



Experience feeding barley and hybrid rye to pigs

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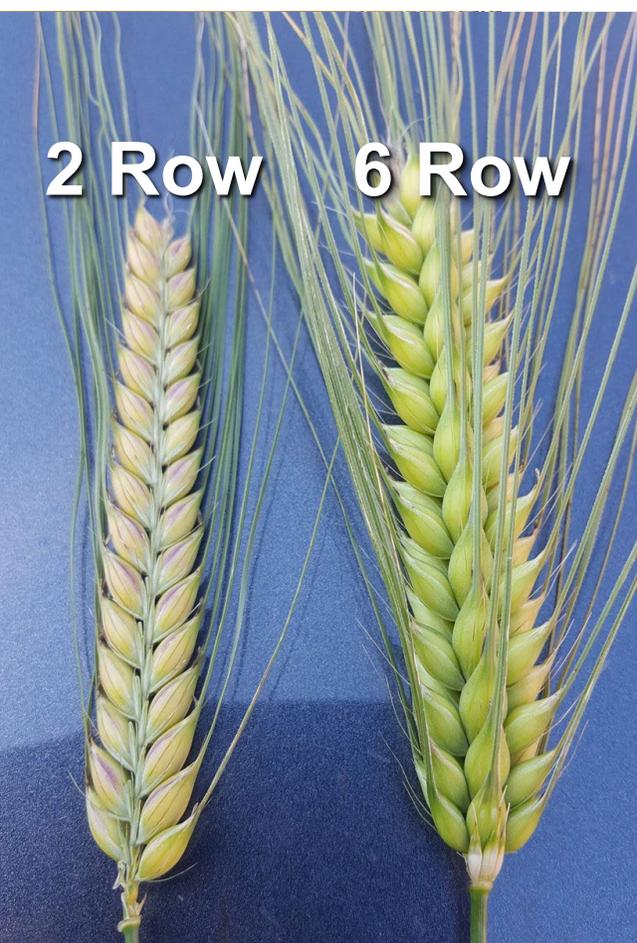
Barley Varieties



Hulled (Whole)



2 Row



6 Row



Winter



Spring



Dehulled (Pearled)



Hybrid Rye Characteristics



Food



Mitigated Ergot Risk

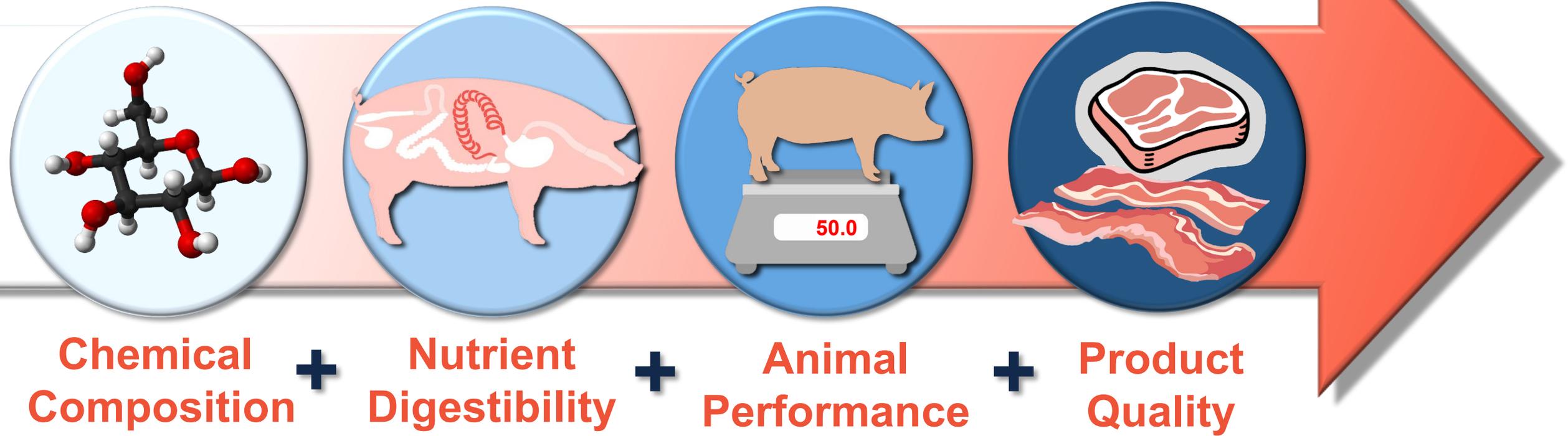


Feed

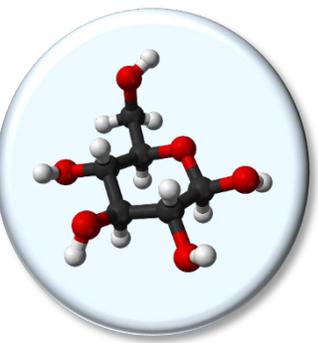


Increased Yield

Feed ingredient evaluation

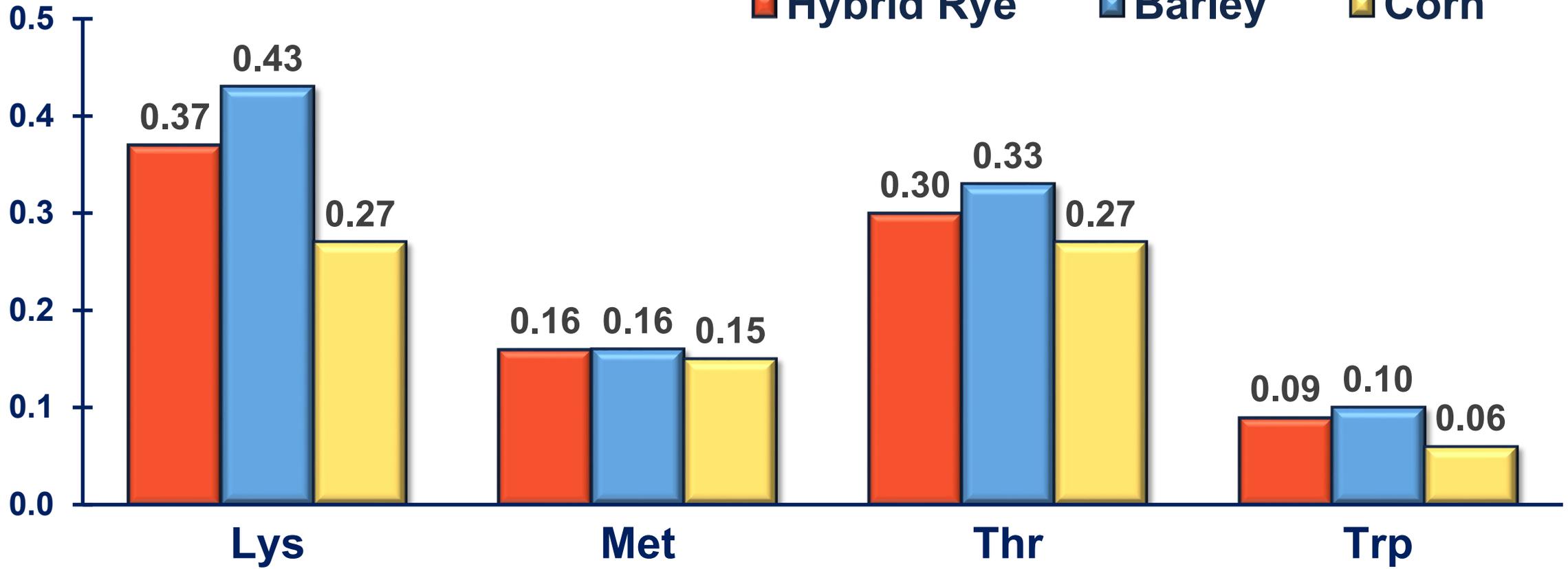


As-is basis.



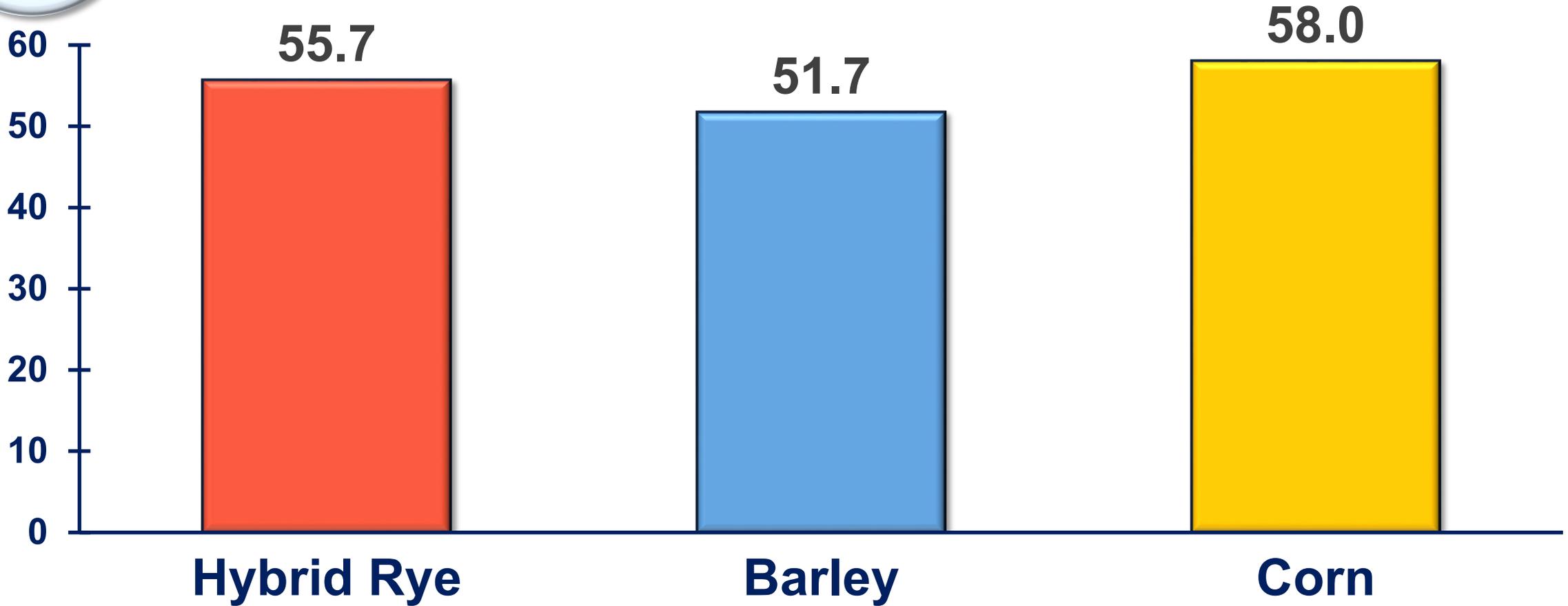
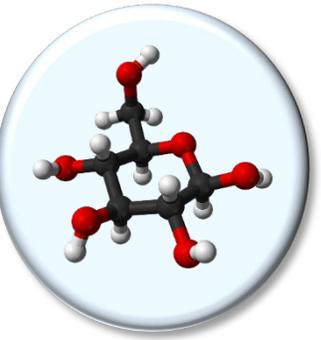
Amino Acids, %

■ Hybrid Rye ■ Barley ■ Corn

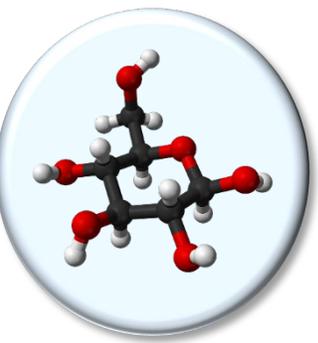


As-is basis.

Starch, %

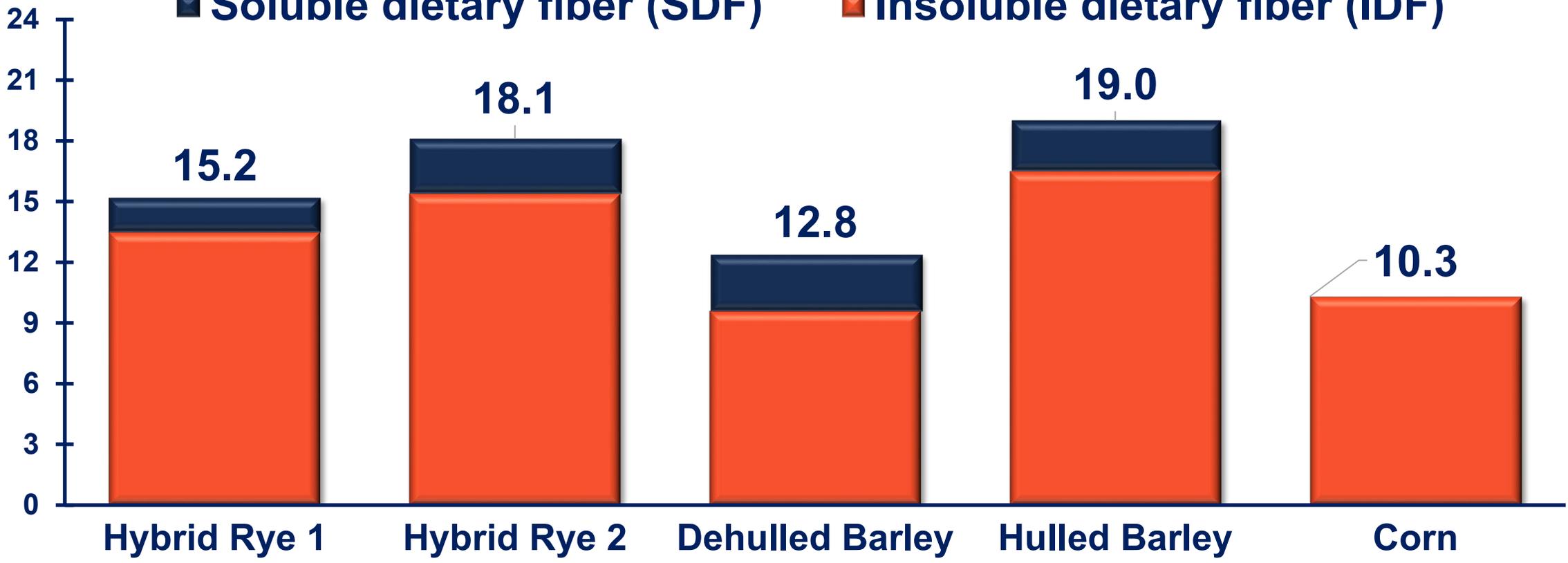


As-is basis.

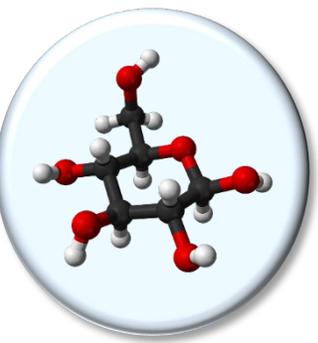


Total Dietary Fiber, %

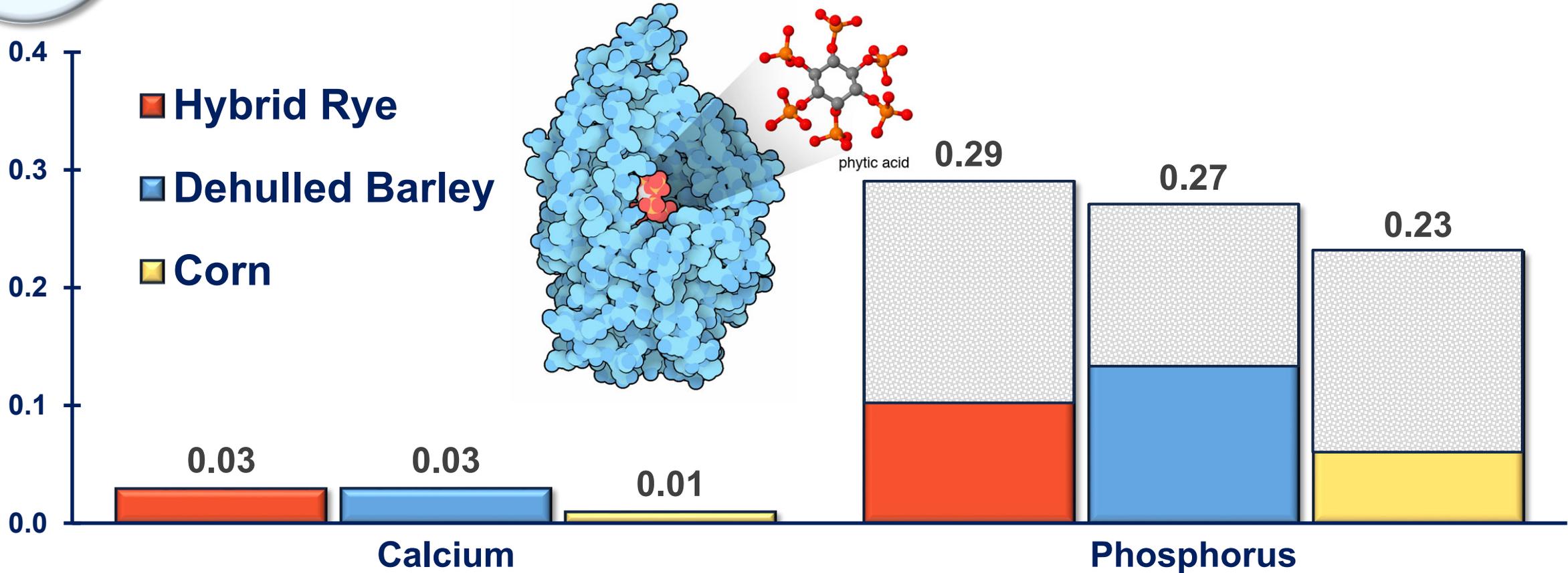
■ Soluble dietary fiber (SDF) ■ Insoluble dietary fiber (IDF)



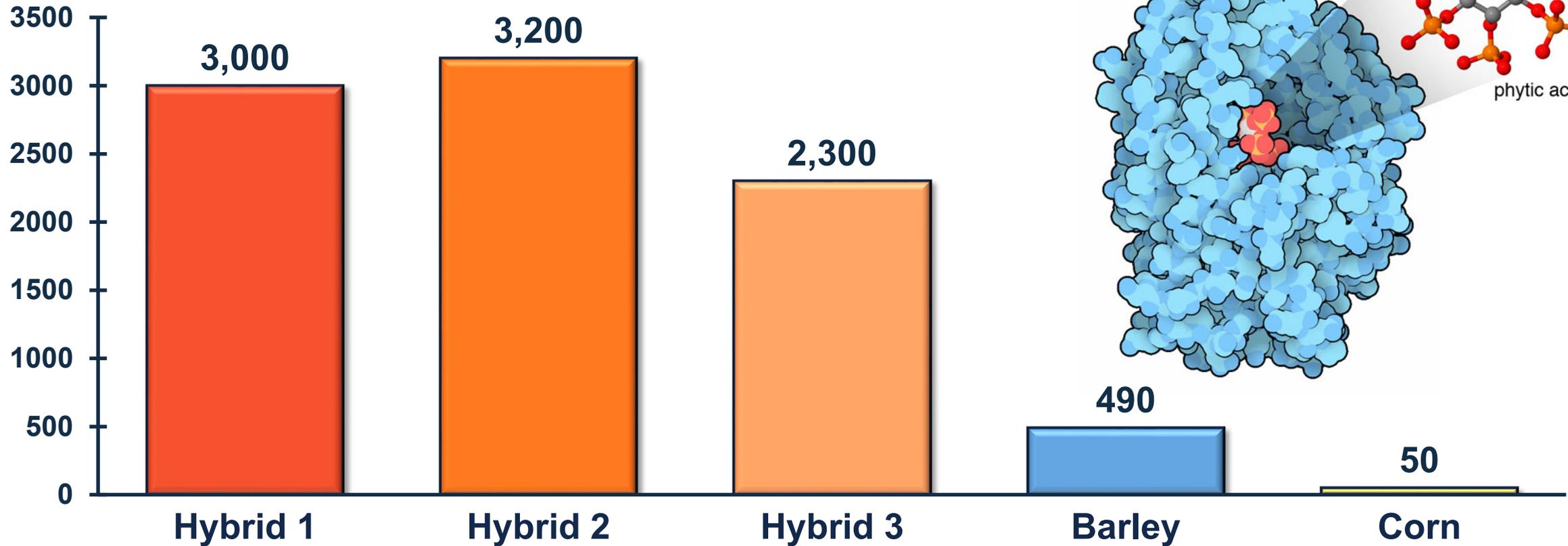
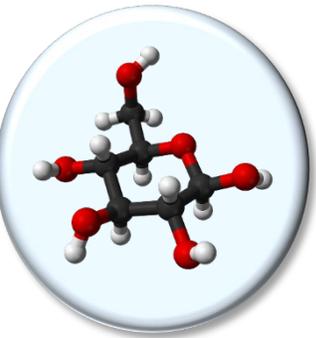
As-is basis.



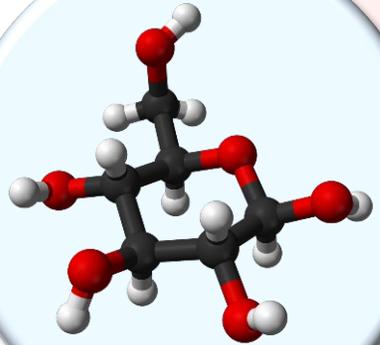
Minerals, %



Intrinsic Phytase, FTU



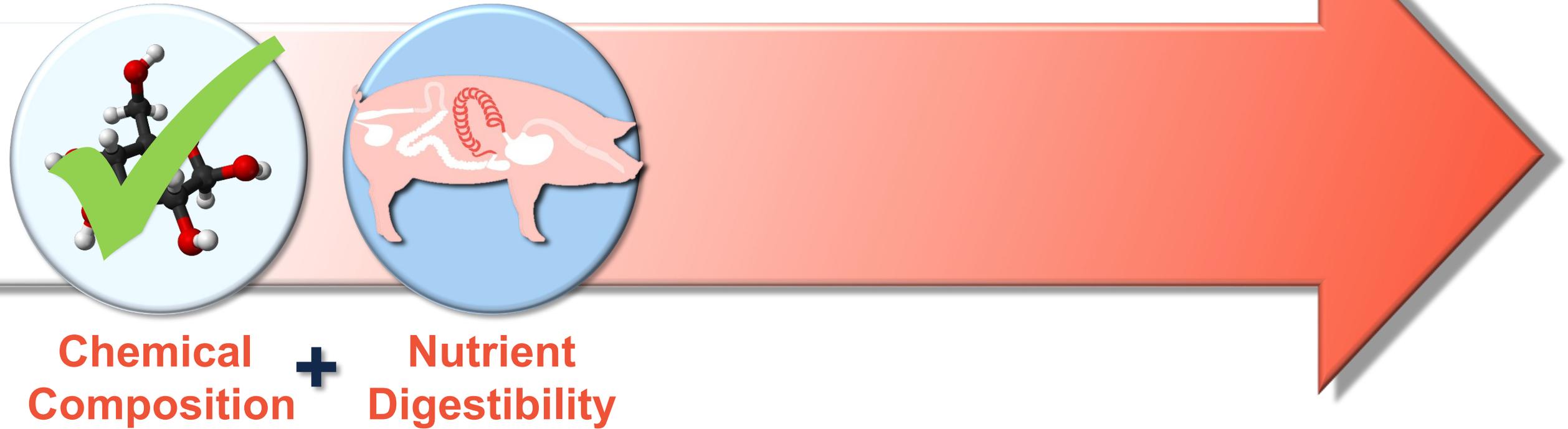
Feed ingredient evaluation

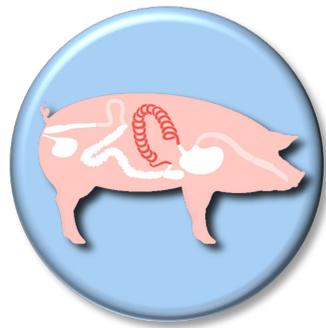


Chemical Composition

1. Barley has more essential AA than corn and rye.
2. Hybrid rye + barley have more fiber than corn.
3. Most P in cereal grains is bound to phytate.

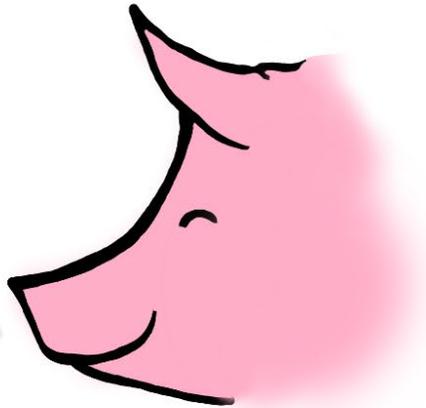
Feed ingredient evaluation



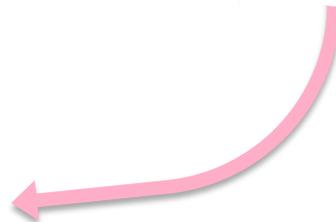


Nutrient Digestibility

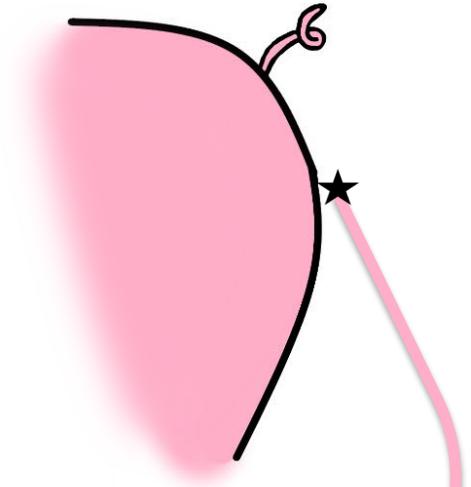
Feed ingestion

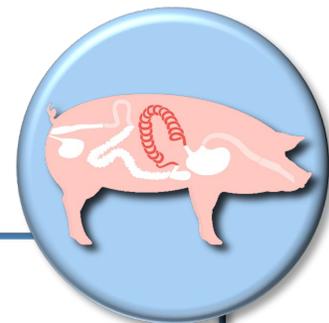


Ileal
digestibility

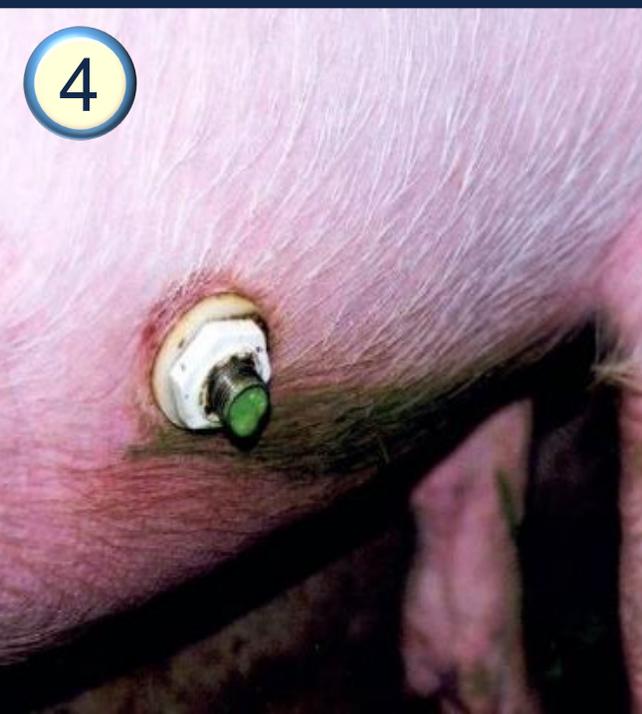


Fecal output =
Total tract digestibility





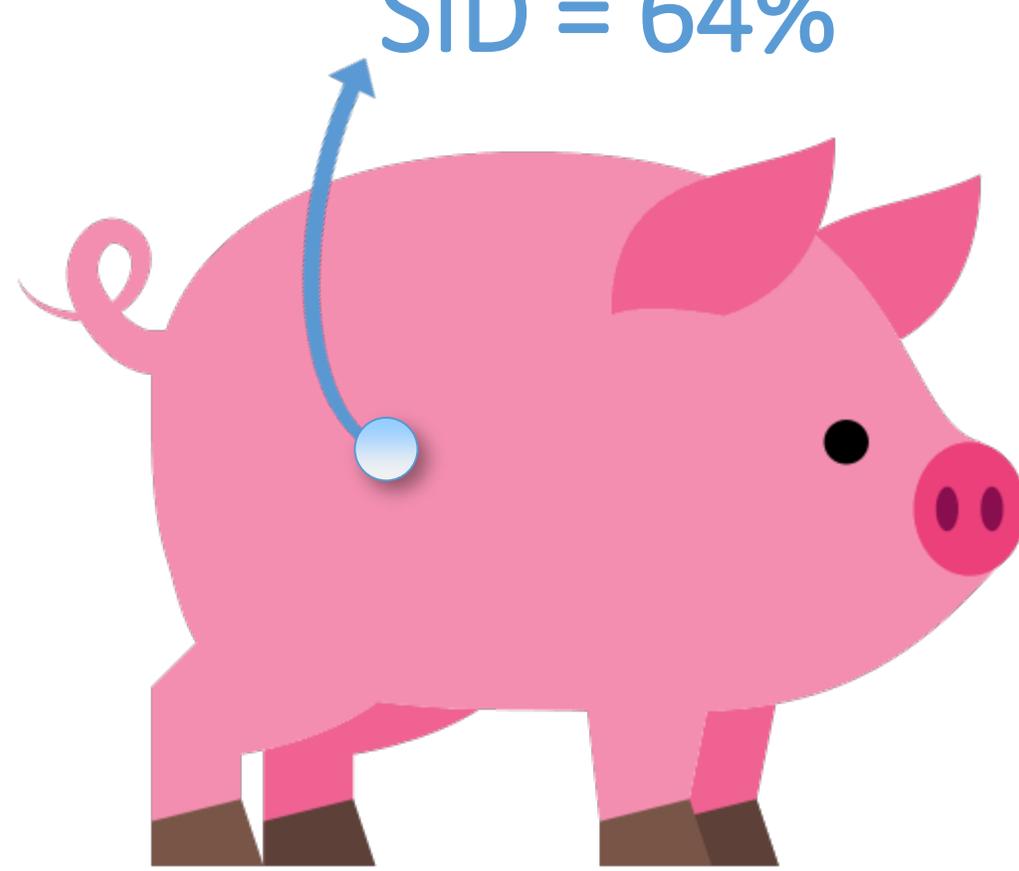
Procedure for Ileal digestibility



Used for:
AMINO ACIDS
STARCH

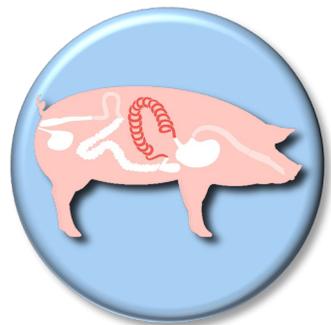
Amino Acid & Starch Digestibility

SID = 64%

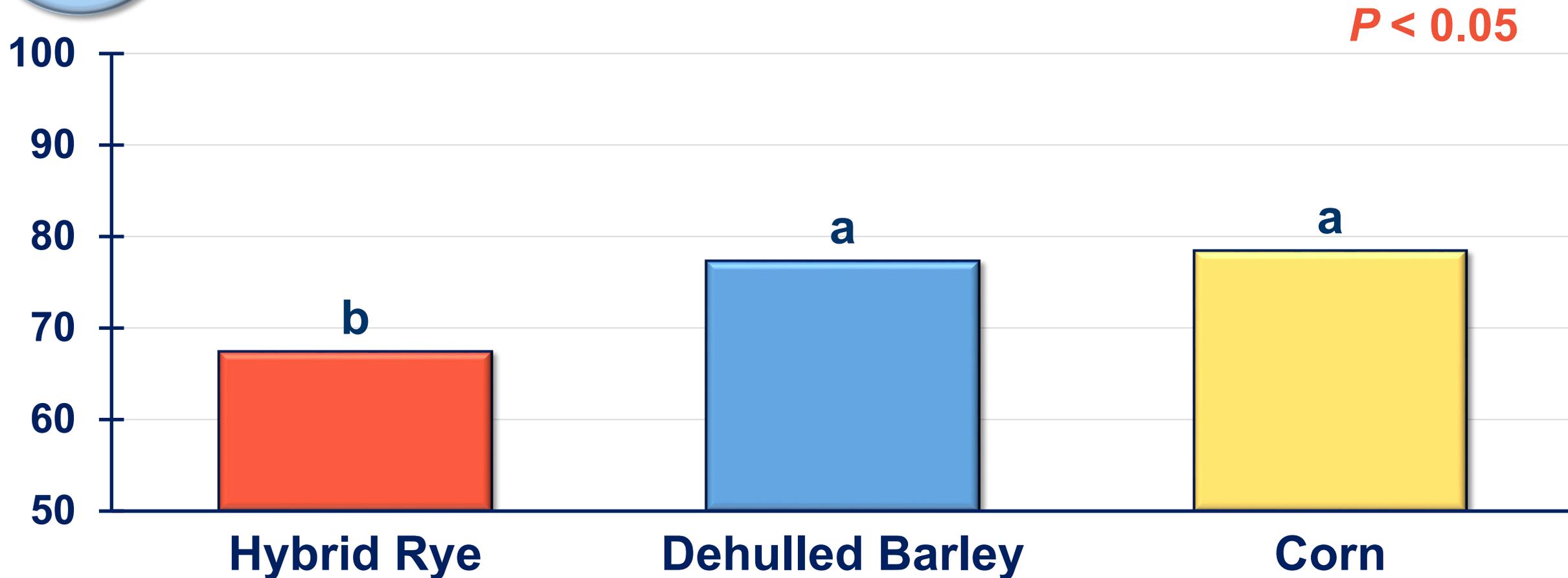


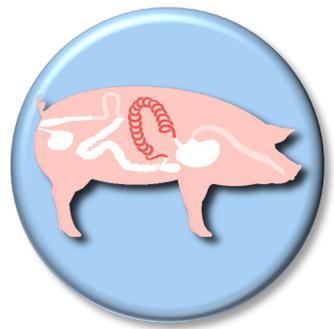
0.41% Lysine

0.26% *SID* Lysine

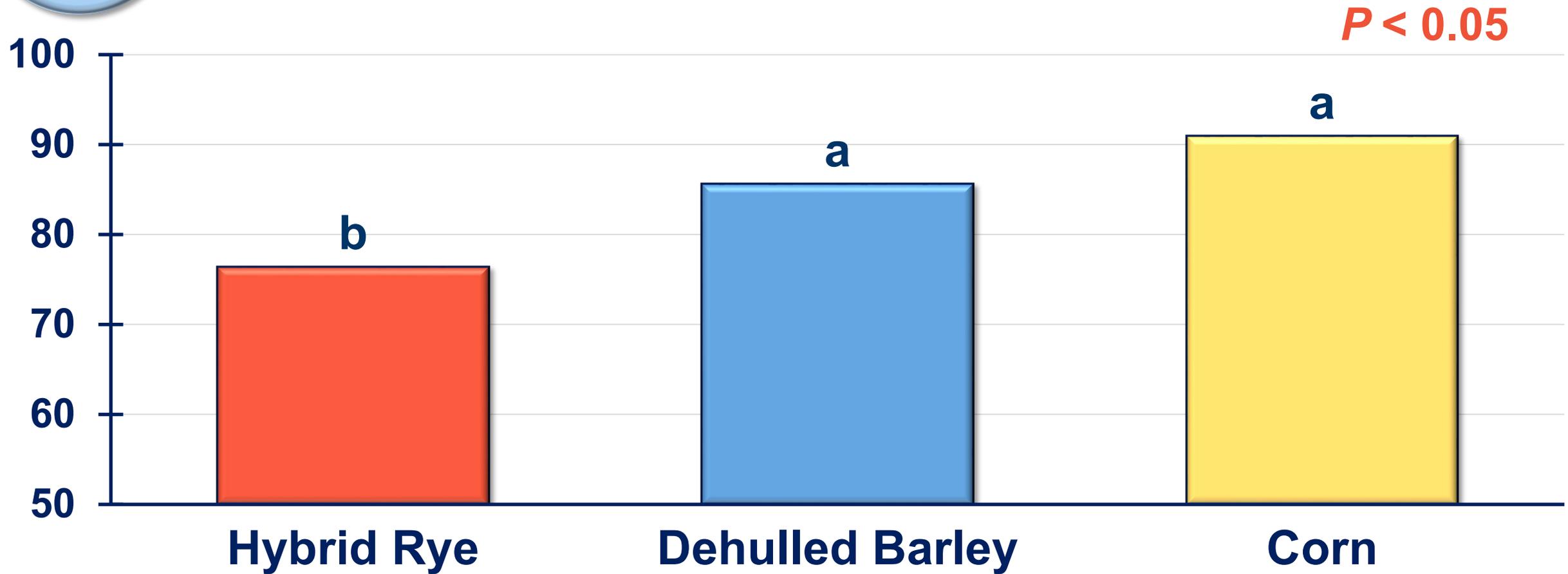


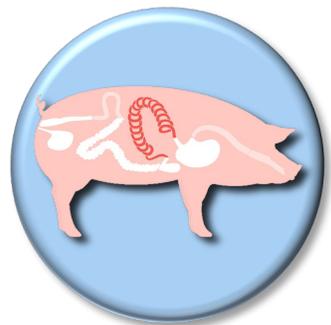
Digestibility of Lysine, %



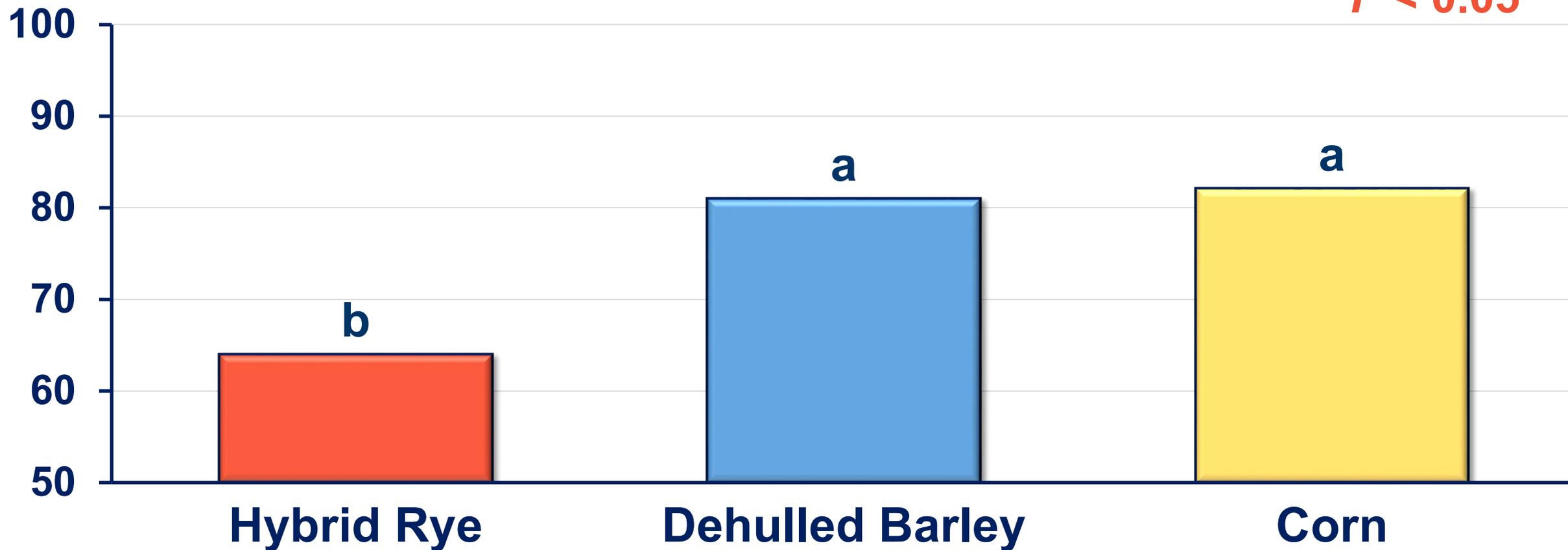


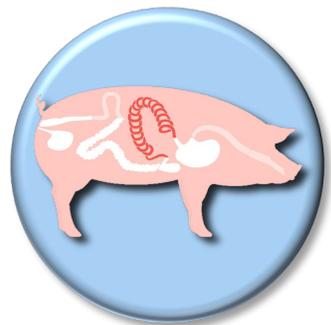
Digestibility of Methionine, %



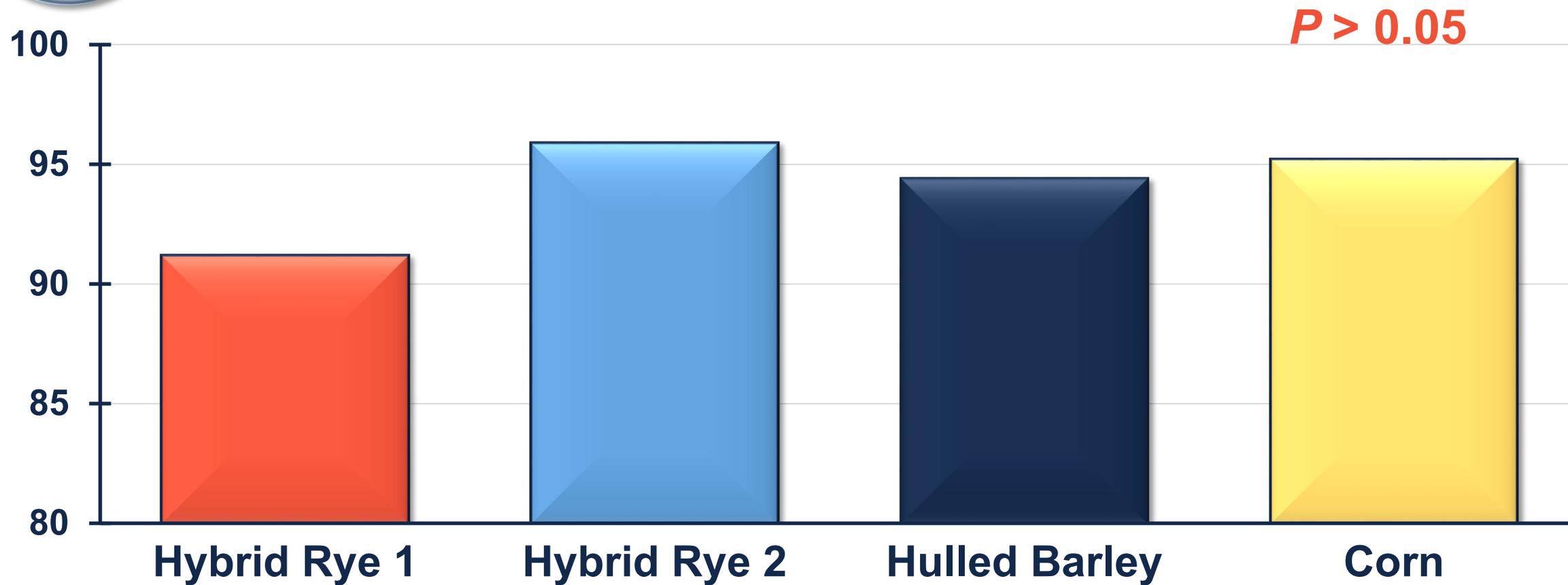


Digestibility of Threonine, %



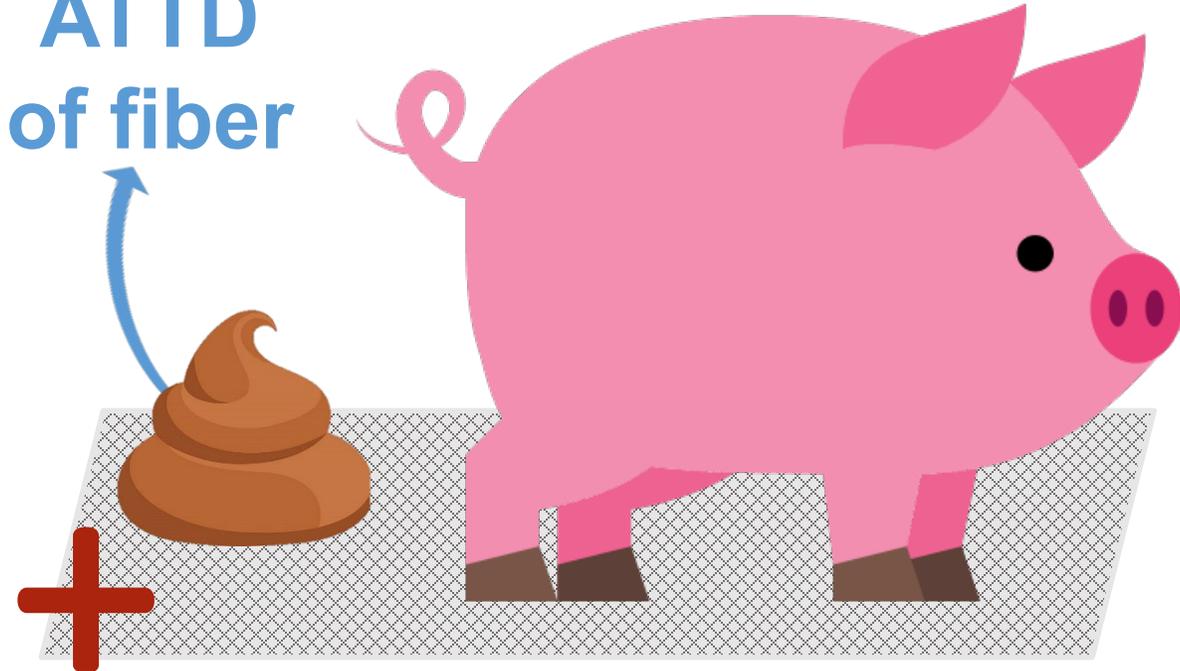


Digestibility of Starch, %



Energy & Fiber Digestibility

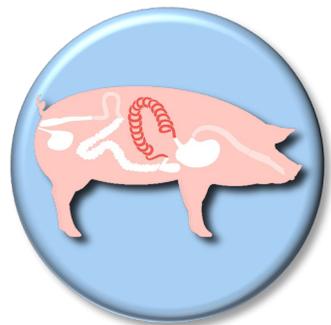
ATTD
of fiber



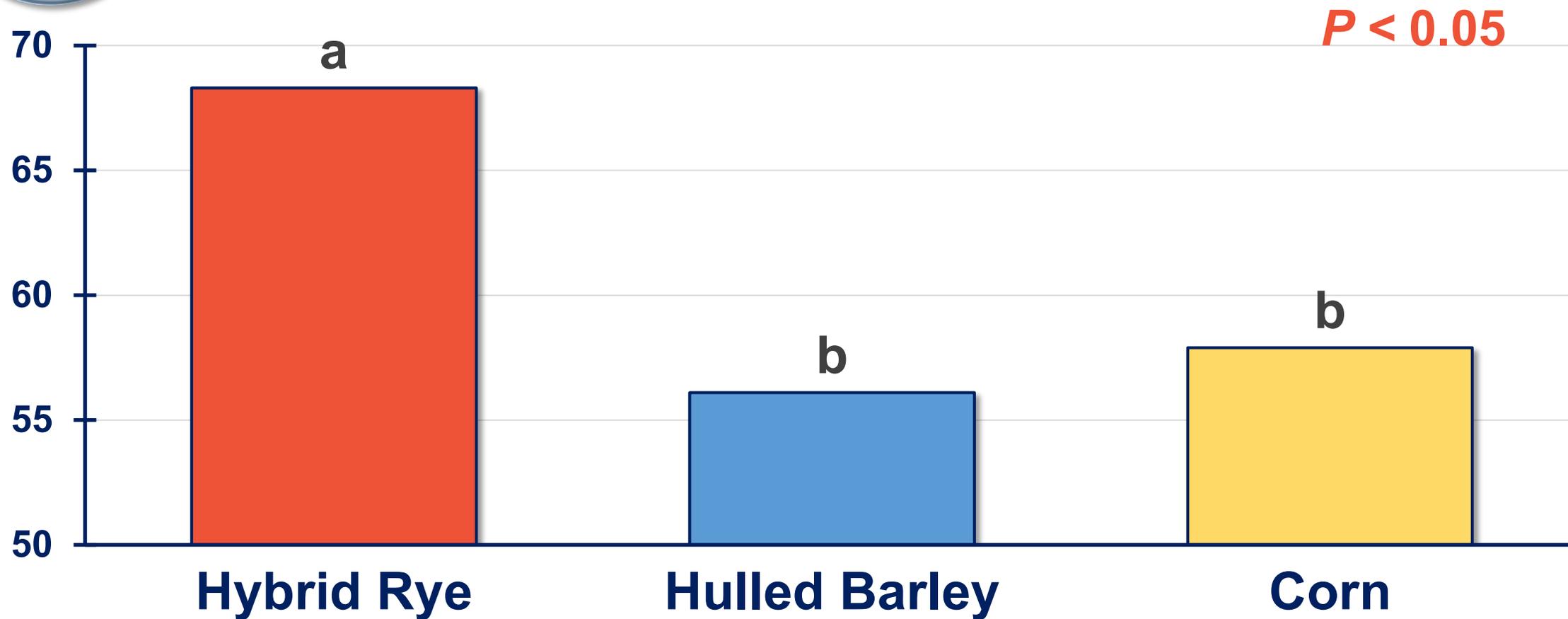
3,800 kcal/kg
18% Fiber

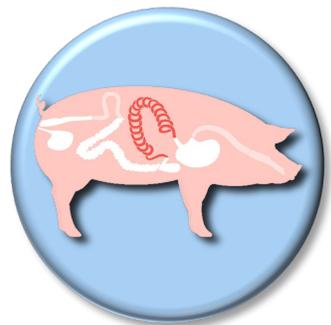


Metabolizable Energy



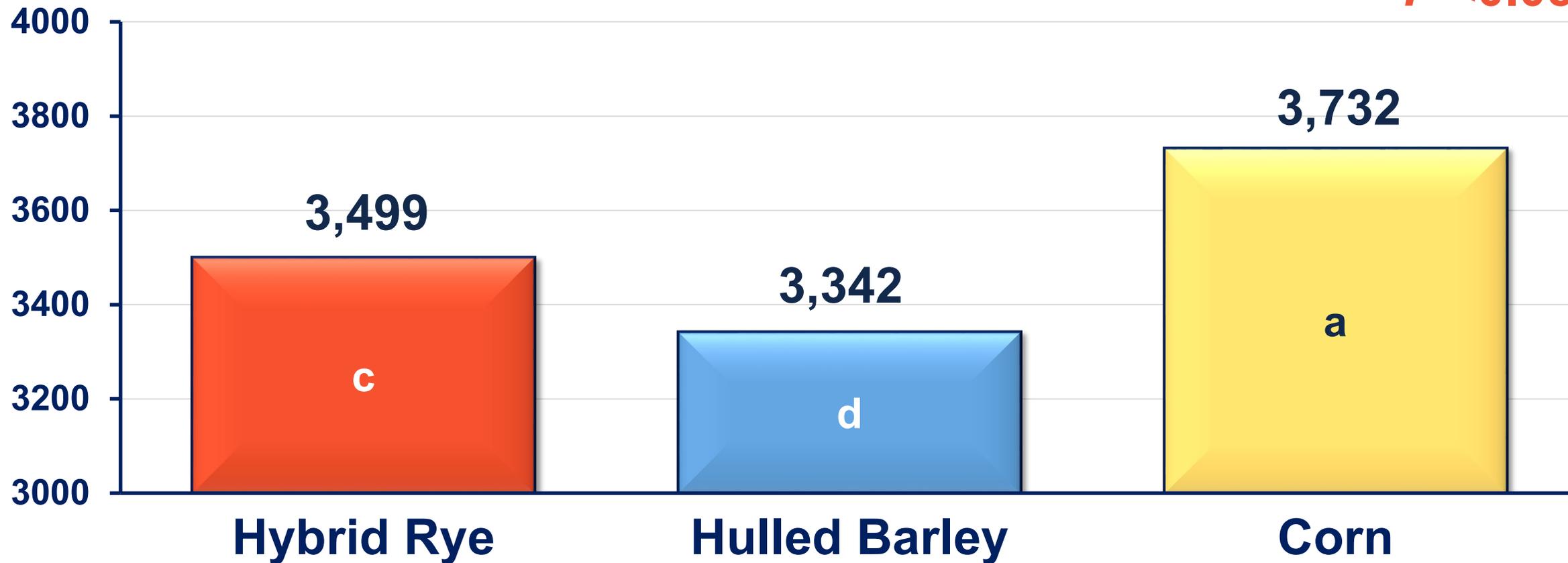
Digestibility of Dietary Fiber, %





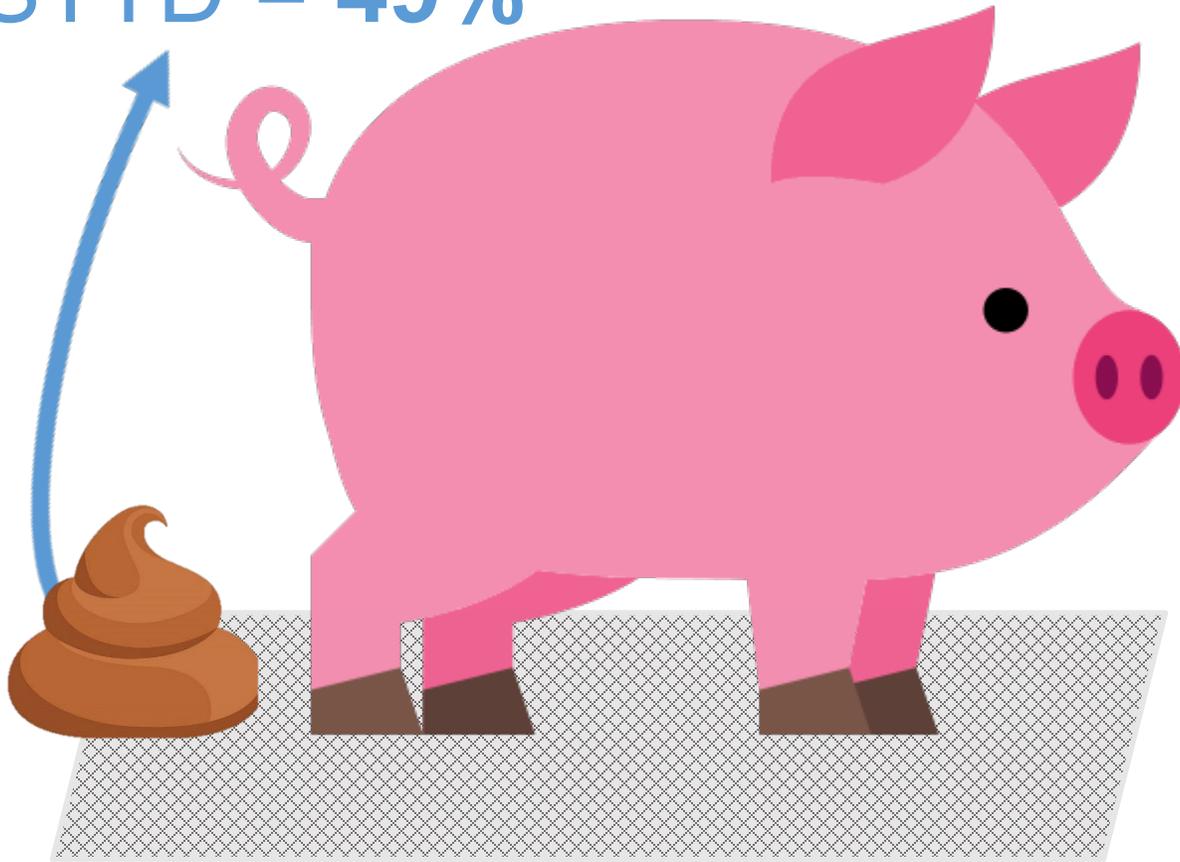
Metabolizable energy, kcal/kg DMB

P < 0.05



Phosphorus Digestibility

STTD = 49%

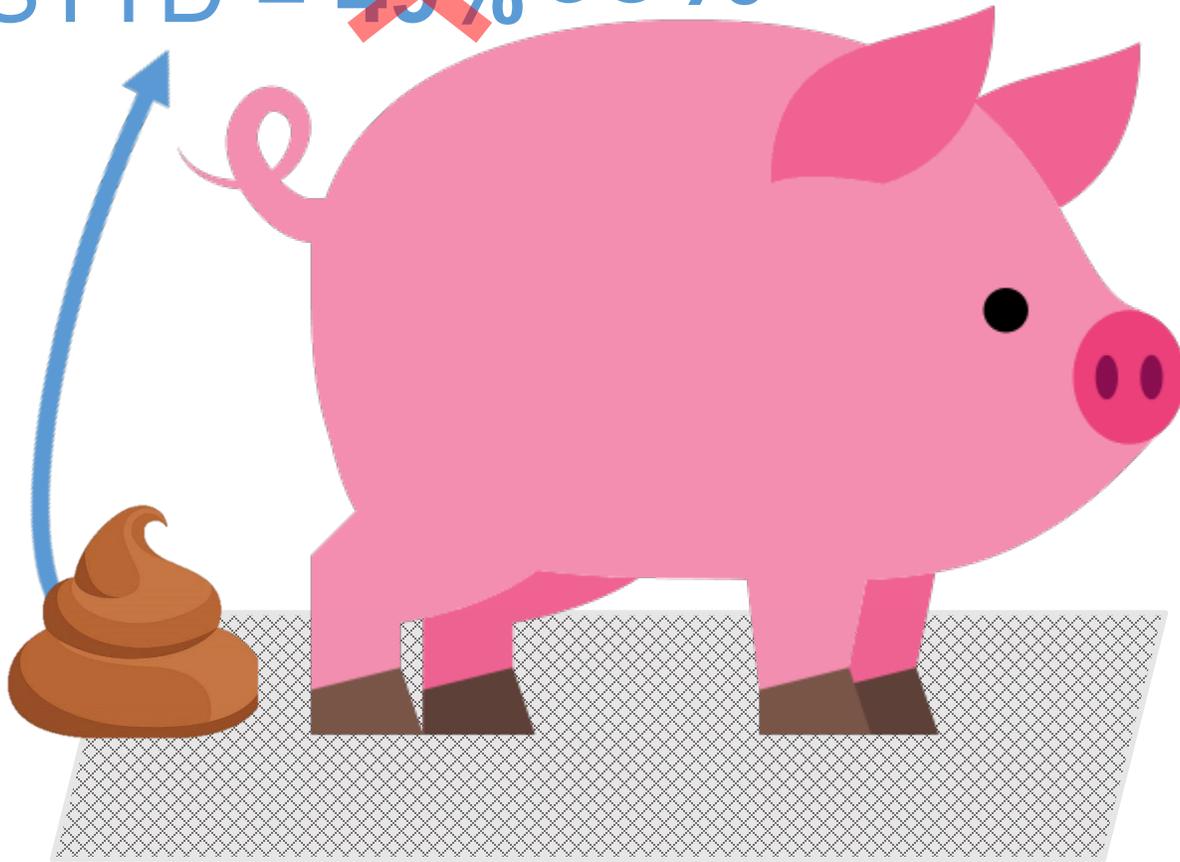


0.29% Total P
0.14% *STTD P*

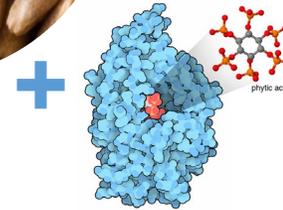
What if we
add Phytase?

Phosphorus Digestibility

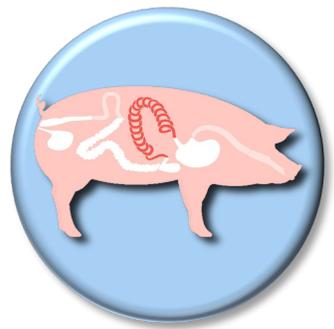
STTD = ~~49%~~ 63%



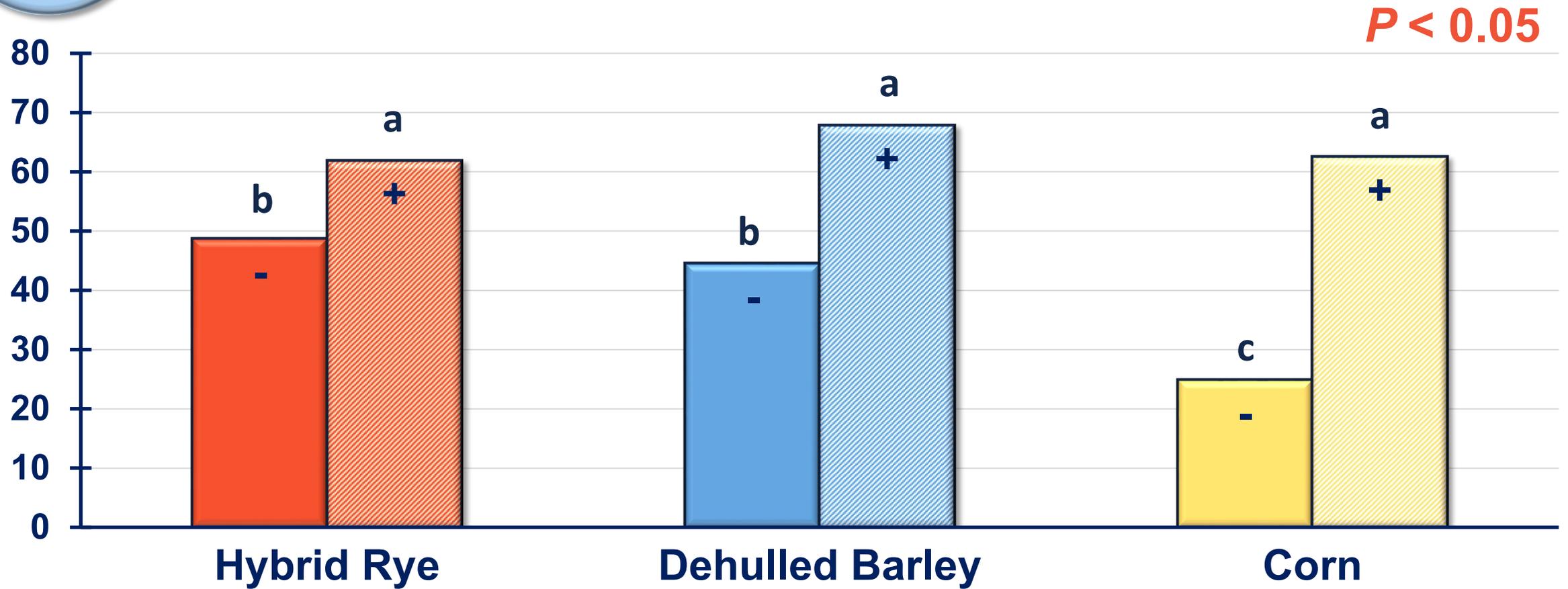
0.29% Total P
0.18% STTD P



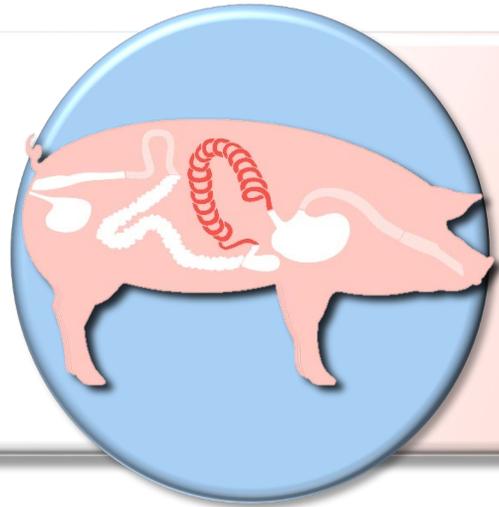
What if we
add Phytase?



Digestibility of Phosphorus, %



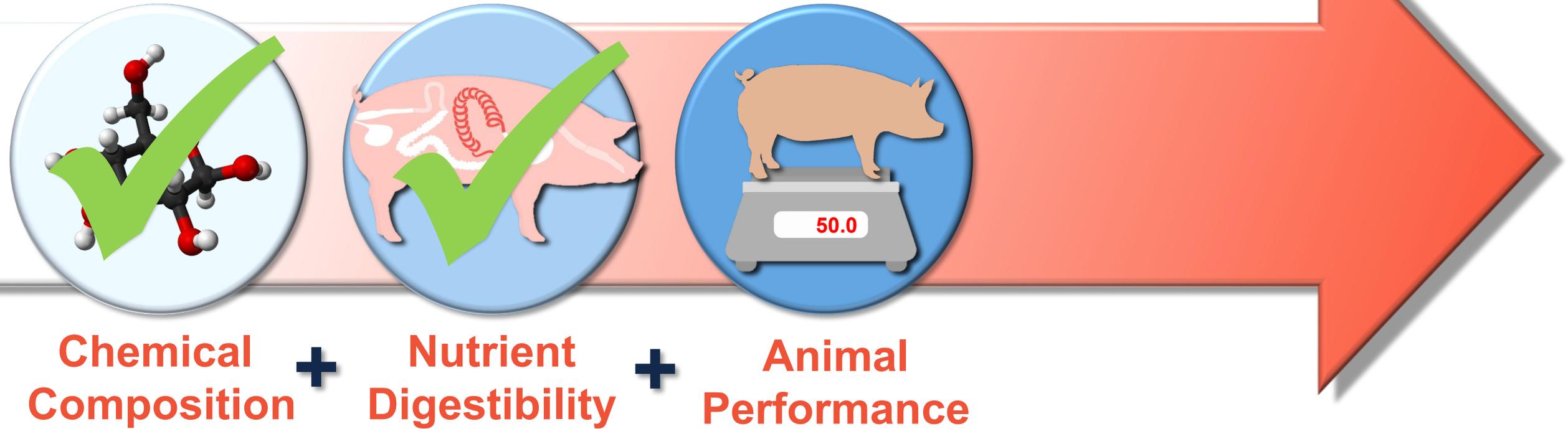
Feed ingredient evaluation



Nutrient Digestibility

1. Barley + corn have high amino acid digestibility.
2. Hybrid rye has more “usable” energy than barley.
3. Phytase improves P digestibility in cereal grains.

Feed ingredient evaluation





Nursery pigs fed barley

Day 0 – 25
post-wean

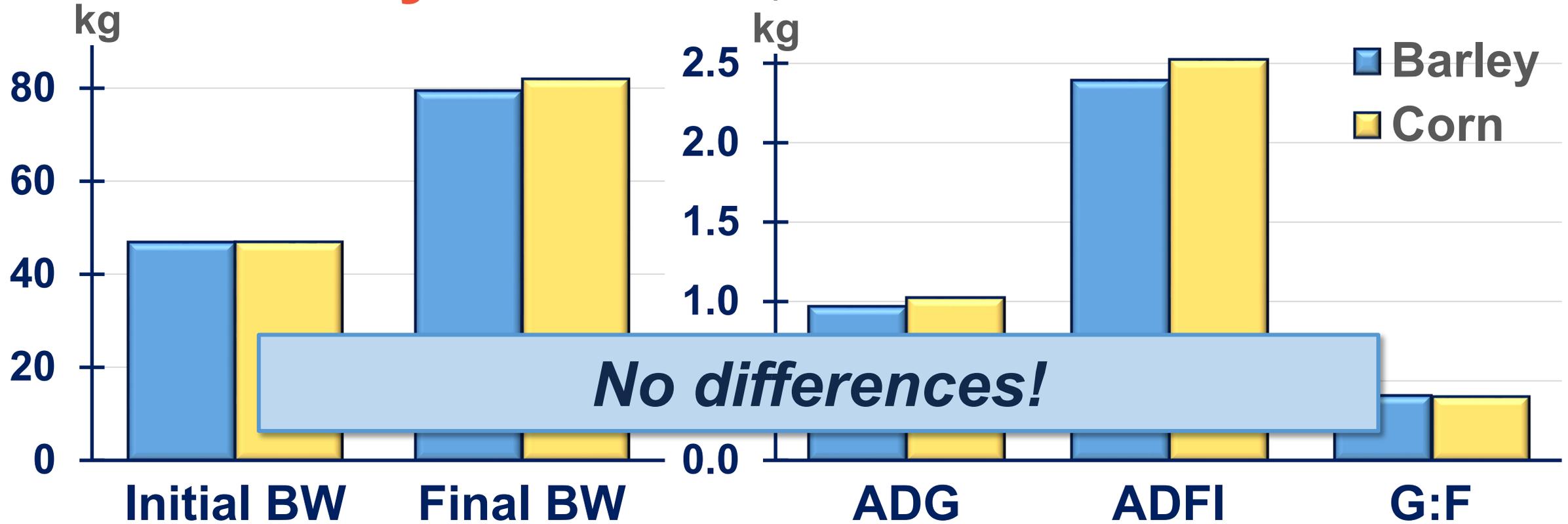
Barley inclusion rate = 50%
Greater ADG





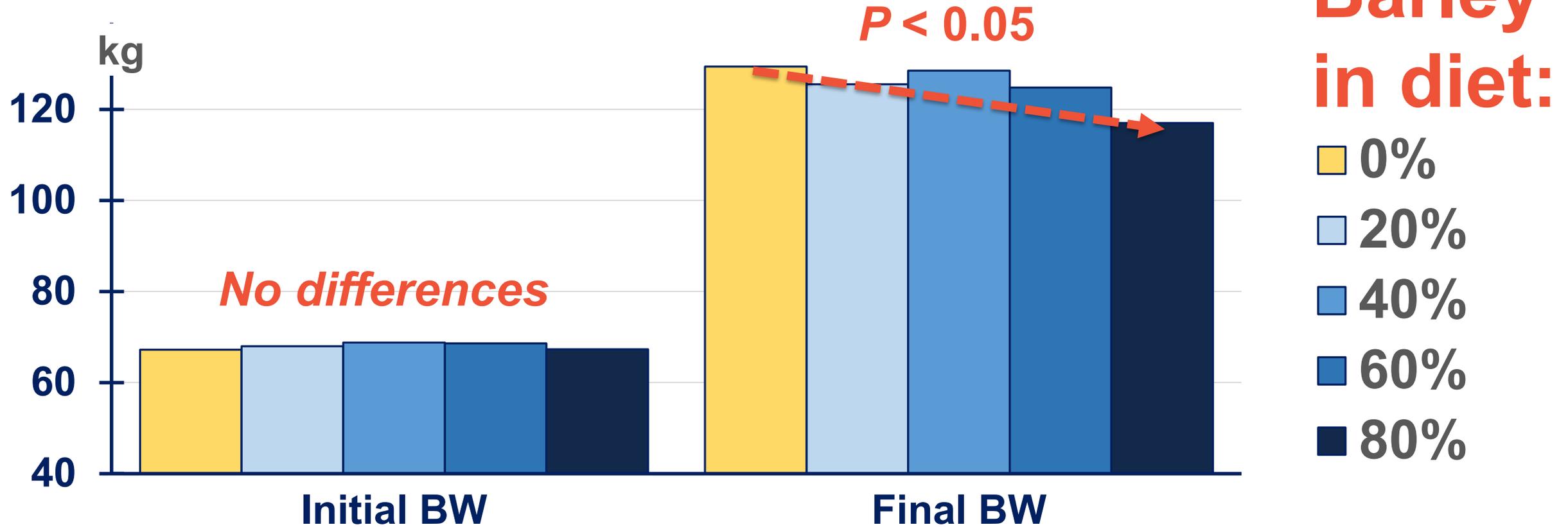
Growing pigs fed barley

Barley inclusion rate = 83%



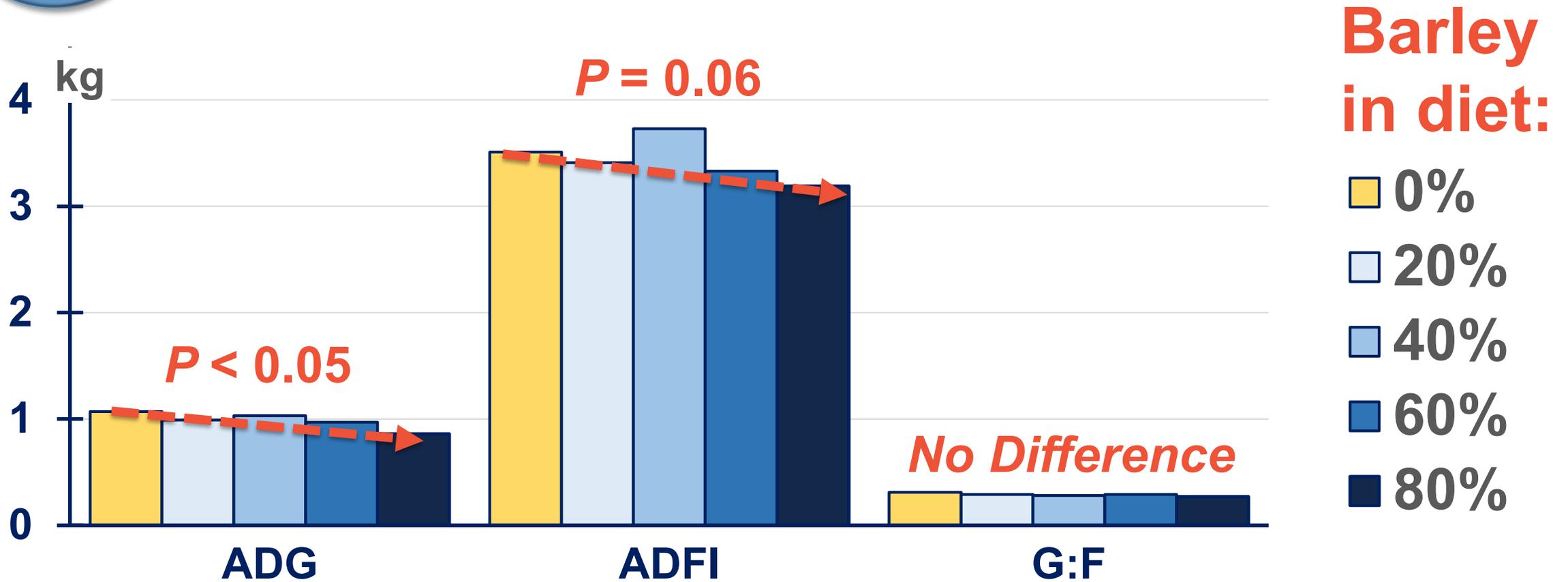


Finishing pigs fed barley



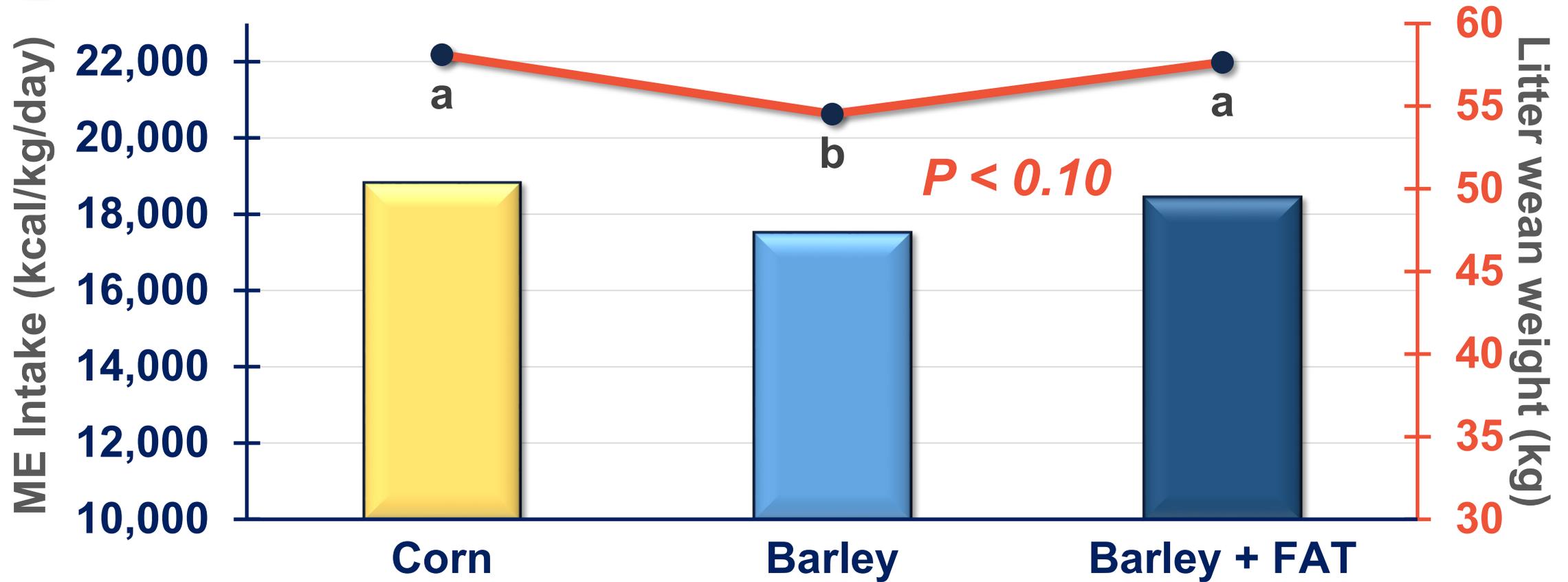


Finishing pigs fed barley



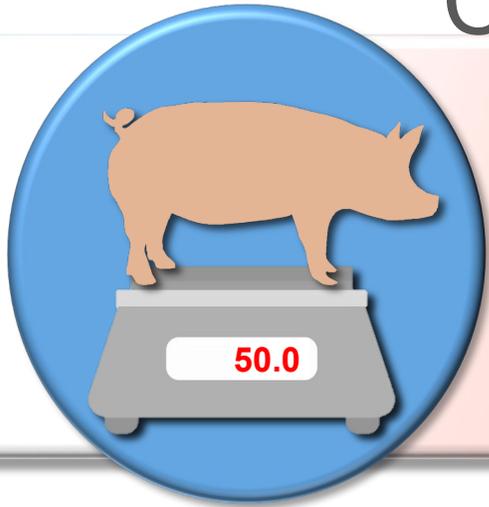


Feeding barley in lactation



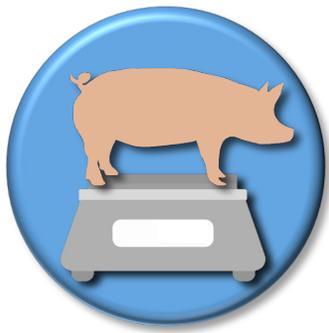
Feed ingredient evaluation

Compared with corn, *barley* . . .



**Animal
Performance**

- . . . improved ADG when fed to nursery pigs.
- . . . slightly reduced performance of finishing pigs.
- . . . should be supplemented w/ fat if fed in lactation.



Nursery pigs fed hybrid rye

Hybrid Rye Inclusion Rates

Day 0 – 7:

0%

8%

16%

24%

Day 7 – 21:

0%

16%

32%

48%

Day 21 – 35:

0%

20%

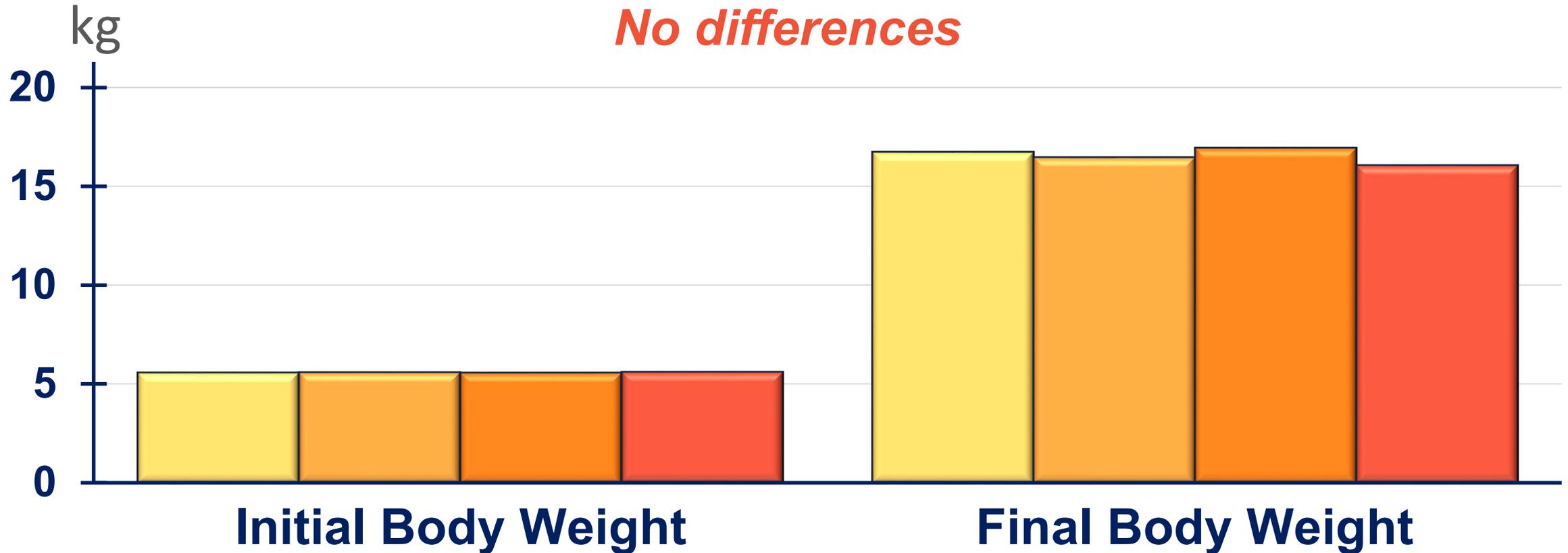
40%

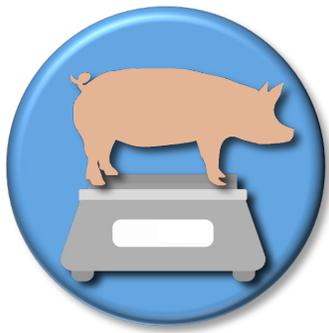
60%



Nursery pigs fed hybrid rye

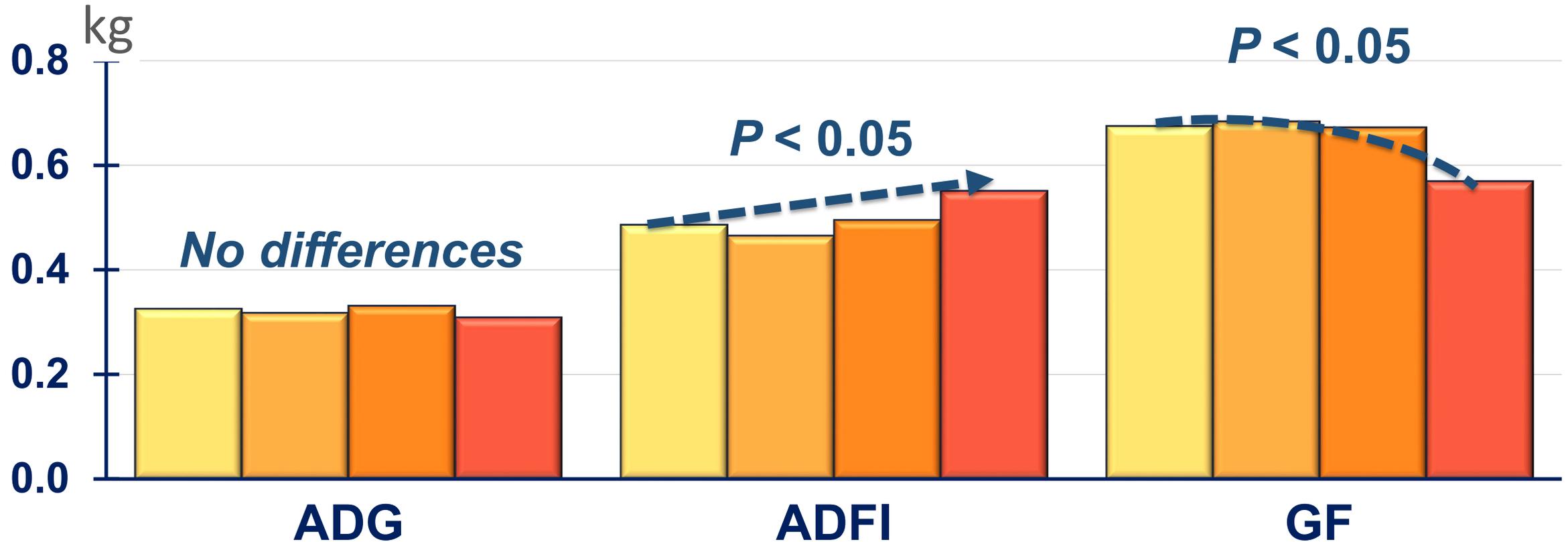
Day 0 – 35
post-wean

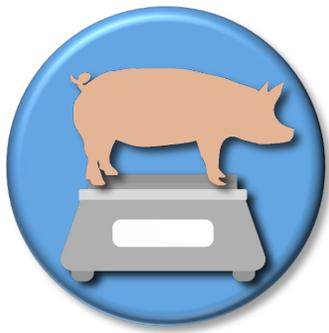




Nursery pigs fed hybrid rye

Day 0 – 35
post-wean

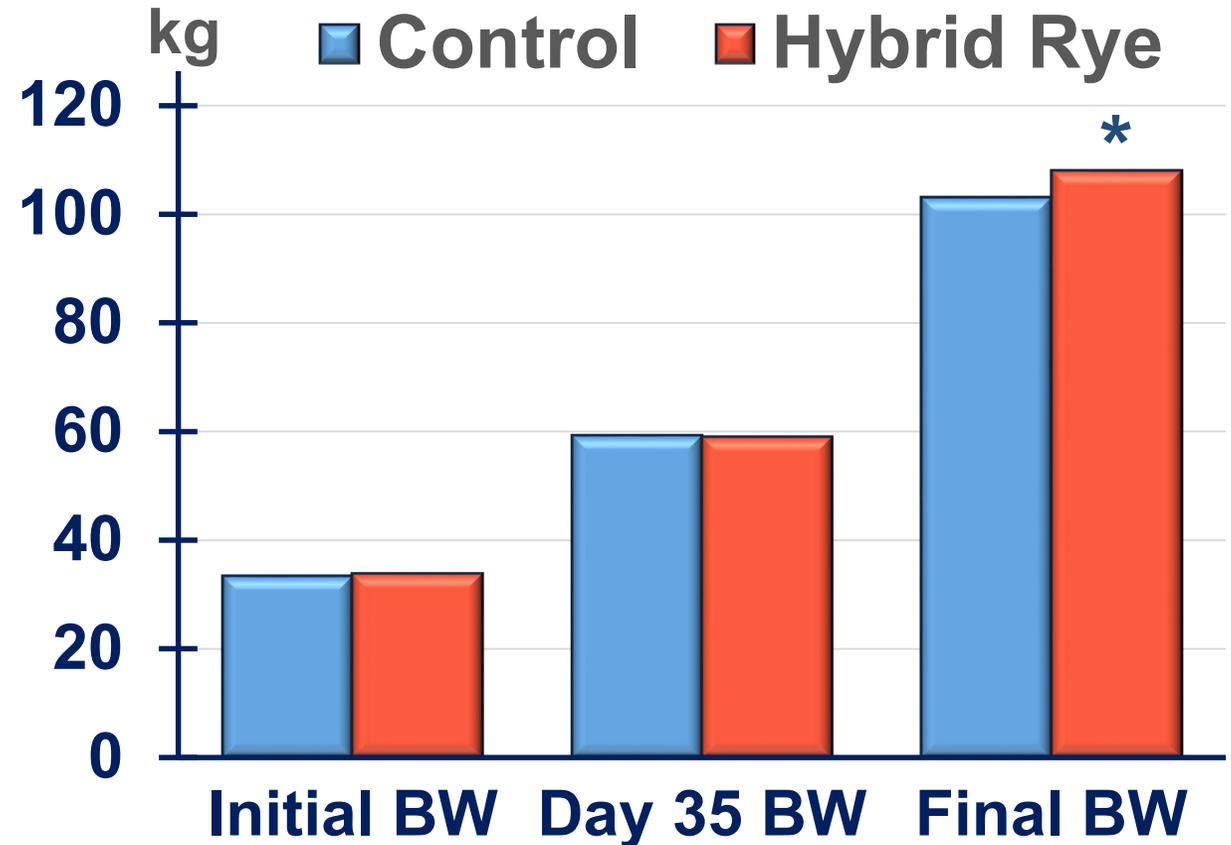


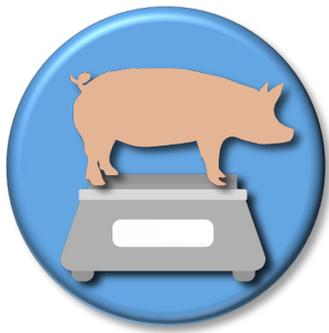


Grow/finish pigs fed hybrid rye



**+ 25%
Hybrid Rye**

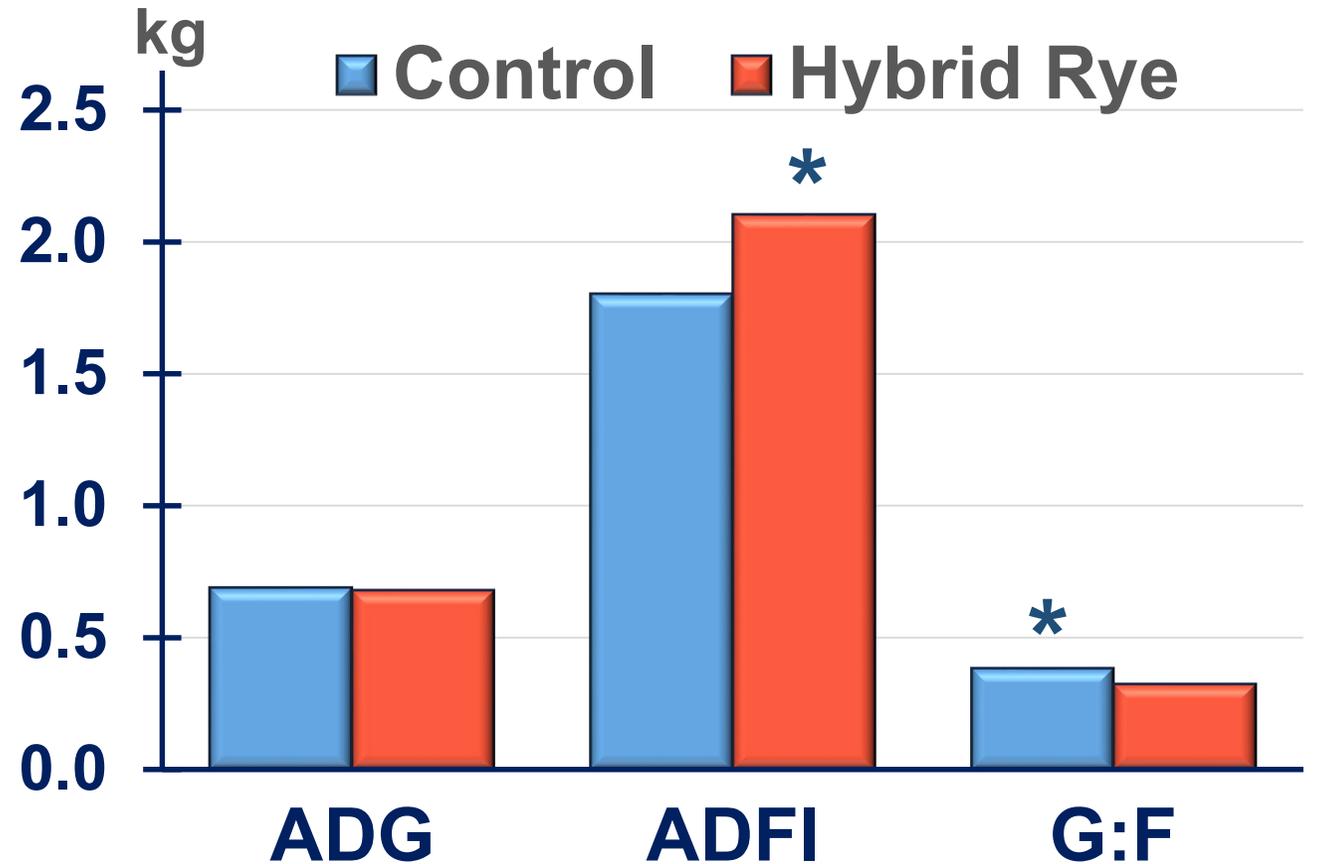


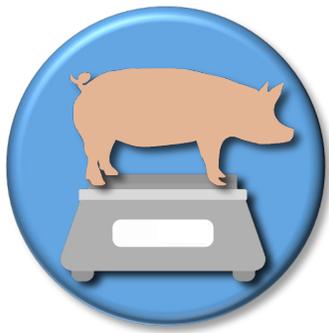


Growing pigs fed hybrid rye



**+ 25%
Hybrid Rye**

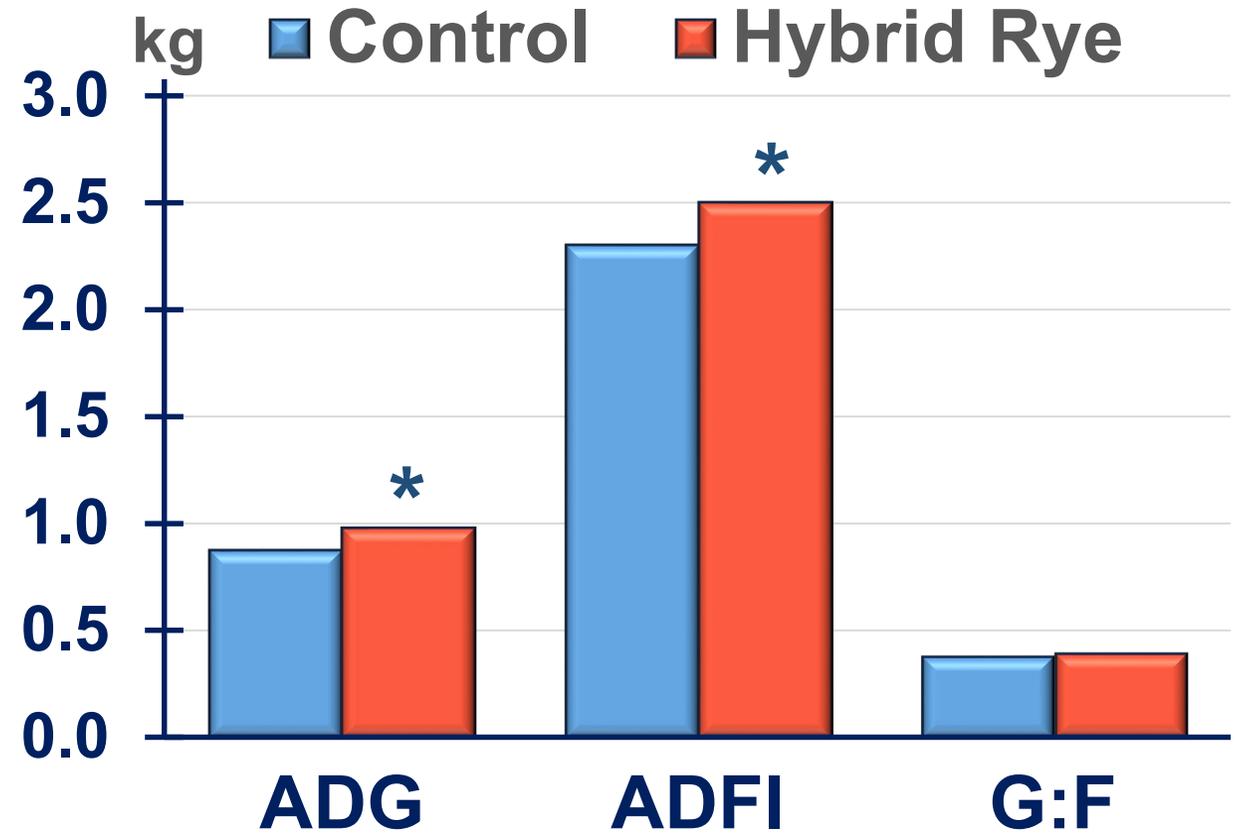




Finishing pigs fed hybrid rye

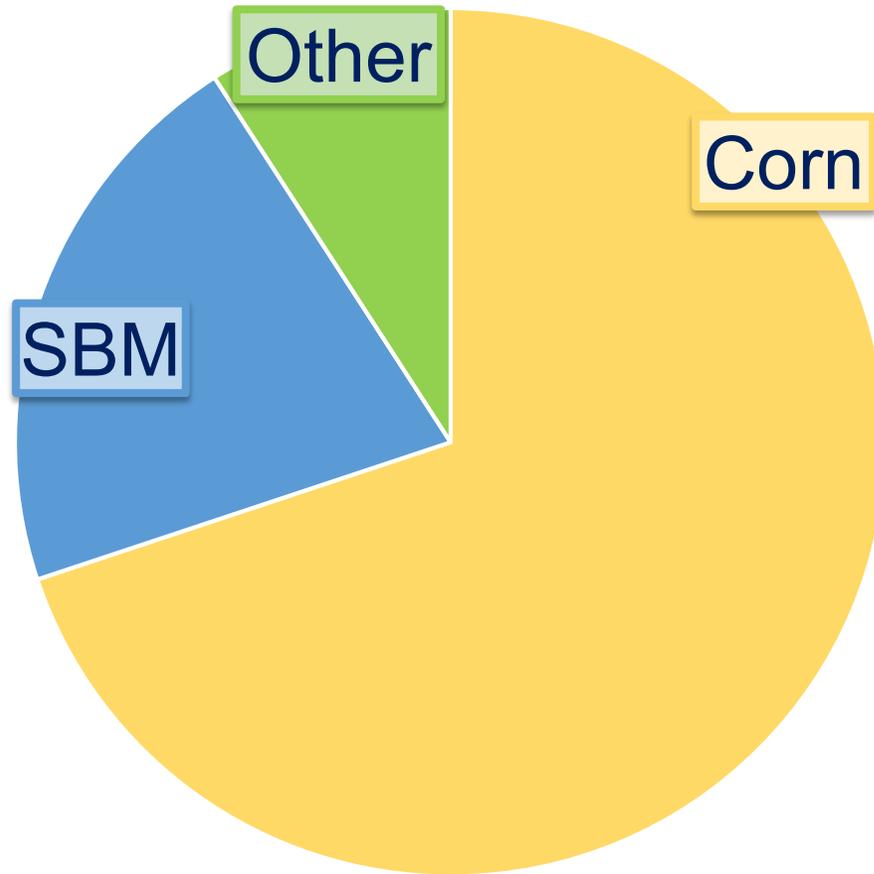


**+ 50%
Hybrid Rye**





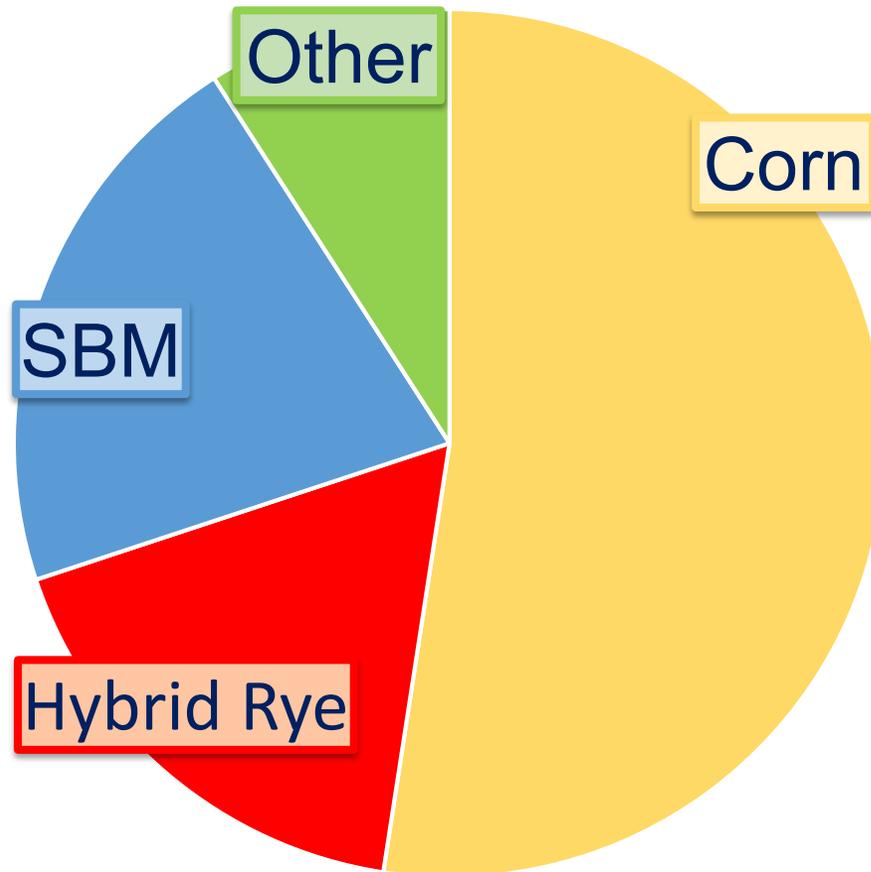
Hybrid Rye for Sows



Control:
Corn/SBM



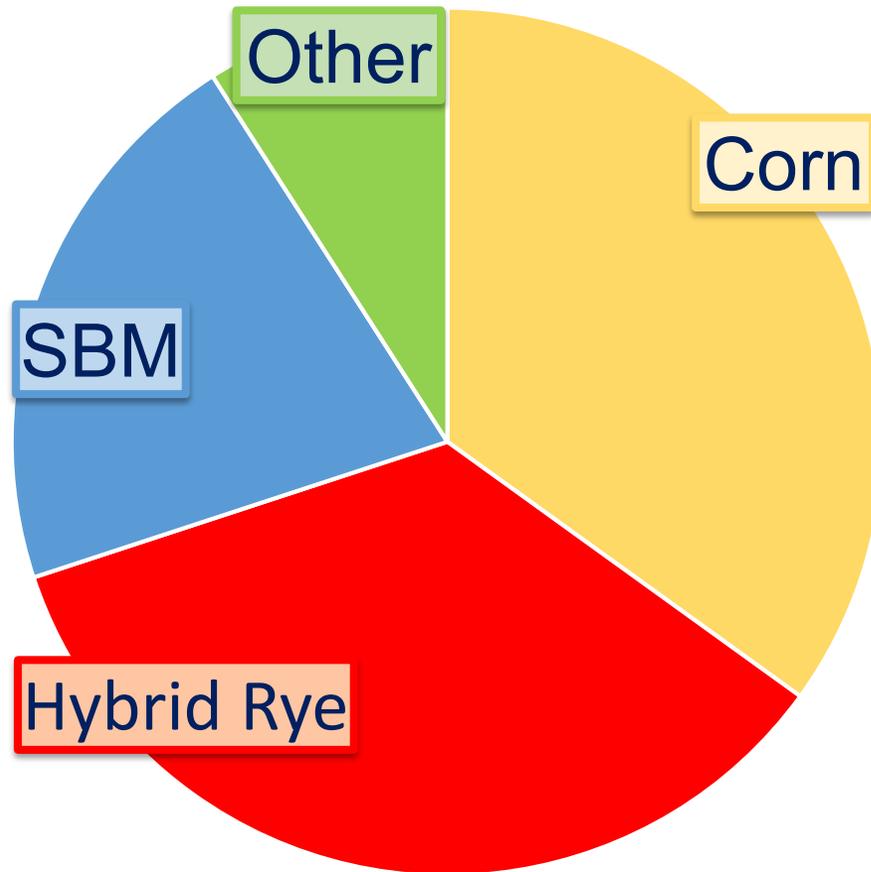
Hybrid Rye for Sows



Replaced
25% of
corn with
hybrid rye



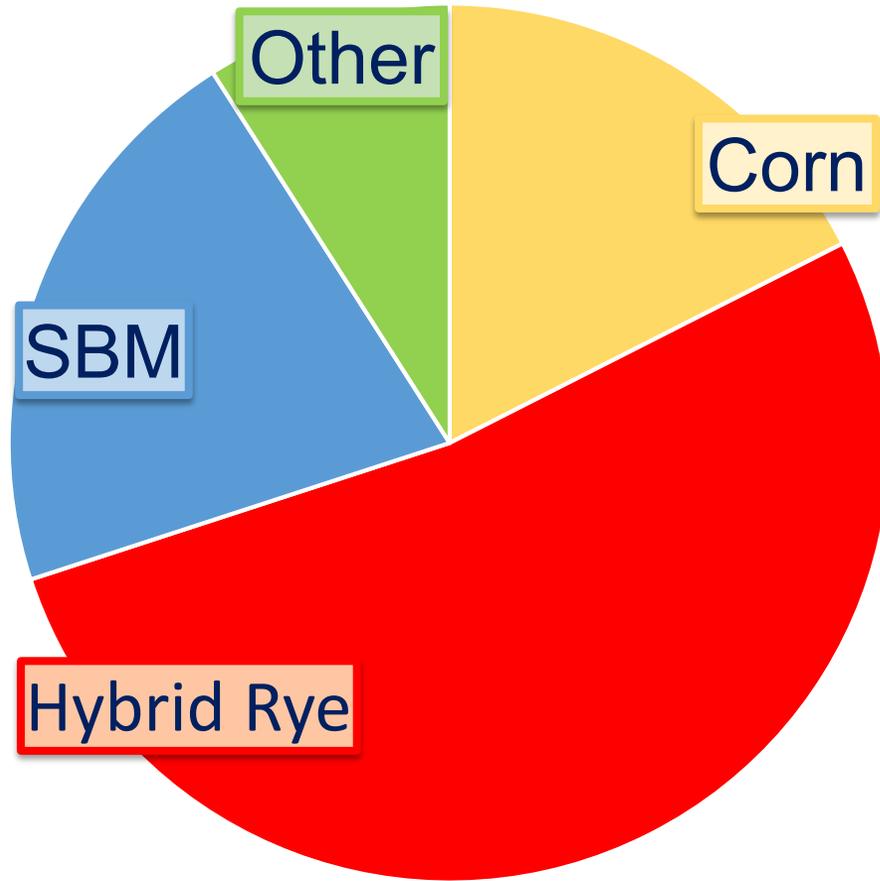
Hybrid Rye for Sows



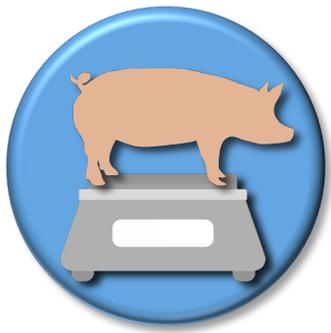
Replaced
50% of
corn with
hybrid rye



Hybrid Rye for Sows

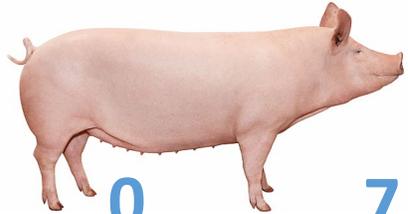


Replaced
75% of
corn with
hybrid rye



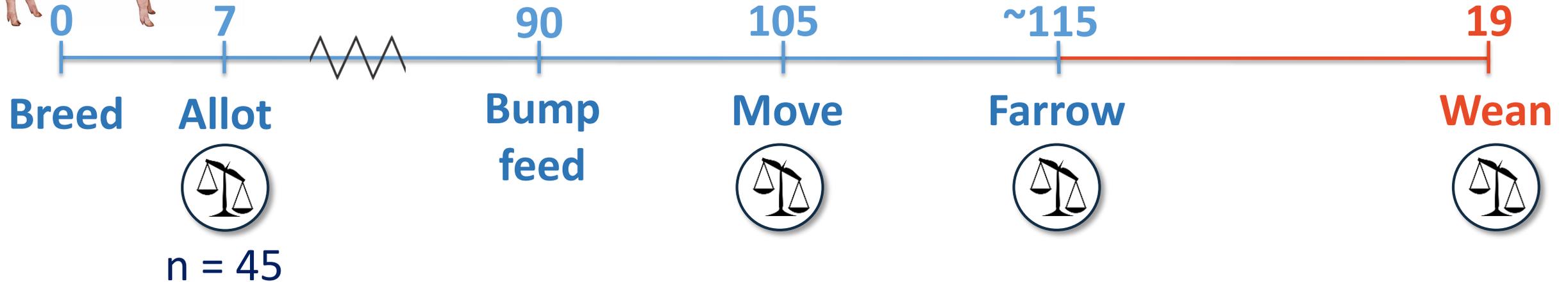
Hybrid Rye for Sows

x 200



days of gestation

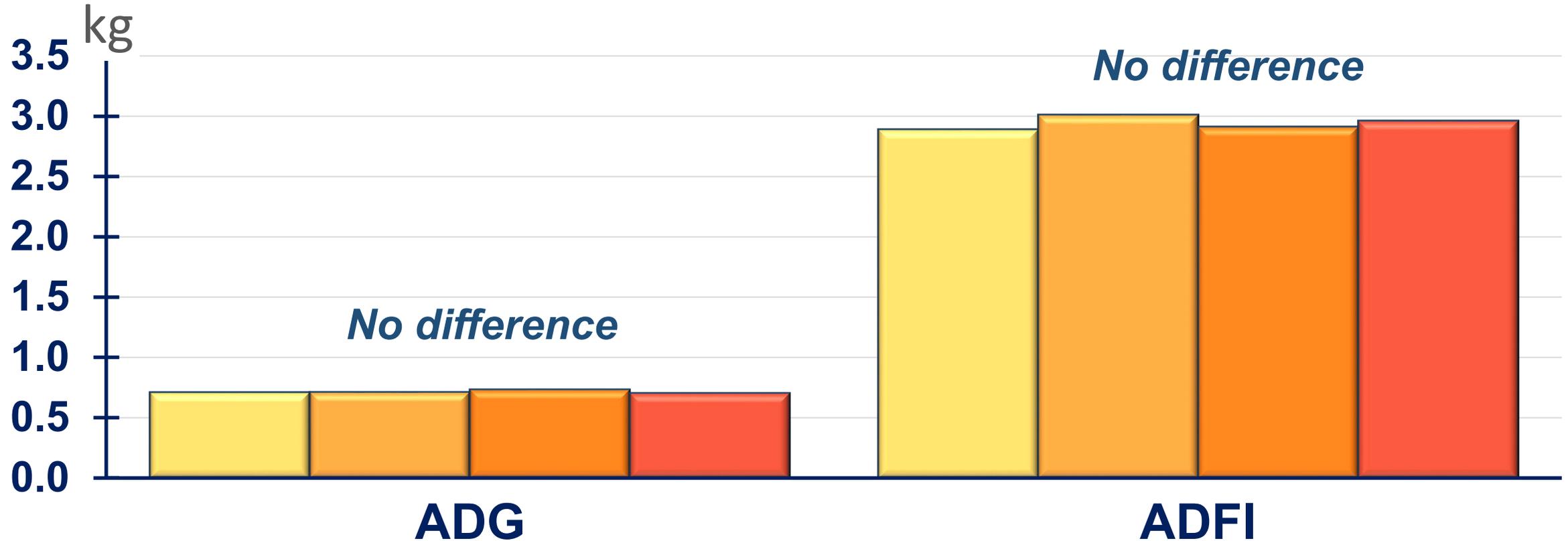
days of lactation

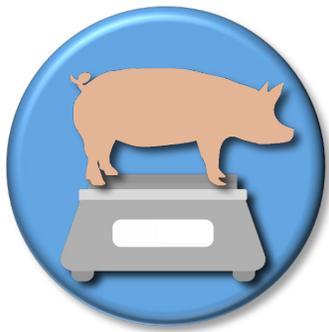




Gestating sows fed hybrid rye

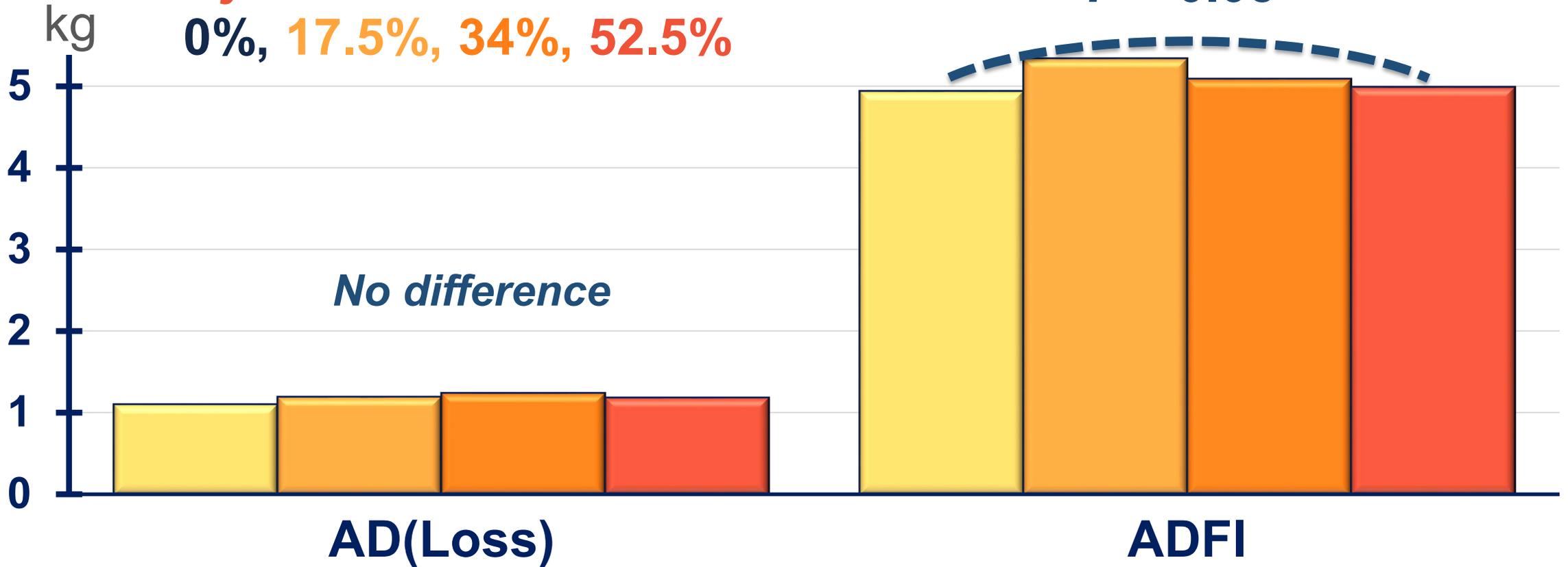
Rye Inclusion Rates: 0%, 17.5%, 34%, 52.5%

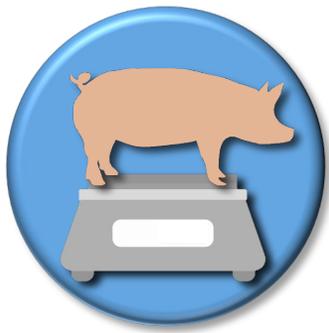




Lactating sows fed hybrid rye

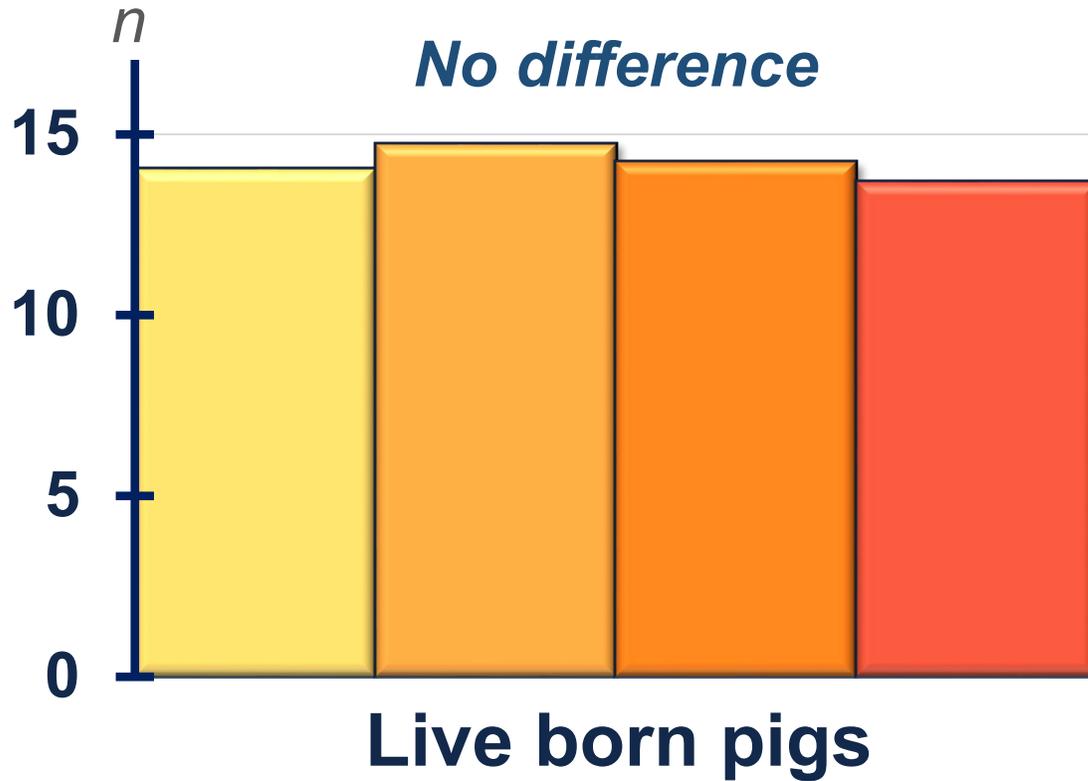
Rye Inclusion Rates:
0%, 17.5%, 34%, 52.5%





Lactating sows fed hybrid rye

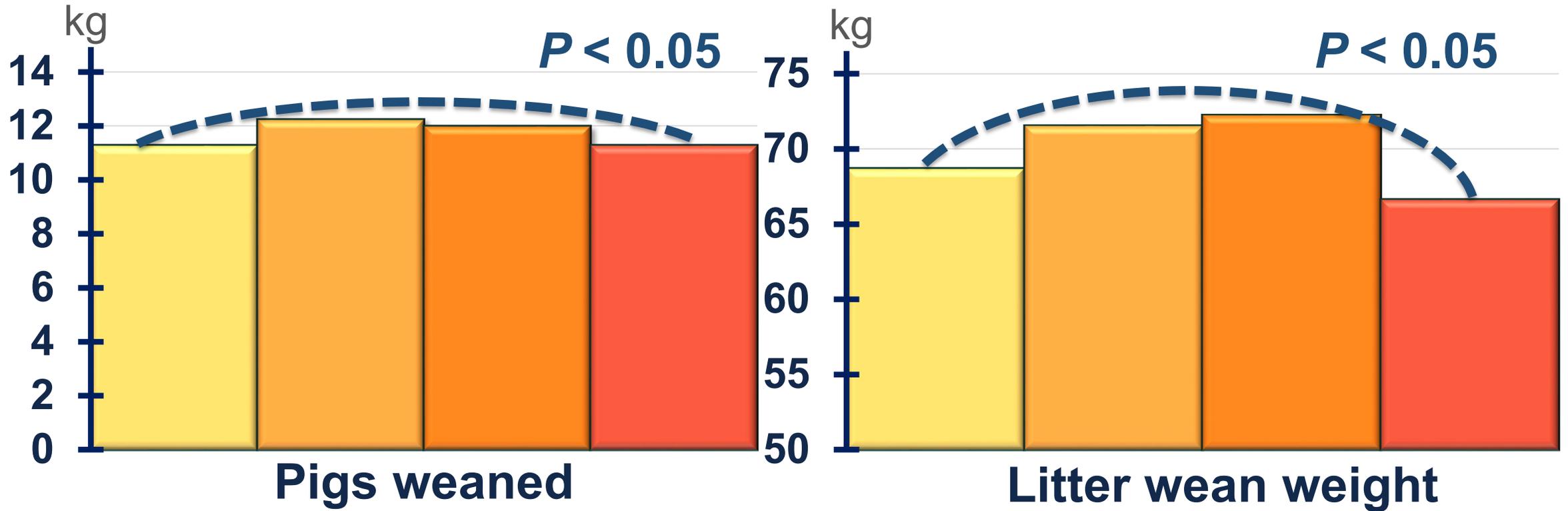
Rye Inclusion Rates: 0%, 17.5%, 34%, 52.5%

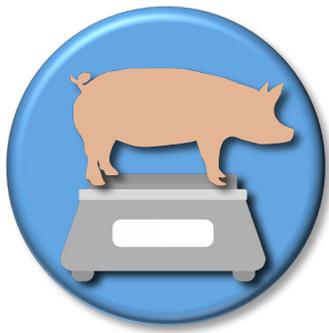




Lactating sows fed hybrid rye

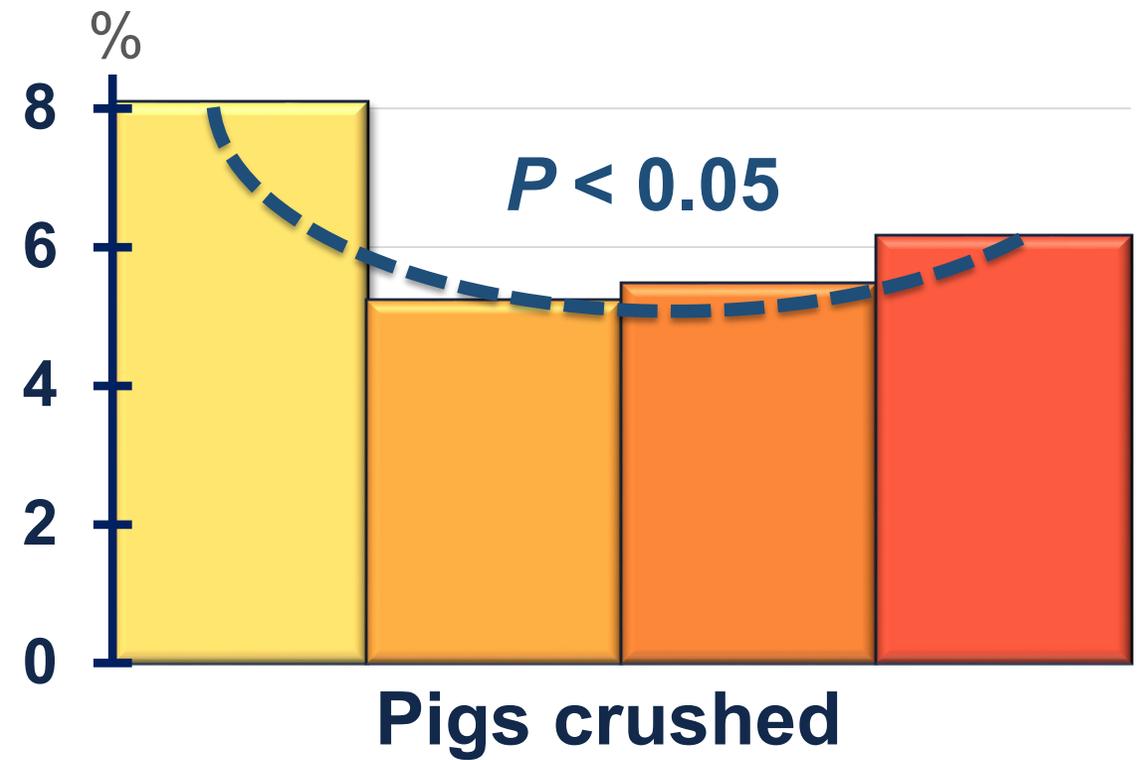
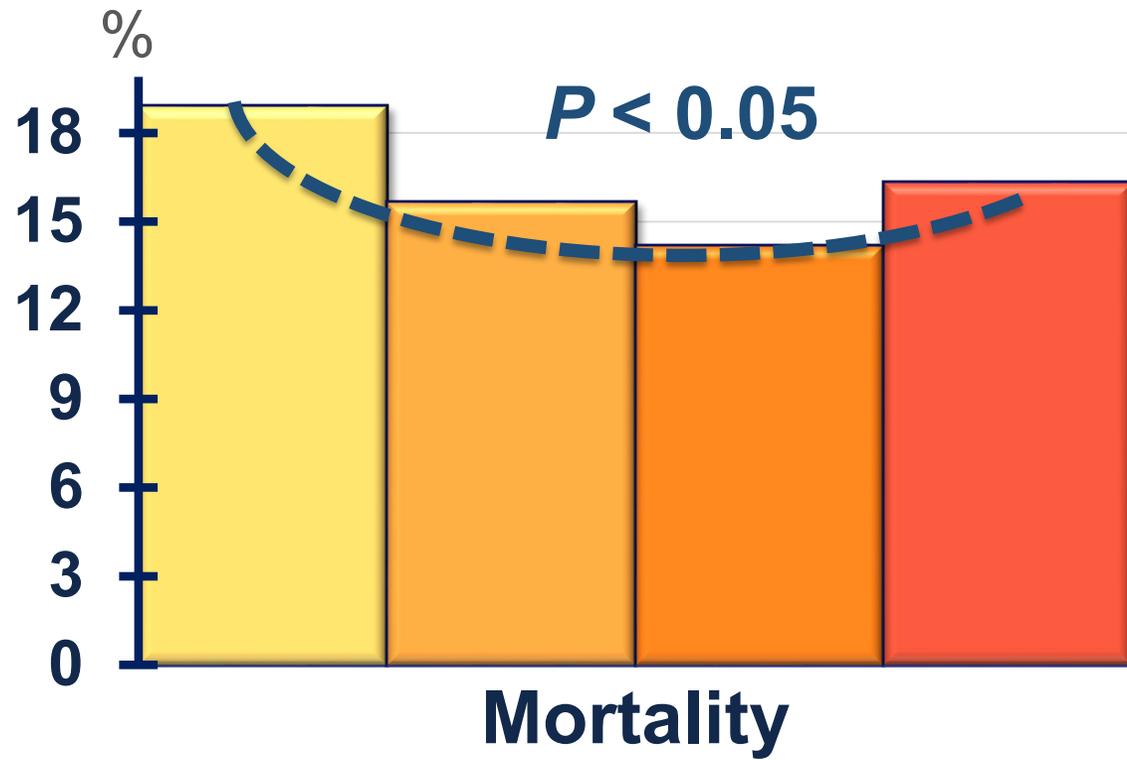
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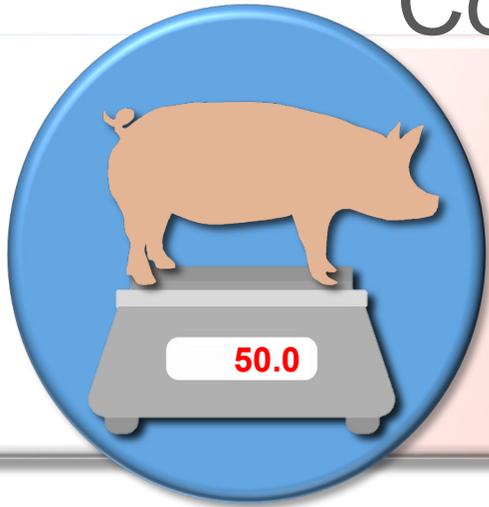
Lactating sows fed hybrid rye

Rye Inclusion Rates: 0%, 17.5%, 34%, 52.5%



Feed ingredient evaluation

Compared with corn, *hybrid rye* . . .



- . . . may increase feed intake, but reduce efficiency.
- . . . may replace up to 75% of corn in diets for sows without jeopardizing growth performance.

**Animal
Performance**

Feed ingredient evaluation





Barley-fed carcass data

Diets:

74% Corn
22% SBM

83% Barley
14% SBM

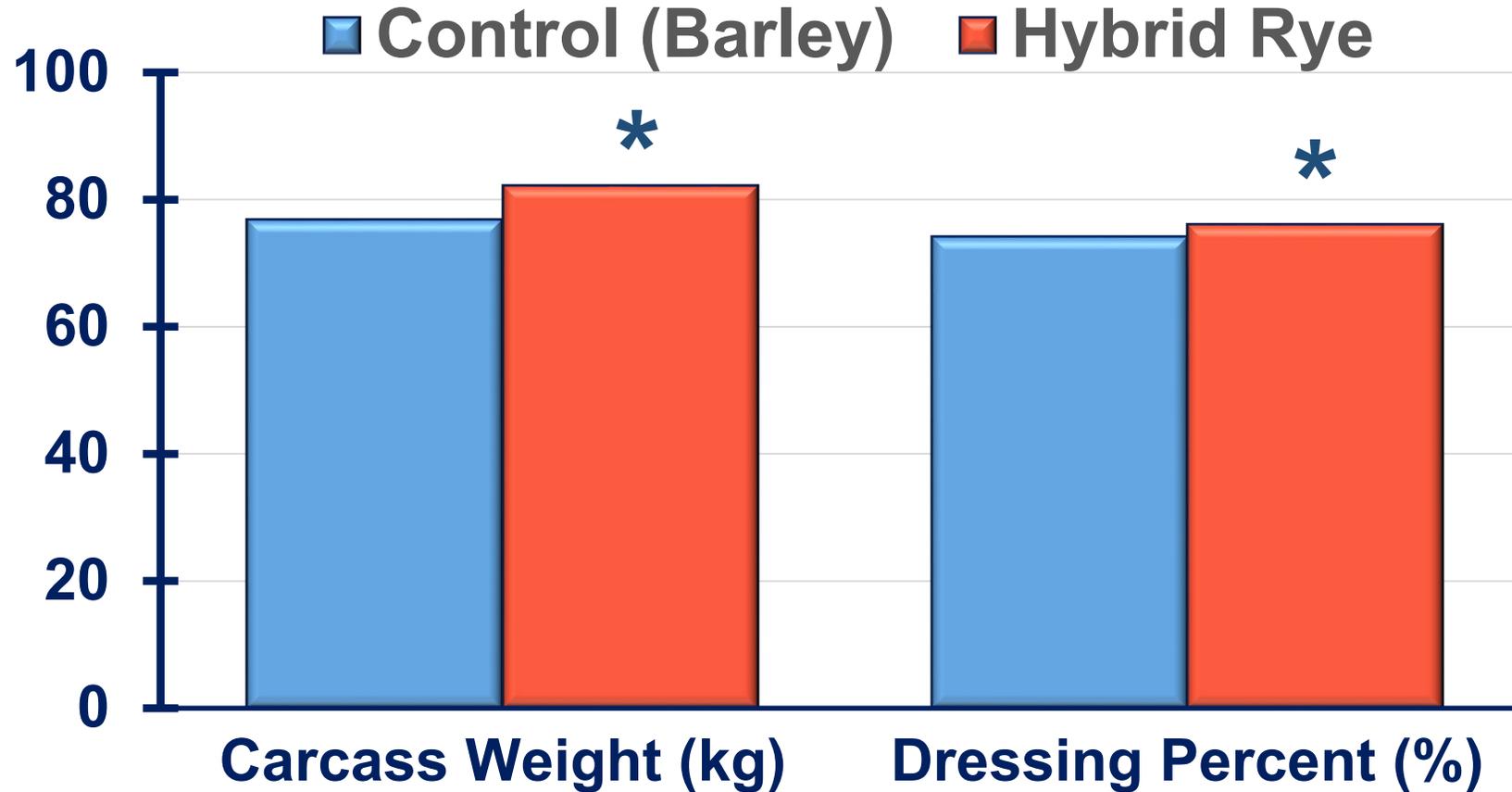
**No
differences:**

Hot carcass weight
Dressing percent
Carcass length
Ultimate pH
Color

Back fat thickness
Loin muscle area
Belly firmness
Drip loss
Eating quality



Hybrid rye-fed carcass data



No differences:

Back fat
Loin depth
Lean percent

Feed ingredient evaluation



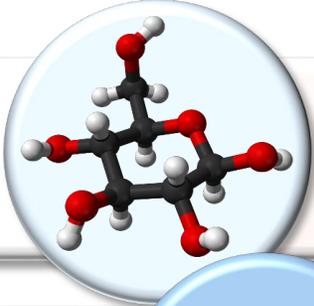
**Product
Quality**

1. Barley + corn result in similar carcass traits.
2. Hybrid rye resulted in greater carcass weight and dressing percent compared with barley.

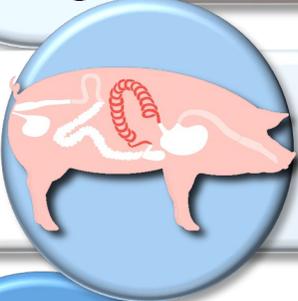
Feed ingredient evaluation



Conclusions



Barley and hybrid rye have more AA & fiber than corn.



Barley and hybrid rye have less ME than corn.



Small grains may reduce feed efficiency,
but can offer other positive health benefits.



Carcass traits remain mostly unchanged.

Our other work with hybrid rye

- ❑ **Taste preference** compared with corn
- ❑ **Grow/finish** compared with corn
- ❑ **Carcass traits** compared with corn
- ❑ **Energy digestibility** with enzyme supplementation
- ❑ **Immunological responses**

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