

Engineering electron metabolism to increase biofuel production in *Clostridium thermocellum*

Background

- NAD(P)⁺ Efficient electron flux is critical for engineering fuel production pathways, but little is known about the relative importance of these enzymes in *Clostridium thermocellum*.
- One hypothesis is that ethanol production may be limited by the availability of NADH.

Approach

- A series of gene deletion and overexpression experiments were performed to understand the effect and interaction of enzymes in *C. thermocellum* involved in electron transfer.

Outcome

- Confirmation that the *mfCDGEAB* gene cluster is responsible for electron transfer from ferredoxin to NAD⁺ (Fd:NAD⁺ activity)
- Increased production of ethanol by 30% in some strains

Significance

- Engineering electron metabolism is a promising strategy for improving ethanol production in *C. thermocellum*.
- A strain with improved ethanol production was also generated by overexpressing the *mfCDGEAB* operon.

Diagram of electron metabolism in *C. thermocellum*

