IdaPlus 1085: New Functional Milk Protein

Clean Label Conference

March 26-27, 2019

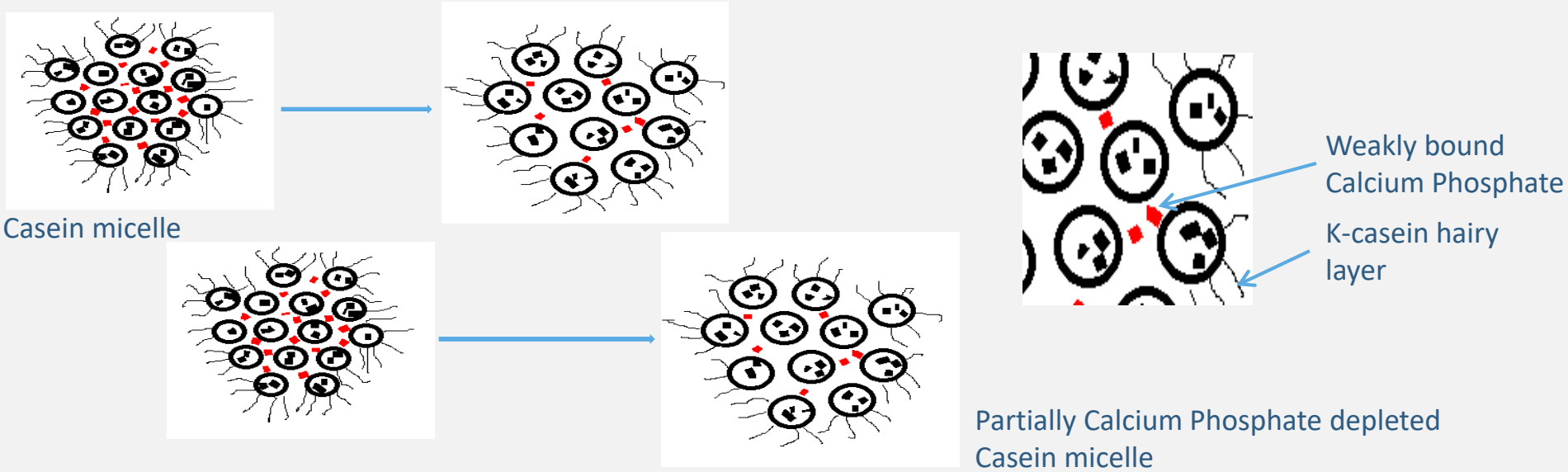
Idaho Milk Products

Milk: an exquisitely designed food …but sometimes a challenging ingredient!

- Challenge
  - Heat and pH changes as part of food processing can disturb the packaging of calcium phosphate and allow migration of some micellar calcium from the interior of the casein micelle to the micelle surface.
- Some consequences of free and migrated calcium
  - Calcium mediated aggregation of proteins during processing.
  - Loss of shelf life due to irreversible aggregation of caseins mediated by free calcium – “case hardening”.
  - Chalkiness in food applications.

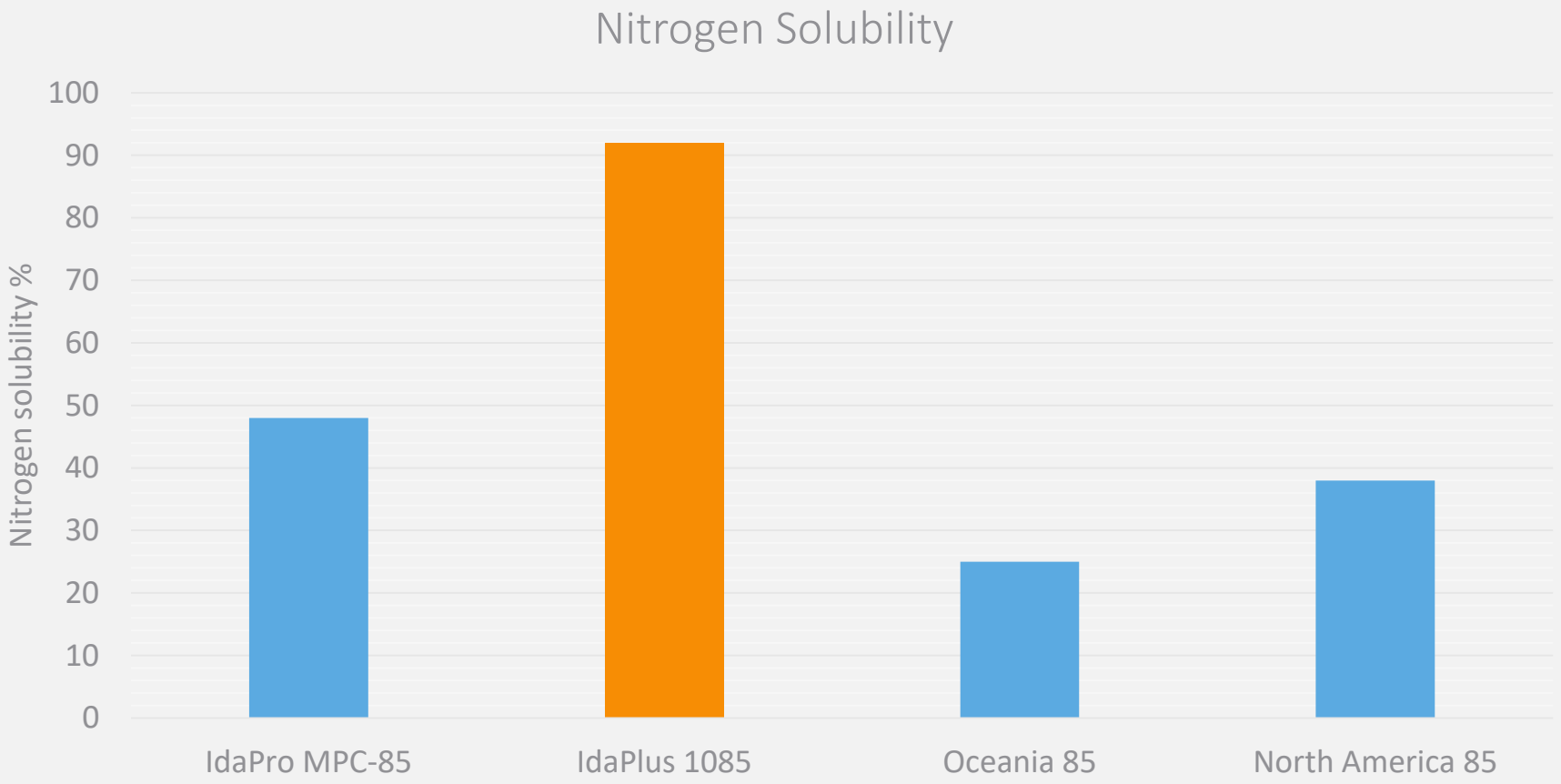
An Exquisitely Designed Solution

IdaPlus 1085 addresses these challenges. The calcium phosphate content has been adjusted to optimize the functionality of proteins.



Partial removal of calcium phosphate opens up the structure of casein micelle opening the doors for improved functionality of proteins.

Nitrogen Solubility Improvement has important benefits



Study performed at Kansas State University – Dr. Jayendra Amamcharla

RTD Trials at TetraPak, Denton

Formula information

Processed at 293°F for 3.5 s – Direct steam injection	
Post UHT treatment homogenization at 4500 and 500 psi	
pH adjustment with 10% NaOH	
Components in RTDs	%
Water	85.06 to 87.6
MPC-85	11 to 13.2
Fructooligosaccharide (Inulin)	0.60
Sodium hexametaphosphate	0.25
Potassium citrate	0.23
Sodium citrate	0.10

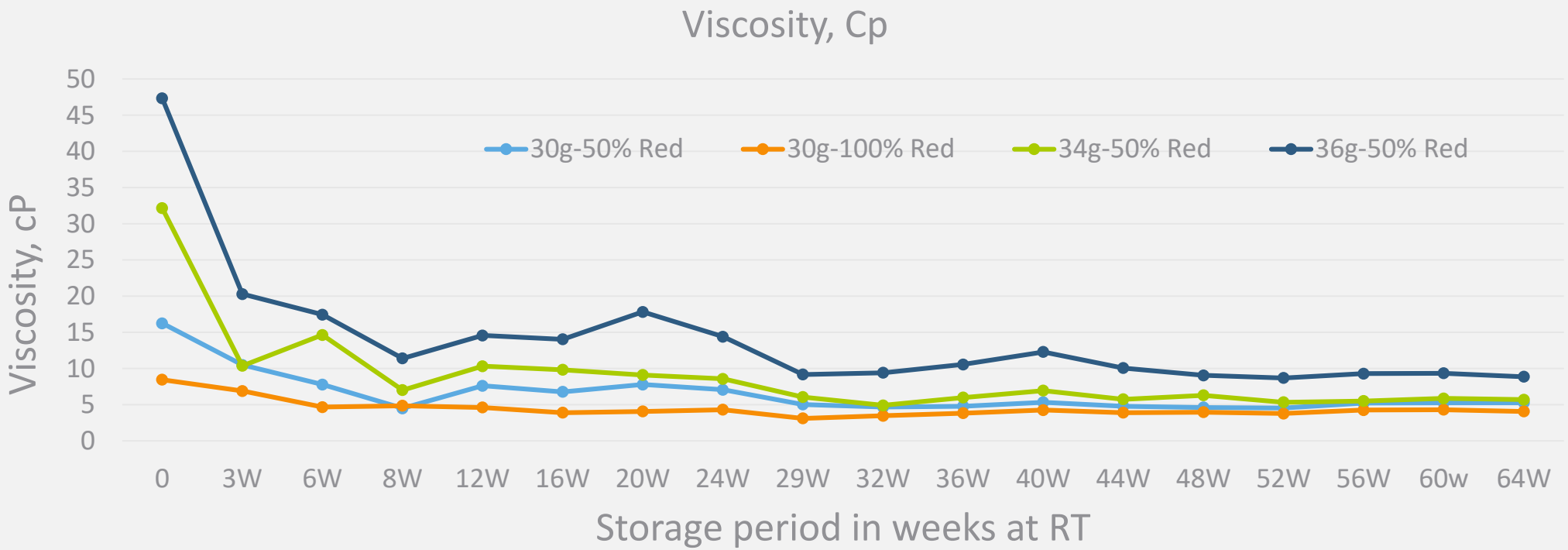
Varying level of SHMP/buffer salt were used in different treatments

Normal level of chelating and buffering salts (sodium hexametaphosphate+potassium citrate+sodium citrate) = 0.58 %.

Protein - phosphate reductions

Sample ID	Protein g/11 oz serving	SHMP/buffer salt	SHMP/buffer salt reduction %
RTD # 1	30	0.29	50
RTD # 2	30	0	100
RTD # 3	34	0.29	50
RTD # 4	36	0.29	50

Results: viscosity



Observations (1 year and 4 month data)

1) Initial viscosity is dependent upon level of SHMP/buffer salt (decreases with reduced level of SHMP/buffer salt).
2) No signs of gelation or thickening in the RTDs.

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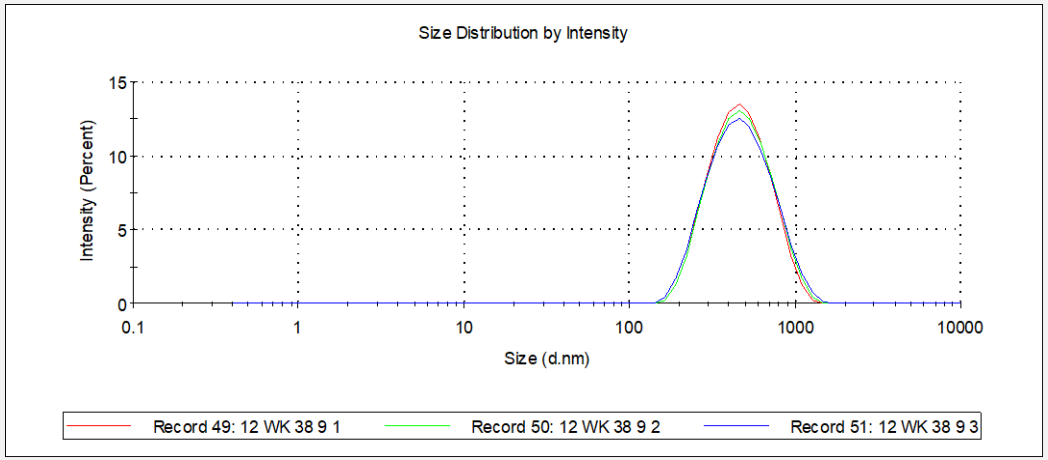
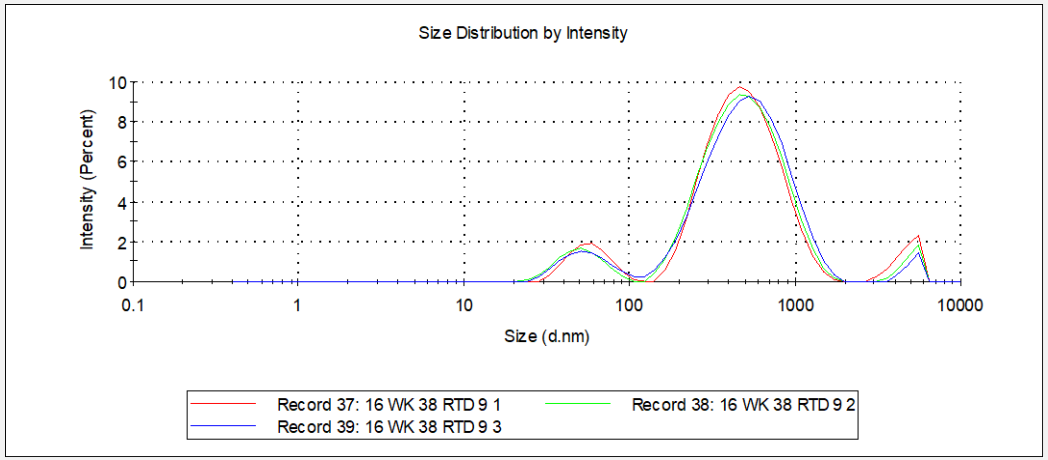
Average particle size

- Particle size analysis at different time points will give an indication of micellar aggregation leading to gelation or phase separation.
- Increase in particle size will indicate the aggregation of casein and decrease in particle size will indicate some kind of dissociation.





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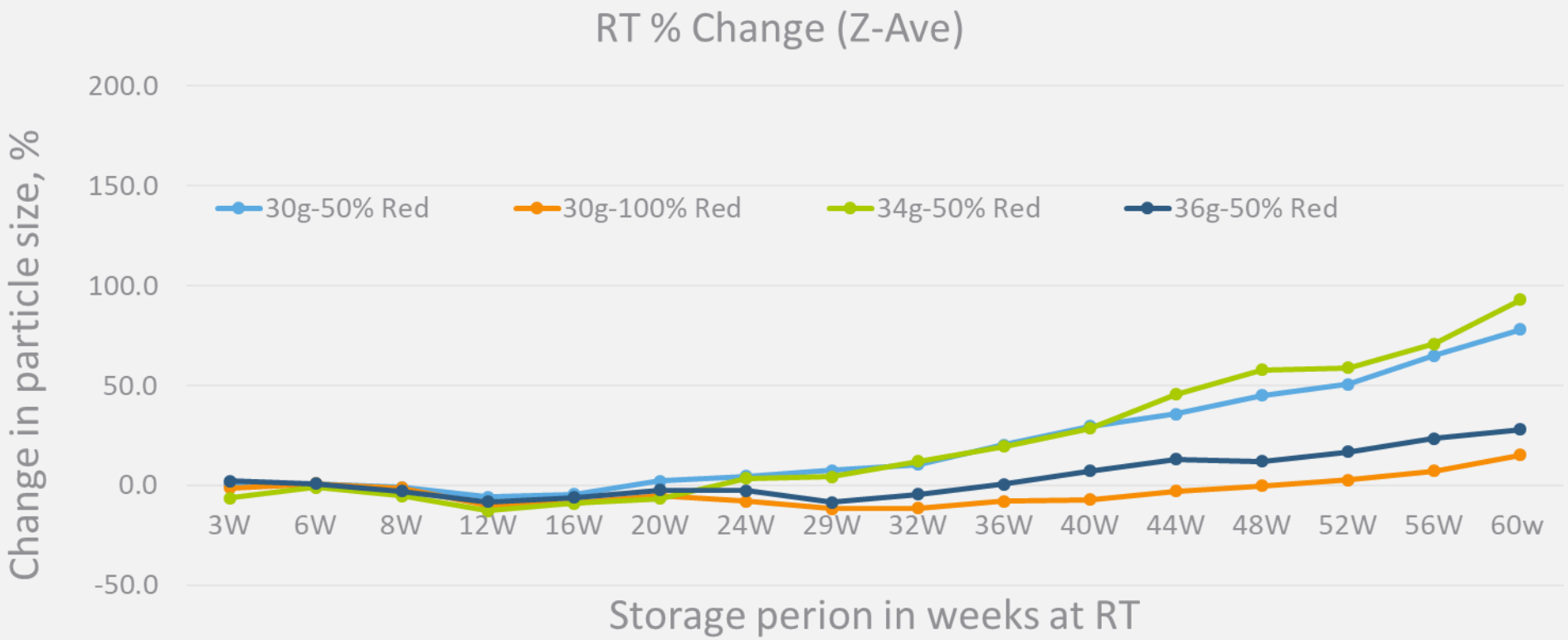
Results: Particle Size



Observations (1 year and 4 month data)

1) Increase in particle size to the extent of 200% indicates failure of RTD.
2) No signs of abnormal increase in particle size so far.

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Conclusions

- Based on data available so far (16 months):
  - Functional MPCs make stable RTDs.
  - RTDs with 30g/serving protein level can be made with elimination SHMP/buffer salts.
  - Calcium reduced MPCs open up possibilities for making clean label and low phosphate RTDs.
  - With adjusted level of SHMP/Buffer salts, there is a possibility to make higher protein (per serving) RTDs.

Thank you

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