

Effect of dietary fiber sources on reproductive performance and colostrum quality of gestating sows

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My background

Veterinarian
2015-2020



Master in Animal Welfare and Behavior
2020-2022



PhD in Animal Nutrition
2022-2026



My background

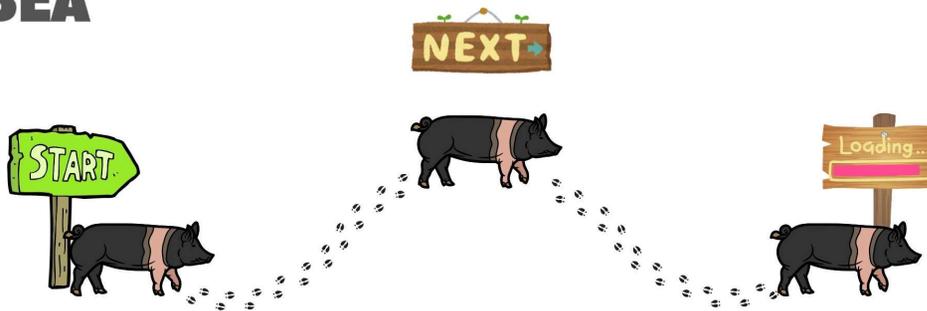
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2022 - actual



Modern Sow Challenges

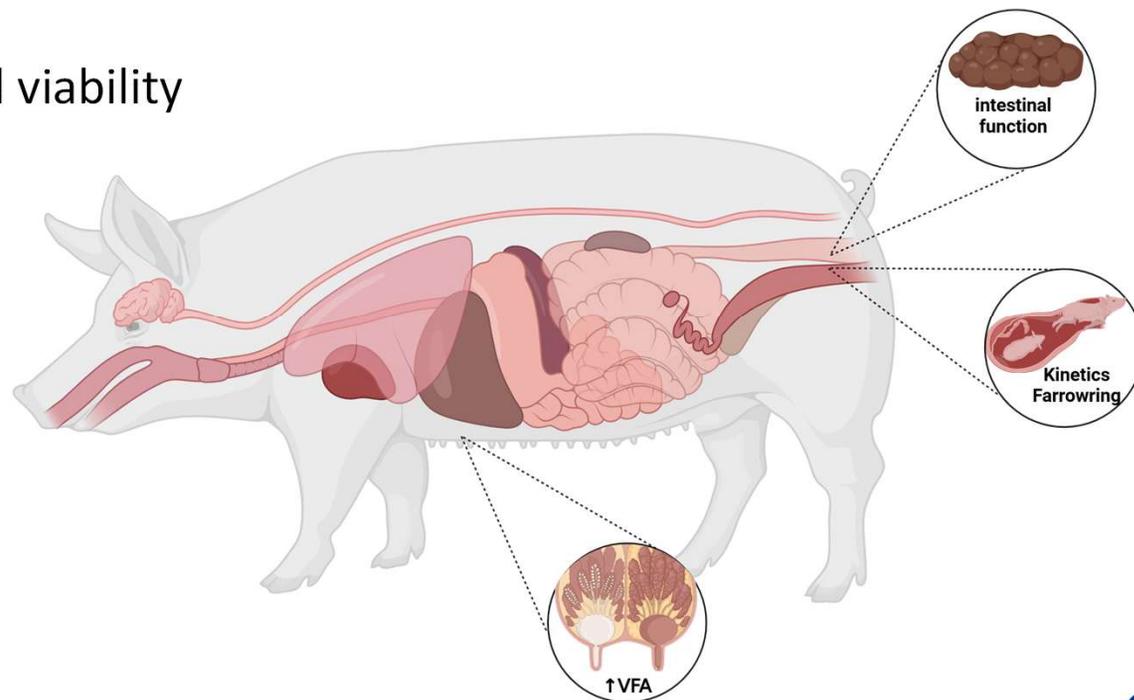


- Hyperprolificacy of modern sows

↓ reduced piglet birth weight and viability

↑ higher pre-weaning mortality

↑ impaired growth performance





Optimizing Sow Nutrition

Nutritional strategies?

Dietary Fiber

Challenges in the Brazilian Scenario



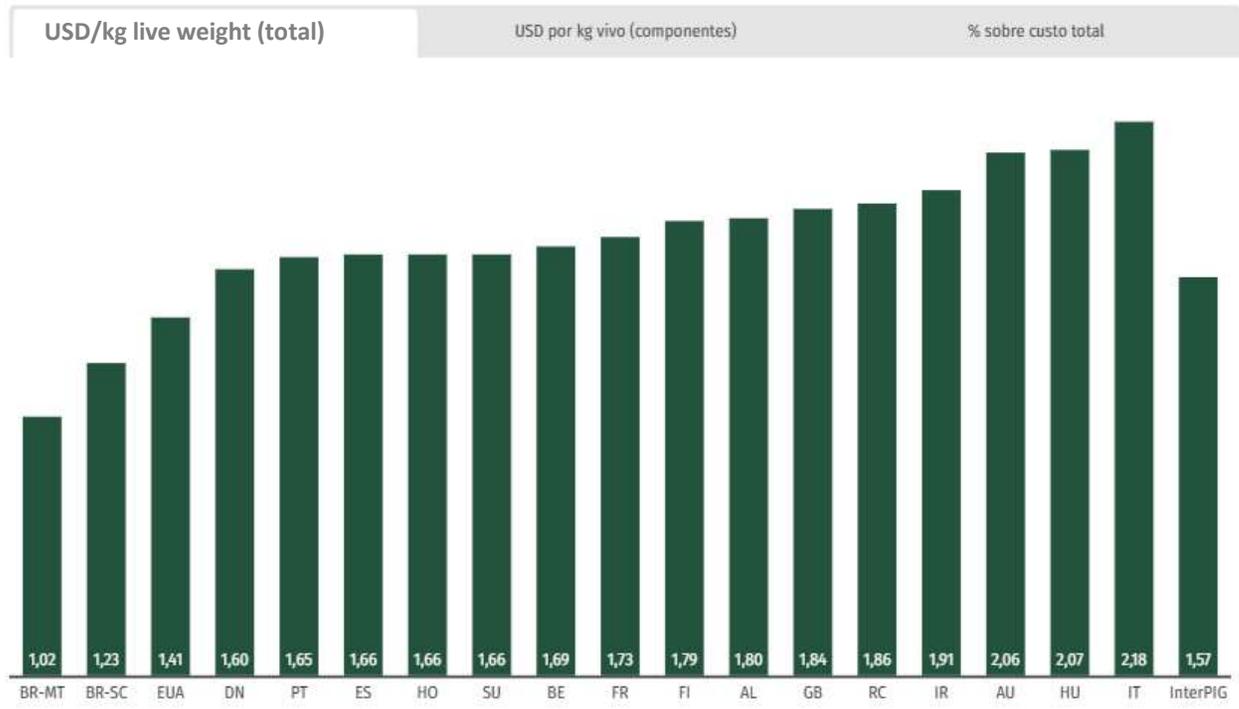


Pork Production in Brazil

Production cost per component, in 2023

*Weighted average by pork production of countries belonging to the InterPIG network (FAOSTAT, 2022)

*Source: InterPIG



Optimizing Sow Nutrition

Nutritional strategies?

Dietary Fiber

Challenges in the
Brazilian Scenario



Mycotoxin



Ryegrass



Oats



Beet pulp



Flaxseed



Citrus pulp



Hypothesis

The inclusion of a dietary fiber source in the diet of gestating sows reduces constipation, improves farrowing kinetics, and consequently enhances reproductive performance and piglet vitality at birth.



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Objective

Evaluate the effects of including different fiber sources, insoluble or soluble, in diets on reproductive performance and colostrum quality for group-housed gestations sows

Methodology

Local and facilities

Commercial Farrowing Unit

Location: Santa Catarina, Brazil

Herd Size: 700 sows

Housing System: Group gestation-sows

Ventilation: Natural ventilation



Ethical approval from the Animal Care and Use Committee: 2200/2024

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Experimental facilities



Group Housing System → According to Brazilian legislation (IN 113/2020)



Management System

Management system: Mix-after-AI
(1 week post-insemination)

Stocking density: 1.2 m²/sow

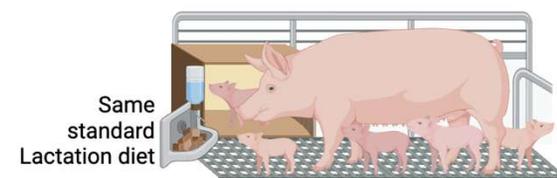
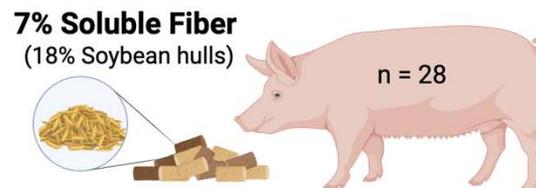
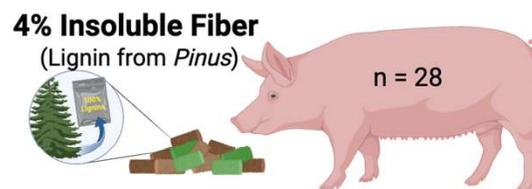
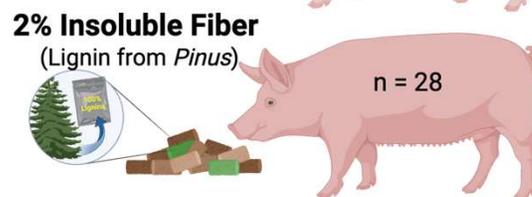
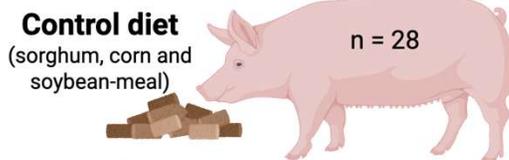
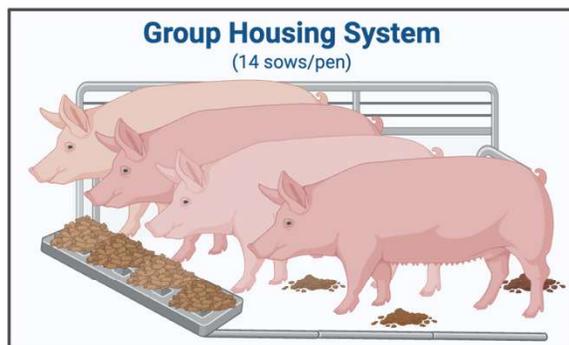
Group size: 14 sows/pen

Flooring: Partially slatted + solid floor

Feeding system: Individual feeding
once daily in mini-stalls



Experimental design





Experimental Diets

Table 1. Calculated composition of experimental diets for gestating sows fed different fiber sources.

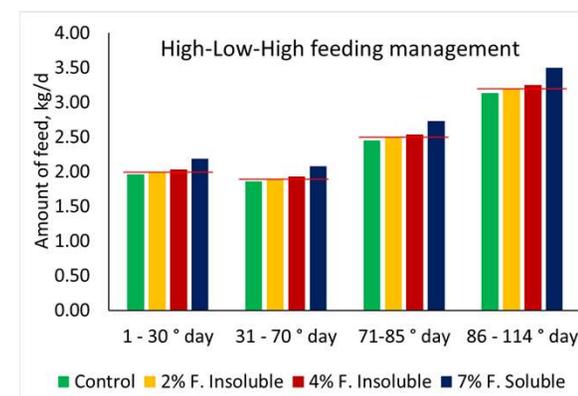
Item	Treatment ^o			
	Control ¹	2% Fb Insoluble ²	4% Fb Insoluble ²	7% Fb Soluble ³
Nutrient composition				
Dry matter, %	86.32 (88.61)	84.58 (88.65)	82.86 (88.68)	86.81 (88.65)
Gross energy, kcla/kg	(3,962)	(3,962)	(3,979)	(3,932)
Metabolizable energy for sows, kcal/kg	1,346	1,357	1,395	1,352
Net energy for sows, kcal/kg	936.9	943.1	973.0	939.4
Net energy for sows, %	15.14 (13.68)	15.07 (13.10)	14.99 (13.33)	15.76 (13.51)
Digestible lysine, %	0.65	0.65	0.65	0.61
Ether extrac, %	2.44 (4.05)	2.39 (3.69)	2.64 (3.97)	2.36 (4.22)
Crude fiber, %	2.58 (2.50)	3.93 (2.68)	5.28 (3.66)	8.69 (5.33)
NDF, %	11.24 (15.51)	12.91 (16.19)	14.56 (15.99)	19.71 (18.78)
ADF, %	4.81 (3.48)	6.30 (4.00)	7.79 (4.87)	12.18 (7.55)
Total phosphorus, %	0.49 (0.51)	0.48 (0.45)	0.49 (0.55)	0.49 (0.56)
Available phosphorus., %	0.45	0.45	0.45	0.45
Cálcium, %	0.81 (0.76)	0.82 (0.75)	0.77 (0.78)	0.82 (0.81)

Diets based on sorghum, corn, and soybean meal.

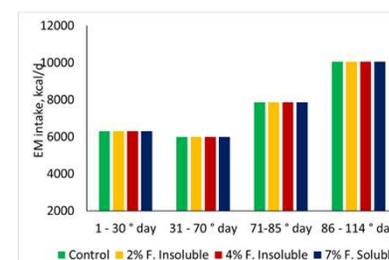
Source of insoluble fiber → Lignin from ground *Pinus sp.*

Source of soluble fiber → Soybean hulls (18% inclusion)

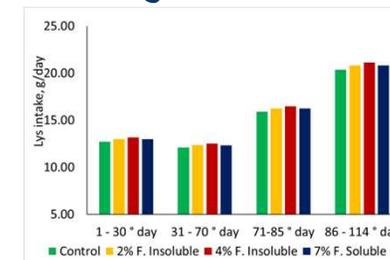
Daily feed consumption



EM intake



Lys intake



Weighing with daily adjustment of quantities based on the EM of the diet



Data collected

I Reproductive performance

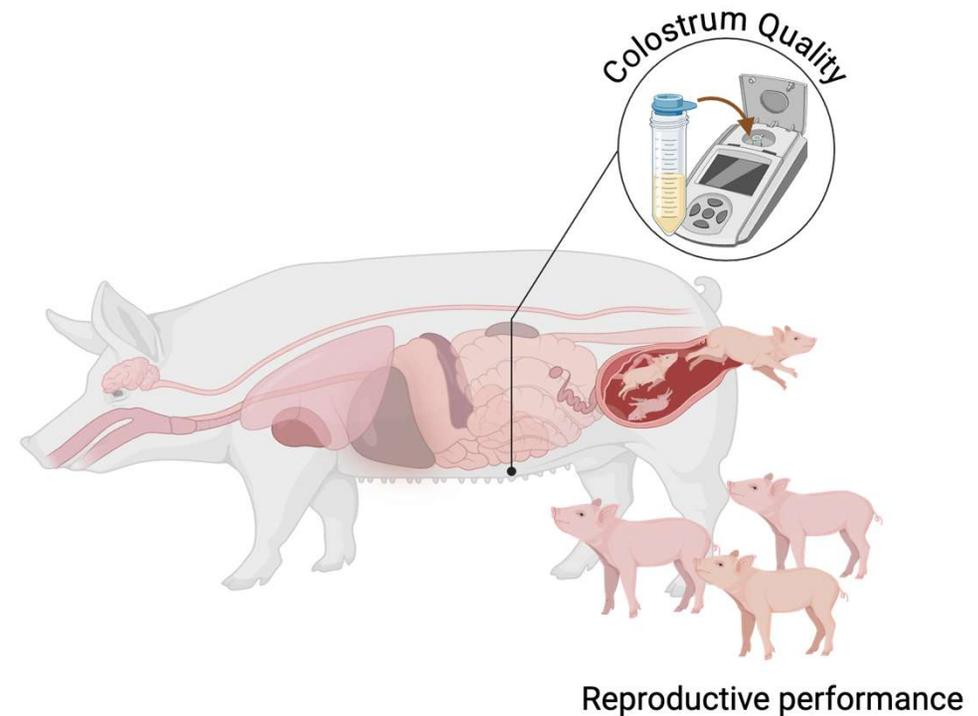
Body weight of piglets

Number of piglets:

- Total born
- Born alive
- Mummified
- Stillborn

II Colostrum quality

Use of refractometry
(Brix degrees)



Statistical analysis



- Data were analyzed using the GLIMMIX procedure of SAS®
- Randomized block design
- Experimental unit → sow (n= 28/trt)
- Model:
 - Fixed effect: Treatments
 - Random effect: Blocks based on body weight and Parity order + Production Cycles
- Tukey's test (5% significance)





Reproductive performance and Colostrum quality

Table 2. Number of piglets born (total, liveborn, stillborn, and mummified), piglets weaned, and colostrum quality of sows fed different fiber sources (insoluble or soluble) during gestation and housed in a group-housing system.

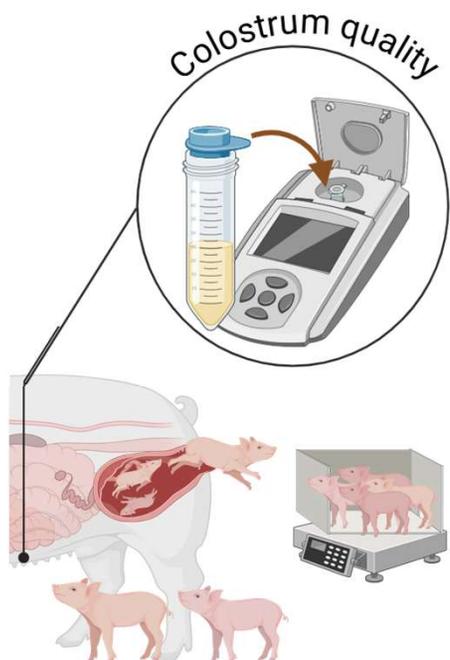
Item	Treatments				SEM ²	P-value
	Control ¹	2% Fb Insoluble ²	4% Fb Insoluble ²	7% Fb Soluble ³		
<i>Litter</i>						
Total born, n	19.53	19.01	17.15	18.71	0.2	0.72
Born alive, n	16.70	16.66	15.65	15.65	0.8	0.85
Mummified, n	0.61	0.32	0.66	0.40	0.1	0.50
Stillborn, n	2.22	2.02	1.15	1.63	0.6	0.21
Birth weight, kg	1.31 ^b	1.29 ^b	1.46^a	1.33 ^b	0.0	<0.01
<i>Colostrum quality</i>						
Brix, %	24.63^b	26.65 ^{ab}	28.97^a	27.37^a	0.7	< 0,01

¹ Control diet formulated with sorghum, corn, and soybean meal (2.4% crude fiber).² Diets containing 2 or 4% inclusion of a commercial insoluble fiber source based on lignocellulose (Growfiber®).³ Diet formulated with 18% soybean hulls as a source of soluble fiber. SEM = Standard error of the mean. a–b Means with different superscript letters differ at the 5% significance level according to Tukey's test.

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4% and 7% better than Control

Effect of fiber on sow performance



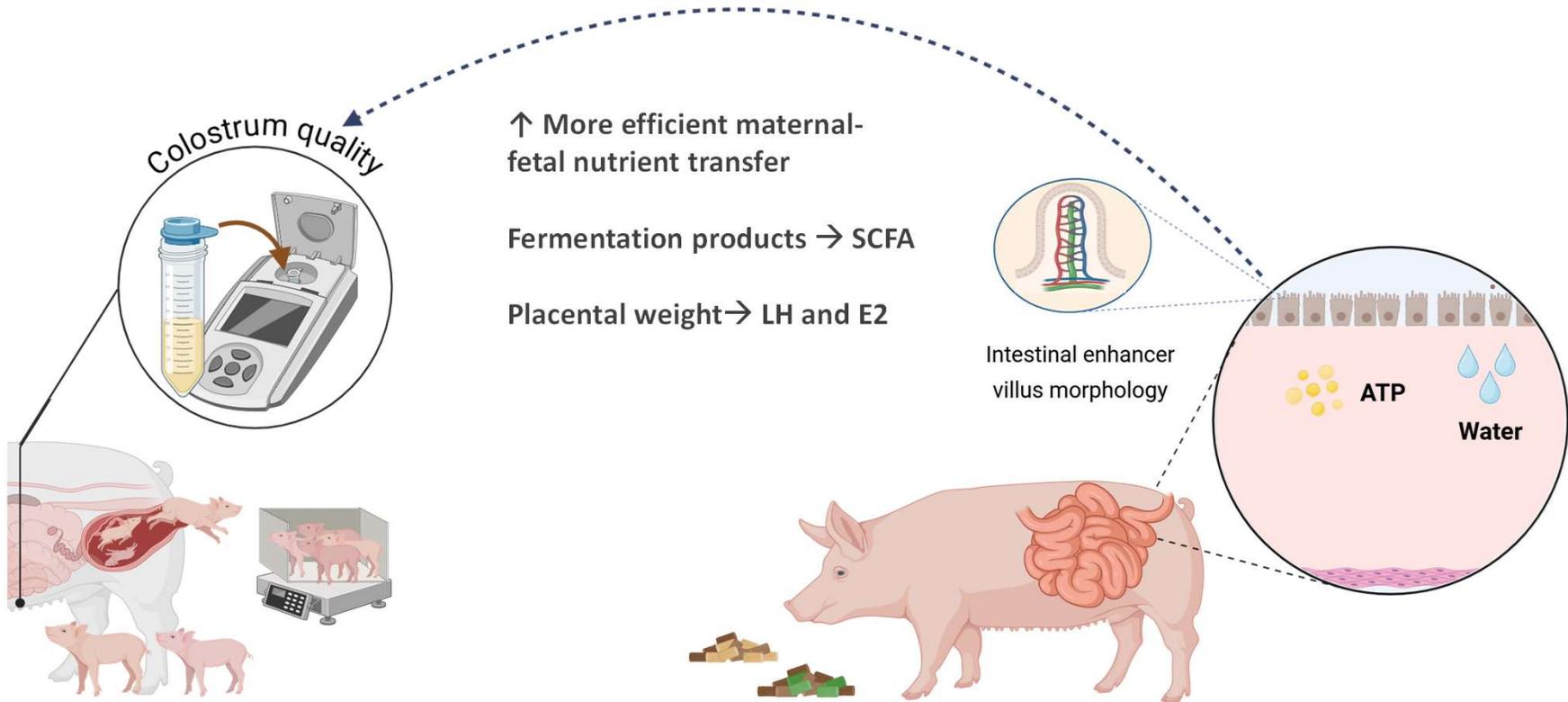
More efficient maternal-fetal nutrient transfer

Fiber fermentation products → ↑ SCFA

Placental weight → ↑ Luteinizing Hormone (LH) and Estrogen (E2)



Effect of fiber on sow performance



Conclusions

The **addition** of **insoluble fiber sources** (including 2% or 4%) **or soluble fiber** to the diet of sows throughout **gestation** does **not affect** the **total number** of piglets born; however, it **improves piglet birth weight**.

Furthermore, diets supplemented with **4% insoluble fiber or 7% soluble** fiber improve **colostrum quality**.

Acknowledgment

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Swine Research Group Unesp



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 *Muito obrigada!*

 *Dank u wel!*

Acknowledgements



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Educação



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