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Australian Export Grains Innovation Centre

Optimising milling conditions for key Australian wheat grades

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GOVERNMENT OF WESTERN AUSTRALIA

GRDC GRAINS RESEARCH & DEVELOPMENT CORPORATION

AEGIC is an initiative of the Western Australian State Government and Australia's Grains Research and Development Corporation

Optimising milling conditions for key Australian wheat rades

- Getting the maximum value out of Australian wheat
- Concept of milling potential of a wheat
- The milling potential of wheat is a function of the target flour specifications
- Is the mill extracting the maximum value out of the wheat?

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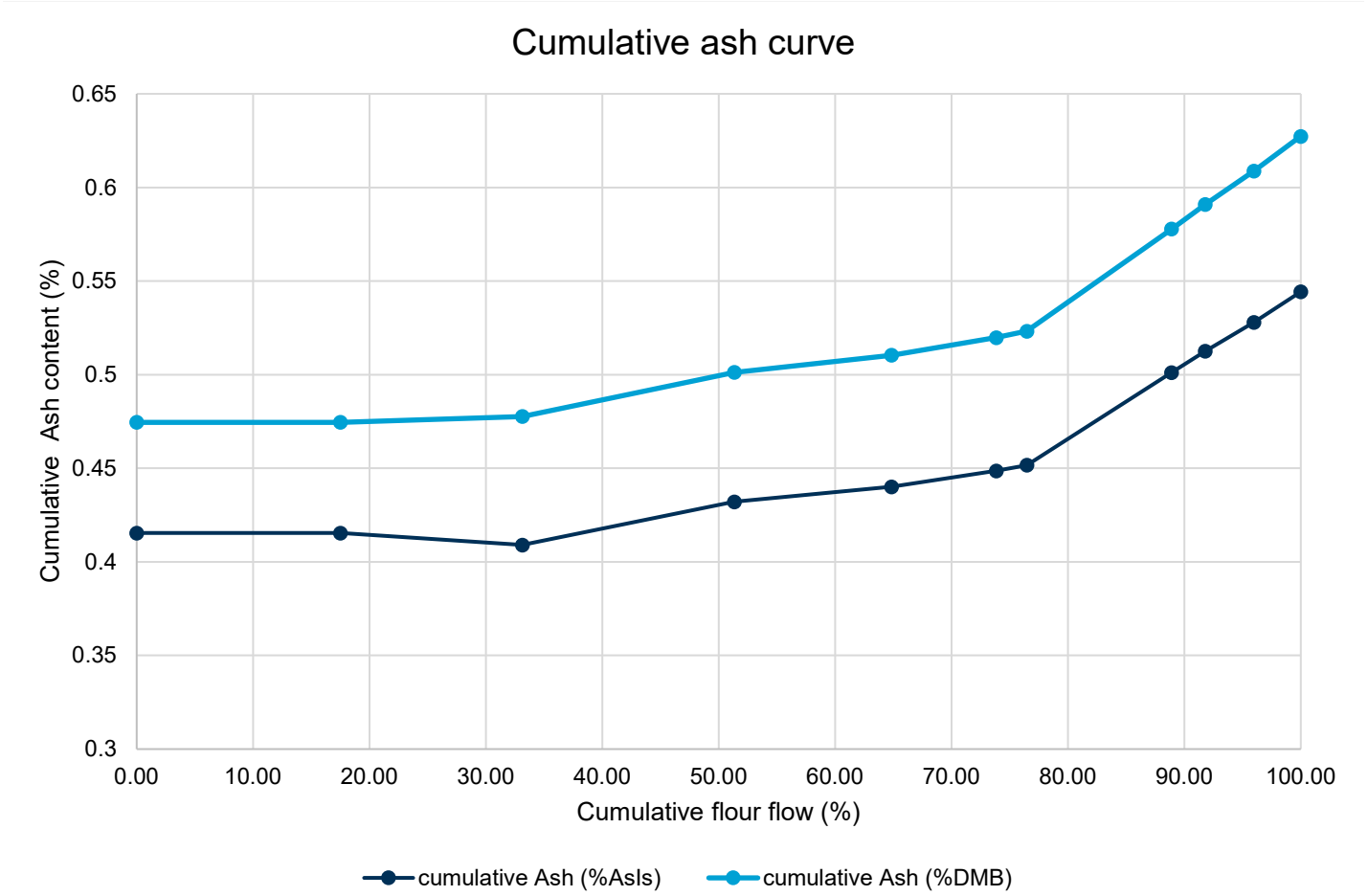
Milling variables and vlour specifications

AEGIC Pilot Mill

- Milling variables:
  - Conditioning Moisture
  - Tempering time
  - Break intensity
  - Reduction intensity
- Responses:
  - Flour yield
  - Ash content
  - Moisture content
  - Water absorption
  - Starch damage
  - Protein content
  - Flour stream flowrates



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Models based on experimental design

Calculation Sheet - AH			
Target Specifications	**Target**	**Actual**	**Units**
Maximise Clean Wheat Yield		76.81	%
Total Ash (%DMB) less than	0.55	0.550	%DMB
Starch Damage greater than	7	7.14	%
Starch Damage less than	12	7.14	%
Water absorption greater than	59	59.00	%
Water absorption less than	100	59.00	%
Maximum Moisture Content	14.5	14.50	%
Protein Content		13.83	%DMB
Protein AsIs		11.79	%
Ash Content As Is (%)		0.470	%
Pilot Mill Settings			
Conditioning Moisture		16.8	%moisture
Tempering Time		22.3	Hours
Break Roll Intensity		1.73	
Reduction Roll Intensity		1.71	
1st Break Release		53	%
2nd Break Release		54	%
Roll Gaps			
1st Break		259	µm
2nd Break		223	µm
3rd Break		100	µm
4th Break		25	µm
Sizings		200	µm
A-Reduction		86	µm
B-Reduction		43	µm
C-Reduction		43	µm

- Response Surface Methodology (RSM)
- Model development
- Models used to determine optimal yield for target flour specifications
- Non-linear optimisation
  - Evolutionary
  - Generalised Reduced Gradient

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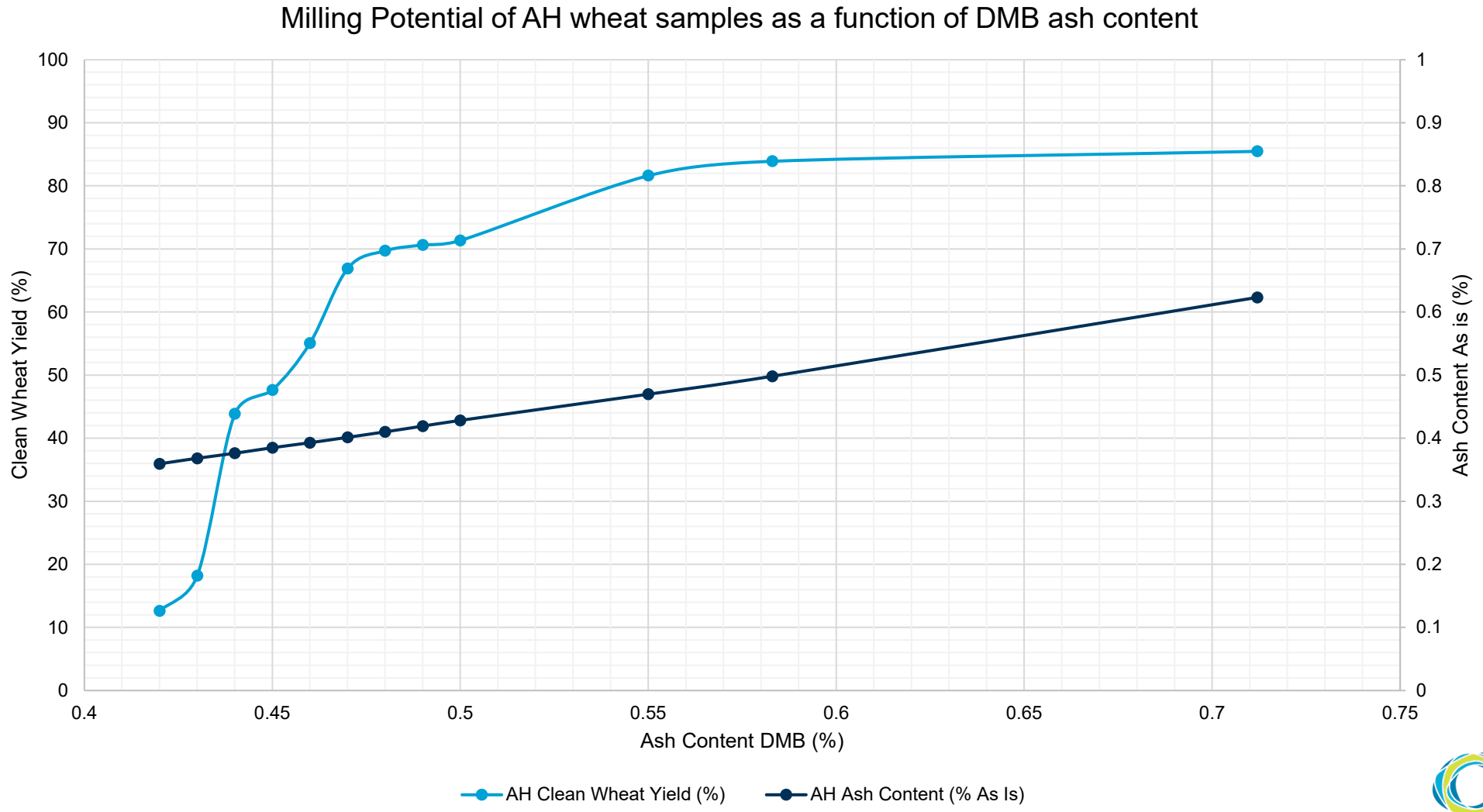
Milling potential as a function of ash content



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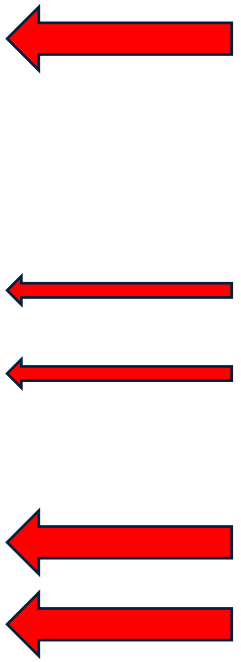
Wheat samples evaluated

	units	AH	ASW
Protein	% (11%mb[1])	12.91	7.63
Moisture	%	9.64	10.49
Starch	% (dmb[2])	70.02	73.81
Wet Gluten	% (dmb[2])	38.04	22.29
Zeleny	mL	67.58	27.83
Hardness Index		72.46	79.63
Kernel Diameter	mm	2.58	2.98
300 Kernel Weight	mg	37.69	49.73



[1] 11% moisture basis
[2] Dry matter basis

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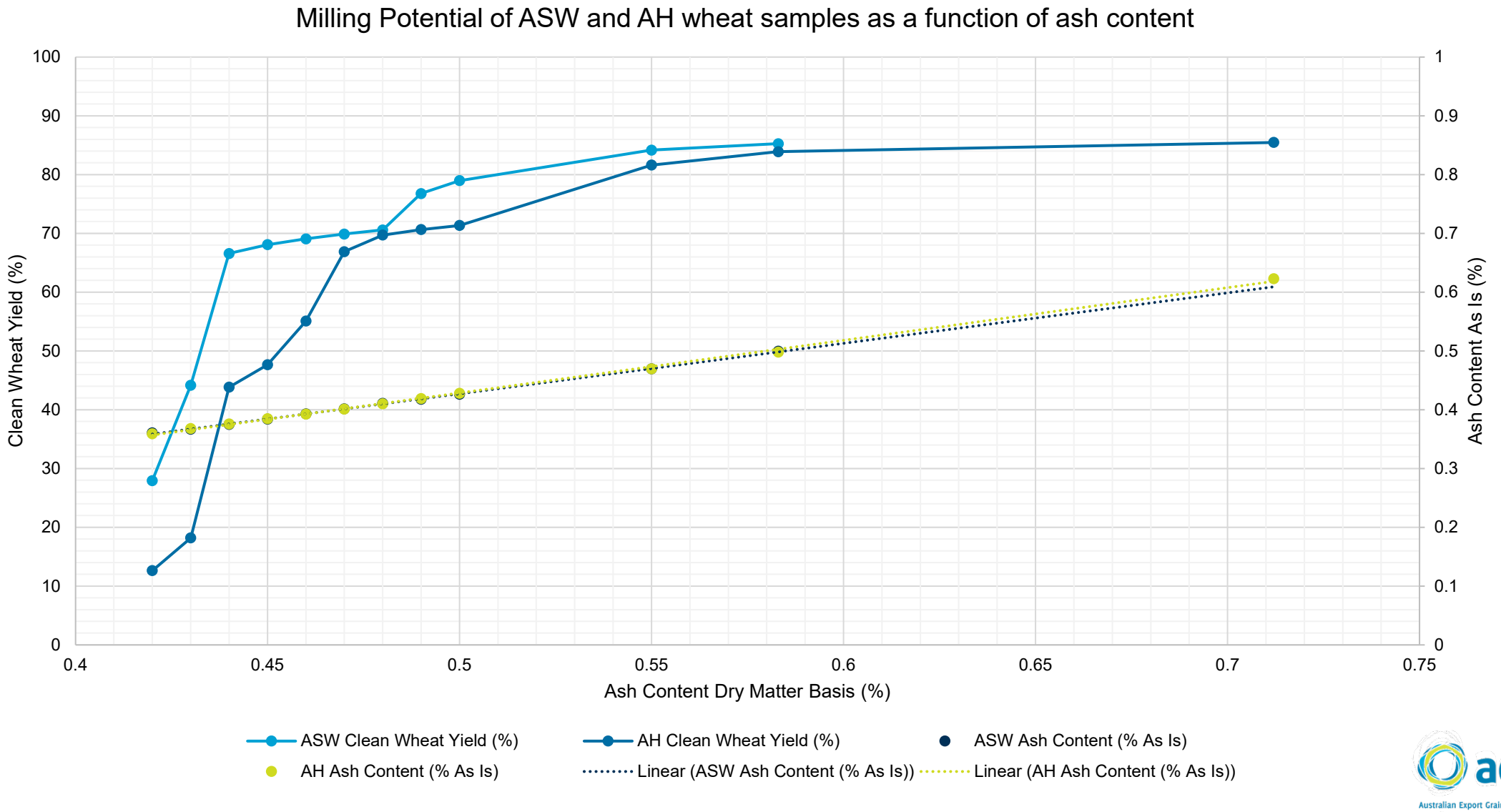
Yield optimisation – milling potential



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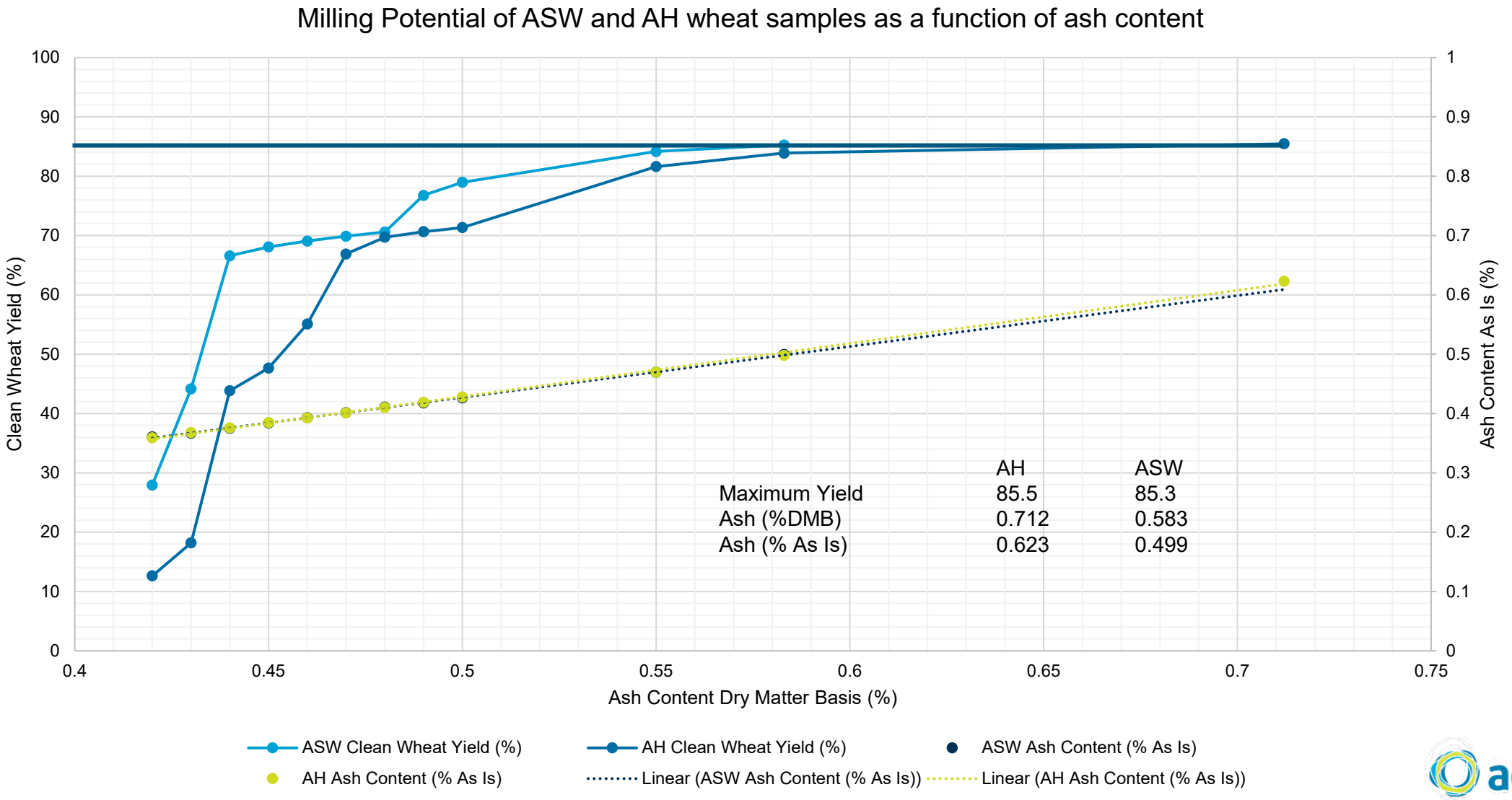
Yield optimisation – milling potential



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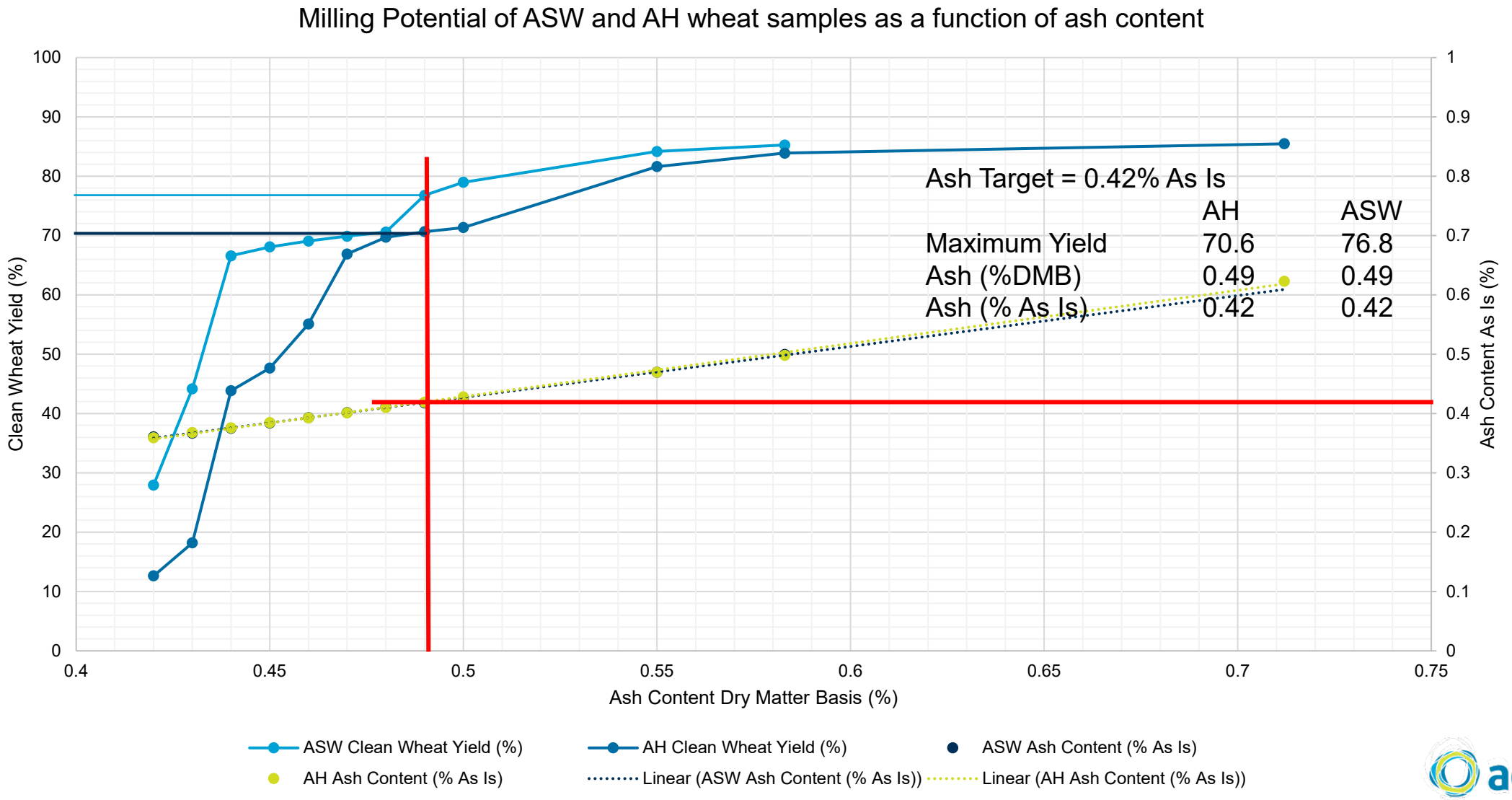
Yield optimisation – milling potential



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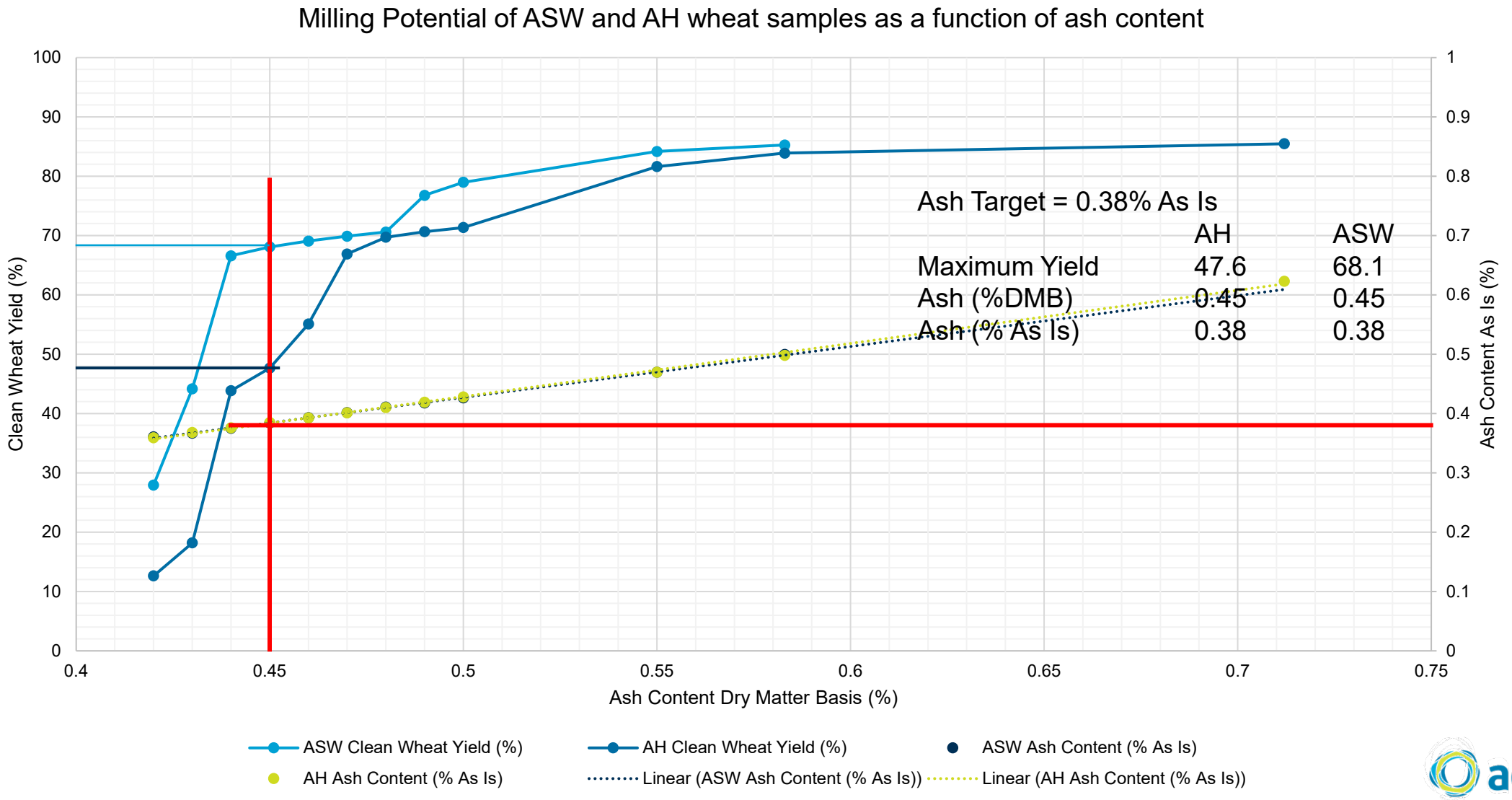
Yield optimisation – milling potential



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Conclusion

- Using the milling potential helps match wheat selection with final flour specifications
- Not all wheat is equally suited to all flour types
- Helps inform millers on whether they are getting the most out of the wheat

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