Agricultural GHG emissions - post 2012 mitigation potential

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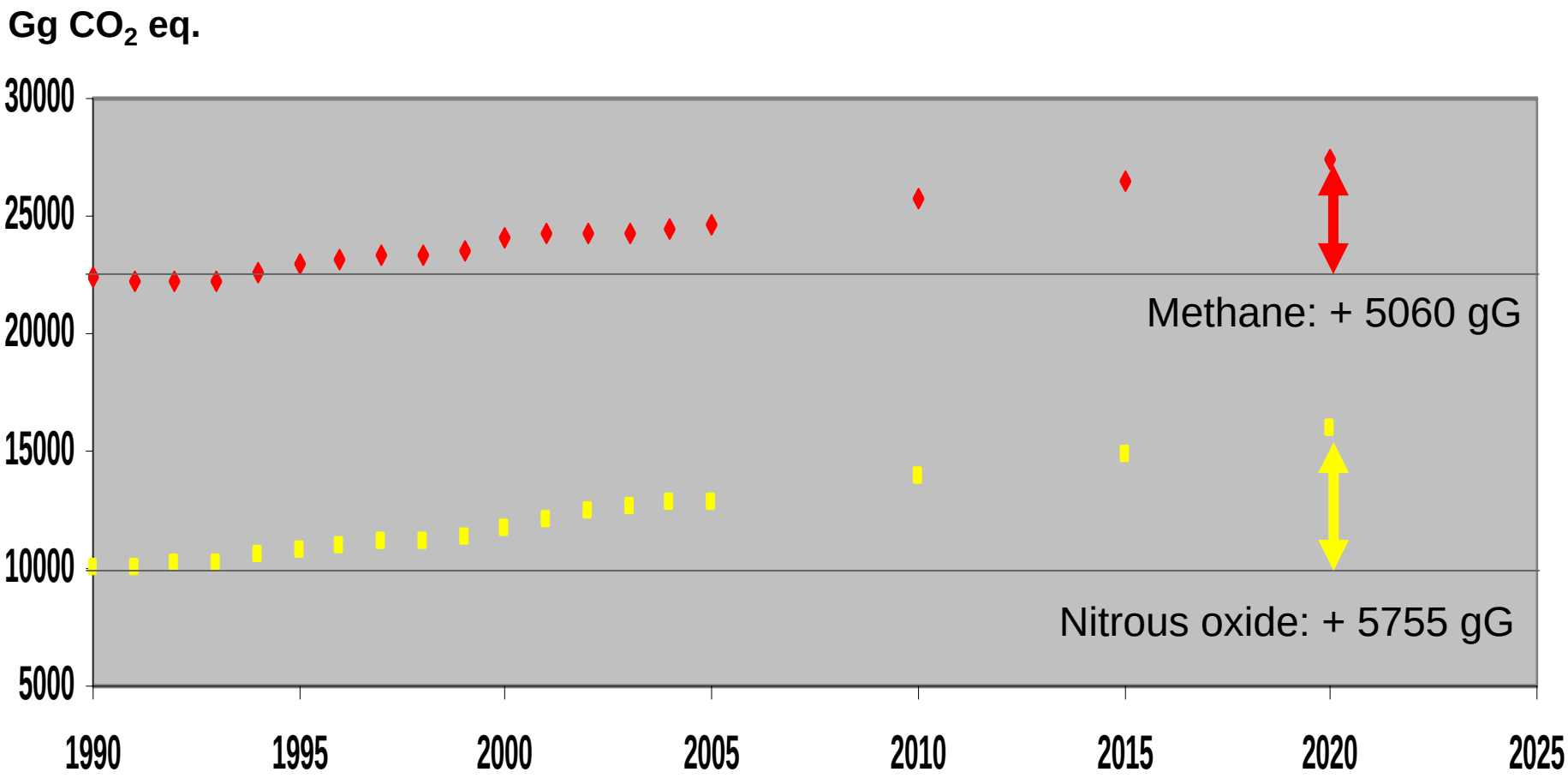
Post 2012 Roundtable Series – Agriculture
19 July 2007

New Zealand methane and nitrous oxide emissions projected to 2020 using the 1990-2005 time series



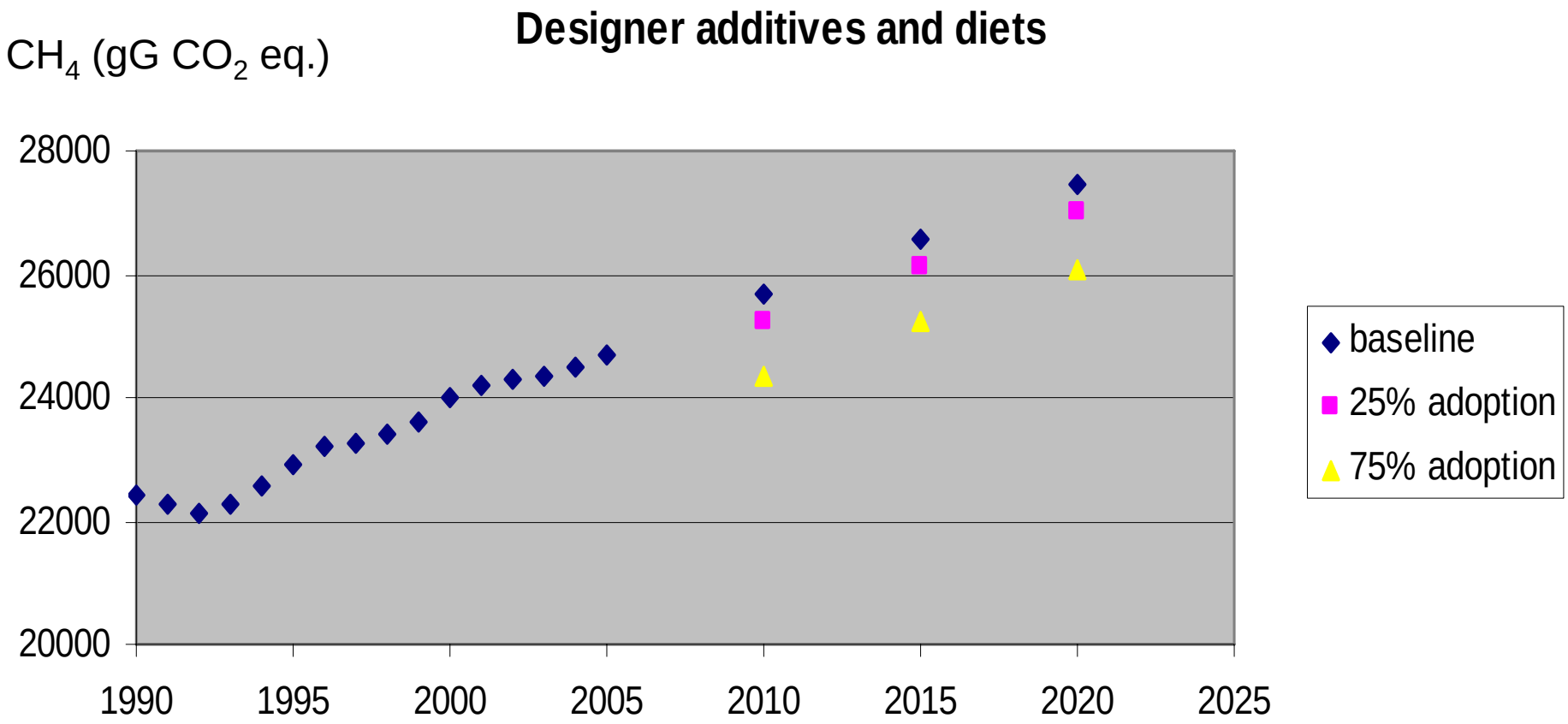
Possible CH_4 mitigation options

Mitigation	% reduction in CH_4 per unit of feed consumed	Limitations	Assumptions
'Designer' forages e.g. high energy	15	Only 3% of land area is re-sown each year	Re-seeding increases to 5%, effect lasts for 4 years before ingress of non-sown species reduces the effect to zero. Available 2010.
'Designer' dietary additives e.g. probiotics, yeasts, ionophores	15	May not be practical for all systems due to delivery issues	Applicable to only 45% of livestock. Available 2010.
'Designer' diets e.g. high oil	20	Restricted mainly to dairy	Applicable to only 45% of livestock. Available 2010.

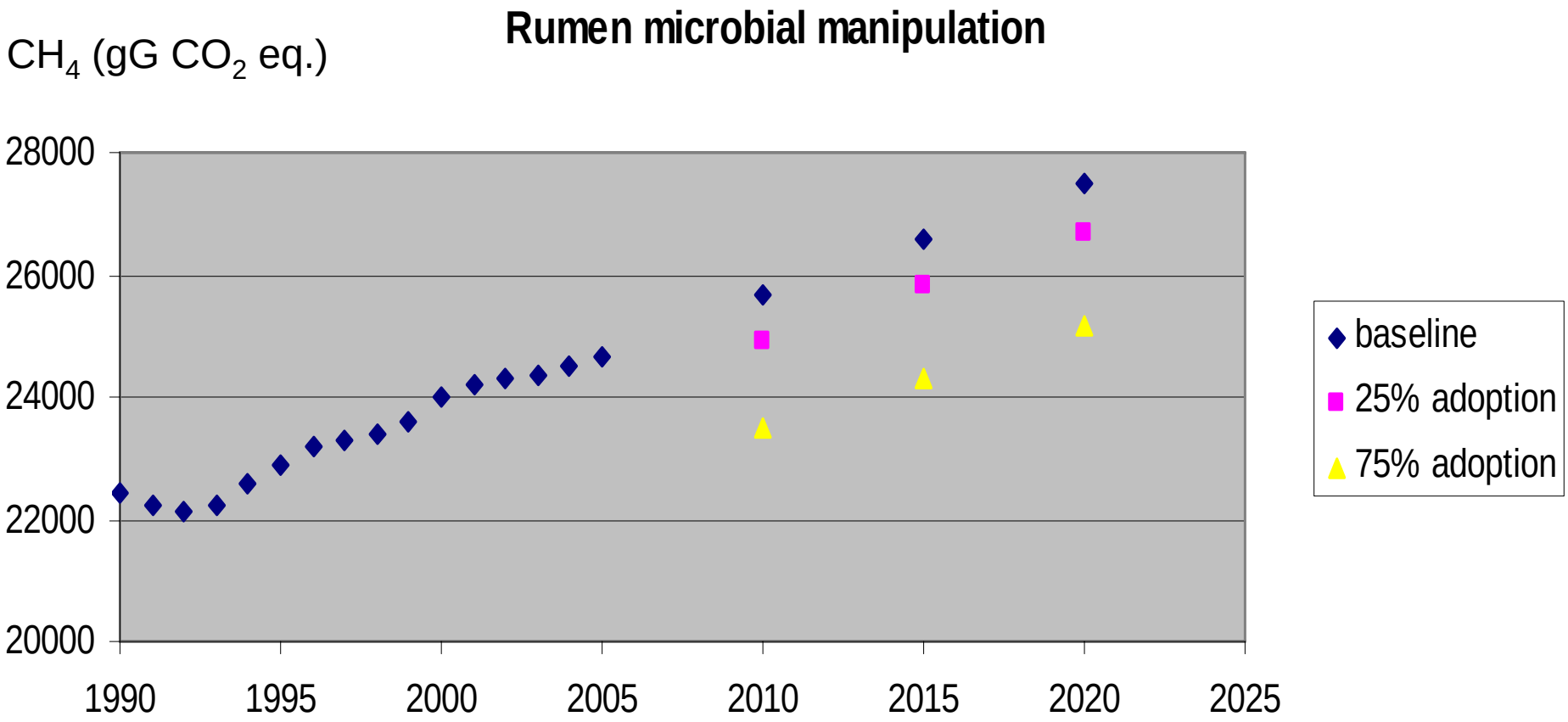
Possible CH_4 mitigation options

Mitigation	% reduction in CH_4 per unit of feed consumed	Limitations	Assumptions
'Targeted' manipulation of the rumen ecosystem eg replacement of methanogens with acetogens	25	Technically challenging due complexity of the problem. Longevity of effect. Cost? Effect on efficiency of digestive process	Only available from 2015. Limited to dairy sector initially (approx 45% of emissions)
Breed animals with low CH_4 yield	10	Confined only to dairy. Low emission trait has to be balanced with other productive traits	Only available from 2015, limited to dairy sector (approx 45% of emissions)

Impact of individual CH_4 mitigation options at two contrasting adoption rates



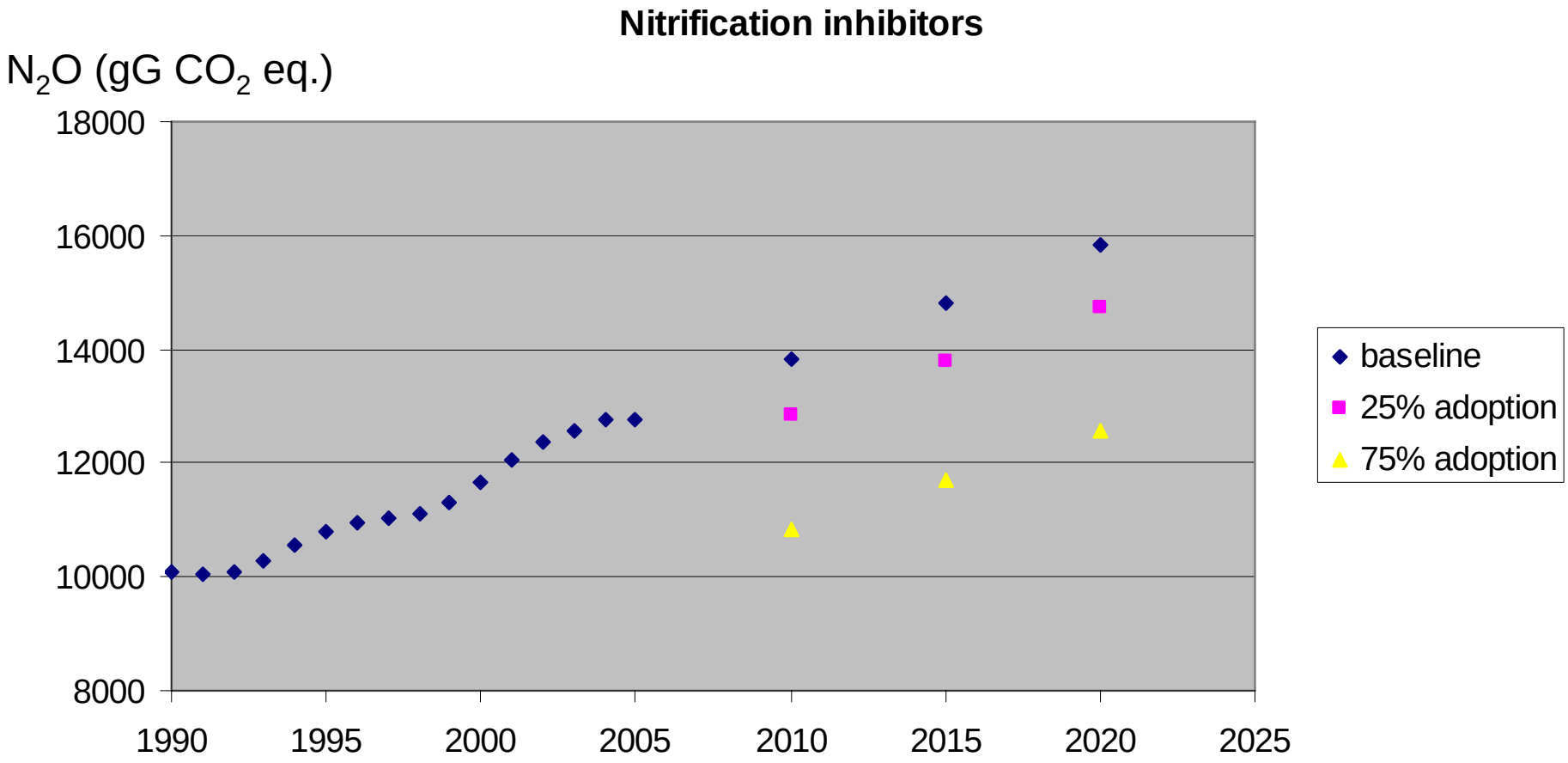
Impact of individual CH_4 mitigation options at two contrasting adoption rates



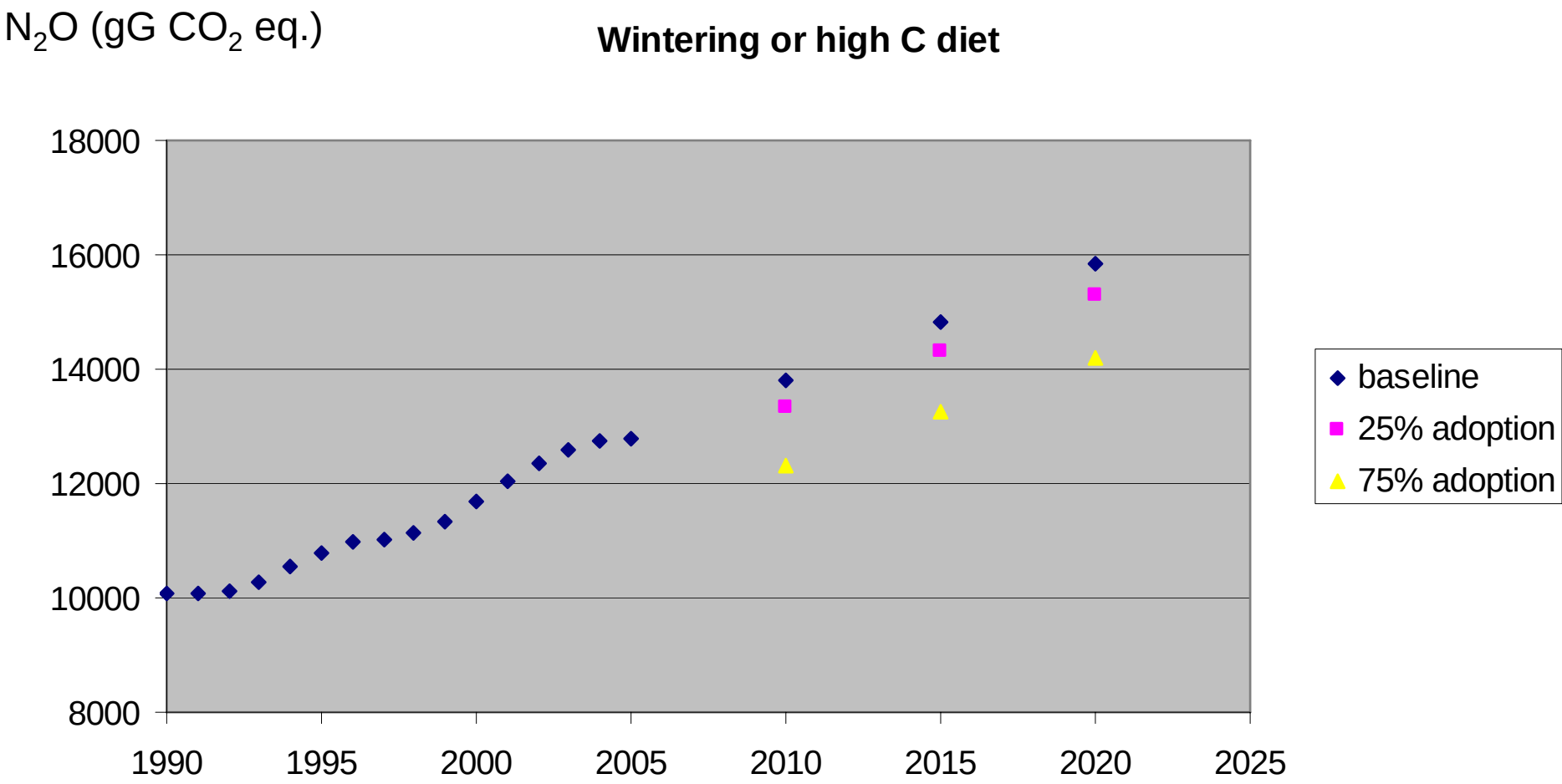
Possible N_2O mitigation options

Mitigation	% reduction from farm system N_2O	GHG	Limitations	Assumptions
Nitrification inhibitors	50	10 (15)	Long-term impacts?	10% reduction total GHG, applicable to all sectors Available now
Wintering systems	<10	<10	Limited impact on total GHG emissions Limited to dairying and intensive beef	Applicable to 50% of livestock emissions Available now
'Designer' diets e.g. high carbon:N ratio	20	10	Limited to dairying and intensive beef	Applicable to 50% of livestock emissions Available now

Impact of individual N_2O mitigation options at two contrasting adoption rates



Impact of individual N_2O mitigation options at two contrasting adoption rates



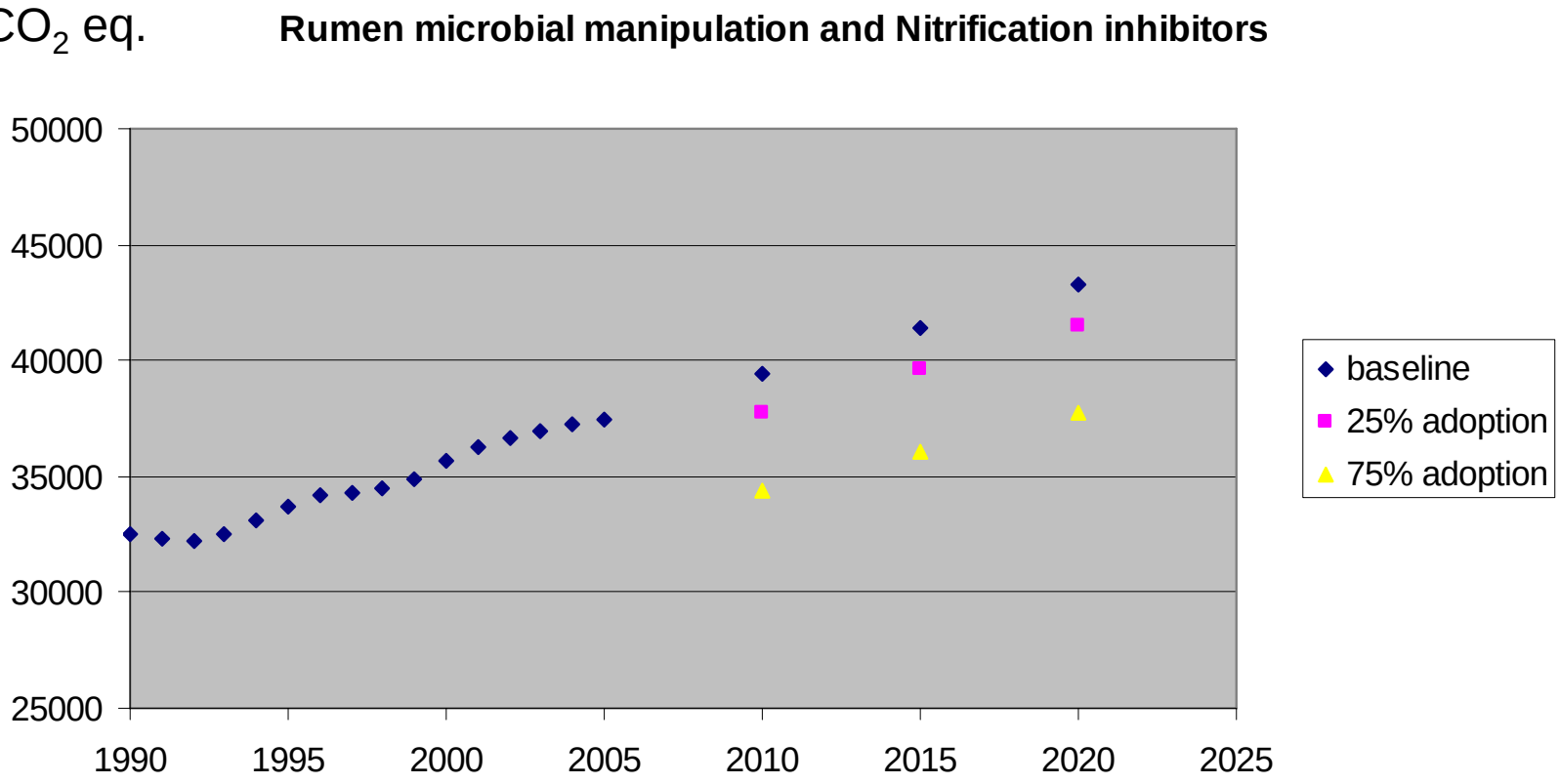
Future N_2O mitigation options

Mitigation	% reduction in N_2O per unit of product	Assumption
Diuretics e.g. salts	50?	Mainly effective for dairy and beef
Breed animals with 'improved N retention'	5	
Physical interventions to spread urine	50?	Mainly effective for dairy and beef

Impact of combination of 2 key options at two contrasting adoption rates

$CH_4 + N_2O$

gG CO_2 eq.



Summary

Simple projections show that by 2020,

- Methane 22% above 1990 and 11% above 2005 levels
- Nitrous oxide 57% above 1990 and 24% above 2005 levels

Using optimistic assumptions regarding availability and effect of known mitigation technologies emissions are likely to continue to increase

To reduce emissions even to a 2005 baseline will require one highly effective mitigation option or a combination of effective mitigation options that are applicable to all sectors and have high uptake

Continue to strive for efficiency gains

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