List of Figures

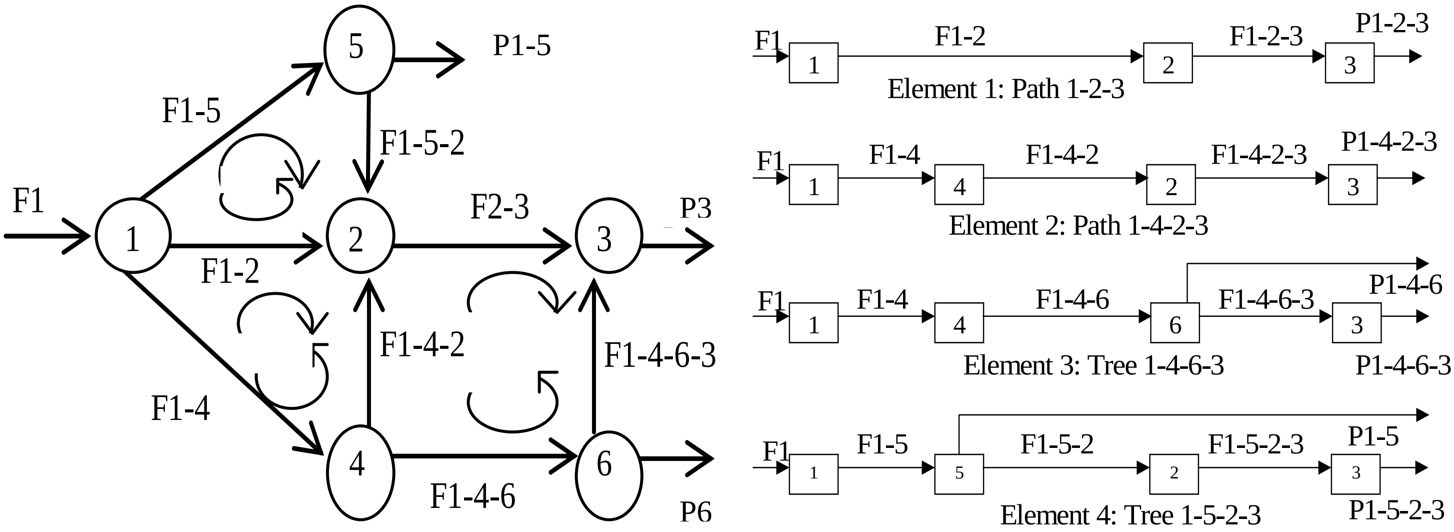


Figure 1. Foundation of a process network in terms of basic processing paths and tress (elements) (Ref. Sadhukhan and Smith, 2007)

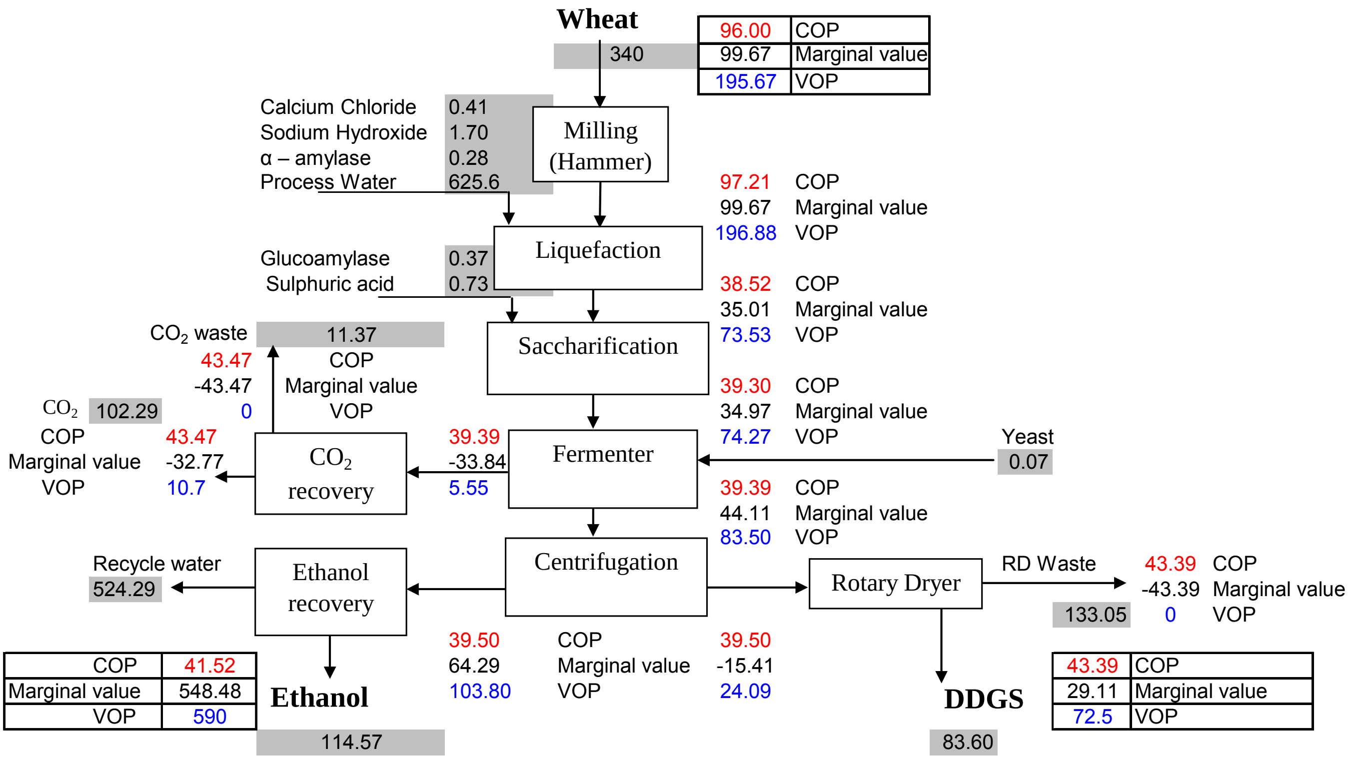
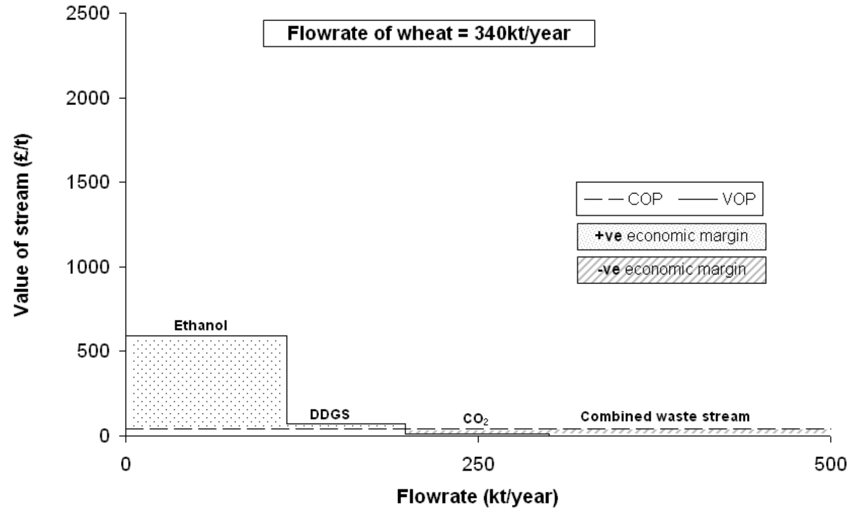
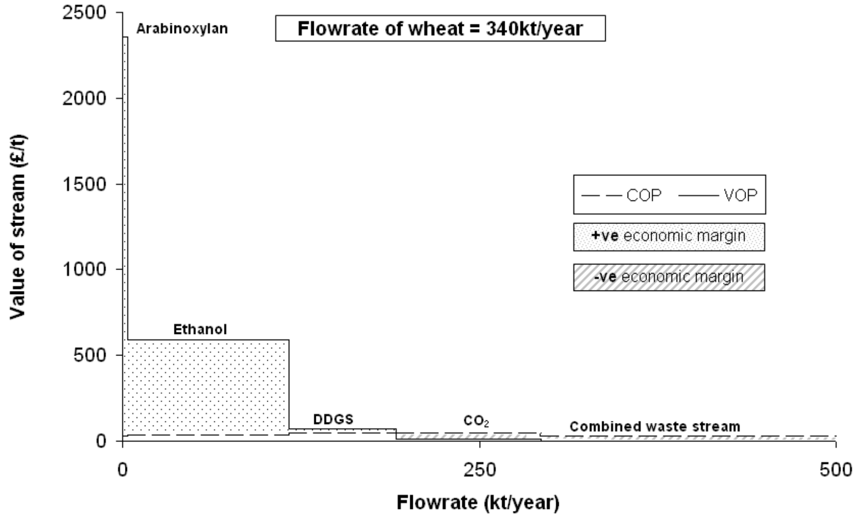


Figure 2. COP, VOP and marginal values of streams in £/t and mass flowrates in kt/y (in shaded areas) of a conventional wheat bioethanol flowsheet



Stream	COP (£/t)	VOP(£/t)	Economic margin = VOP-COP (£/t)	Flowrate (kt)	Total (million £)
Ethanol	41.52	590	548.48	114.57	62.84
DDGS	43.39	72.5	29.11	83.6	2.43
CO2	43.47	10.7	-32.77	102.29	-3.35
Combined waste	41.93	0	-41.93	668.71	-28.04

a. Production of bioethanol, DDGS, and CO_2 (base case).



Stream	COP (£/t)	VOP(£/t)	Economic margin = VOP - COP (£/t)	Flowrate (kt)	Total (million £)
Arabinoxylan	27	2355	2328	4	8.56
Ethanol	37.98	590	552	113	62.15
DDGS	45.41	72.5	27.1	76	2.05
CO2	44.75	10.7	-34.1	101	- 3.45
Combined waste	28.61	0	-28.6	1238	- 35.42

b. Production of an additional 80% purity arabinoxylan co-product.

Figure 3. Detailed value analysis for a biorefinery (a) producing bioethanol, DDGS, and CO2 (base case) and (b) co-producing an additional 80% purity AX product.

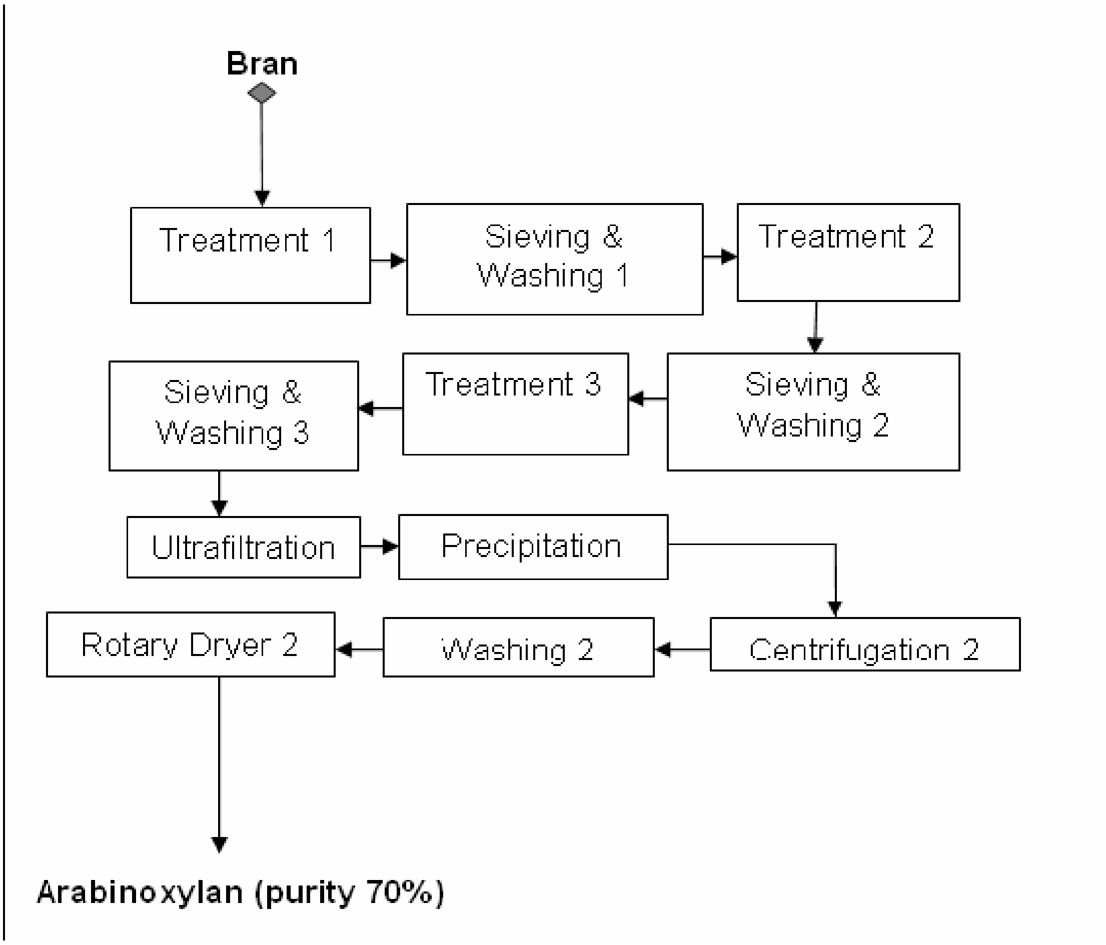


Figure 4. Arabinoxylan extraction flowsheet modified from Hollmann and Lindhauer (2005) for achieving a 70% purity arabinoxylan product

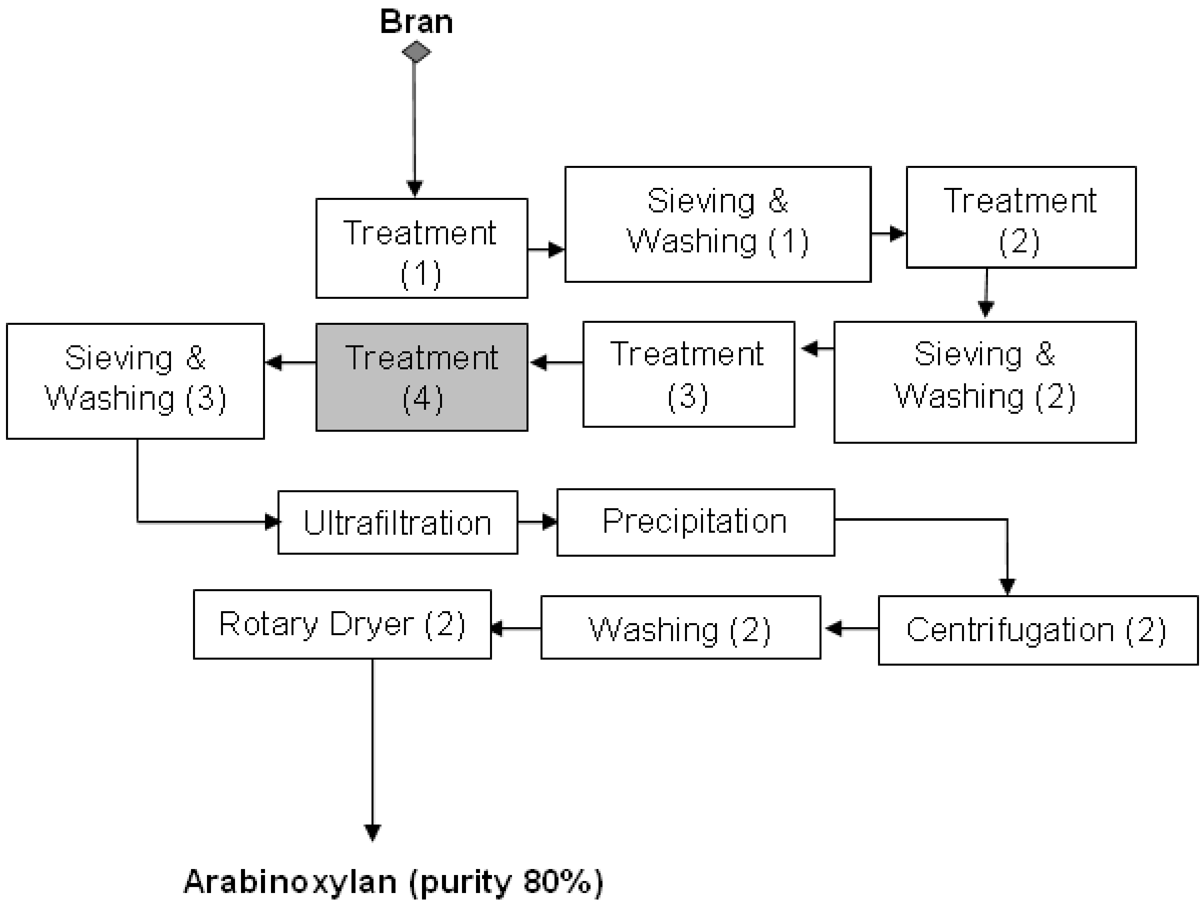


Figure 5: Increasing arabinoxylan purity to 80% through the addition of an extra treatment step, Treatment (4), for the removal of β-glucans

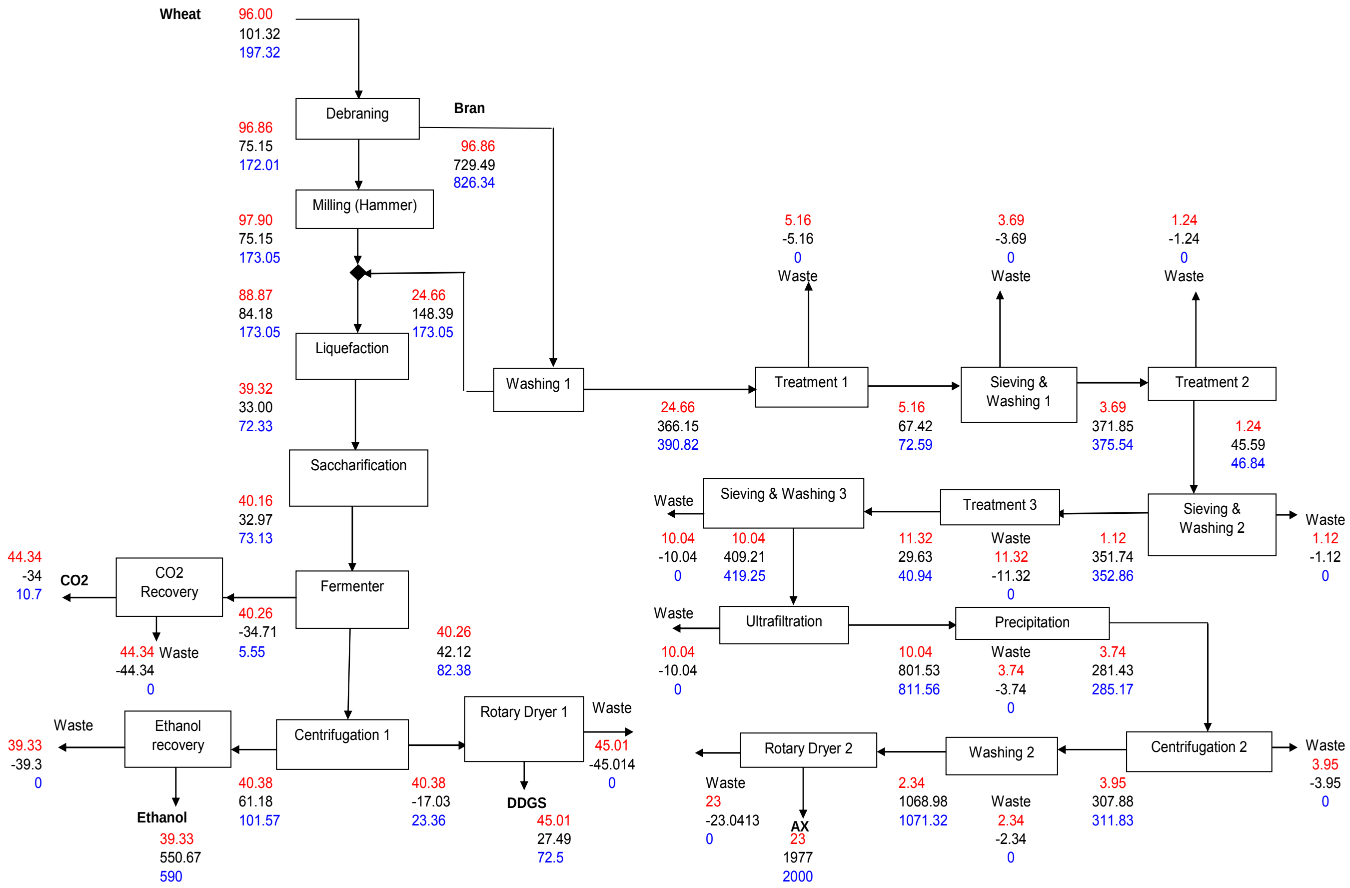


Figure 6. Integrated Ethanol and 70% purity AX extraction flowsheet design and value analysis of individual streams in terms of their COP, economic margin and VOP provided in £/t in three consecutive rows from top respectively

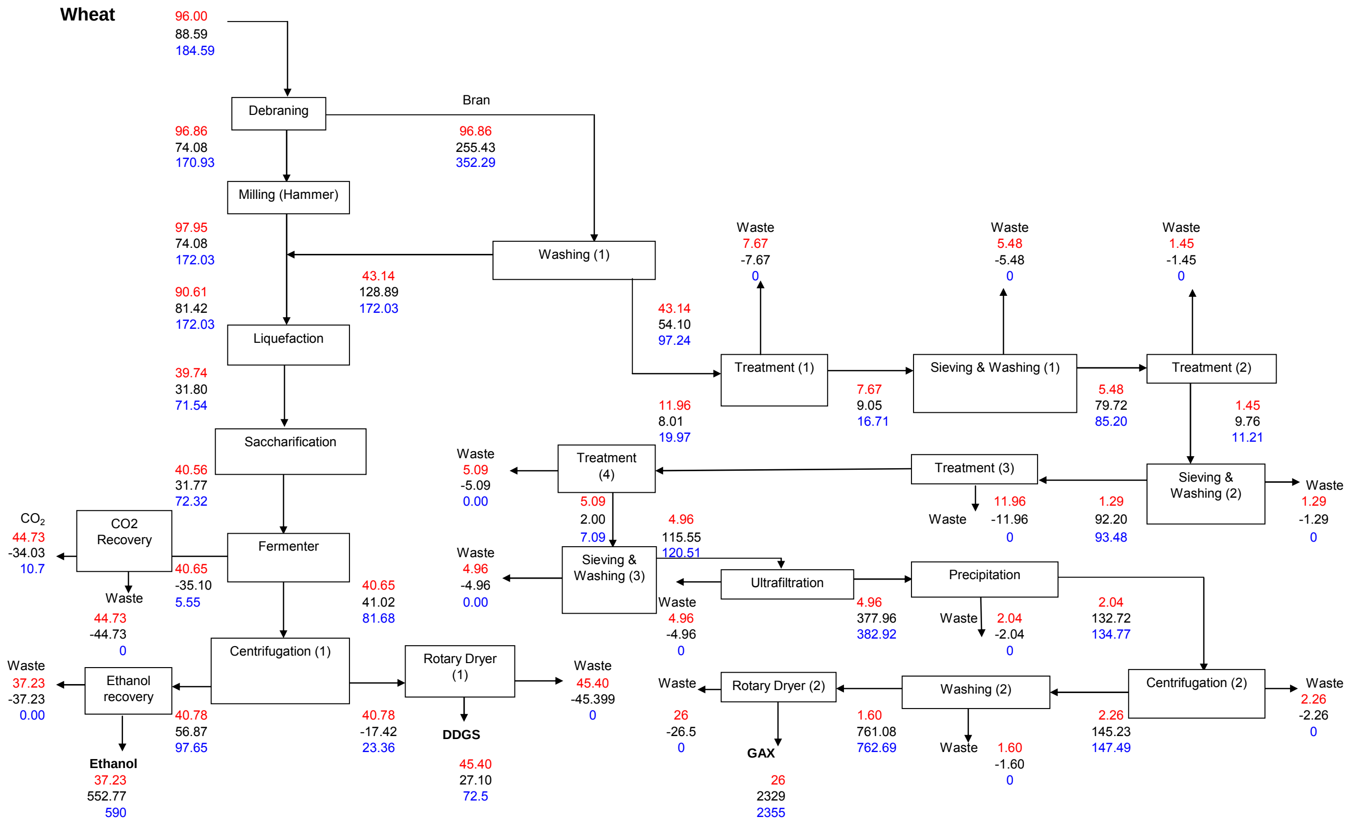


Figure 7. Integrated Ethanol and 80% purity AX extraction flowsheet design and value analysis of individual streams in terms of their COP, economic margin and VOP provided in £/t in three consecutive rows from top respectively

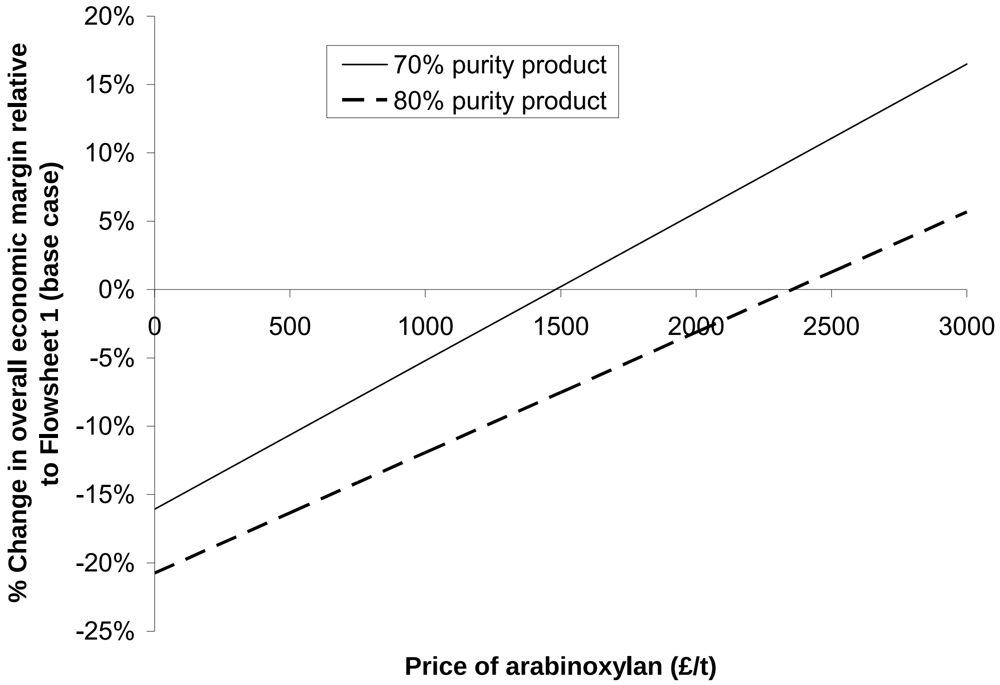


Figure 8. The impact of the price of AX on the overall economic margin for 70 and 80% purity products