Maximizing Success With High-Potency Sweeteners

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Formulating with Sweet Enhancing Ingredients

Global Food Forums' 2021 Sweetener Systems Premium Webinar

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CONNECT CONSULTING

Outline

Maximizing Success With HPS

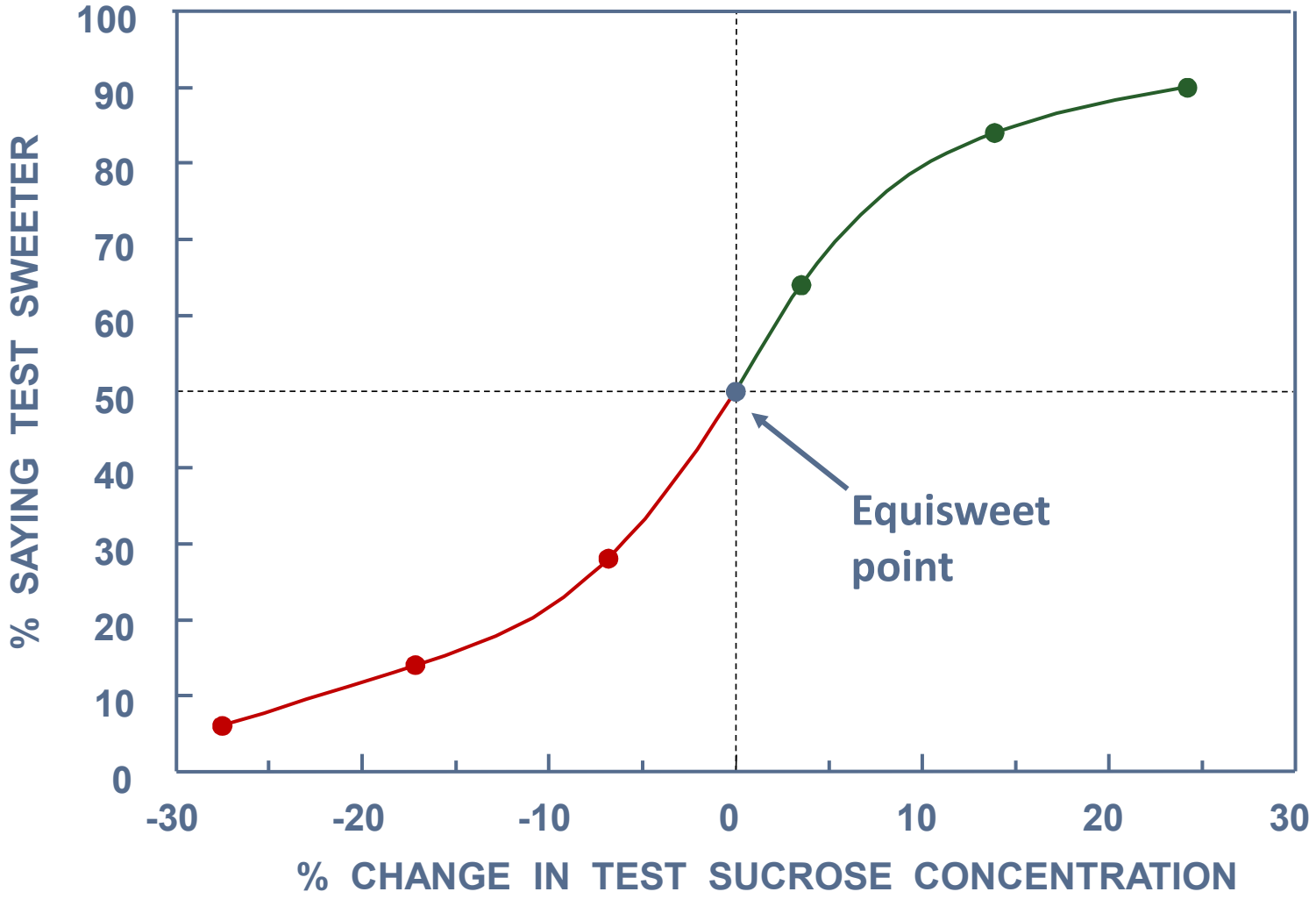
- Assessing prototypes fairly
- Sweetener selection
- How much to use
- Dealing with defects

Assessing prototypes fairly

- Human variability
- Realistic sample size

Assessing prototypes fairly

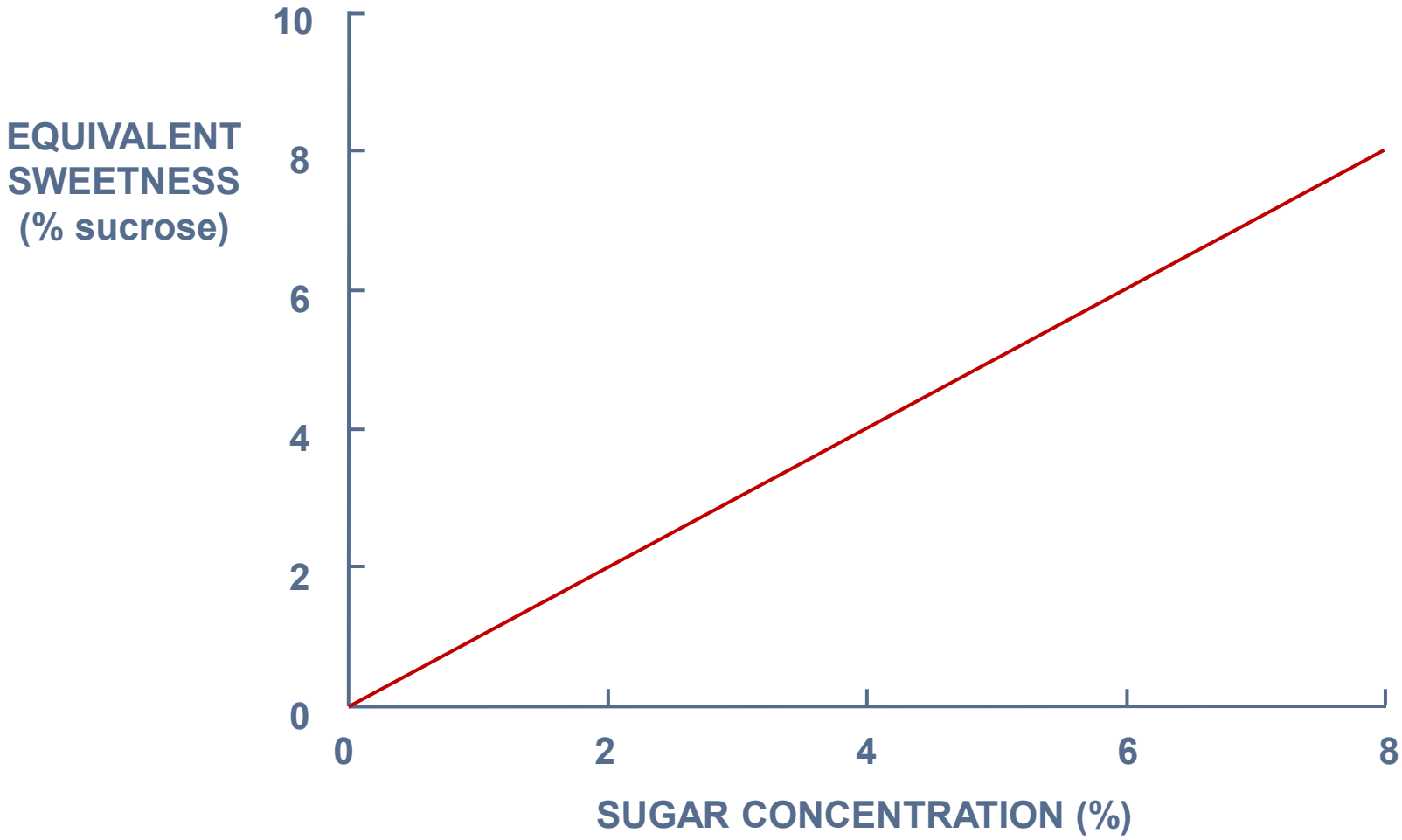
Which is sweeter, a fixed concentration of sugar or a test solution?



Source: Connect Consulting

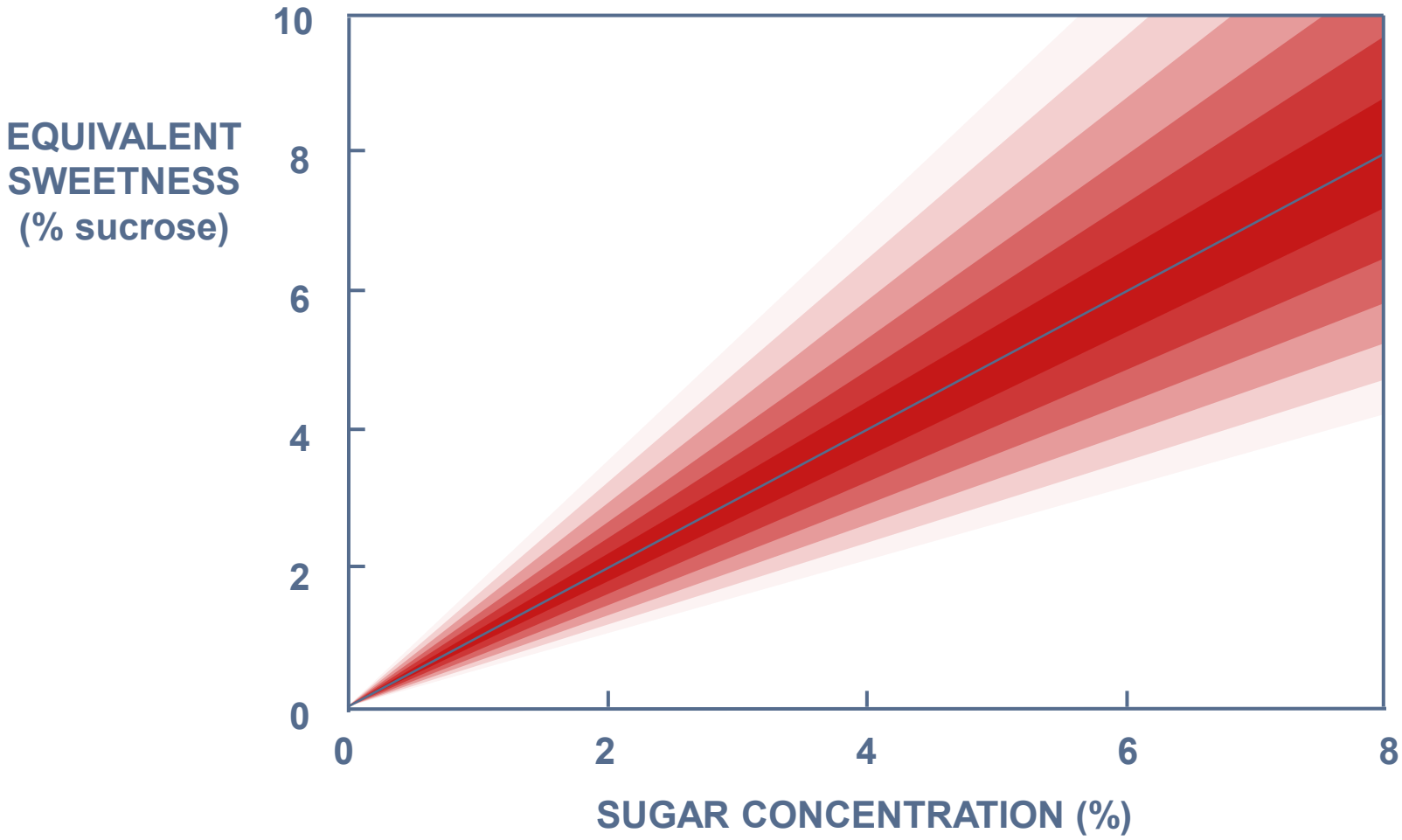
Assessing prototypes fairly

Concentration-response of sucrose (text book)



Assessing prototypes fairly

Concentration-response of sucrose (reality)



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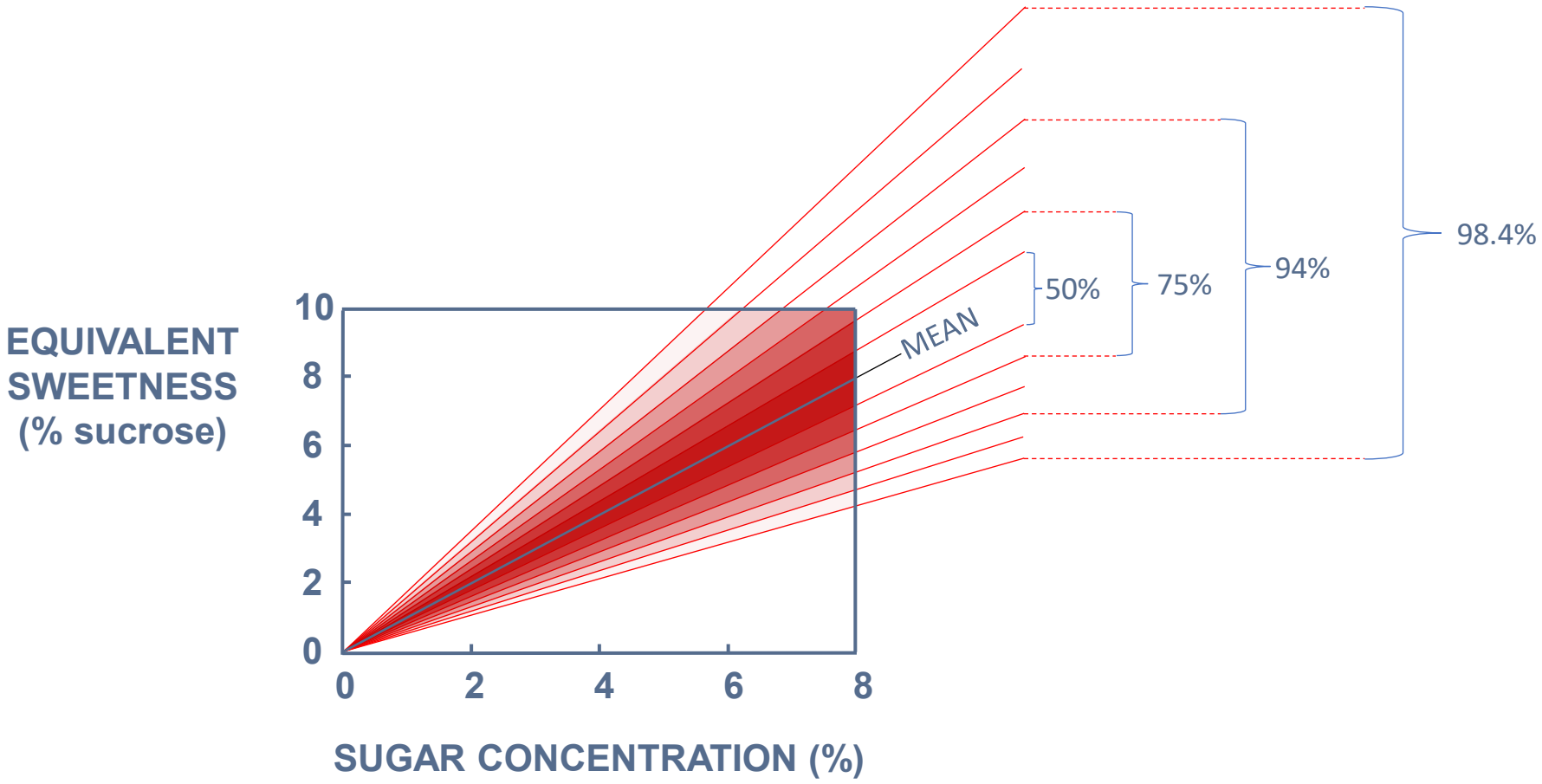
Assessing prototypes fairly

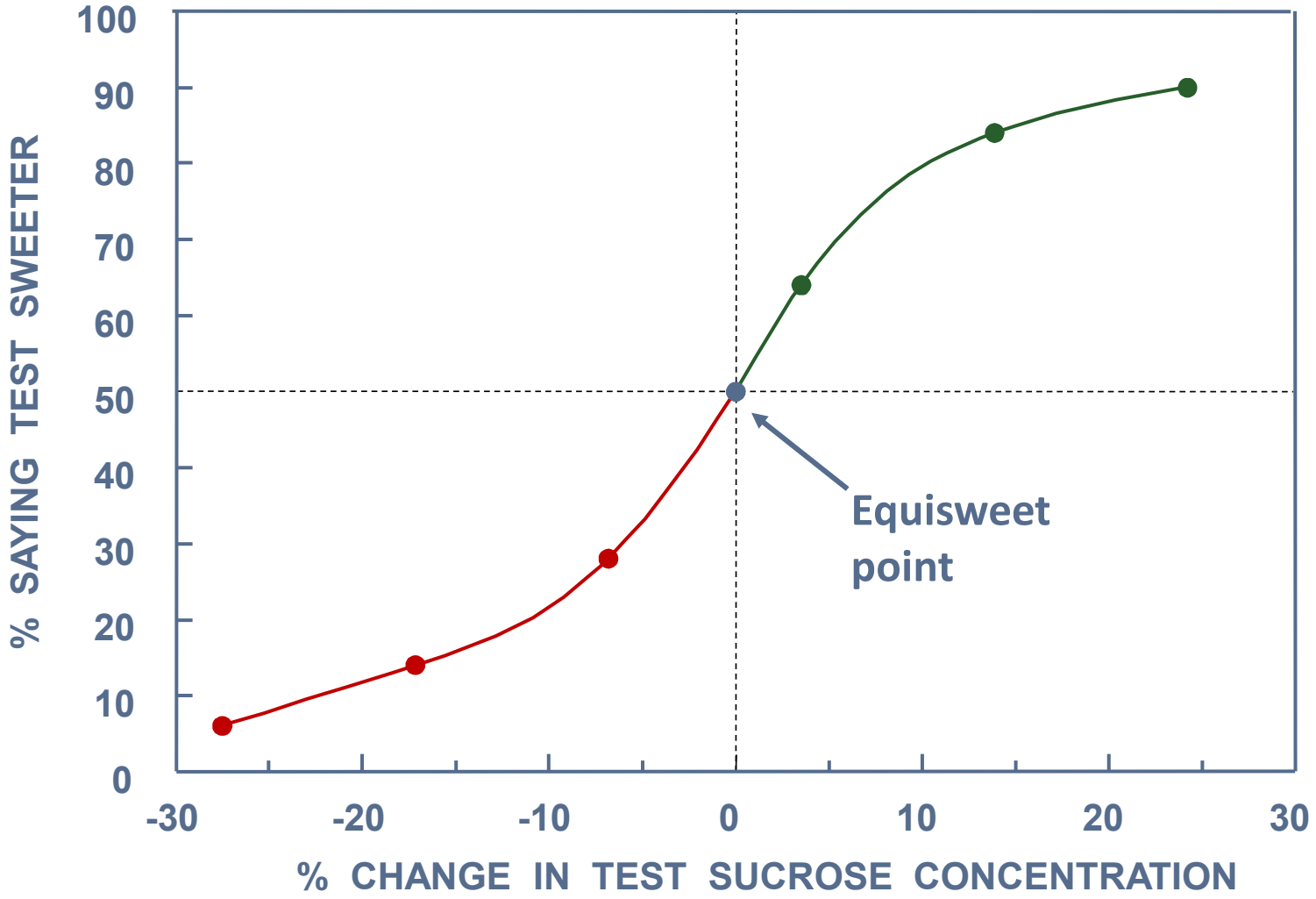
Concentration-response of sucrose (reality)



Source: Connect Consulting

Assessing prototypes fairly

Where is your product developer on this curve?



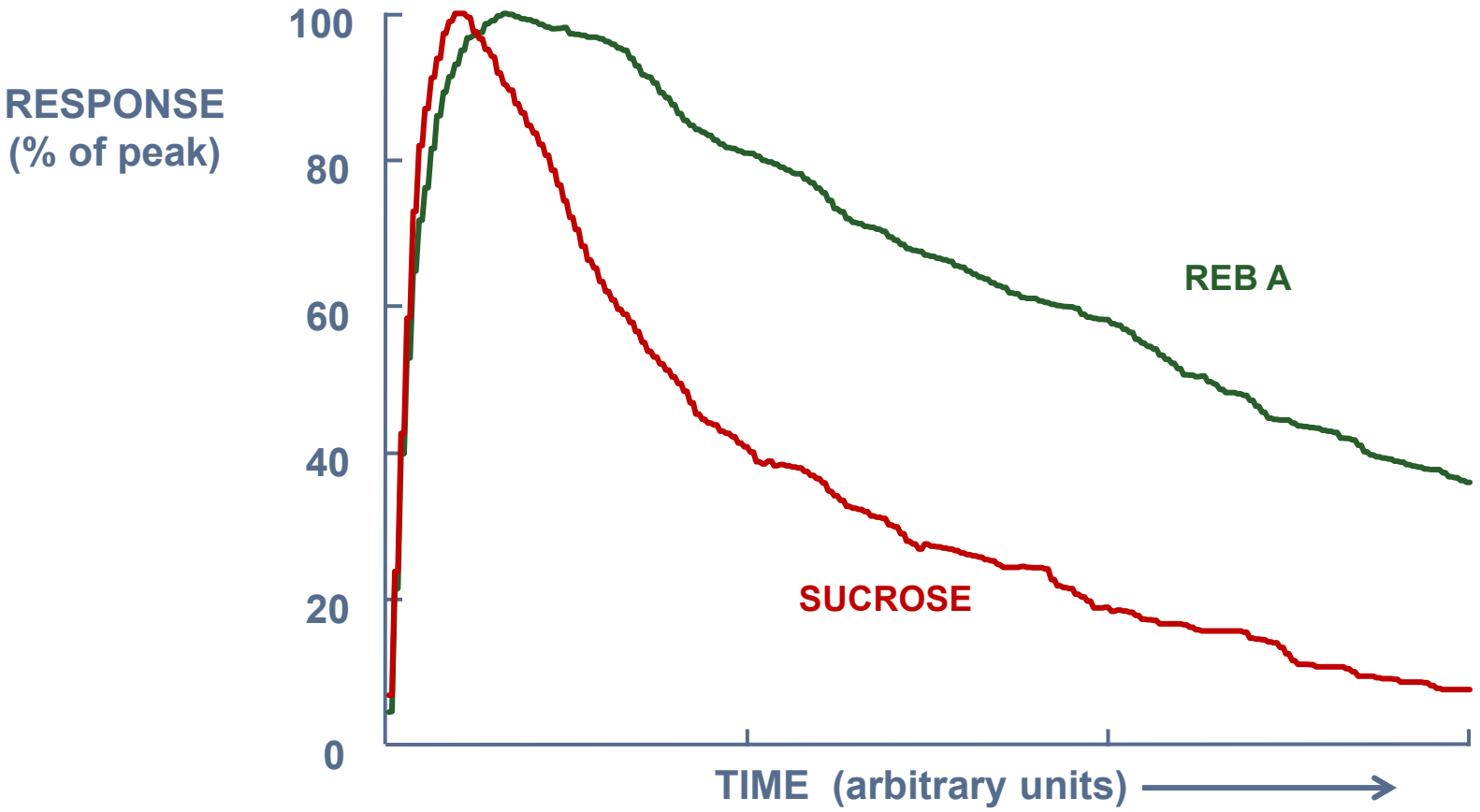
Source: Connect Consulting

Assessing prototypes fairly

- Human variability
  Properly constituted panels, not a few individuals
- Realistic sample size

Assessing prototypes fairly

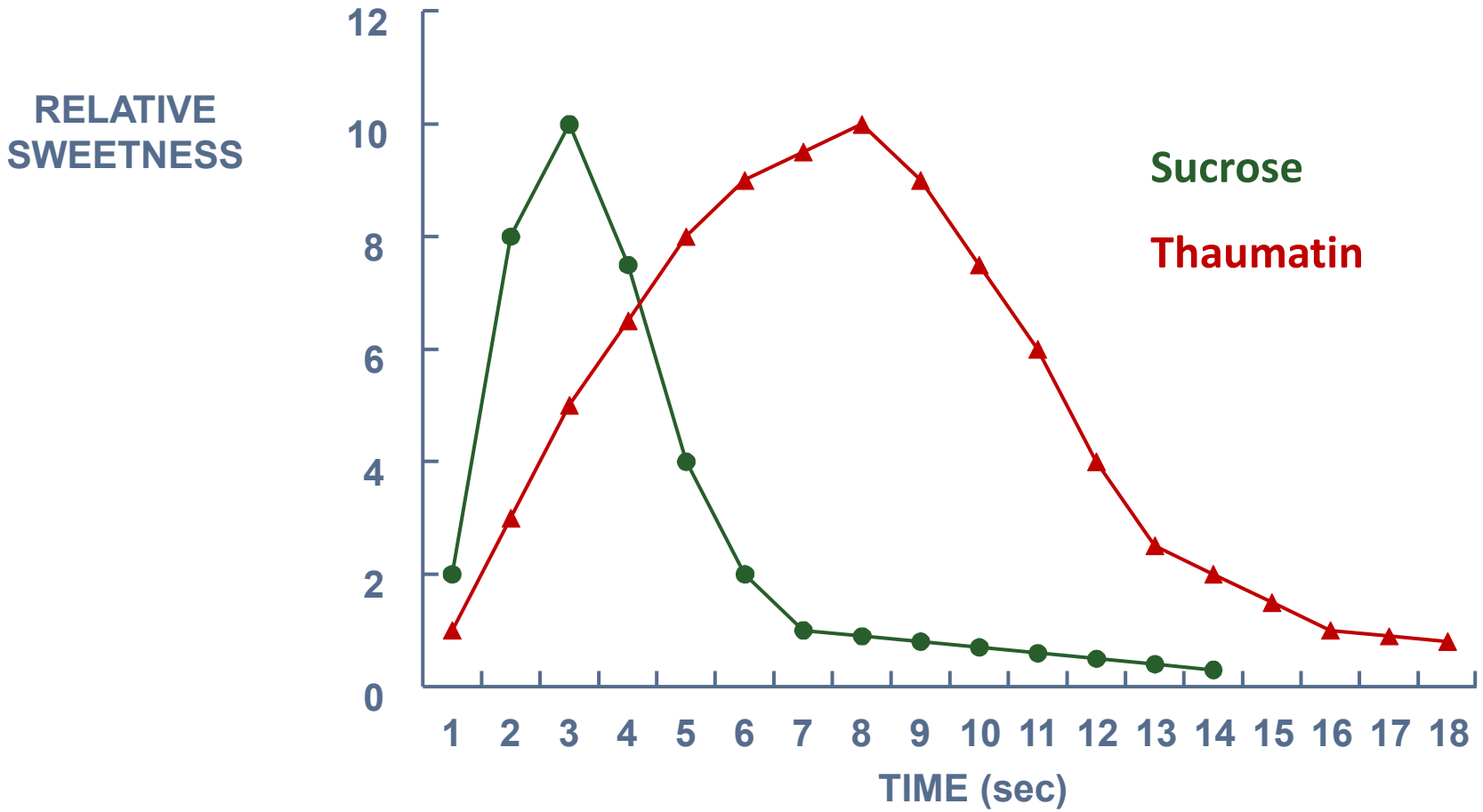
HPS typically slower onset than sucrose



Source: Prakash et al, 2008, *Food Chem. Toxicol.*, 46(7S):S75-82

Assessing prototypes fairly

Slow onset can be extreme



Source: S. Pearce & H. Roth, in *Advances in Flavours and Fragrances: From the Sensation to the Synthesis* Royal Society of Chemistry, UK, 2002, pp 178-193

Assessing prototypes fairly

- Human variability

  Properly constituted panels, not a few individuals

- Realistic sample size

  Significant volume, not just a sip

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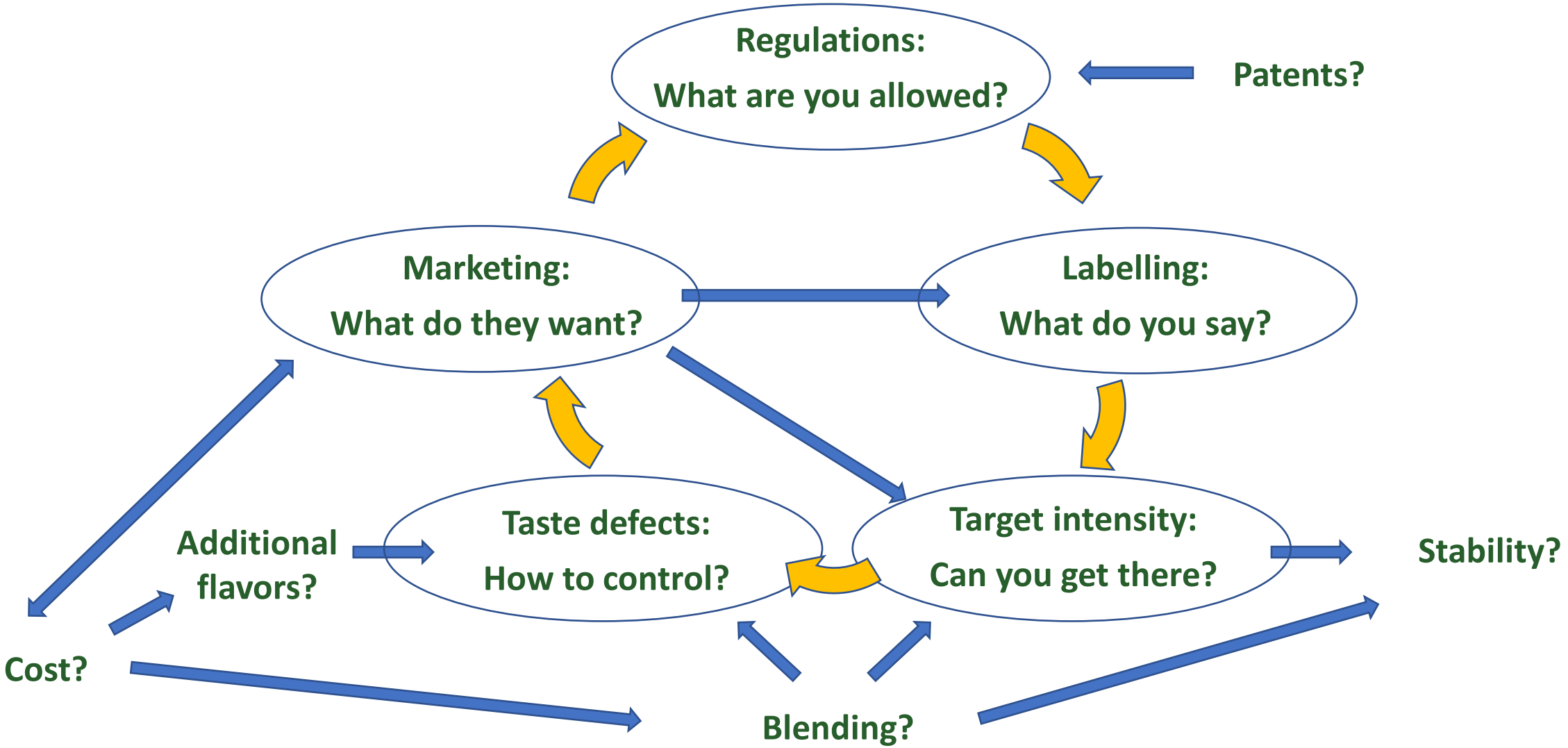
Sweetener selection



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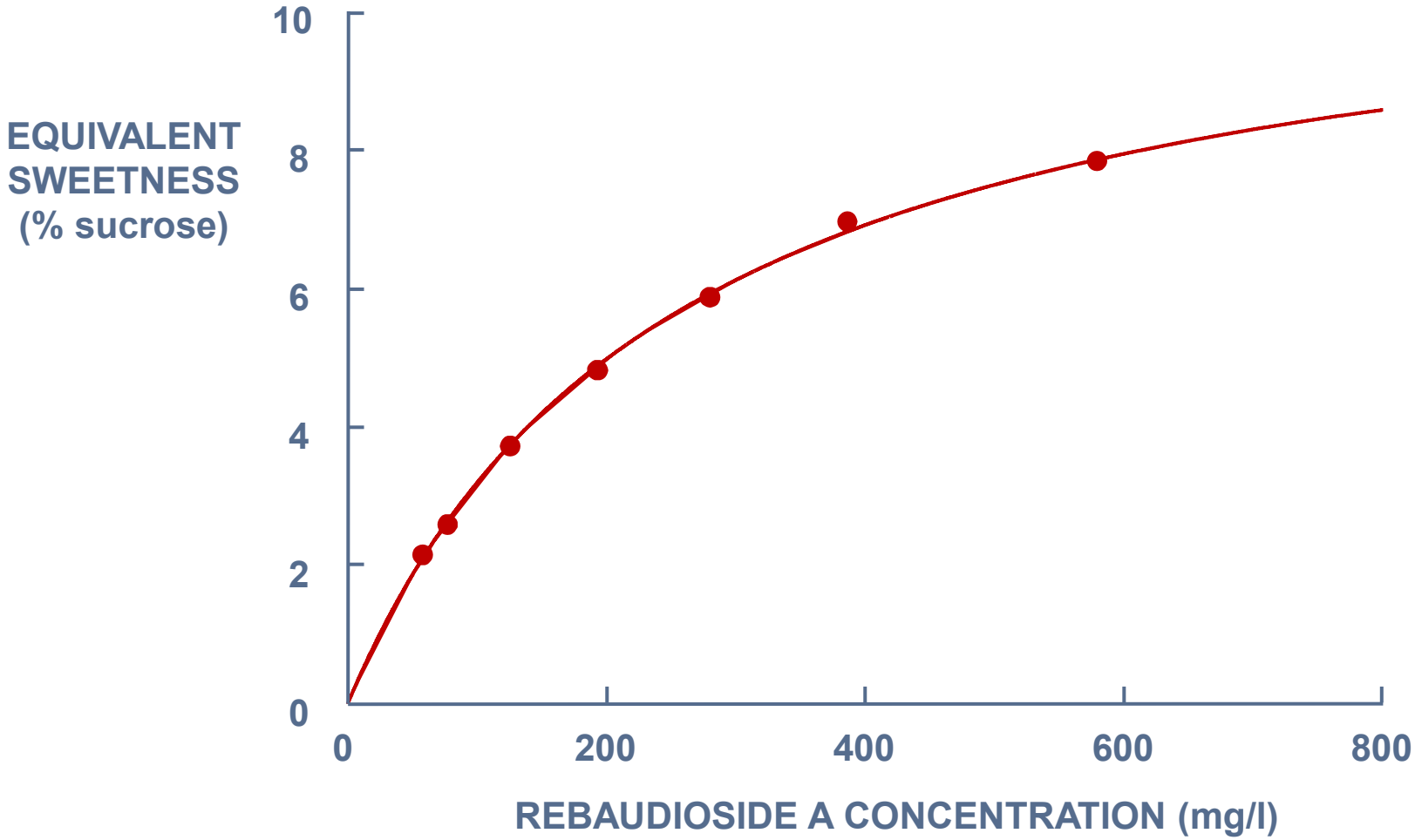
How much to use

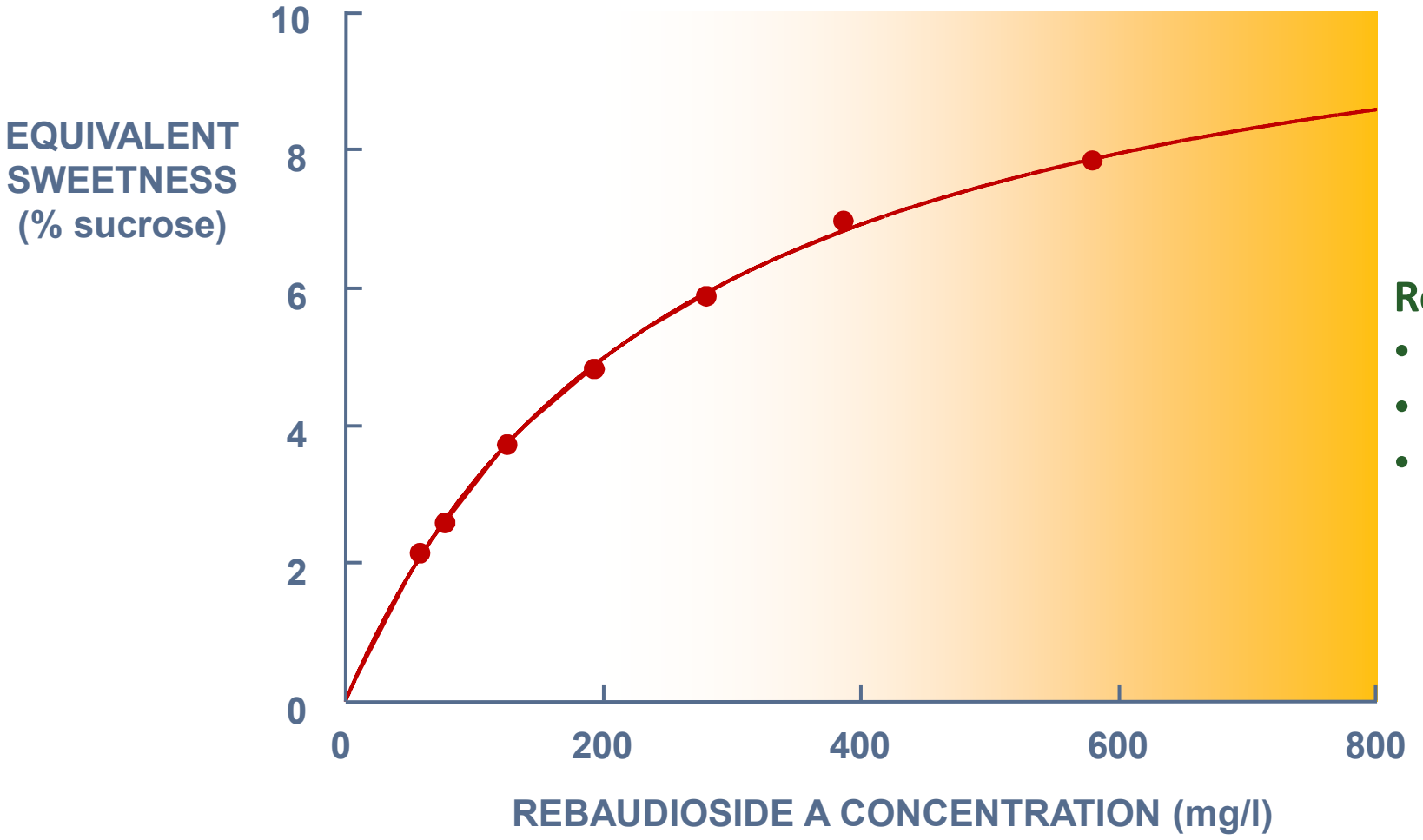
Concentration–response of typical HPS: rebaudioside A



Source: Fry, Yurttas & Biermann, 2011, *J. Food Sci.*, 76(9):545-8

How much to use

Concentration–response of typical HPS: rebaudioside A



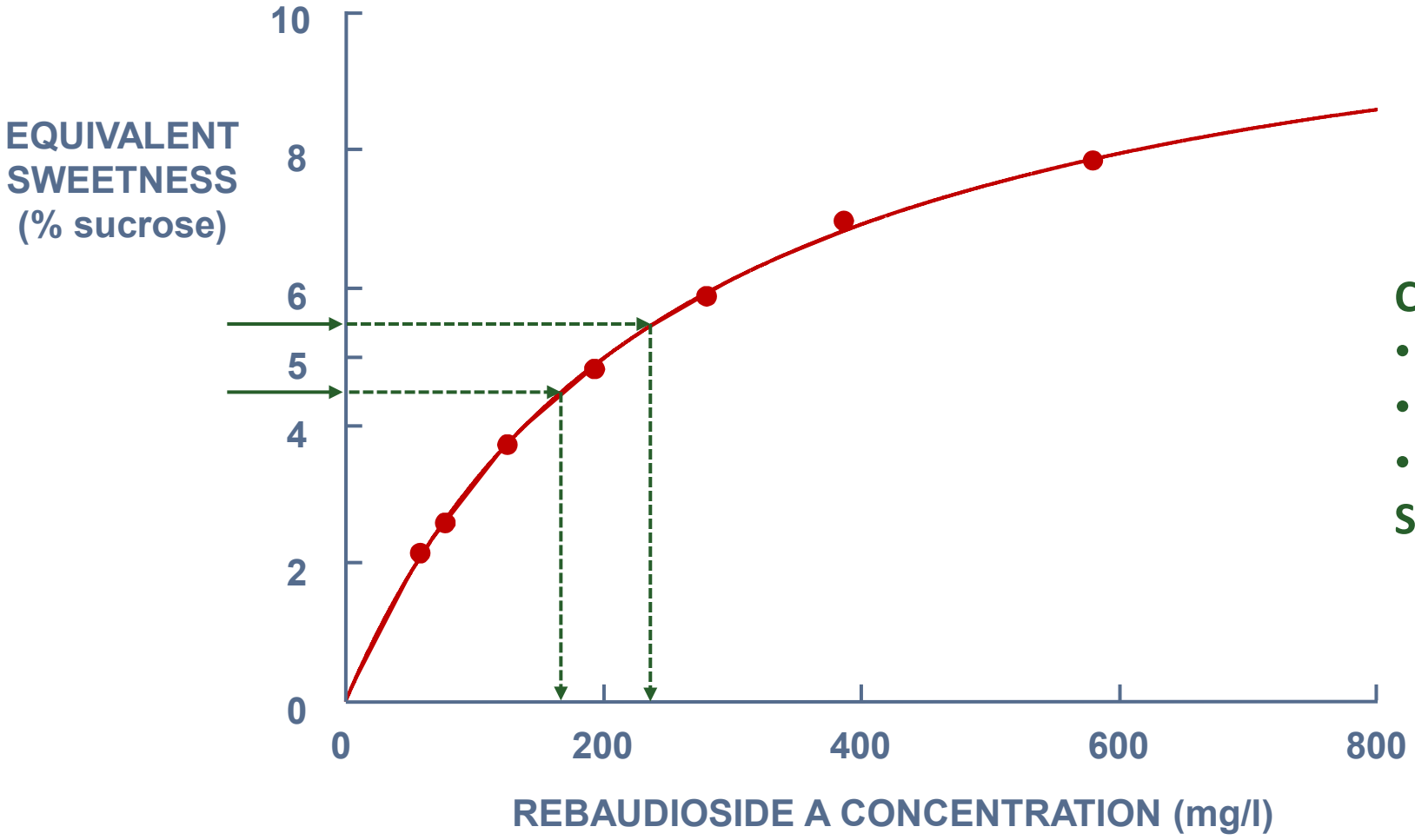
Reasons to avoid high concentrations:-

- low potency, least cost effective
- greater risk of unwanted side-tastes
- may not be legal!

Source: Fry, Yurttas & Biermann, 2011, *J. Food Sci.*, 76(9):545-8

How much to use

Concentration–response of typical HPS: rebaudioside A



C-R only a guide:-

- usually in water
- pH & temperature can affect potency
- original data may not be very good

Solution: bracket target intensity

Source: Fry, Yurttas & Biermann, 2011, *J. Food Sci.*, 76(9):545-8

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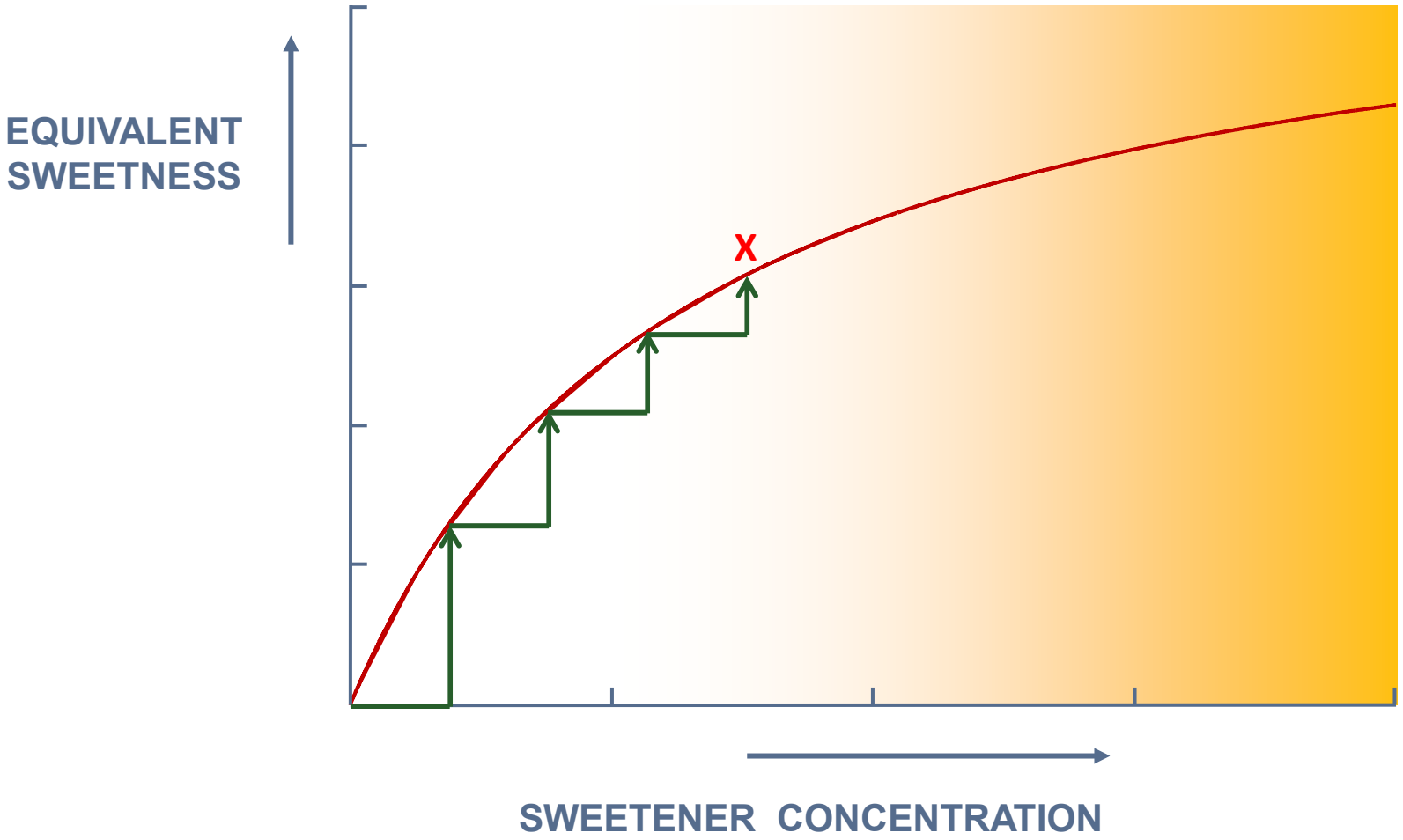
Dealing with defects

SIDE TASTES



Unwanted side tastes:-

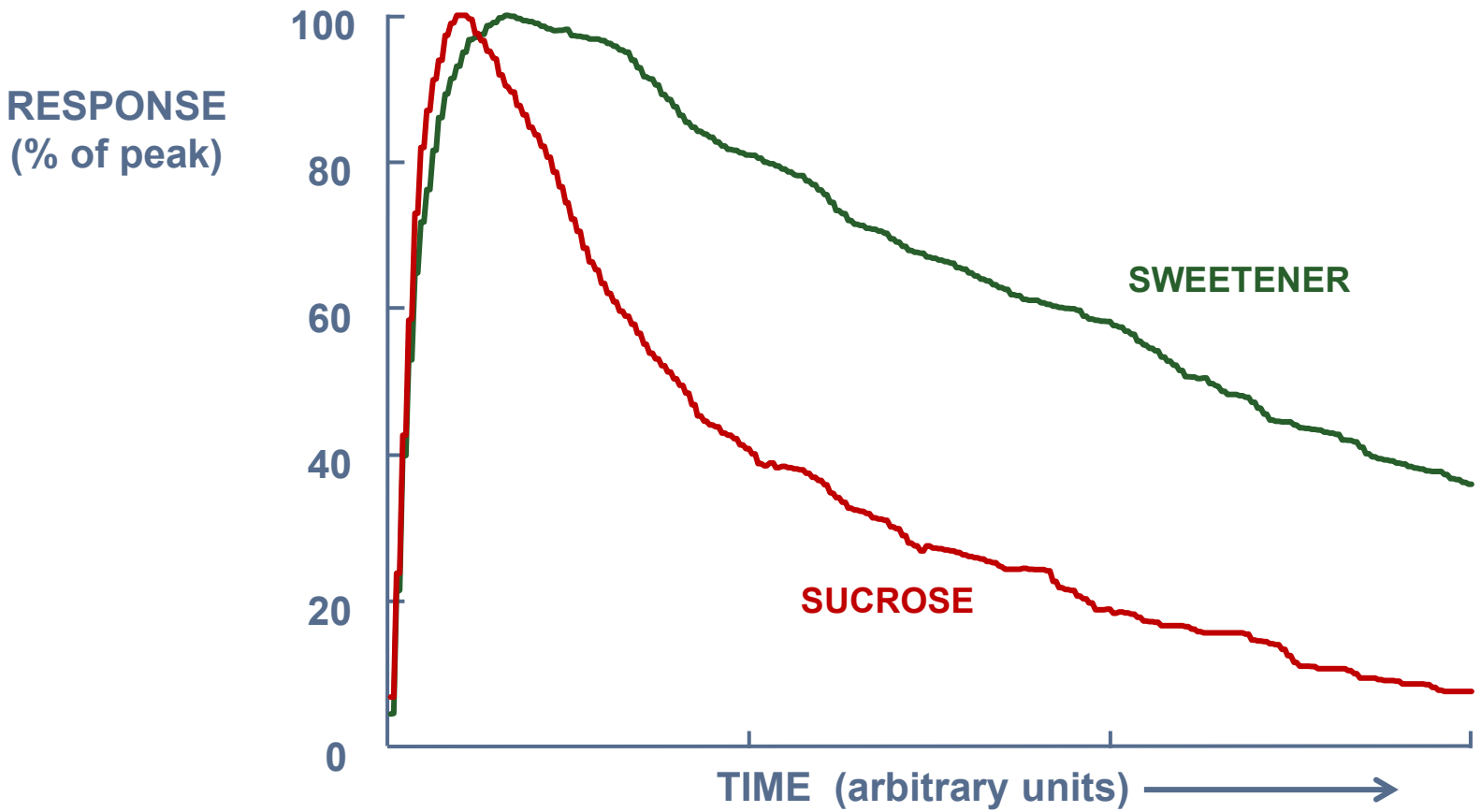
- often bitter, licorice, but also others e.g. fruity (monk fruit)
- more prevalent at higher concentrations

Solutions:-

- build sweetness stepwise
- blended sweetener systems e.g. two HPS each below side taste threshold
- “blockers” e.g. sugar cane distillate

Dealing with defects

SLOW ONSET, LINGER



Poor dynamics:-

- most HPS different from sugar
- delayed peak and sweet linger common

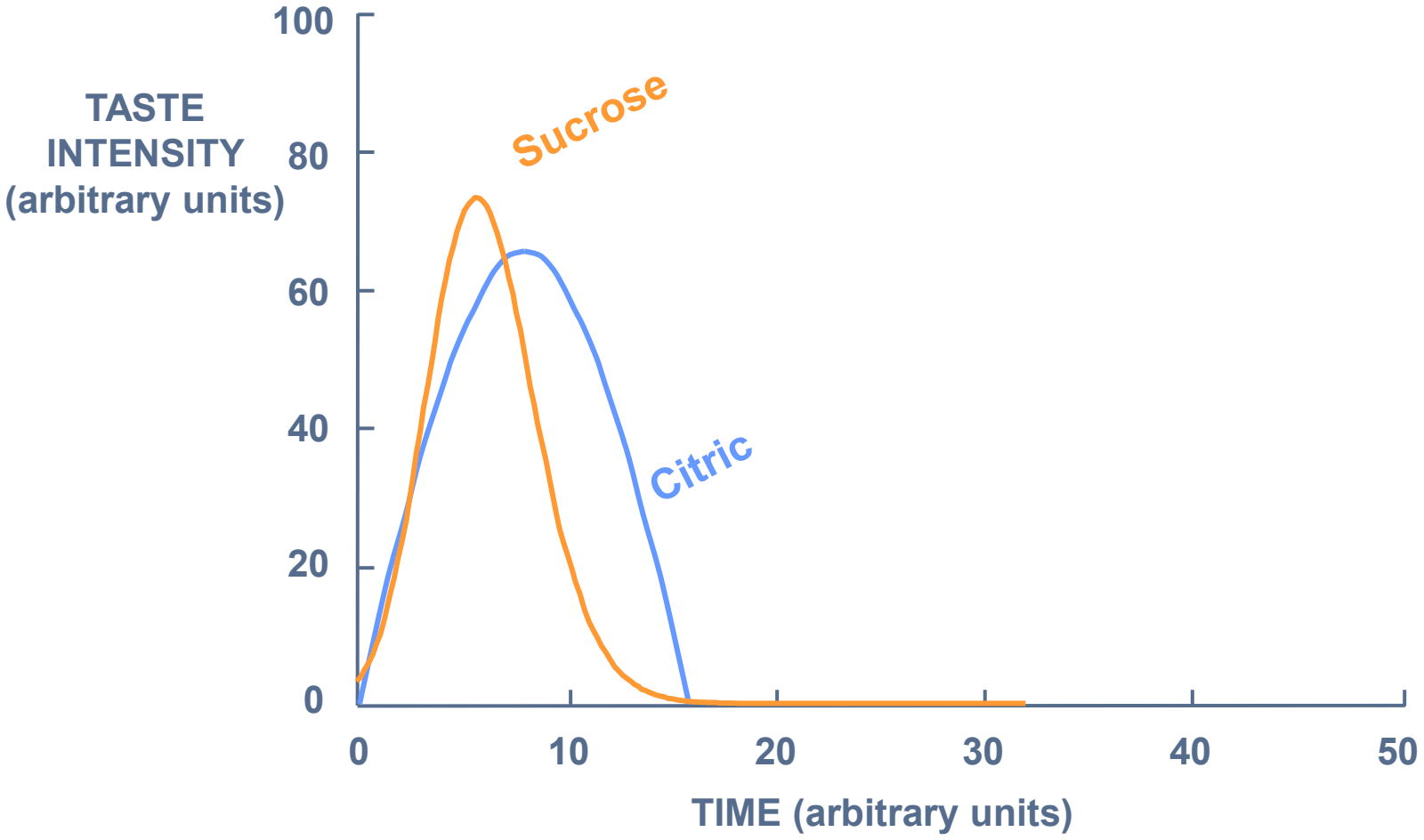
Solutions:-

- blend with fast onset HPS (best are synthetic: saccharin & acesulfame-K, but GSG can help)
- match sweet/sour profile

Dealing with defects

SLOW ONSET, LINGER

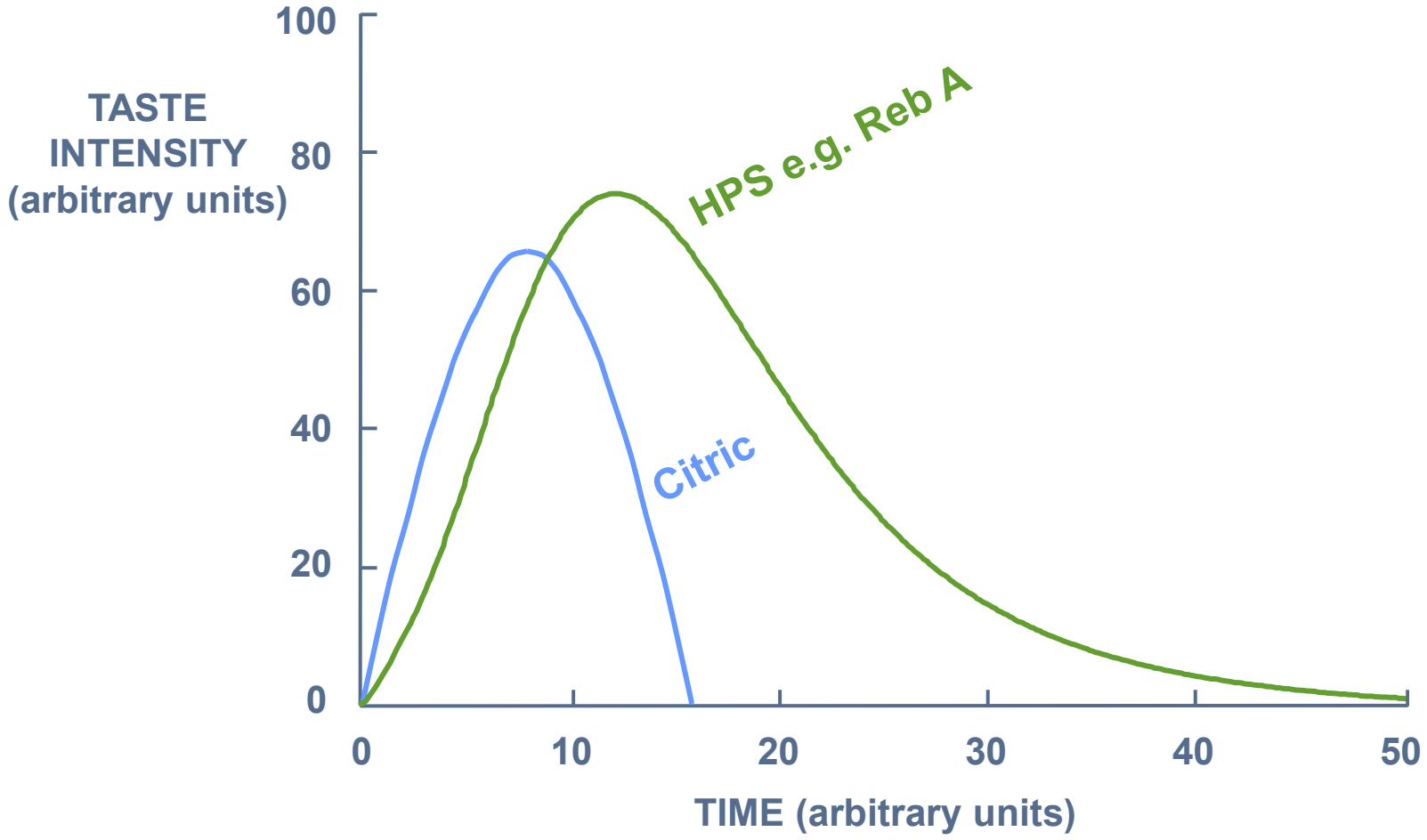
Matching sweet & sour



Dealing with defects

SLOW ONSET, LINGER

Matching sweet & sour



Dealing with defects

SLOW ONSET, LINGER

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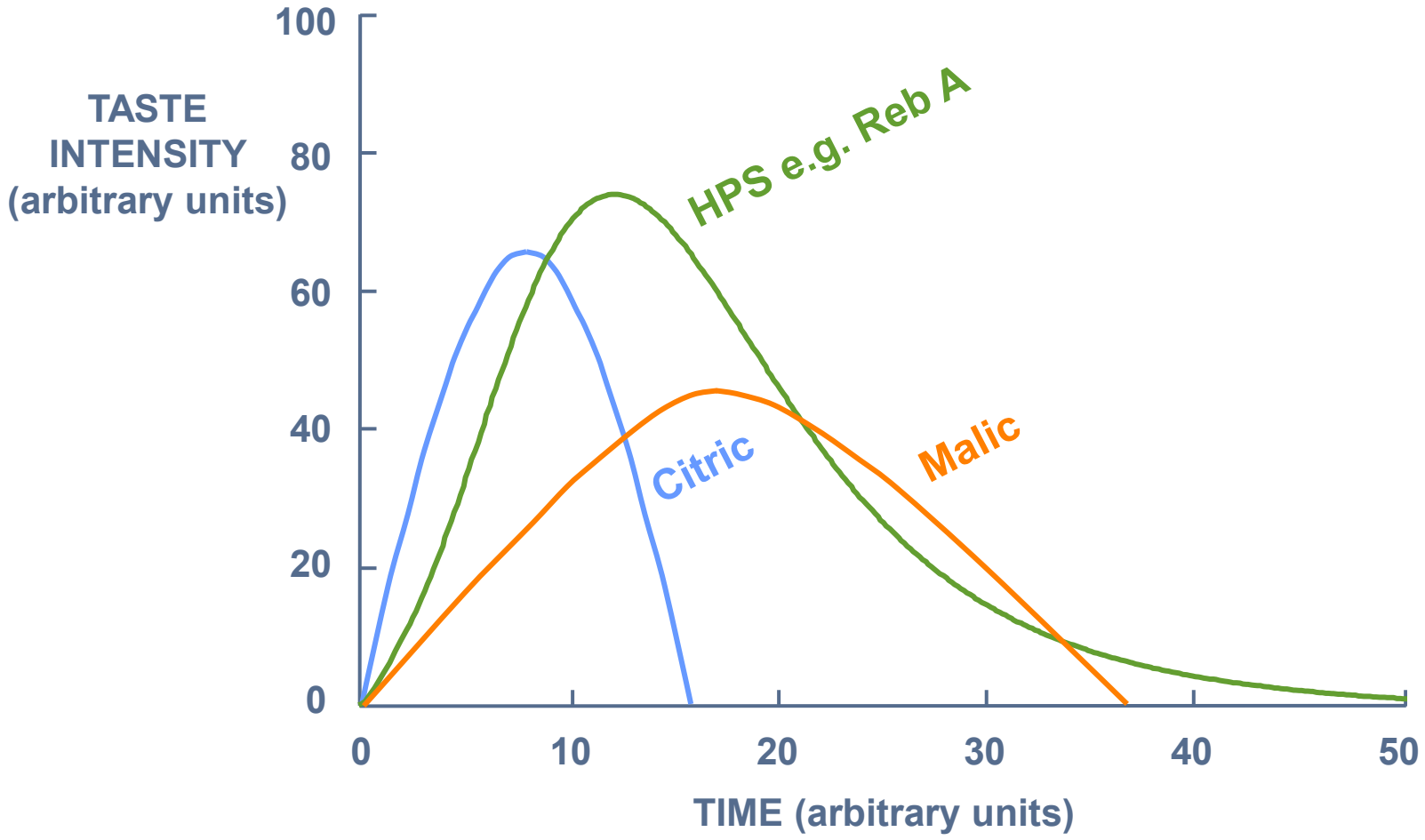
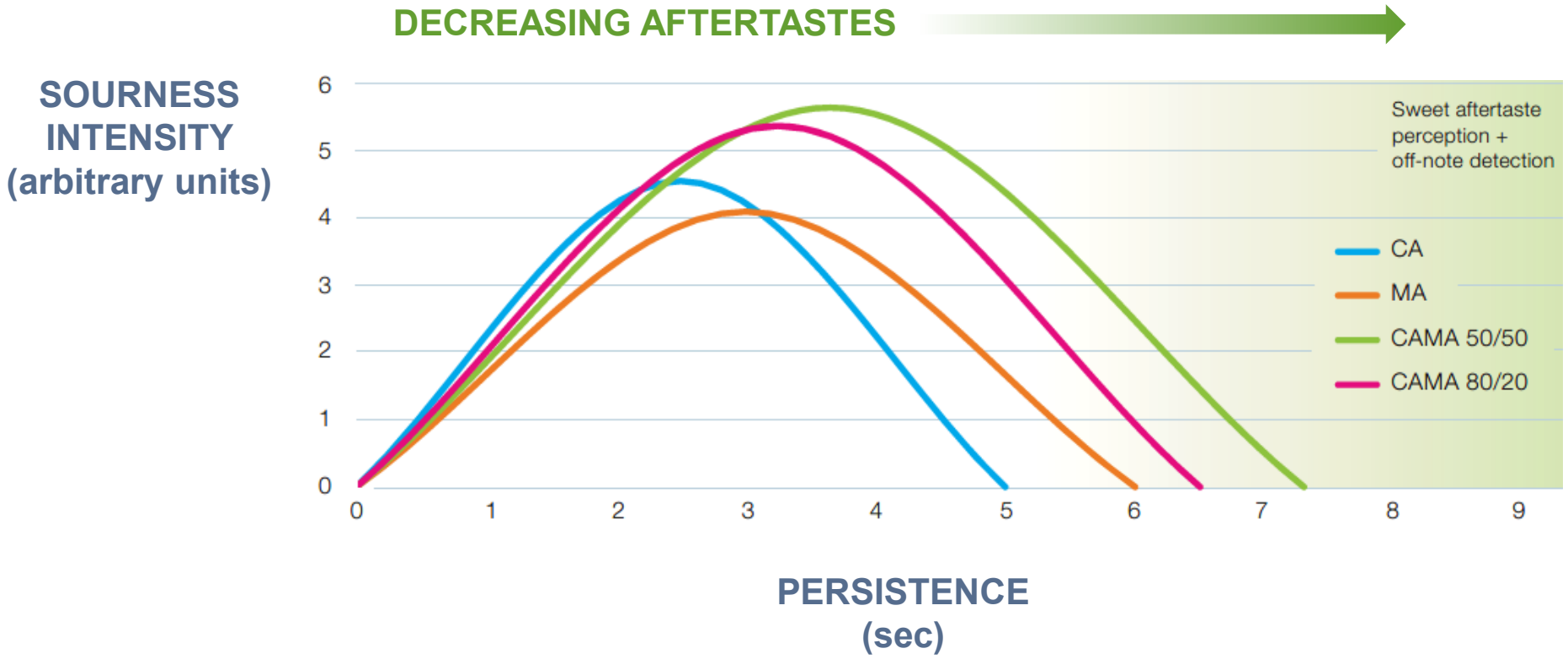


Dealing with defects

SLOW ONSET, LINGER

Matching sweet & sour

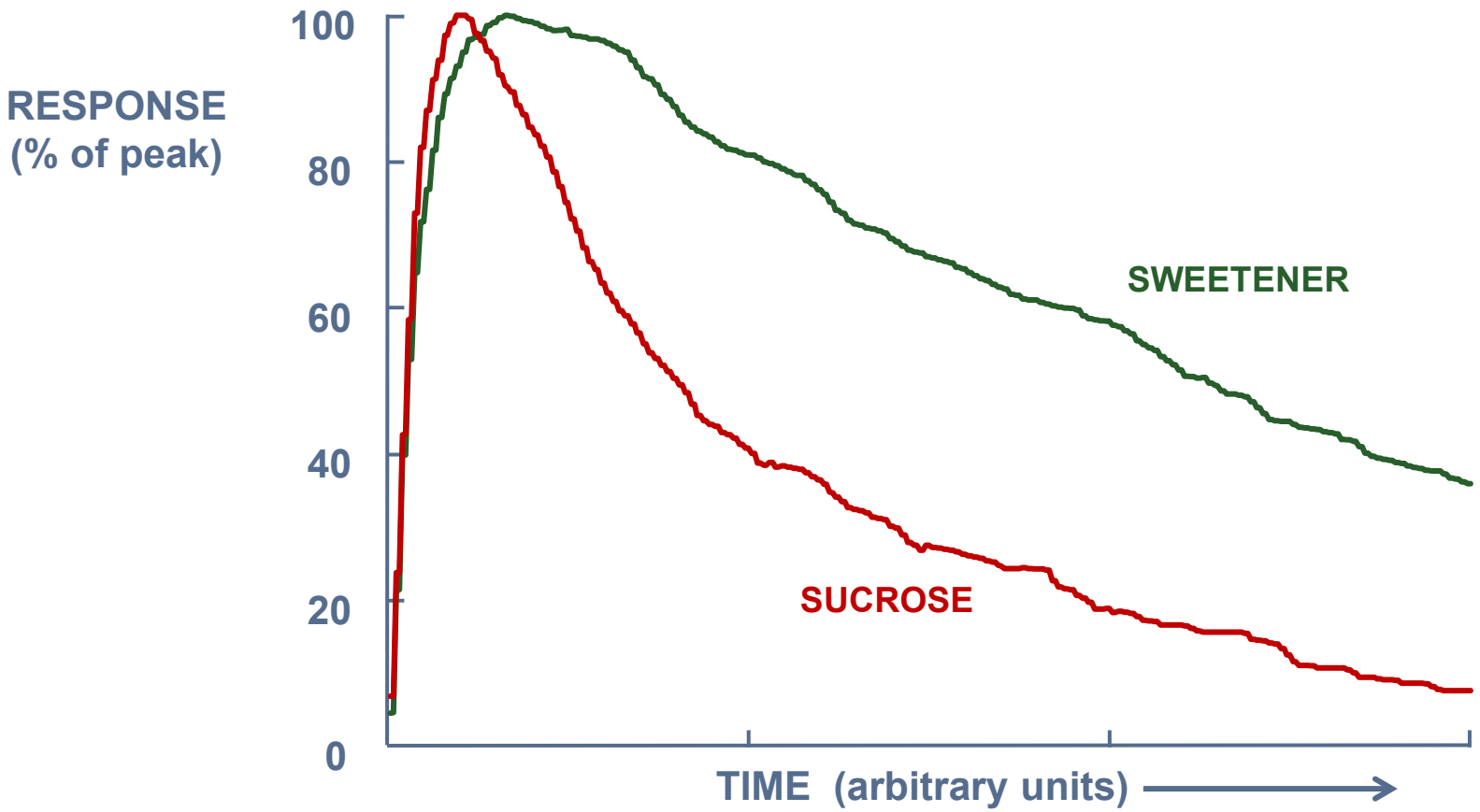
Dynamics of citric acid (CA), malic acid (MA) & blends



Source: Jungbunzlauer

Dealing with defects

SLOW ONSET, LINGER



Poor dynamics:-

- most HPS different from sugar
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Solutions:-

- blend with fast onset HPS (best are synthetic: saccharin & acesulfame-K, but GSG can help)
- match sweet/sour profile
- mineral additions Ca^{++}, Mg^{++}, K^{+}
- solutes to add osmotic pressure

Summary

Maximizing Success With HPS

- Assessing prototypes fairly
  - Human variability & panels
  - Realistic sample size
- Sweetener selection
  - Complex interaction
- How much to use
  - C/R curve key
  - Avoid high concentrations
  - Bracketing
- Dealing with defects
  - Counter side tastes:
    - Stepwise build
    - Blend sweeteners
    - Blockers
  - Counter poor dynamics:
    - Blend sweeteners
    - Sweet/sour profile
    - Mineral additions
    - Solutes

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