

Utilizing *in vitro* protein digestion kinetics and resistant fiber to steer ingredient composition of nursery pig diets for reduced risk of post-weaning diarrhea

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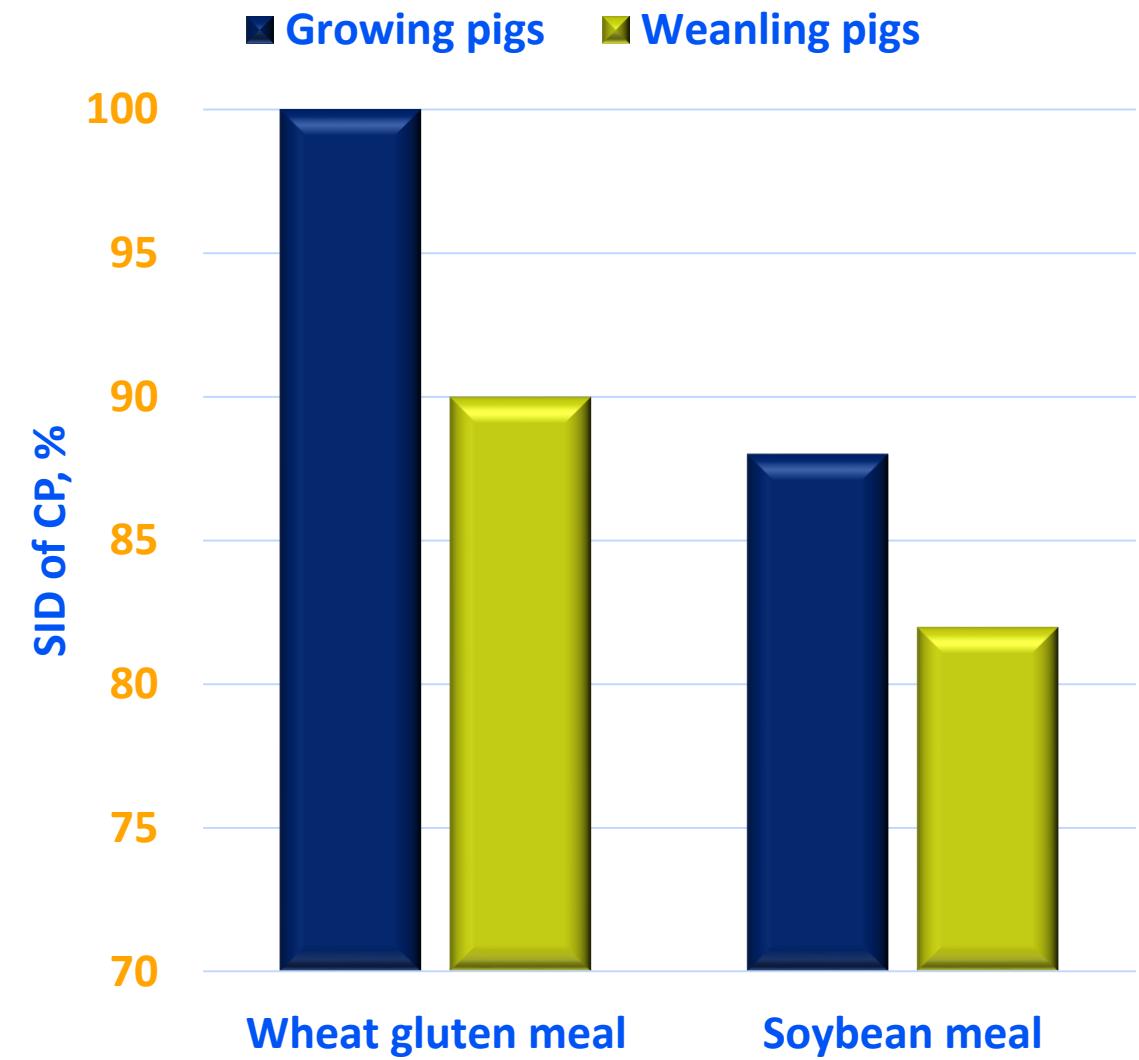
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PROTEIN DIGESTIBILITY

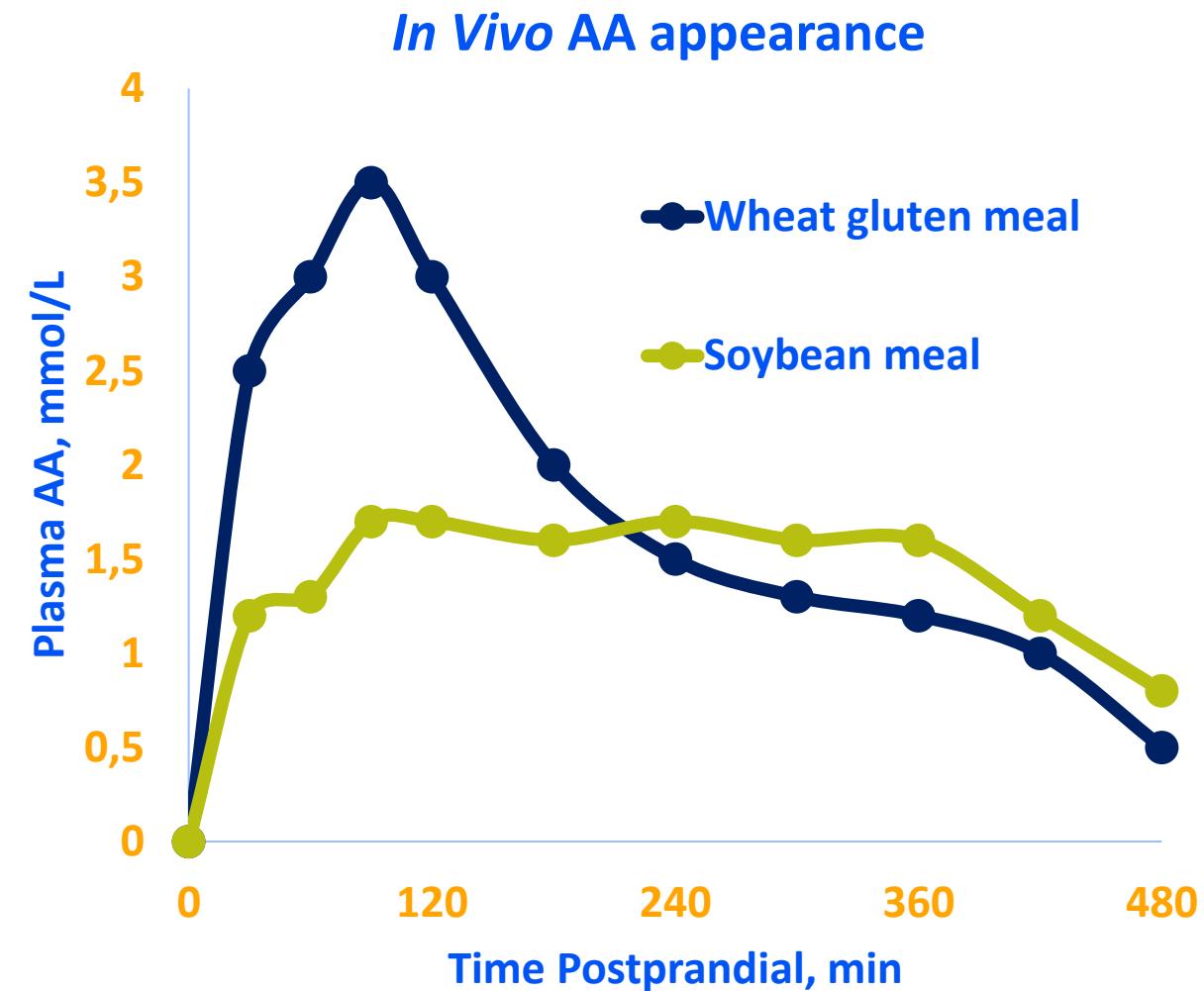
Determined in
Growing Pigs



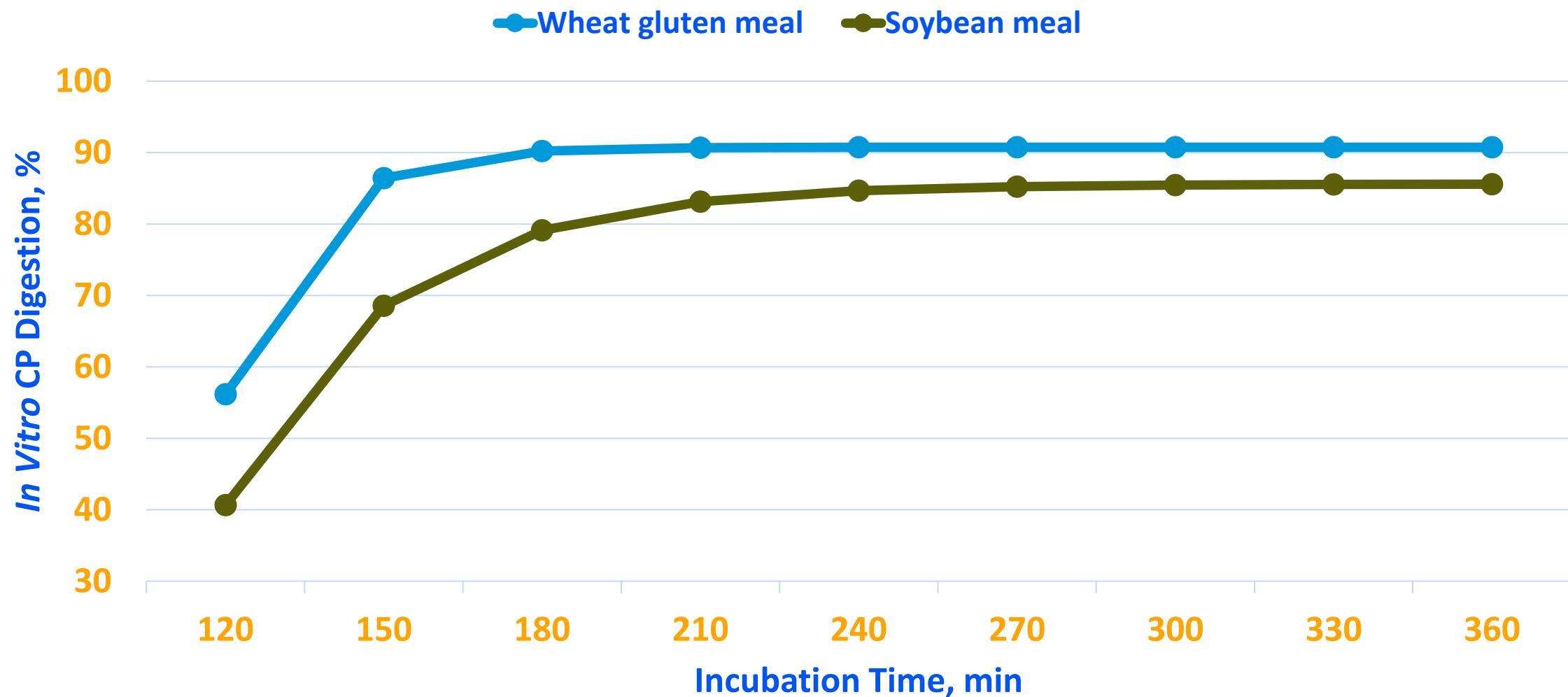
PROTEIN DIGESTIBILITY

Determined in
growing pigs

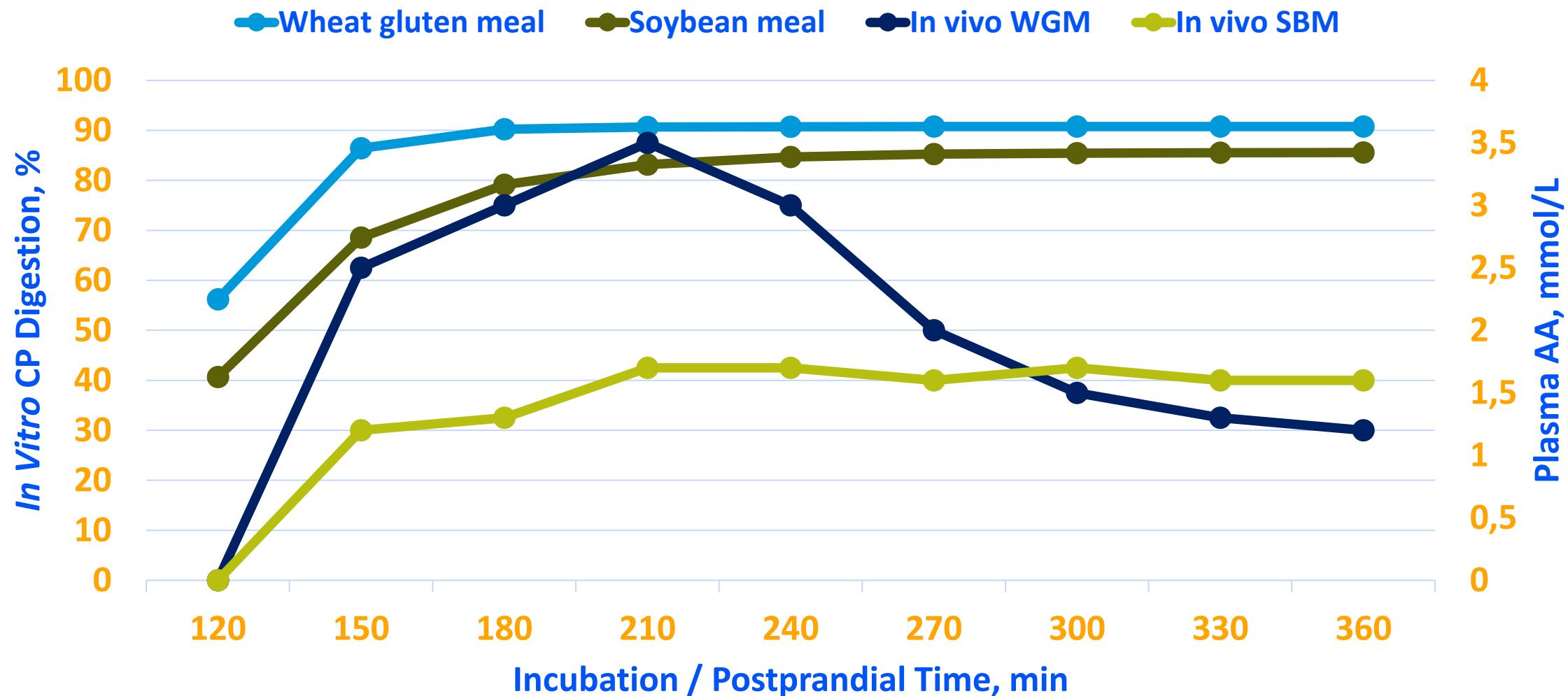
Kinetics of
protein digestion
vary with
ingredients



IN VITRO PROTEIN DIGESTION KINETICS



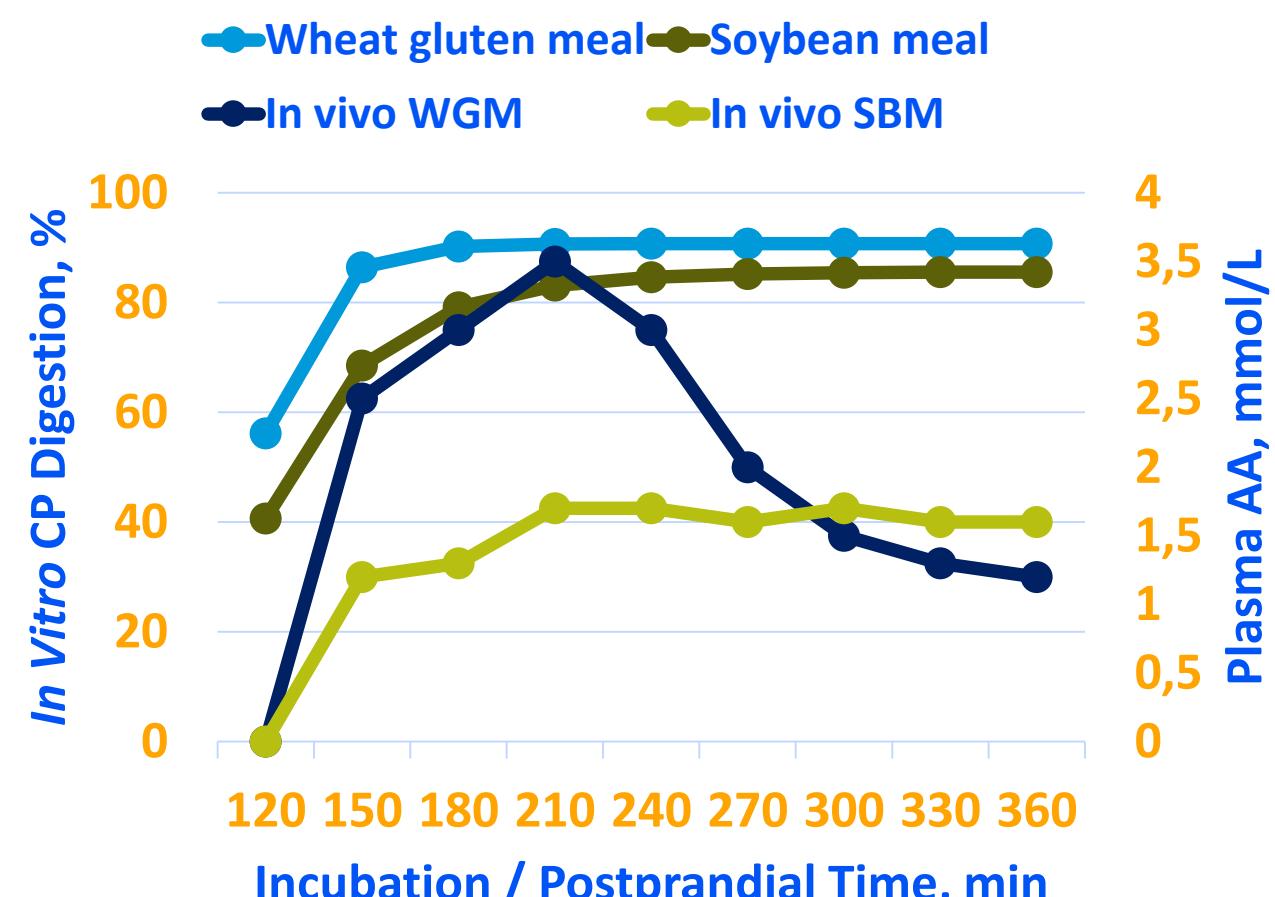
IV CP Digestion Kinetics Correlate with AA Appearance



PROTEIN DIGESTIBILITY

Determined in growing pigs

Kinetics of protein digestion vary with ingredients



Hypothesis: Rapidly digestible protein sources have less diarrhea risk fed to weanling pigs

TOTAL DIETARY FIBER FERMENTATION KINETICS



Analyzed	Calculated
ADF	Insoluble hemicellulose (NDF – ADF)
NDF	Cellulose (ADF – ADL)
ADL	TDF (SDF + IDF)
SDF	NSP (TDF – ADL)
IDF	Soluble hemicellulose (=SDF)
-	Soluble NSP (=SDF)
-	Insoluble NSP (NSP – Soluble NSP)
-	Non cellulosic NSP (NSP – Cellulose)

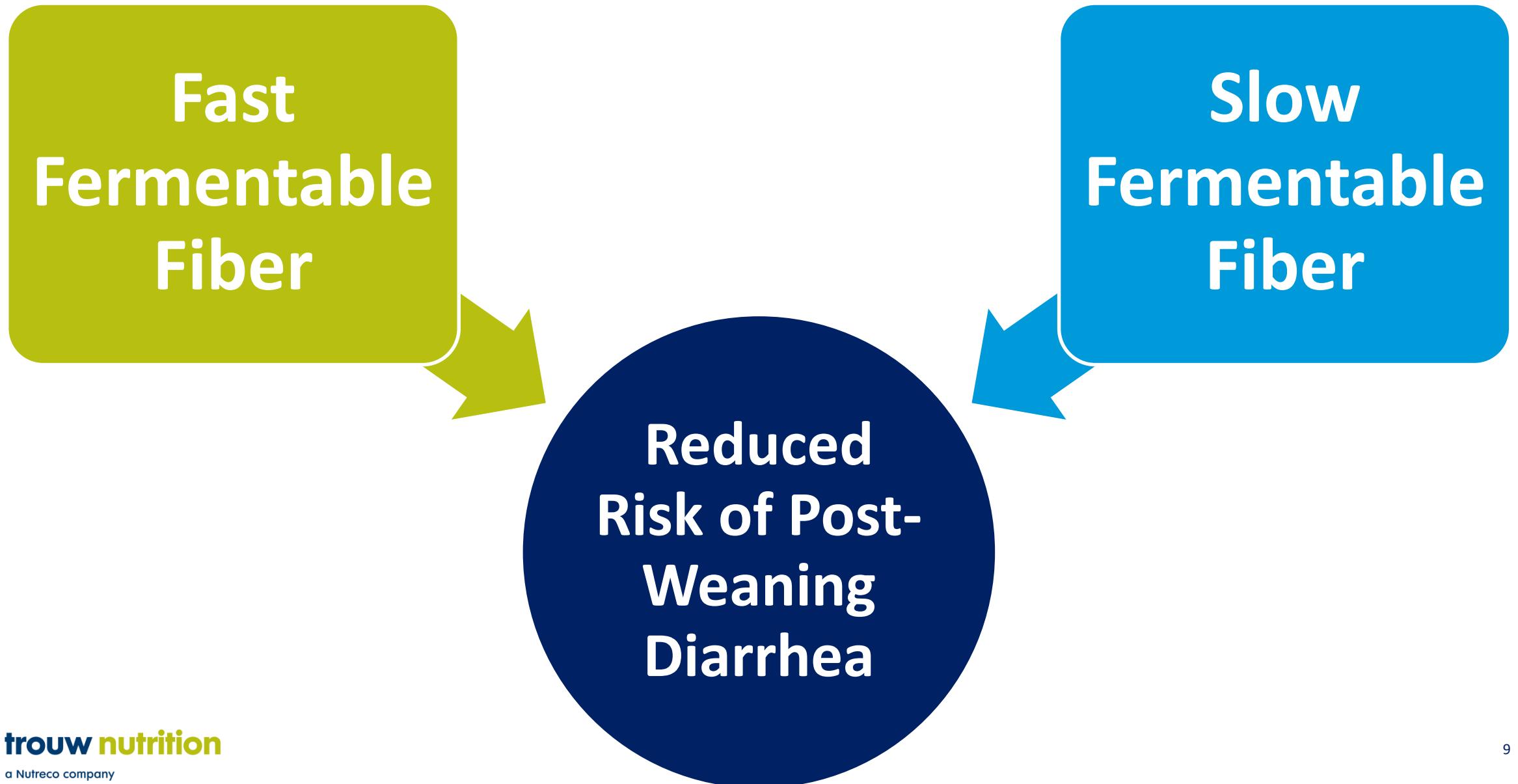
TOTAL DIETARY FIBER FERMENTATION KINETICS

Fast
Fermentable
Fiber

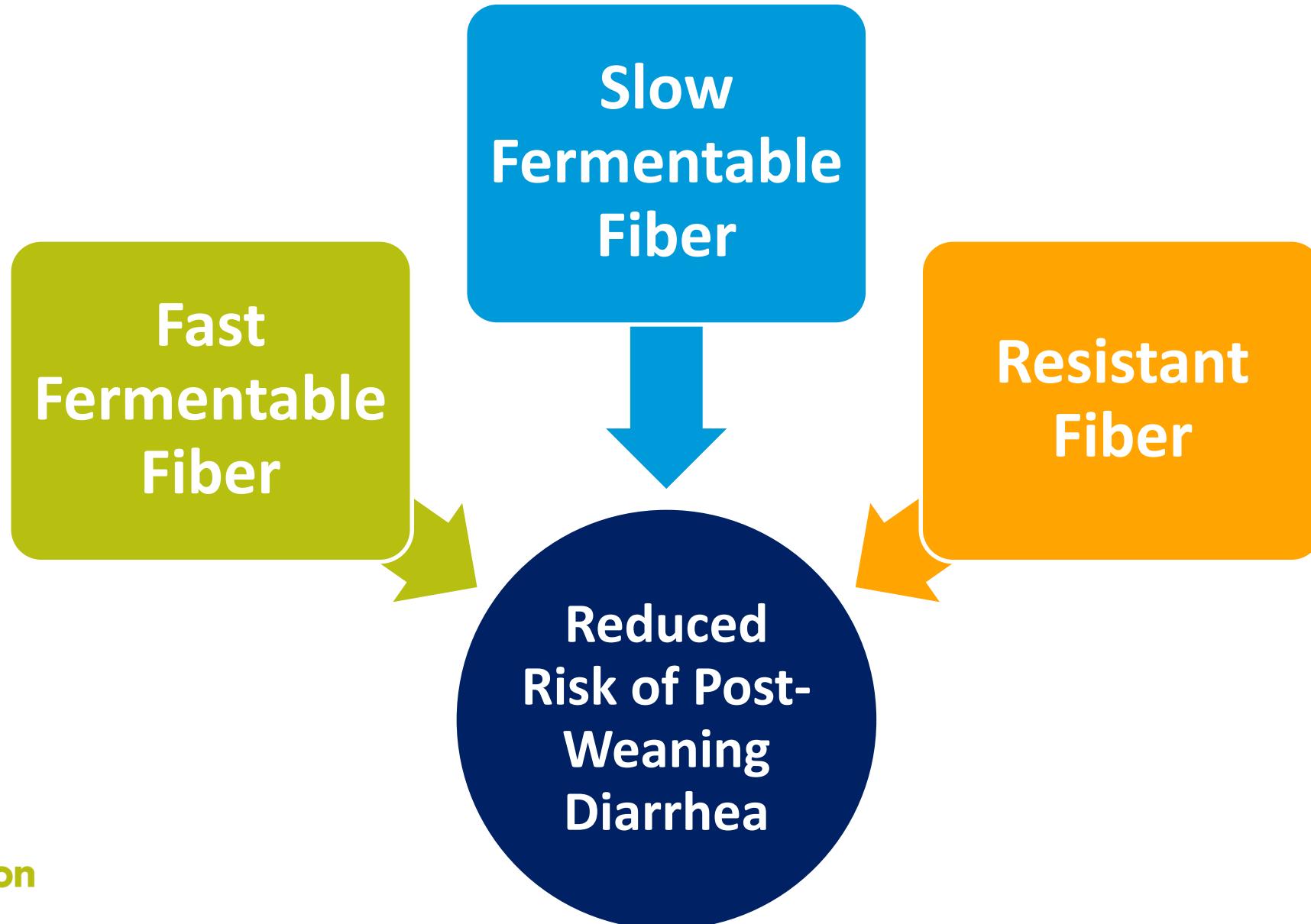


Reduced
Risk of Post-
Weaning
Diarrhea

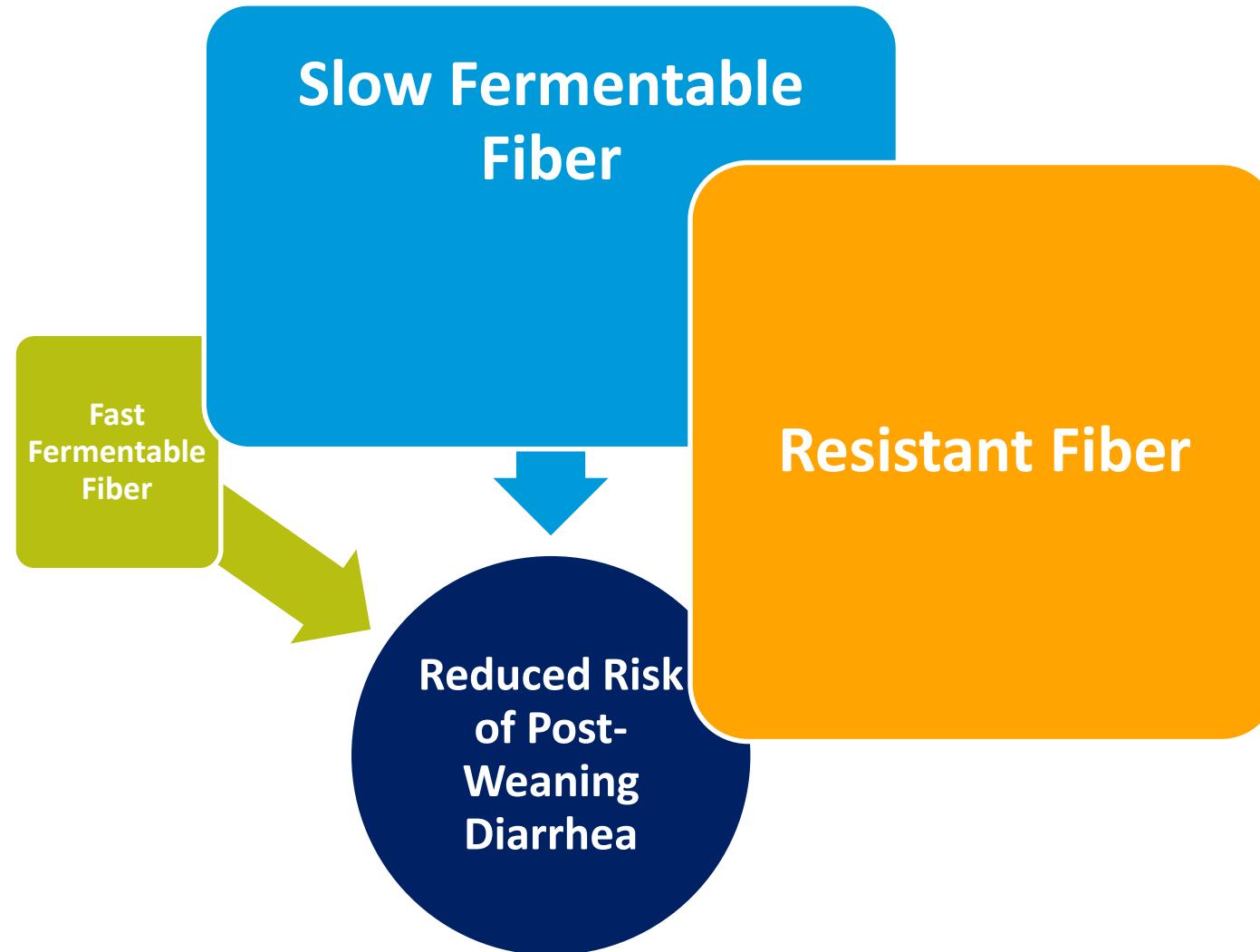
TOTAL DIETARY FIBER FERMENTATION KINETICS



TOTAL DIETARY FIBER (TDF) FERMENTATION KINETICS



HYPOTHESIS: Increased Slow & Resistant Fiber Will Reduce Risk for Post-Weaning Diarrhea



Objective

❖ Validate

- *in vitro* CP digestion kinetics
- TDF fermentation kinetics
 - ✓ to formulate a nursery pig diet to reduce PWD compared with
 - ✓ Pharmacological dose of ZnO



Materials & Methods

864 pigs (18 reps/trt; 16 pigs/pen)

- 20 d of age
- 6.26 ± 0.15 kg BW

3 phase feed budget

- Phase 1: 2 kg / pig (d 0 – 10)
- Phase 2: 5 kg / pig (d 10 – 25)
- Phase 3: common diet fed until d 42 post-wean

Measurements

- Weekly Performance & Diarrhea Incidence



Dietary Treatments

Low ZnO

- 150 ppm ZnO
- Corn, SBM, canola meal, soy protein concentrate based

High ZnO

- 3200 ppm ZnO P1
- 1800 ppm ZnO P2

FastCP + Resistant Fiber

- 150 ppm ZnO
- Ingredient composition steered via protein and fiber kinetics
- Corn, wheat, oats, SBM, oat hull based

Isocaloric

- 2,600 kcal NE/kg P1
- 2,400 kcal NE/kg P2

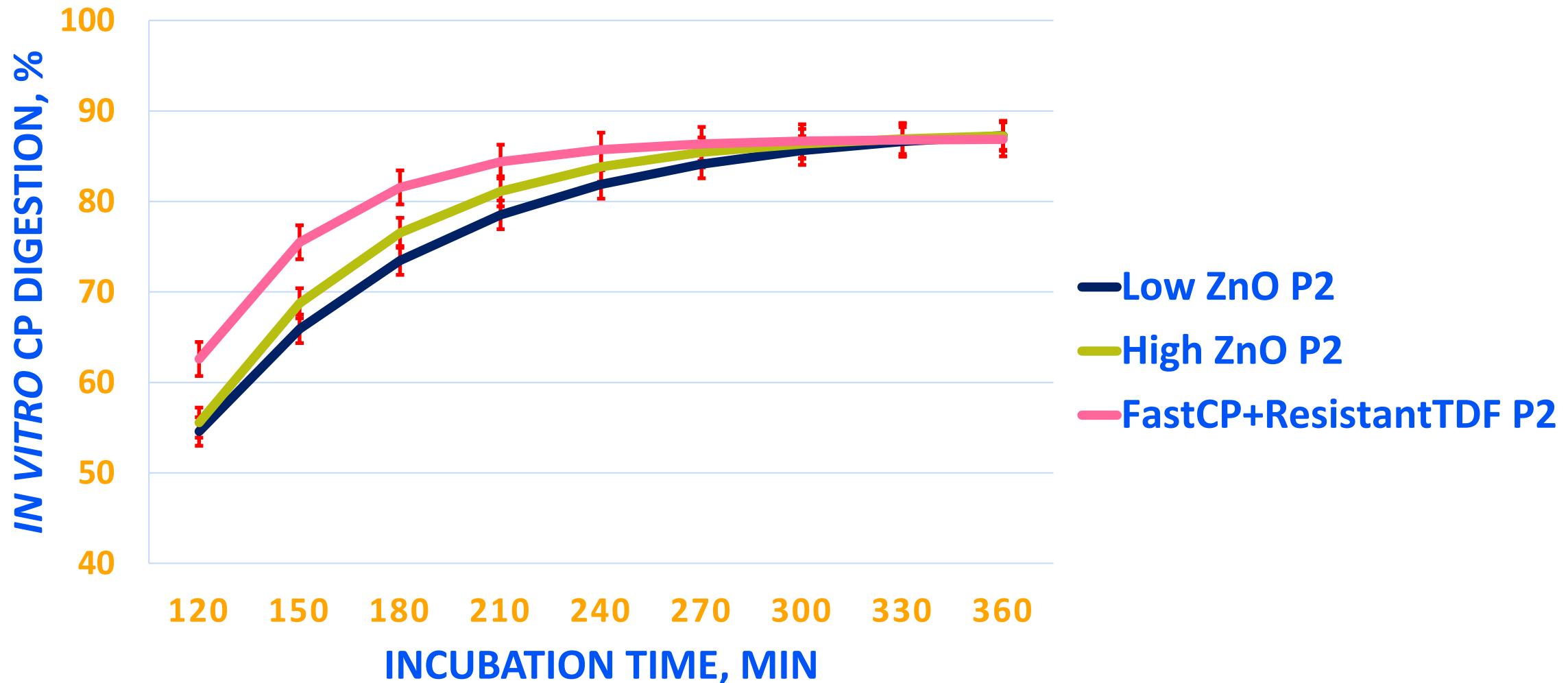
Isonitrogenous

- 16.2% CP P1
- 17.5% CP P2

=SID Lys

- 1.18% P1
- 1.21% P2

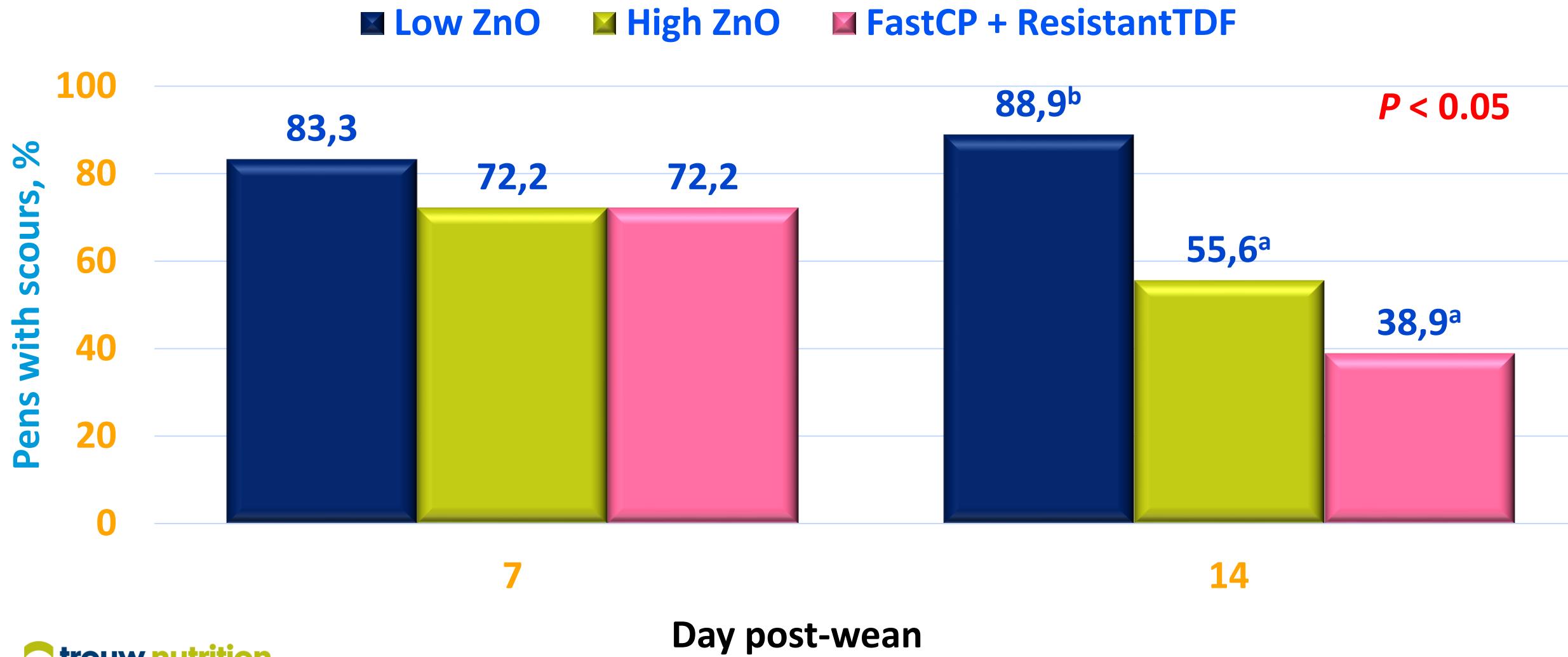
Analyzed *In Vitro* CP Digestion Kinetics of P2 Diets



Analyzed TDF Fermentation Kinetics of P2 Diets



CP & TDF Kinetics Reduced Diarrhea by 25%



CP & TDF Kinetics Fed Pigs were 1kg Heavier on d 42

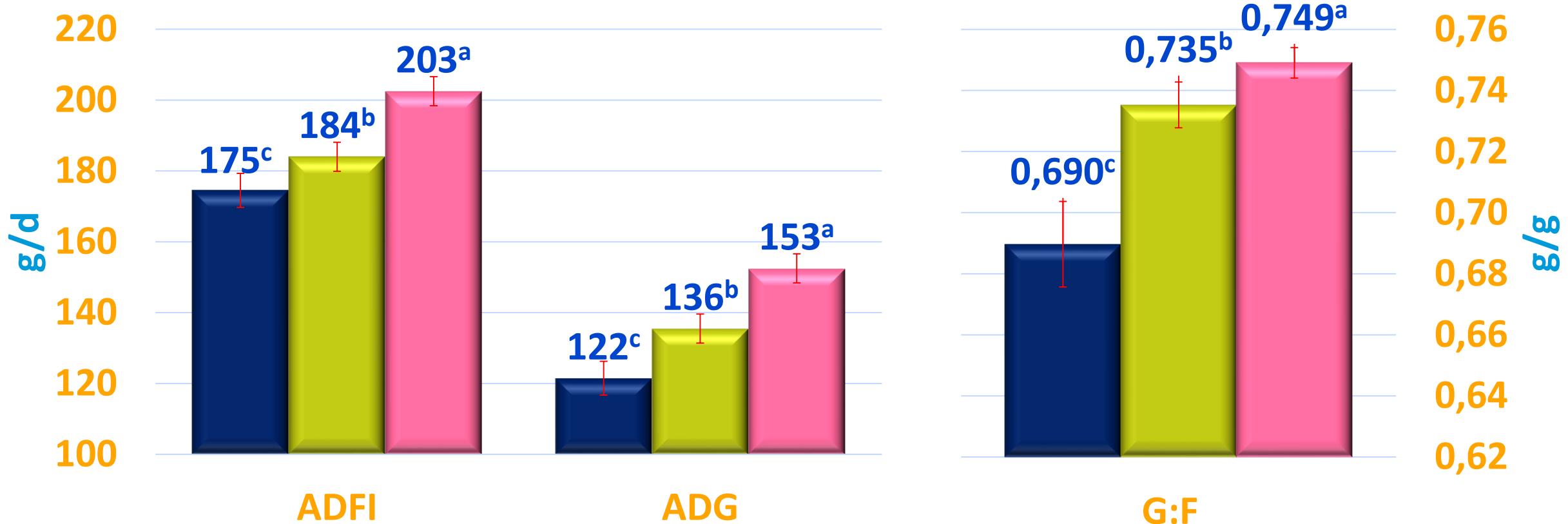
P < 0.05

Nursery Performance, d 0 – 14 post-wean

■ Low ZnO

■ High ZnO

■ FastCP + ResistantTDF



TAKE HOME MESSAGE

In vitro CP digestion kinetics

- More predictable of gut-health and post-weaning diarrhea than dietary CP

TAKE HOME MESSAGE

In vitro CP digestion kinetics

- More predictable of gut-health and post-weaning diarrhea than dietary CP

Slow/Resistant Fiber

- Specific fiber fermentation kinetics are critical in nursery pig GI tract development

Thanks to our Partners



Thank you

