Pasture growth from poultry litter. Part 1

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Introduction

Poultry litter is an effective fertiliser, able to support impressive pasture growth. In the Lower Hunter and other poultry production areas, the by-product litter or manure has been considered a waste disposal issue. It has a long history of use or disposal on broiler farms and nearby holdings. Due to increases in the cost of other fertilisers poultry litter is now being recognised as a valuable fertiliser resource.

Previous soil monitoring has shown that paddocks with a history of poultry litter application accumulate very high phosphorus levels and that with continual use pastures are only responding to nitrogen contained in litter. The extra phosphorus applied is effectively wasted and is possibly a pollution risk.

Poultry litter is recommended to be used as a base fertiliser to build soil fertility. When soil tests show that phosphorus levels are adequate then poultry litter should be alternated with nitrogen or other fertilisers as required. This effectively means that properties with a history of poultry litter use should cut back or move litter to new areas and this will make litter available for new users.

Methods

A paddock trial at Tocal has been comparing pasture growth from poultry litter and fertiliser since 2002. The paddock is irrigated (bike shift) and monitored using pasture cages. It has a kikuyu base and is usually oversown with ryegrass in late autumn (no herbicide used in this paddock before planting). The paddock had high soil fertility when the trial started in December 2001 with pH$CaCl_2$ 5.6 and phosphorus readings of 195 ppm (Colwell) and 53 ppm (Bray).

A range of factors were monitored in this paddock including nutrient runoff, changes in soil fertility and pasture production. The trial consisted of 3 treatments, 2 replications, plot size 15 m x 100 m, 3 cages per plot. Pasture production was estimated using the pasture cages and is reported here as kg dry matter (DM)/ha.

Treatment 1: Annual poultry litter: 15 m^3/ha applied in December each year.

Treatment 2: For the first 3 years received fertilisers applying the same nutrients estimated to be applied in treatment 1. These fertilisers were applied in split applications every 3 months. From year 4 to present this treatment has only received urea at 100 kg/ha/month applied when pasture was actively growing. In years 4 and 5 urea was applied in 7 months each year. In years 6 and 7 it was applied every month.

Treatment 3: Received poultry litter 15 m^3/ha/year every 2nd year (4 times) in total. Also 100 kg/ha urea applied every 3 months except in years 1 and 3 when no urea was applied.

Nil Fertiliser: A 20 metre nil fertiliser "buffer" is located at the bottom of both treatment 3 plots.

Results and discussion

Due to high soil fertility it was expected that nitrogen application would have the main influence on pasture production.

Conclusion

Poultry litter is an effective fertiliser supplying N, P, K, S and other nutrients. It is most beneficial when all nutrients are needed. Annual application of 15 m^3/ha has consistently produced 17 tDM/ha from kikuyu pasture oversown in late autumn with ryegrass when adequate rain or irrigation is available.

Similar or better results were achieved where poultry litter was applied every second year with

2002: Treatment 1 and 3 (litter) were identical in year 1 and both produced just over 15 tDM/ha in the year. Treatment 2 produced 13.6 tDM and the NIL fertiliser area 9.4 tDM/ha.

2003: Treatments 1, 2 and 3 all produced 17 tDM/ha and the Nil fertiliser 11.5 tDM/ha. Note: in this year treatment 3 only received 100 kg/ha urea every 3 months.

2004: The annual litter treatment produced 16.9 tDM/ha, treatment 2 produced 19.5 tDM/ha and treatment 3 produced 20.5 tDM/ha. The Nil fertiliser area produced 12.5 tDM/ha.

2005: The paddock was not oversown with ryegrass which appears to have reduced total production by 5-6 tDM/ha compared to previous year. Treatment 2 changed to be only urea at 100 kg/ha per month when pasture actively growing and treatment 3 was annual litter plus urea 100 kg/ha in March, June, September and December.

The extra nitrogen in treatments 2 and 3 has increased pasture production compared to litter alone.

2006 Ryegrass was sown very late and irrigation stopped in late spring summer (drought). Treatments remained the same as 2005. Extra growth in treatments 2 and 3 can be attributed to extra nitrogen.

2007 Treatment 3 received poultry litter in December, then urea every 3 months. Treatment 2 only received nitrogen fertiliser, other nutrients were adequate from previous applications

2008 Treatment 3 received urea every 3 months only. Treatment 2 produced 22.5 tDM/ha which is the highest yield recorded for this trial.

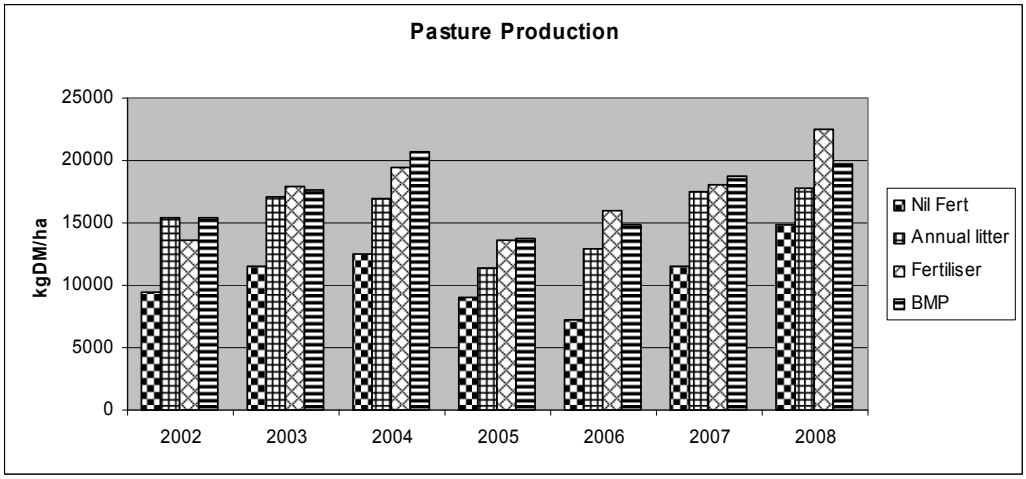

Figure 1. Pasture production following annual application of poultry litter, application of fertilisers to apply similar rates of N, P, K and a BMP which combined biannual poultry litter with extra nitrogen applied.

additional urea in the alternate years indicating that most of the response was due to nitrogen (soil tests indicated that this site had adequate phosphorus and other nutrients).

Fertilisers including DAP, urea and muriate of potash applied at rates to apply similar nutrients to the annual poultry litter for the first three years produced similar pasture production. 2008 highlighted the response possible from urea alone when soil tests indicate other nutrients are adequate.

References

Griffiths NW 2000, Changes in soil chemical properties following poultry litter applications, *2nd Joint Soils Conference of NZSSS and ASSSI, Lincoln University*

Griffiths NW, Dougherty W, & Lawrie R 2004, Protecting water quality by efficient poultry litter use on pastures, *Super Soil, 3rd Joint Soils Conference of ASSSI and NZSSS, Sydney University.*

Griffiths NW 2007, Best practice guidelines for using poultry litter on pastures, *Primefact, NSW Department of Primary Industries.*

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