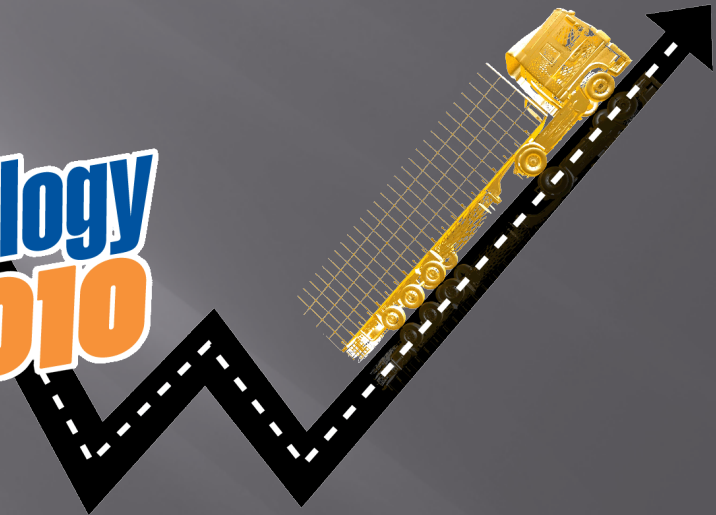




**Transport Technology
& Productivity 2010**



Comparative performance of innovative quad-trailer combinations

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Overview



- ▣ Background and project scope
- ▣ Vehicle combinations and variations
- ▣ Performance measures and results
- ▣ Conclusions

Background

- ▣ Growing road freight transport task



- ▣ Increased preference for quad trailer combinations



- ▣ Currently limited operational experience
- ▣ Speculation about which innovative quad is 'best'

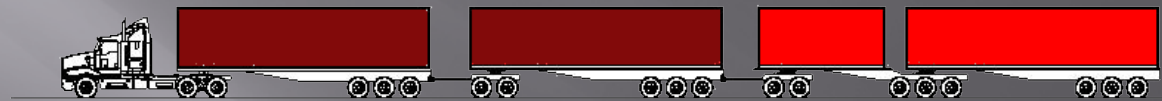
Assessment method

- ▣ Large scale simulation program
- ▣ On road field testing validation
- ▣ National Transport Commission's PBS measures

Vehicle combinations

▣ Three innovative vehicles

AAB-quad



BAB-quad



ABB-quad



▣ 'As of right' vehicle

A-triple



Project scope



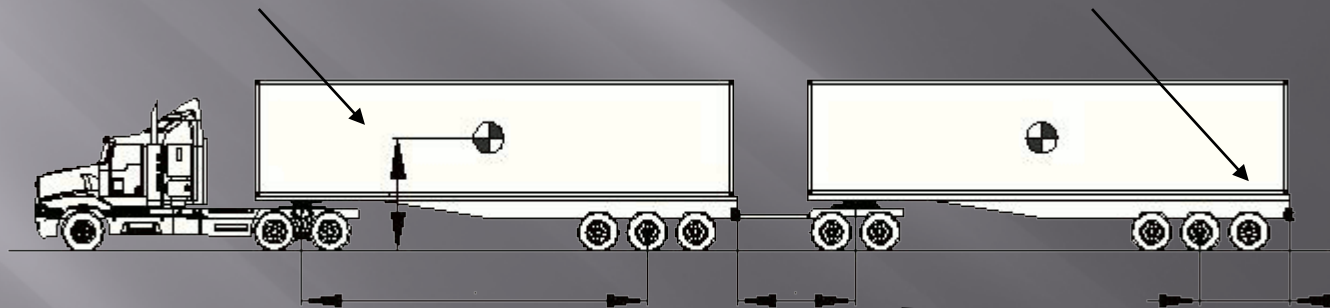
- ▣ Four common commodity types
 - 'general' container freight
 - livestock
 - quarry product
 - fuel (tanker)
- ▣ Varying loading scheme (GML/HML)
- ▣ Tandem and tri-axle groups
- ▣ Mechanical and air suspension

Sensitivity study

- ▣ Varied vehicle and trailer geometry

Trailer centre of gravity height ($\pm 10\%$)

Trailer coupling rear overhang ($+10\%$)

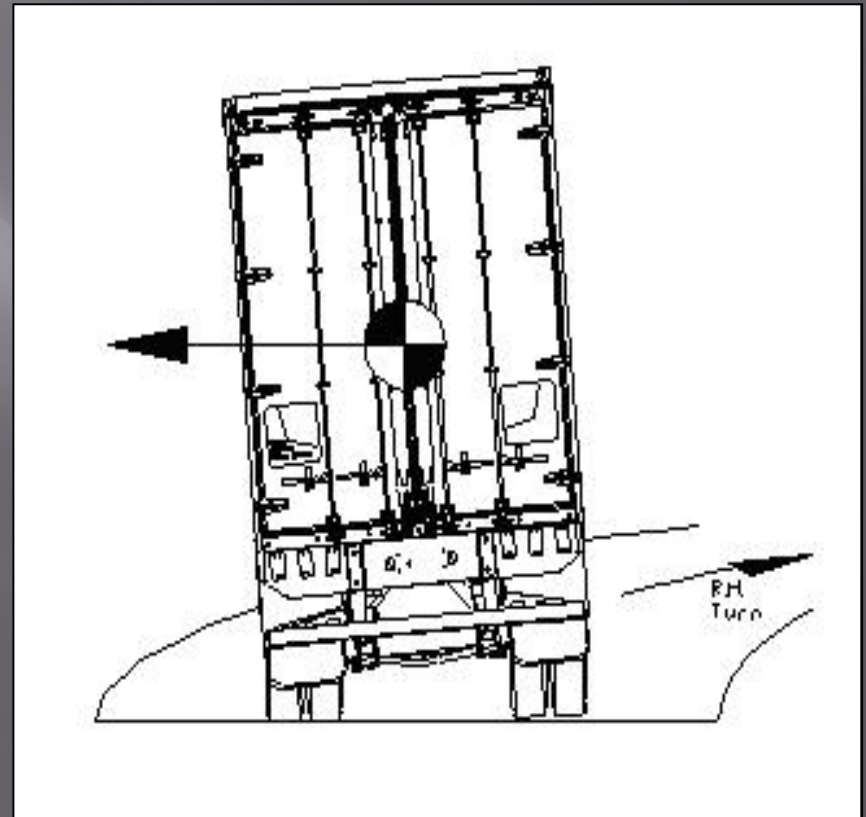


Trailer wheelbase (-5%)

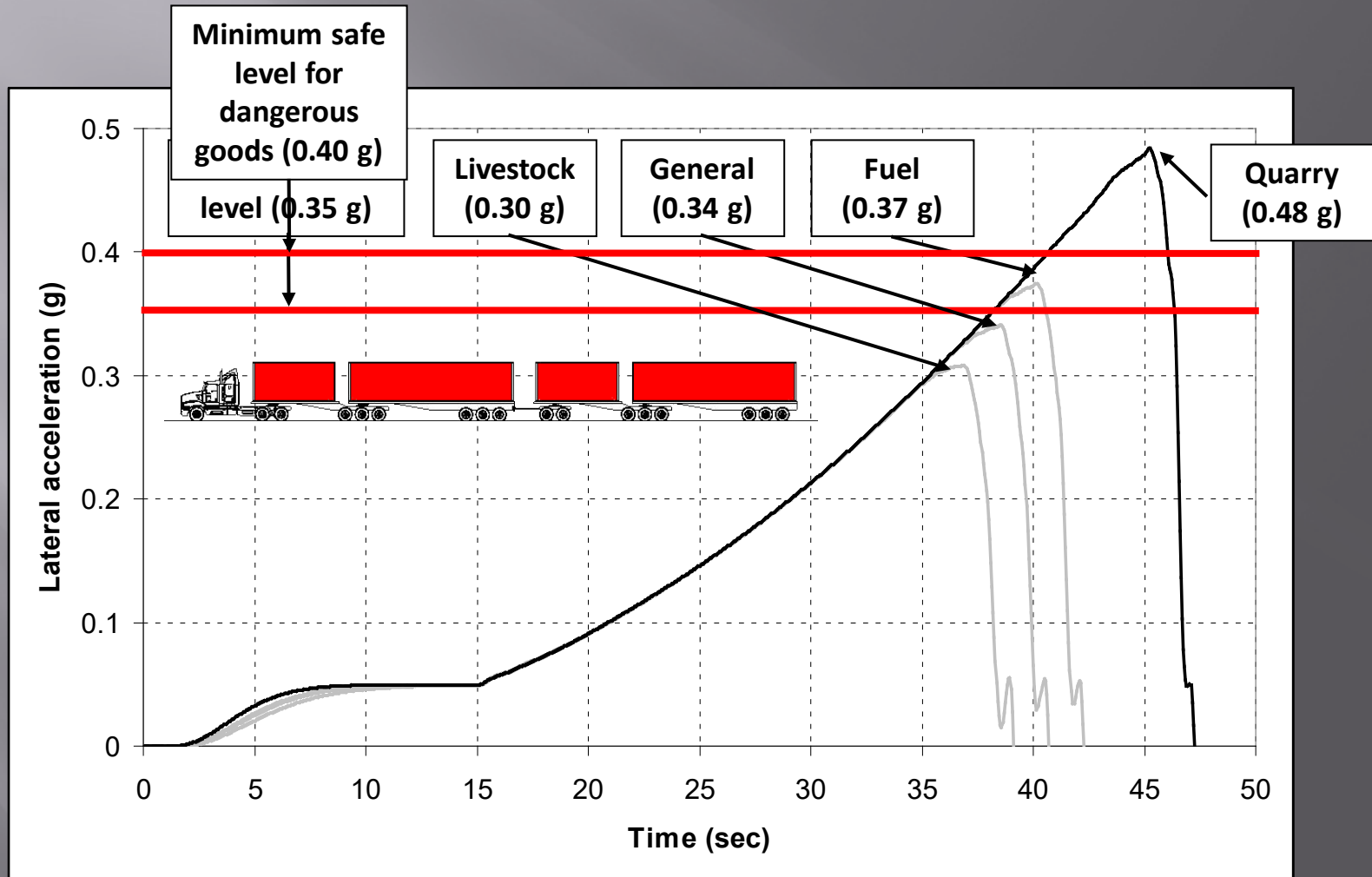
Dolly wheelbase (-5%)

Quantifying vehicle performance

- ▣ Static rollover threshold (SRT)



Results: Static rollover threshold (SRT)



Results:

Static roll threshold (g)



Loading	A-triple	BAB-quad	ABB-quad	AAB-quad
Livestock	0.31	0.30	0.30	0.30
General freight	0.34	0.34	0.34	0.33
Quarry product	0.46	0.48	0.48	0.46
Fuel	0.37	0.37	0.37	0.37

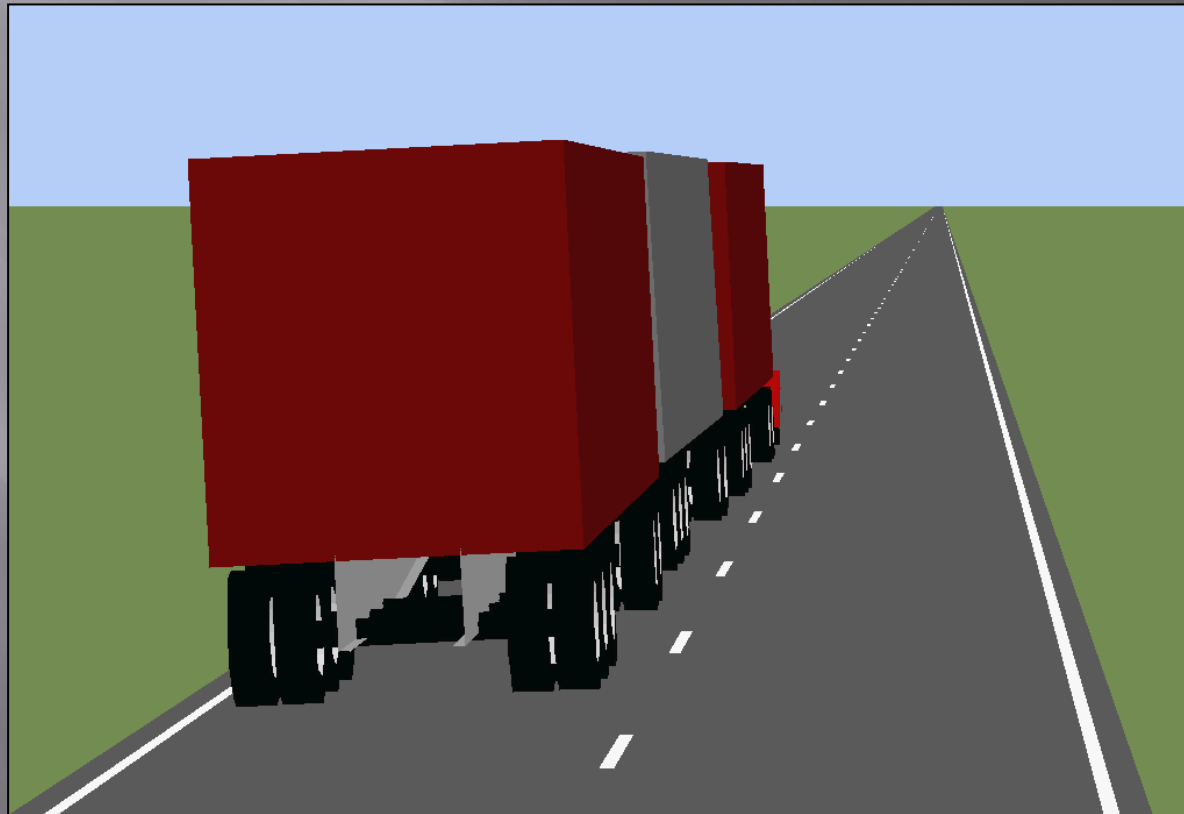
Quantifying vehicle performance



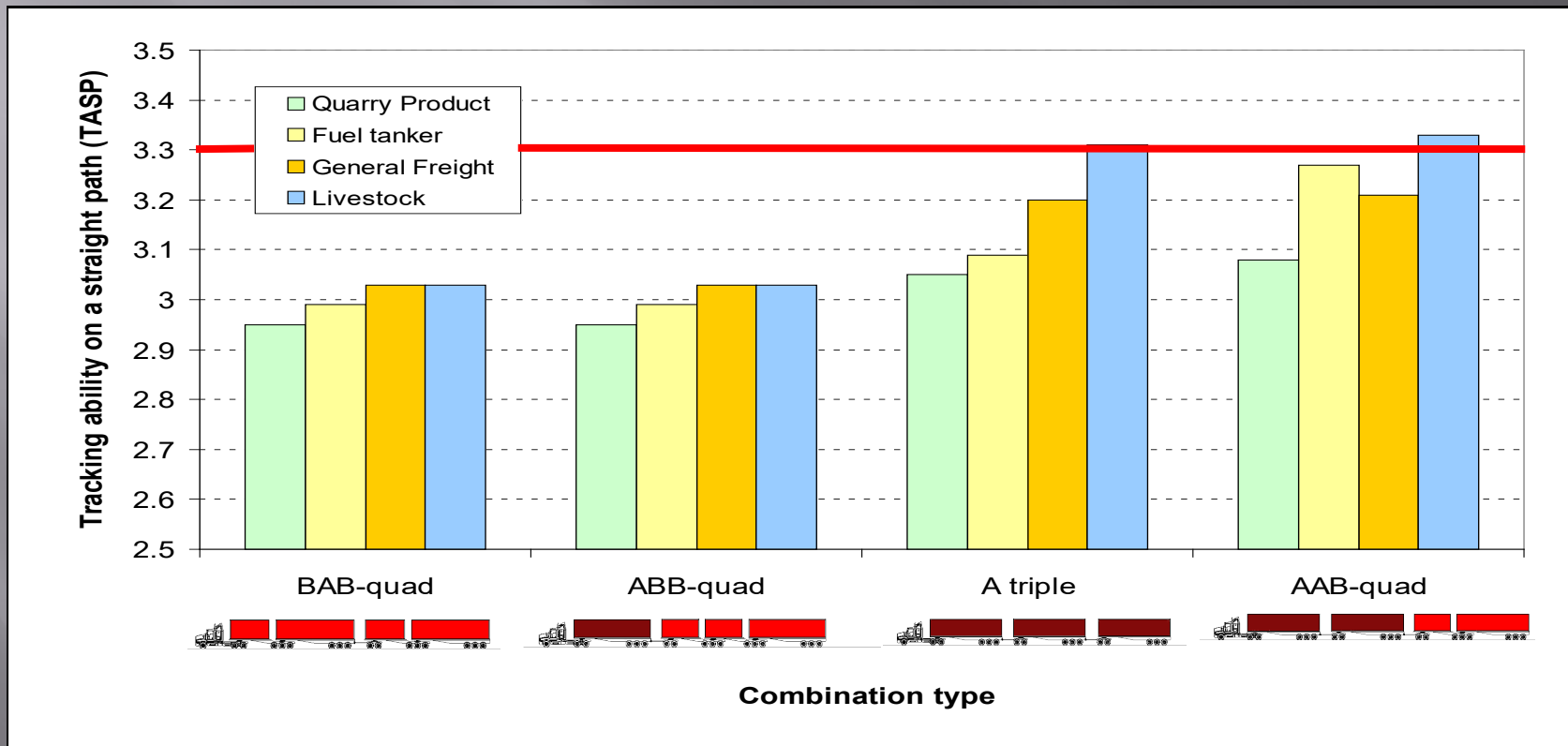
- ▣ Tracking ability on a straight path (TASP)

Quantifying vehicle performance

- ▣ Tracking ability on a straight path (TASP)

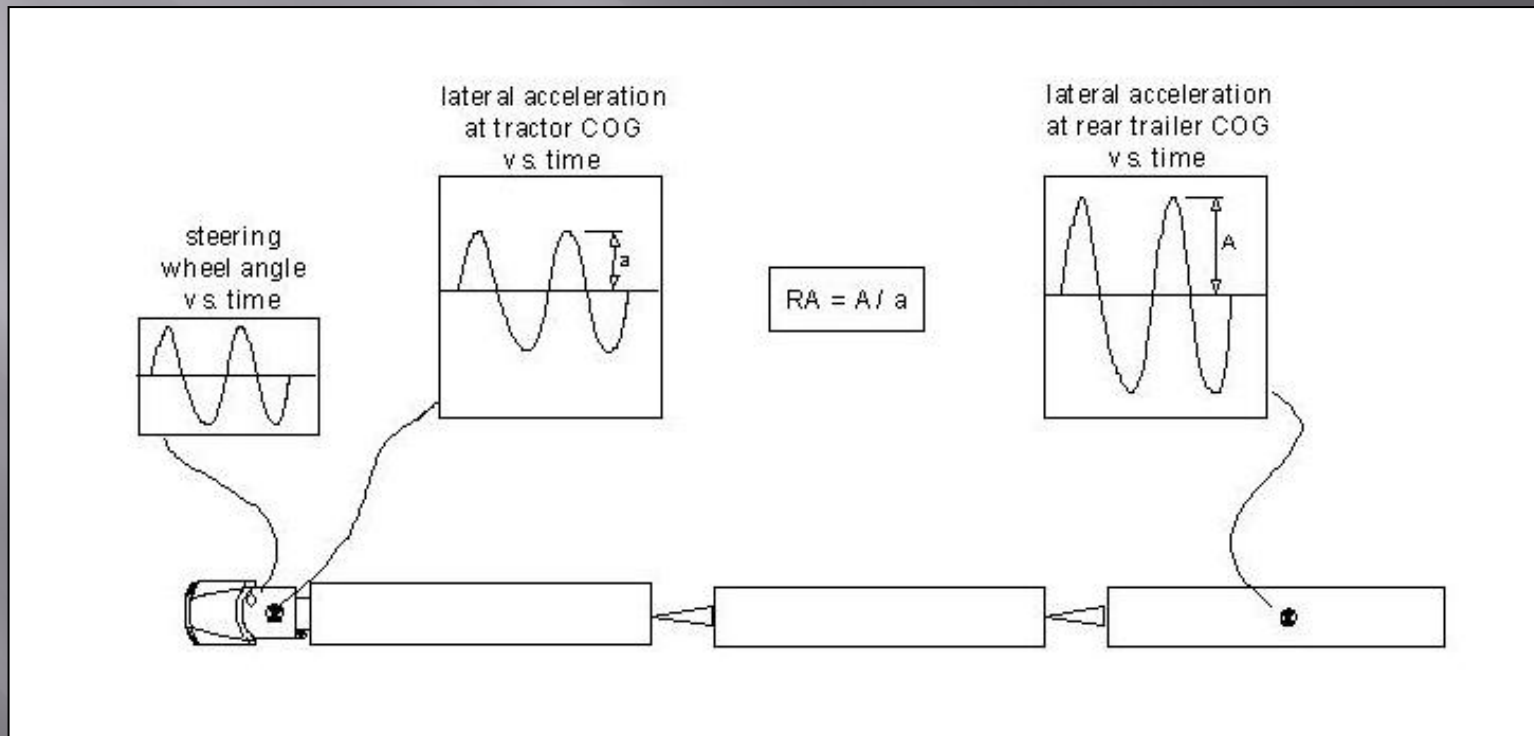


Results: Tracking ability on a straight path (TASP)



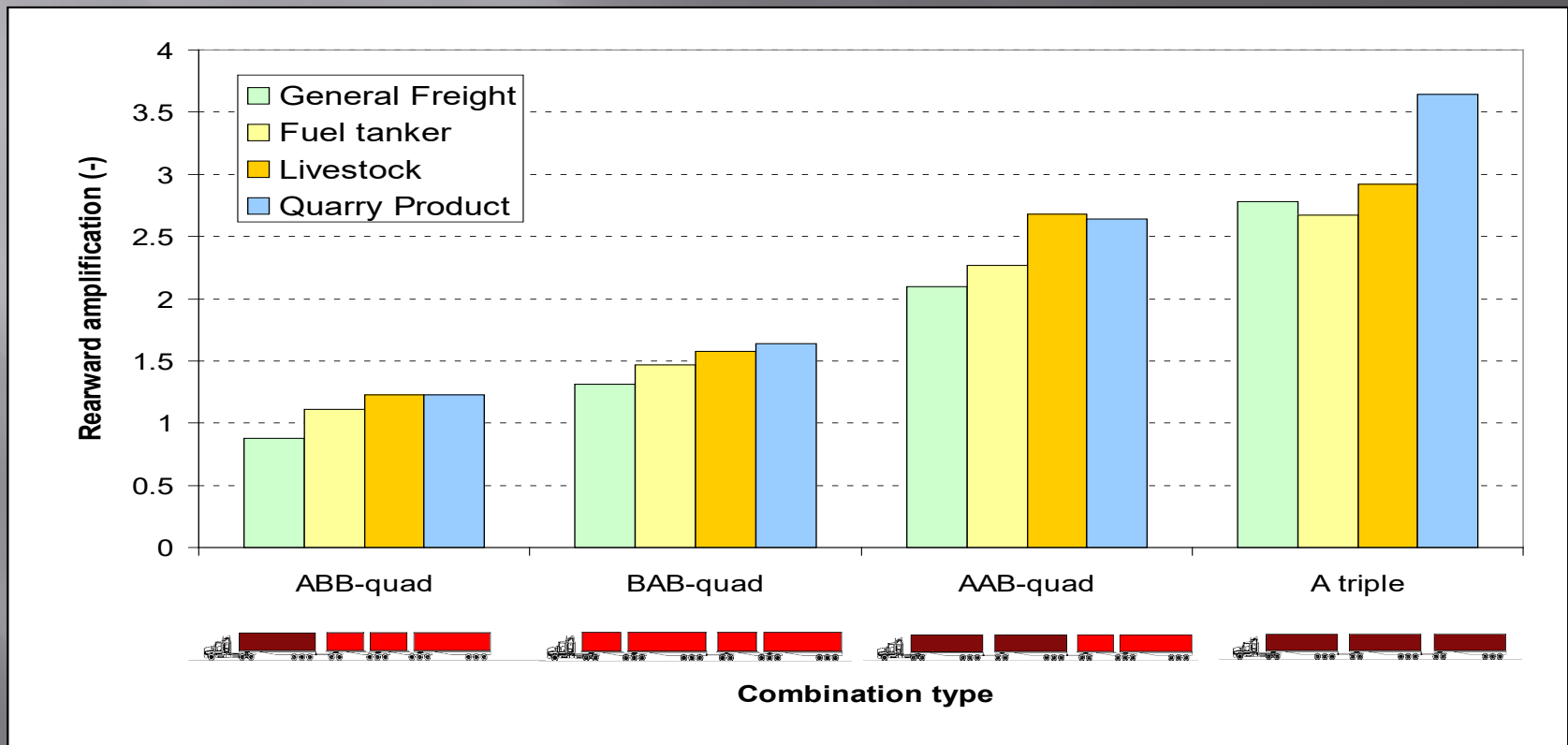
Quantifying vehicle performance

▣ Rearward amplification (RA)



Results:

Rearward amplification (RA)



Conclusions



- ▣ Critical nature of certain characteristics
 - GCM, CoG height, overall length
 - trailer order, coupling type
 - number of roll coupled units
- ▣ Superiority of ABB and BAB combinations