

# Biodiesel Impacts on NOx Emissions

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## Analysis of Biodiesel Emissions Data

- New statistical analysis of all available data (animal and soy) has been performed by Robert Crawford of Rincon Ranch Consulting.
  - ❖ Due to limited time, detailed results will be submitted as workshop comments.
- Results Indicate:
  - ❖ Statistically significant increases in NO<sub>x</sub> emissions for soy with no threshold: NO<sub>x</sub> will increase ~1% on average at the B5 level and ~2% at B10.
  - ❖ Highly variable NO<sub>x</sub> impacts for animal biodiesel depending on the study/blendstock.





## Animal Biodiesel Issues

- The NOx impact of biodiesel is increased or decreased by the effect of blending on cetane number.
  - ❖ Some animal blends increase cetane enough to minimize the NOx impact, while others do not.
  - ❖ No basis for concluding that there are no NOx increases for animal blends at B5 – the impact depends on the change in cetane.
- NOx impacts of animal (and soy) biodiesel should be accounted for using a statistical model analogous to the Predictive Model for RFG.





## New Technology Diesel Engines (NTDEs)

- CARB's conclusions are based on only one study (Lammert *et al.*) where actual NOx emissions were generally below detection limits.
- A new study (SAE 2014-01-1400) by UCR indicates NOx emissions increase from biodiesel use in NTDEs.
- CARB's analysis regarding biodiesel impacts on NTDE NOx emissions should account for the most recent data, impacts of off-cycle operation on HDDV NOx emissions, as well as ECS tampering and deterioration.

