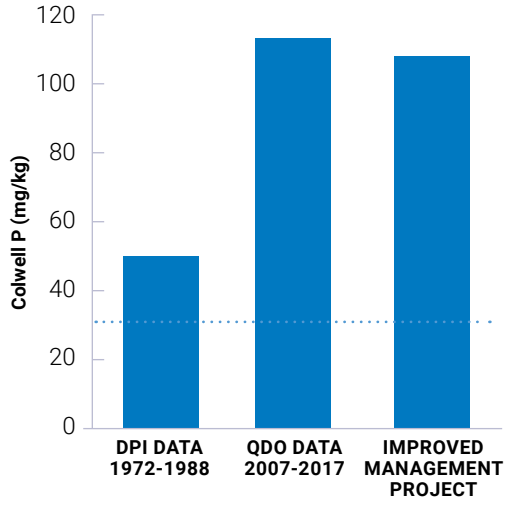
# Focusing on soil phosphorus and potassium

**The Subtropical Dairy Far North Queensland Regional Group recently engaged Dr John Armour and Kev Shaw to undertake a project titled 'Improved Management of phosphorous (P) and potassium (K) on Atherton Tableland Dairy Farms'. This project examined past results from two soil analysis databases (Dairying BnB & DAF) and collated soil analyses from six dairy farms which have a history of soil sampling. Information was also collected about how those farmers use the results in making decisions regarding fertiliser usage.**

A review of the databases revealed the following results:

- Mean Colwell phosphorous levels of dairy pastures in the Eacham Shire (1972 to 1988) were 50 mg/kg compared with 114 mg/kg in the QDO database (2007-2017)
- Mean soil pH (1:5 $H_20$) increased from 5.3 in the earlier DAFQ data to 5.7 in the recent QDO samples and reflects reduced soil acidity.
- Concentrations of potassium, calcium and magnesium have all increased.
- Potassium concentrations are more than double the critical concentration of 0.3 cmol/kg established locally by Kerridge (unpublished data)

**Soil phosphorus levels on the Atherton Tableland versus historical and project datasets. Dotted line represents recommended concentrations.**




Critical soil nutrient values for pH, phosphorous and potassium for both dryland and irrigated pasture production for dairy systems on the Atherton Tablelands have been available for more than 40 years. Phosphorus soil concentrations of 30 mg/kg (or ppm) are considered to be the critical soil level for pasture production. The average P level of mg/kg in the QDO database far exceeds what is required for plant growth and indicates a long history of P fertiliser.

The analysis of historical data from the six dairy farms produced mixed results. In a few cases, it was difficult to establish trends in soil P concentrations due to use of different sampling depths and different extraction methods (Colwell, Olsen) used in the laboratory. In some cases, there had been no soil sampling undertaken for over five years and where others had regularly soil tested.

## Conclusions

- The effectiveness of soil testing to optimise nutrient management, particularly for phosphorous and potassium is currently limited by;
  - o Inconsistent sampling depths
  - o Selection of inappropriate analytical methods
  - o Interpretation of the soil test results that are not based on local soil test calibration and local experience.
- The use of different sampling depths makes interpretation of results impossible, since the critical response levels for pastures were established on a standard of 0-10 cm sampling depth.
- The Olsen P (as opposed to Colwell P) results cannot be reliably interpreted for Atherton Tableland soils because of a lack of calibration data.
- Interpretation of results appears to be outsourced to the laboratories who use an automated standard formula. This formula is often not related to individual farm needs or Atherton Tablelands conditions.

Based on these conclusions, the authors have recommended that training for both agribusiness advisors and farmers should be implemented, at least on a regional but preferably a state level. The aim would be to improve soil testing procedures and to better align fertiliser recommendations with local calibration data and experience. Importantly, the program would provide farmers with the confidence to assess the fertiliser recommendations made by agribusiness advisors in line with the business goals.