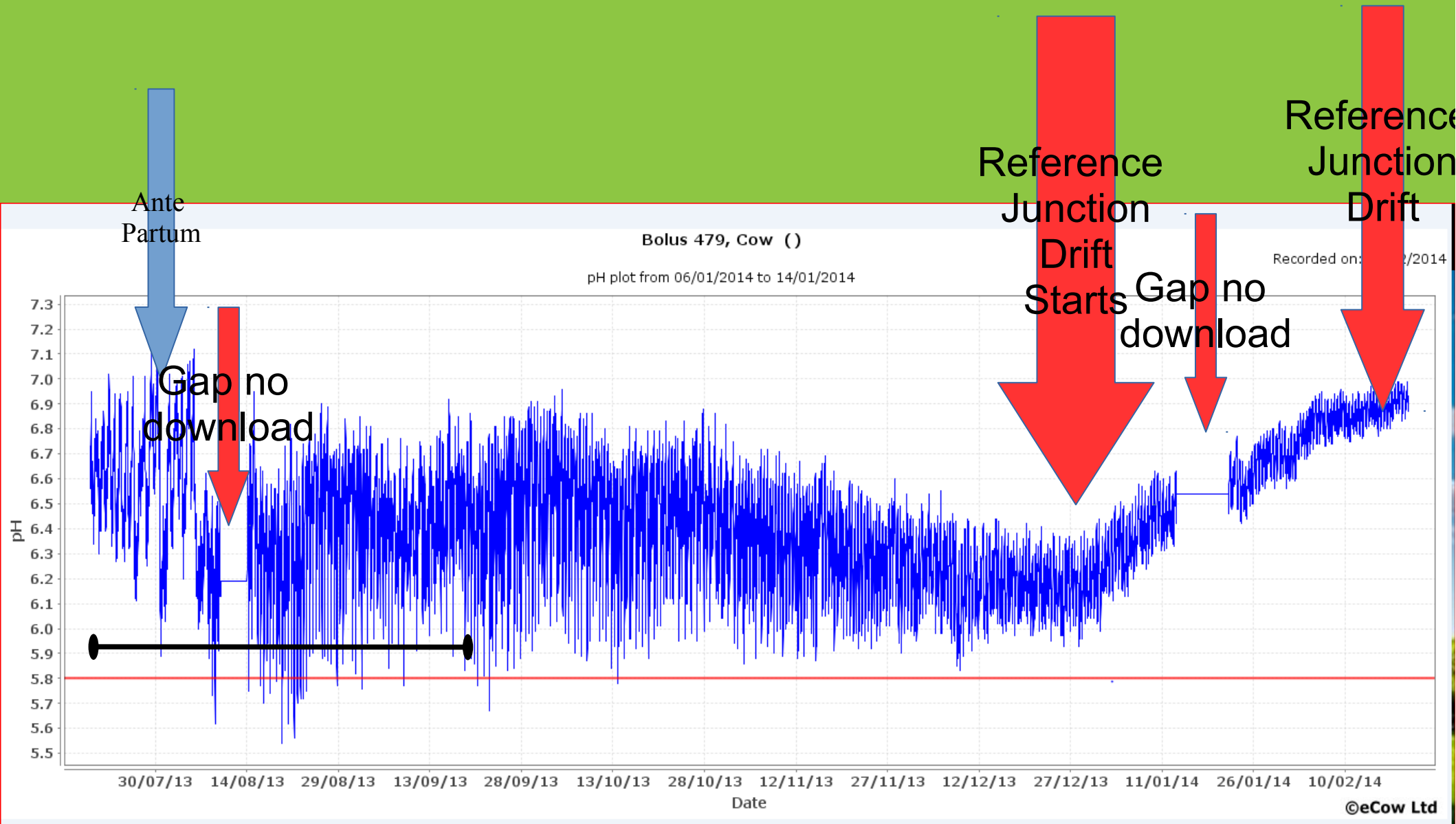
_pH inside physiological range

First 60 days or less

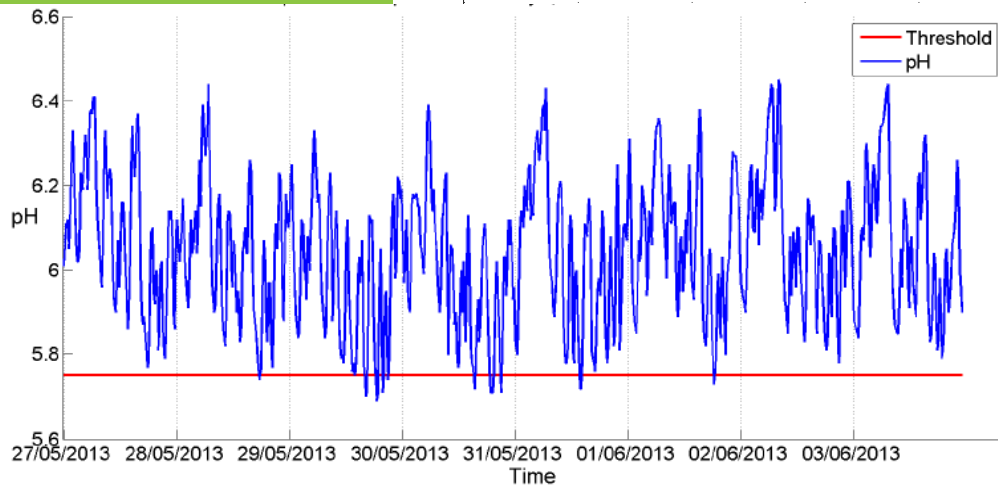
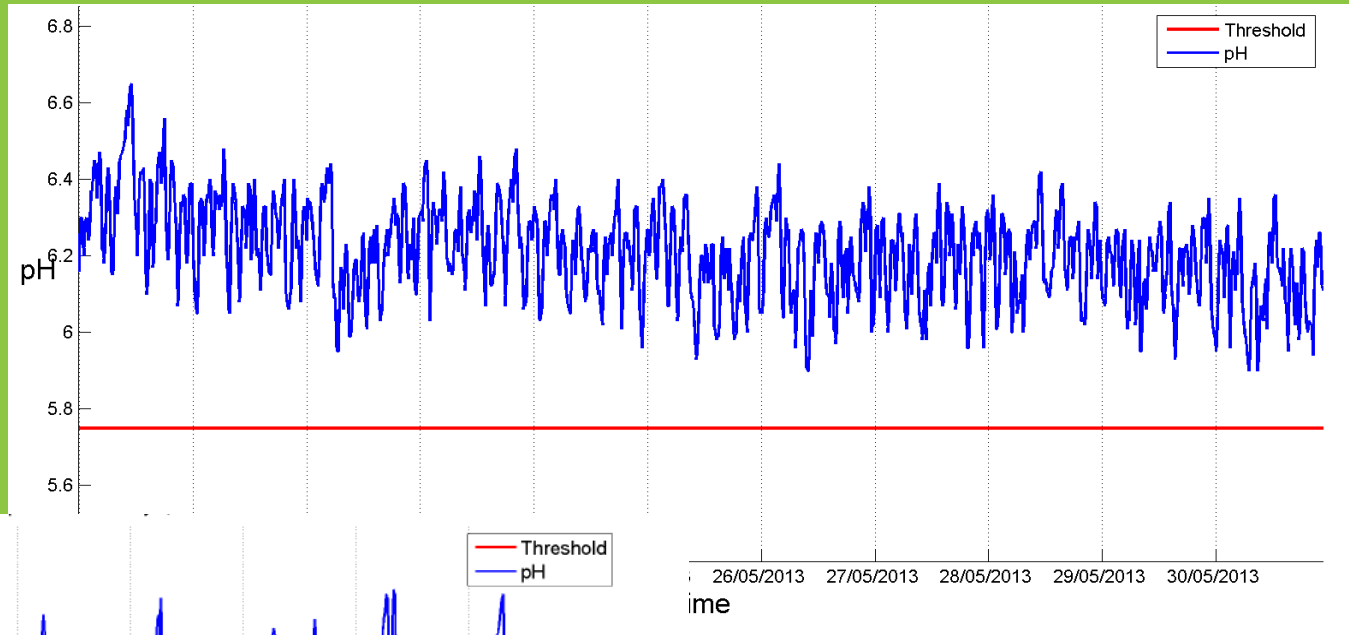
– No loss of accuracy

No gaps in the data

Data from a bolus over 180 days



Systems case studies show variable daily profiles



Rumen pH data features analysed

Daily Mean Values

Maximum and Minimum pH per day

Hours below 5.8 pH

= hours below 5.5 pH in ventral sac

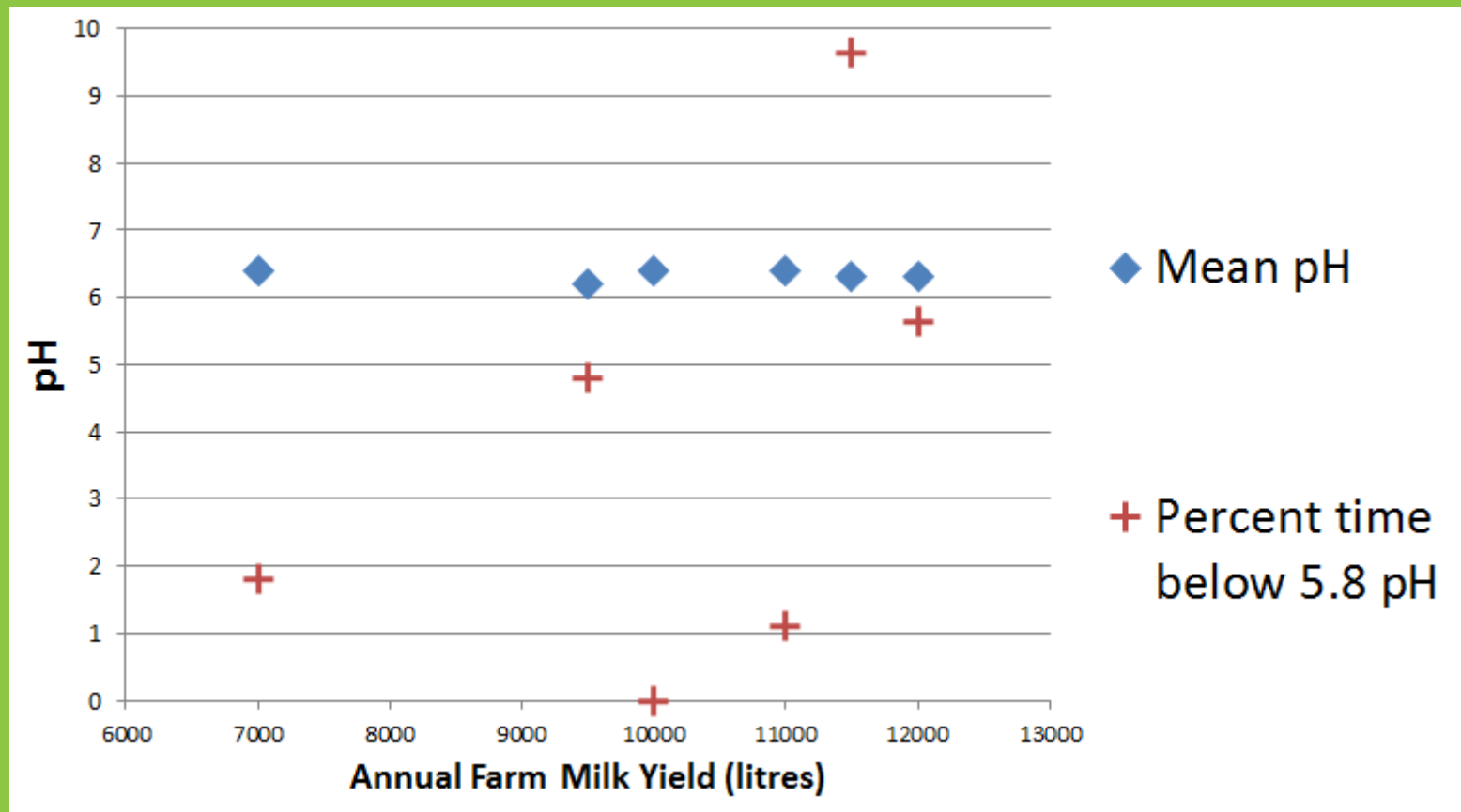
Data Tables

Yield (l/pa)	Mean pH	Percent time below 5.8 pH	n
7000	6.4	1.82	2
9500	6.2	4.79	4
10000	6.4	0	1
11000	6.4	1.12	1
11500	6.3	9.64	1
12000	6.3	5.65	1

System	mean pH	% below	n
SC	6.212	2.68	1
GSC	6.526	0.82	1
Robot	6.205	4.79	4
TC	6.348	5.08	4

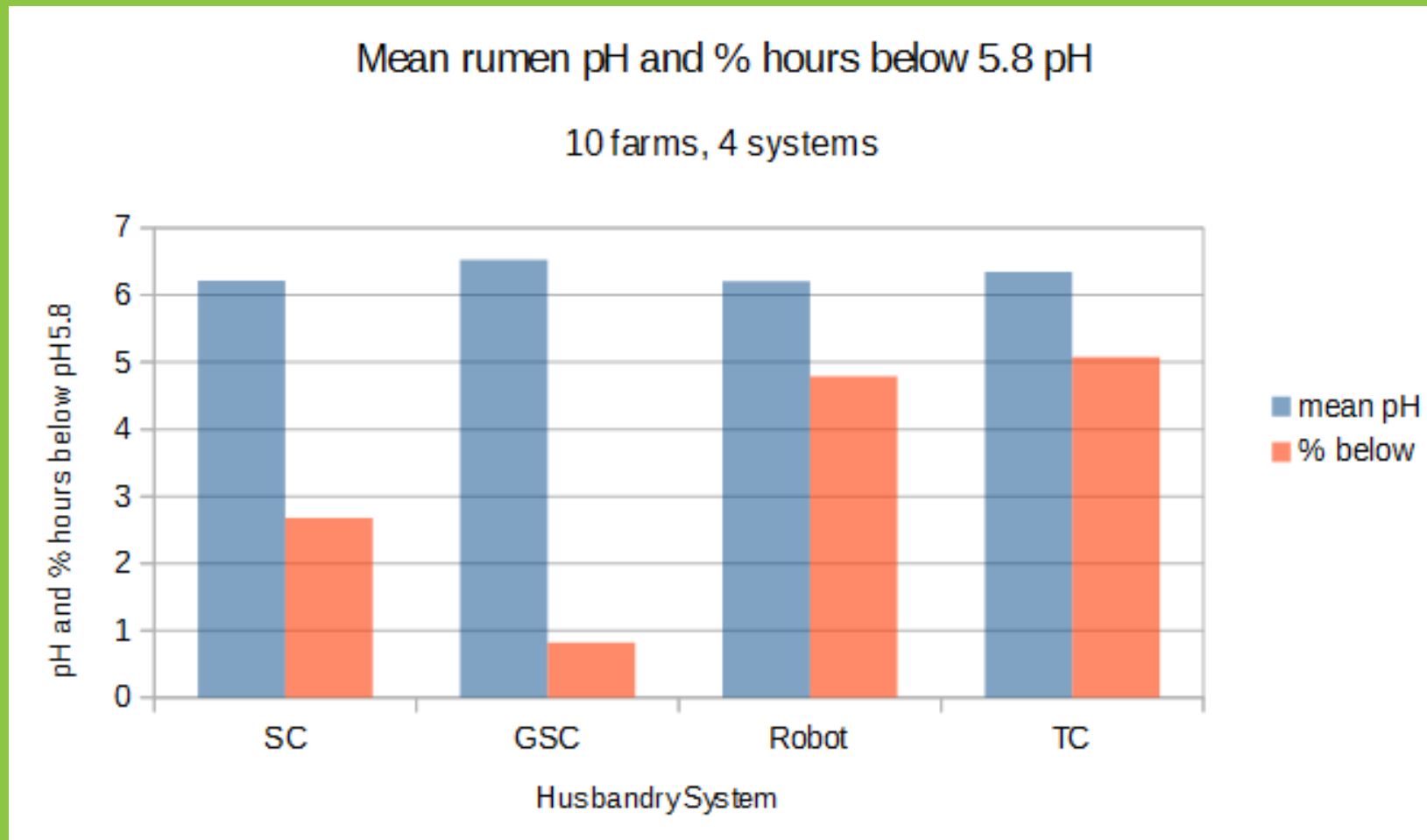
A complete data set will be posted on ResearchGate.net after the conference

Rumen pH and % hours below 5.8 v Milk Yield



This doesn't look well correlated ! R^2 of 0.25 & 0.46

System effect on mean pH & time below 5.8 pH



Summary of data

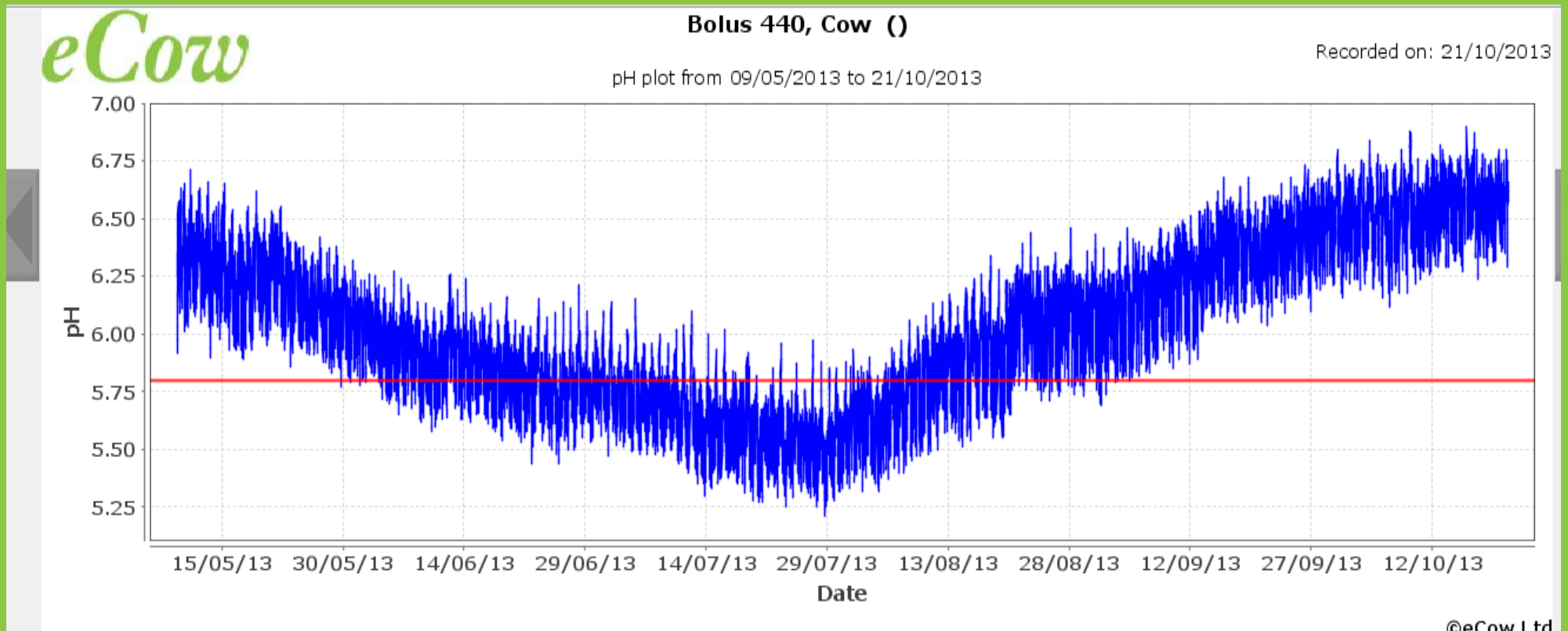
Mean pH is hardly correlated to yield
varies between 6.3 pH at 12000 l
and 6.4 pH at 7000 l

Differences between systems were less
than differences between farms with
the same system

Hours below threshold was a better
correlation but still highly variable

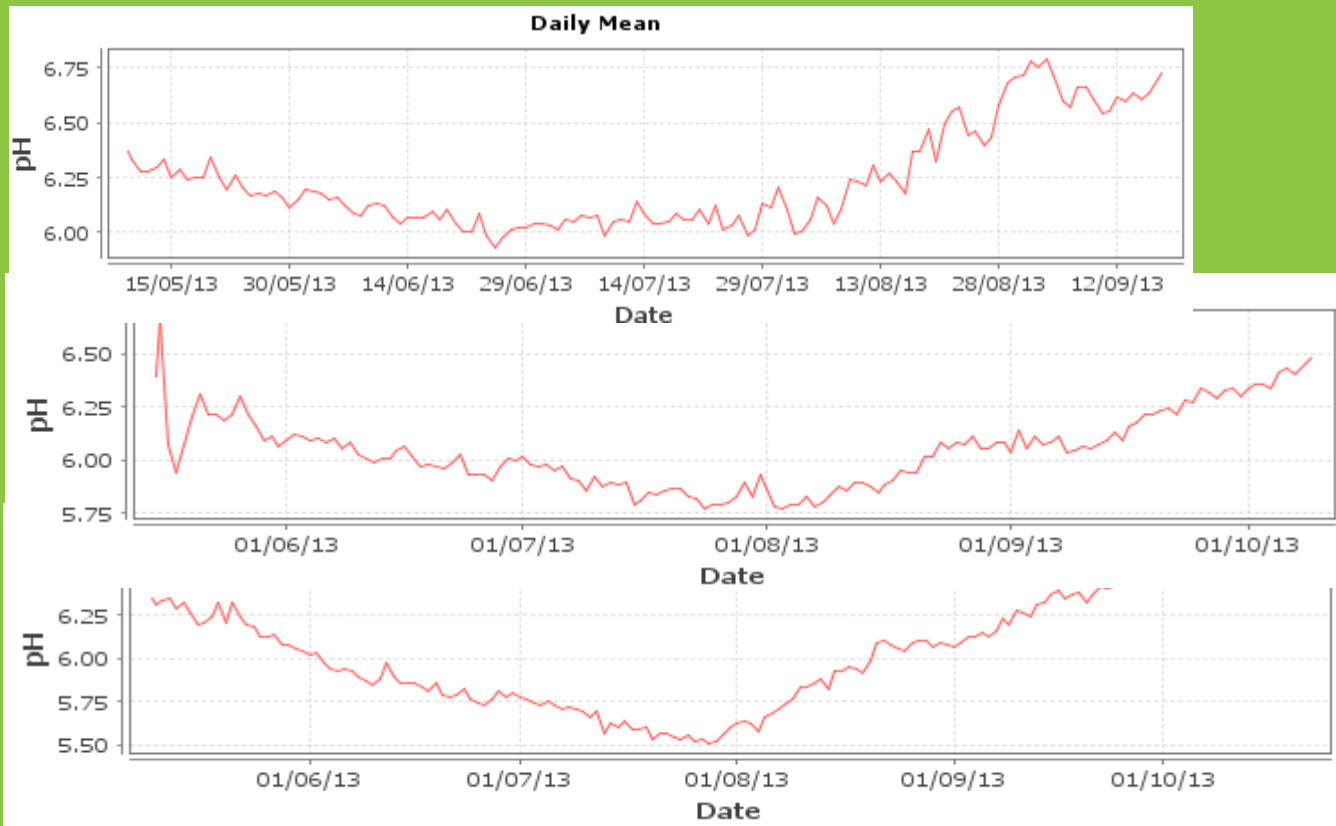
Where is SARA ?

Why is this cow still alive ?



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This is the profile of 3 cows in that herd



Conclusion

Rumen Telemetry is a powerful tool to identify nutritional problems

There is no inevitable risk of SARA with yields to 12k per annum

Concentrate fed to cows in robotic milking systems needs to be carefully selected and managed



Thank you for listening

Thanks to:-

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Bartram



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