Phosphorus fertiliser offers a huge opportunity to increase productivity and profitability of sown pastures in northern Australia

G Peck[A,D], B Johnson[A], F Chudleigh[A], C Guppy[C], D Lawrence[A], S Buck[B] and J O'Reagain[A]

[A]Department of Agriculture and Fisheries, PO Box 102, Toowoomba, Qld 4350
[B]Department of Agriculture and Fisheries, PO Box 6014, Rockhampton, Qld 4701
[C]University of New England, Armidale, NSW

Introduction

The Brigalow Belt bioregion of Queensland is an important part of the northern Australian beef industry as it supports a large proportion of the sown pastures and cattle herd with relatively high stocking and growth rates. Clay soils were widely thought to have adequate plant available phosphorus (P) levels for sown pastures leading to extremely low rates of fertiliser use. Recent studies show large and increasing areas of low plant available soil P and large responses by pasture legumes to P fertiliser precipitating a review (Peck *et al.*, 2015) which this paper summarises.

Methods

A review of current knowledge was conducted involving review of literature and un-published trial results; bio-economic analysis and identifying research, development and extension priorities.

Results and Discussion

The Brigalow Belt carries approximately 30% of the northern Australian beef herd on 15% of the grazed land area, largely due to sown grass pastures growing on relatively fertile soils in a moderate rainfall zone. The productivity of the majority of sown pastures has declined by approximately 50% due to nitrogen being tied-up in soil organic matter – a process commonly called 'pasture rundown'. Incorporating pasture legumes has been identified as the best long term solution to improve the productivity of rundown sown grass pastures, however they require adequate P to grow well and fix large amounts of N. Graziers and farm advisors have traditionally thought that P fertiliser is not required on sown pastures on Brigalow soils which has led to extremely low rates of fertiliser use (which contrasts to southern Australia). This widely held view is inaccurate with low P levels being common; a review of 3 soils databases reveals that only ~30% of soils have adequate P for all legumes (Colwell >25ppm), 20-30% of soils have Colwell P levels <10ppm a level at which all legumes are likely to respond and animals maybe P deficient.

Research trials have demonstrated legumes used in the sub-tropics respond strongly to P fertiliser. Economic analysis indicated strong returns are likely (internal rates of return of 9 – 15% with P fertiliser when establishing legumes into grass pastures on low P soils, 12 – 15% when adding P fertiliser to already established grass/legume pasture and 15 – 30% when establishing legumes into grass pastures on high P soils). RD&E is required for industry to increase P fertiliser from the current almost nil use. Specific R&D requirements include quantifying plant, animal and economic responses to P fertiliser; quantifying P requirements and responses of legume varieties; quantifying the extent of other nutrient deficiencies (e.g. sulphur and potassium). Development and extension activities are required to demonstrate the commercial impacts of applying P fertiliser to legume based pastures.

References

Peck, G. A., Chudleigh, F., Guppy, C., Johnson, B. & Lawrence, D. N. (2015). *Use of phosphorus fertiliser for increased productivity of legume-based sown pastures in the Brigalow Belt region - a review.* Sydney, Australia: Meat & Livestock Australia Limited.

[D]Corresponding author: gavin.peck@daf.qld.gov.au