Spherical pellets were made to test the viability of firing pellets in a boiler. A mixture of 40 w/w% paunch and 60 w/w% sludges (DAF, saveall and decanter sludges) was used which is the approximately mass ratio of organics available at a red meat processing facility (overall starting moisture of 78.8%). The pellets displayed excellent stability during storage over several months and transportation. The pellets were then fired in a 523 kW pilot biomass boiler, the results of which are presented below.

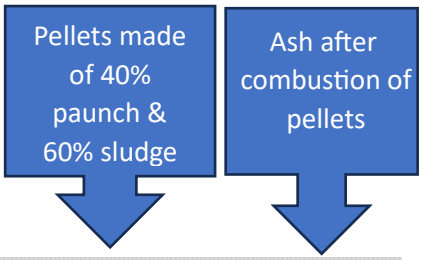
Pellets loaded into the 20' fuel hopper.

20' fuel hopper (left) and 40' containerised boiler (right).

A cost-benefit analysis was completed for an industrial pelletisation plant which found:

- Pellets had a lower heating value of 16.3 GJ/t LHV,
- Levelised cost of energy was $14.78 / GJ [over a 20 year life of plant].
- Pellets replacing coal in a boiler had a 14.1 yr payback; adding ACCUs carbon pricing drops payback to 10.0 yrs.
- Pellet replacing LPG had a 2.0 yr payback; adding ACCUs drops payback to 1.9 yrs (excluding new boiler CAPEX).
- Pellets can have additional advantages of reduced haulage costs and generation of ACCUs when displacing fossil fuels.
- A higher end use for paunch/sludge pellets could be as a fertiliser. Further works are required to confirm and develop a market for a paunch/sludge pellet.

Laboratory testing results of the pellets and the ash that remained after combustion is presented in the following table.



Clients sample Description	Paunch	Ash
Total Moisture		
Moisture, % (ar)	22.5	13.8
Ash Yield (550°C)		
Ash Yield, % (db)	13.5	-
Calorific Value (CV)		
Gross Dry Calorific Value, MJ/kg (db)	23.0	-
Gross Wet Calorific Value, MJ/kg (ar)	17.8	-
Net Wet Calorific Value, MJ/kg (ar)	16.3	-
Total Halides (S & Cl)		
S, % (db)	0.30	1.1
Cl, % (db)	0.15	0.10
Br, % (db)	<0.01	<0.01
I, % (db)	<0.01	<0.01
F, % (db)	<0.01	0.04
CHN		
Carbon, % (db)	52.5	<0.1
Hydrogen, % (db)	6.5	<0.1
Nitrogen, % (db)	0.65	0.27
Major Elements (% db, in sample)		
Al	0.82	-
Ca	1.4	-
Fe	0.90	-
K	0.19	-
Mg	0.19	-
Na	0.36	-
P	0.87	-
Si	2.4	-
Ti	0.06	-

The pellets displayed elevated levels of sulphur dioxide, carbon dioxide, and Nox compared to woodchips and a paunch/woodchip blend when fired in the pilot biomass boiler.

AVERAGE (1 hour)	% O2	ppm CO	ppm SO2	ppm NO	ppm NO2	ppm Nox "Oxide of nitrogen"
Pellet - High	14.805	242.554	85.554	110.286	0.000	110.286
Pellet - Low	15.433	365.467	83.900	111.967	0.000	111.967
80% paunch/20% woodchip - High	14.464	147.000	17.200	85.517	0.248	85.783
80% paunch/20% woodchip - Low	15.793	295.317	1.917	48.500	0.537	49.117
100% woodchip - High	15.188	163.817	0.000	84.567	0.958	85.517
100% woodchip - Low	15.822	245.883	0.000	64.483	0.247	64.817
100% woodchip - High, no flue gas recycle	15.535	101.855	0.200	73.964	0.520	74.455
mg/m^3 (Version: 6.10.2022, Published under the Legislation Revision and Publication Act 2002, South Australia, Environment Protection (Air Quality) Policy 2016 under section 28 of the Environment Protection Act 1993)		1000	1000			500
ppm (Kansas State University)		872.903	381.676			256.703
g/mol		56.02	64.06			46.01
mg/m^3 Group 6 (after 2005) A boiler operating on a fuel other than gas; NSW Protection of the Environment Operations (Clean Air) Regulation 2022 under the Protection of the Environment Operations Act 1997		None listed	None listed	500	500	500