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Dietary Leucine Modulate Pork Quality via Adjusting Muscle Fiber Type Conversion and Intramuscular Fat Deposition in Huanjiang Mini- pigs

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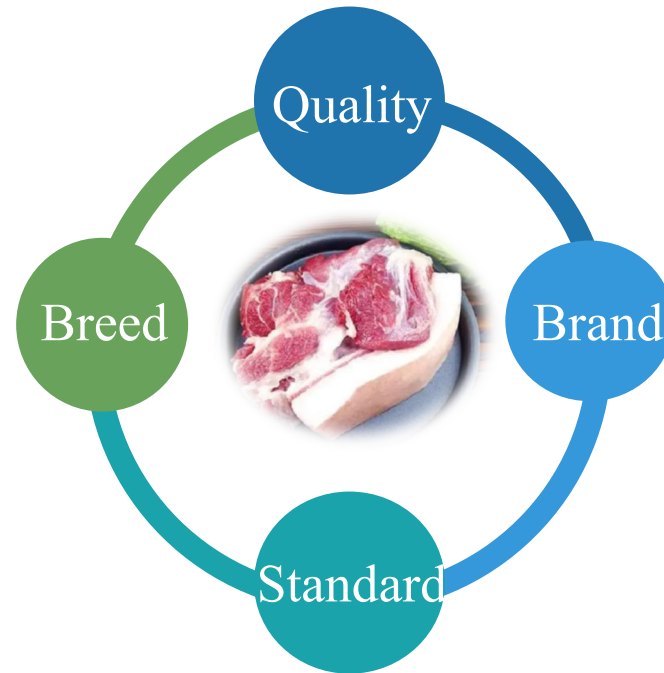
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Research Background

Research Background

- Pork quality has decreased due to excessive pursuit of growth and production of pig
- Consumption concept has shifted from **quantity** to **quality**
- Agricultural production should **balance** efficiency with product quality

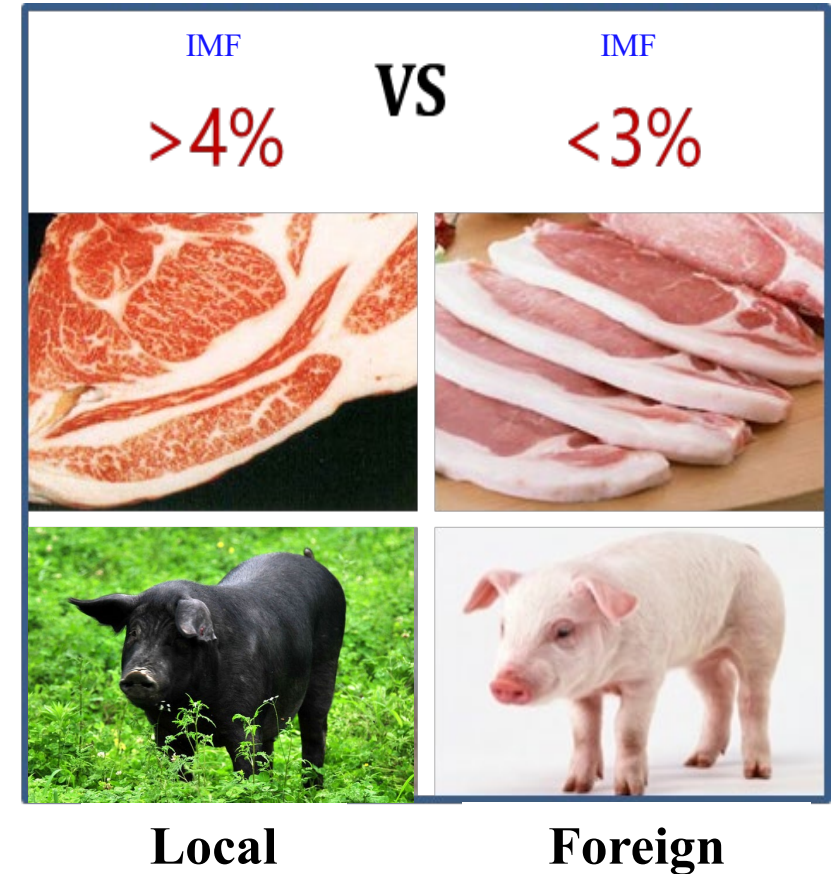
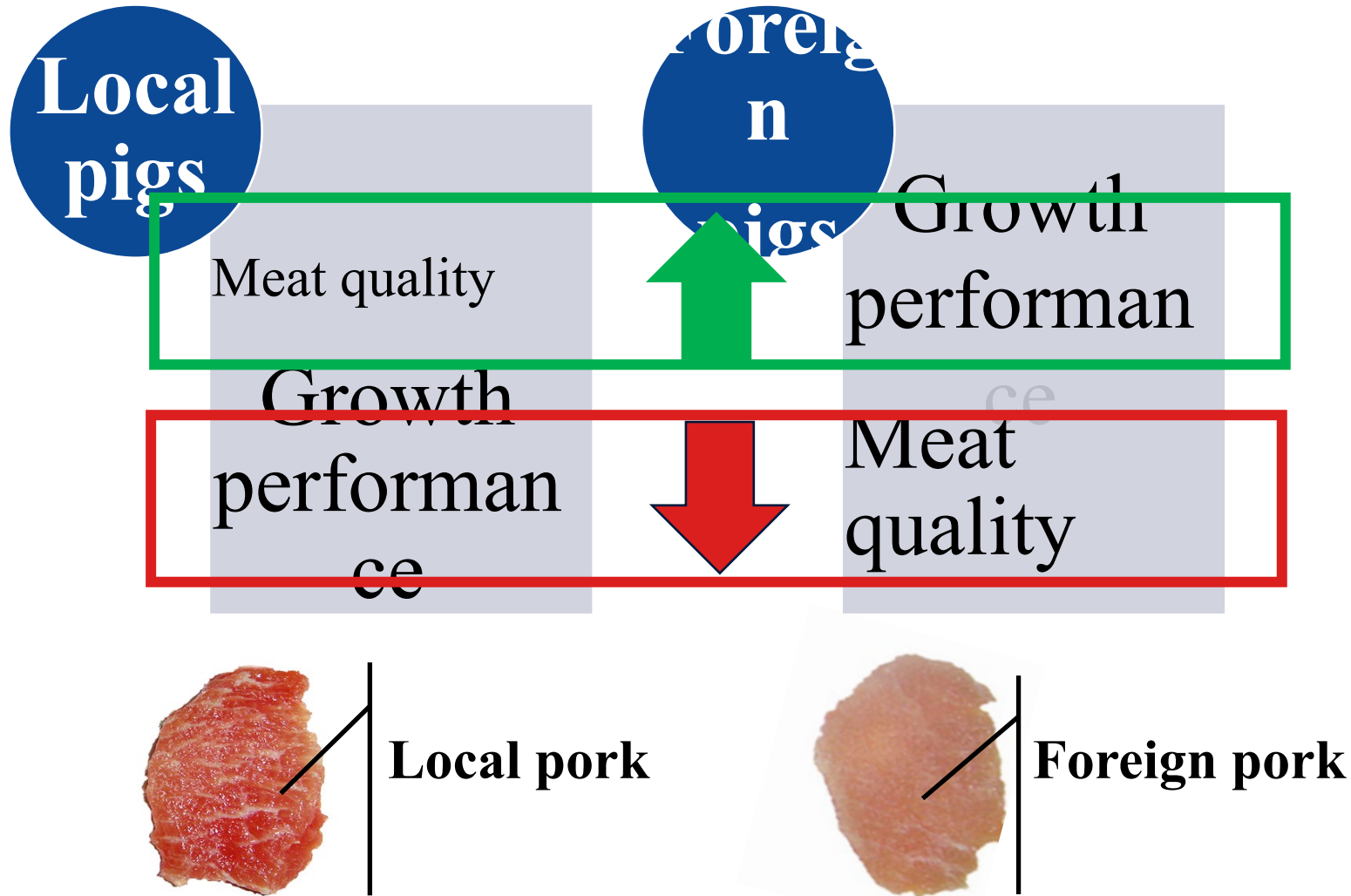


Main indicators of meat quality	
Color	Meat color、 water holding capacity
Smell	Flavor (IMF)
Taste	Juiciness、 tenderness、 (myofiber types)



The improvement of pork quality is a key issue for high-quality development of animal husbandry

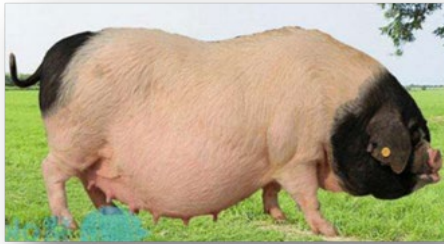
Research Background



- To clarify the pattern of meat quality differences
- To formulate nutritional regulation strategies to improve meat quality

Research Background

- China possesses abundant local pig breed resources: Huanjiang pigs, Shaziling pigs and Ningxiang pigs
- Characteristics: High IMF ($>3\%$)、Good meat quality、Roughage-resistance
- Problem: Low lean mass percentage ($<50\%$)、Low FCR ($>3:1$)



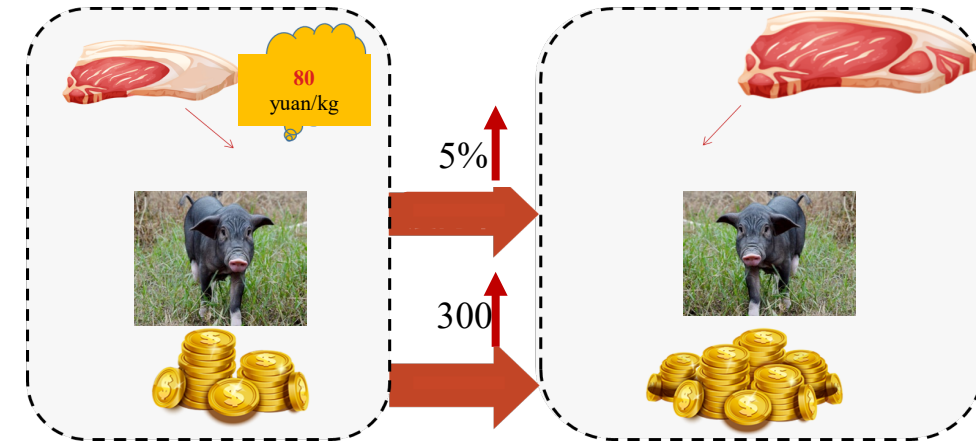
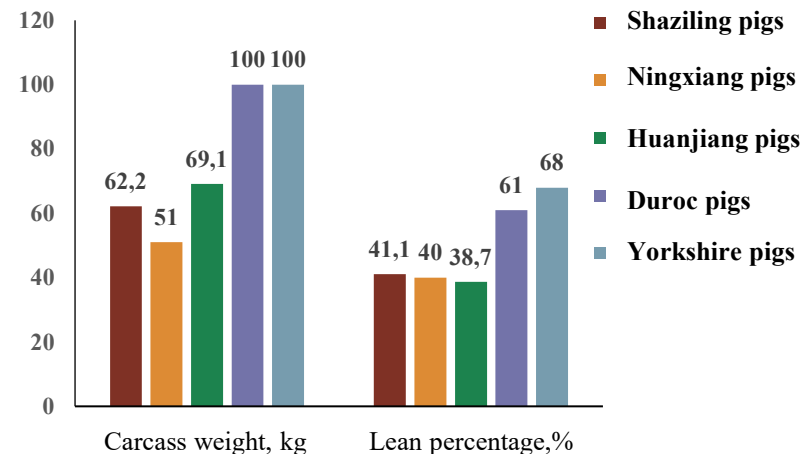
Shaziling pigs



Ningxiang pigs

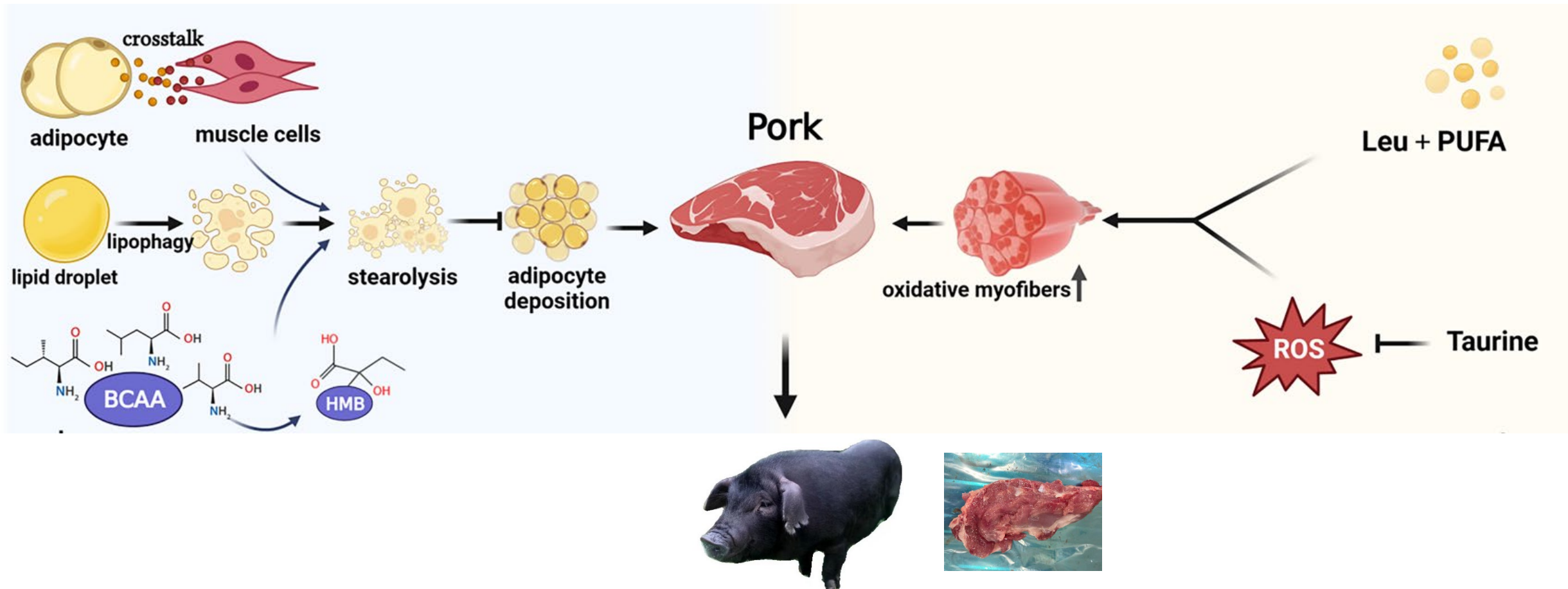


Huanjiang pigs



□ For every **5%** increase in lean meat percentage, the profit increases by approximately **300 RMB (€37.68)** per pig

Scientific Question?



What is the specific mechanism by which leucine regulates the meat quality of Huanjiang mini pigs?

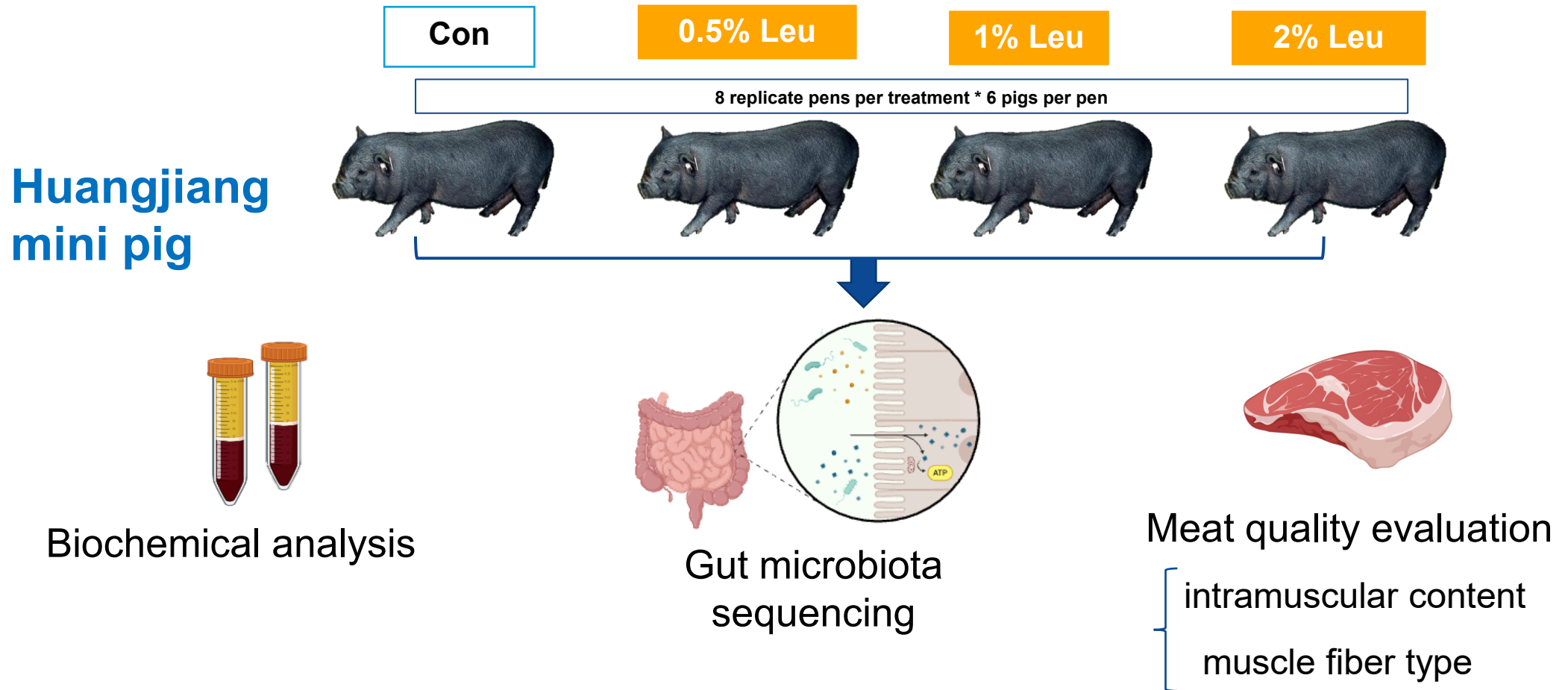


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Research Content

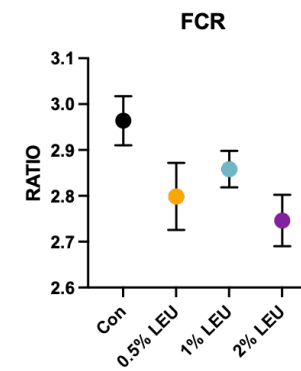
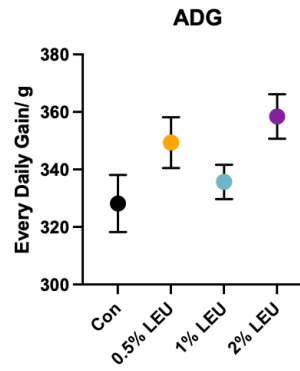
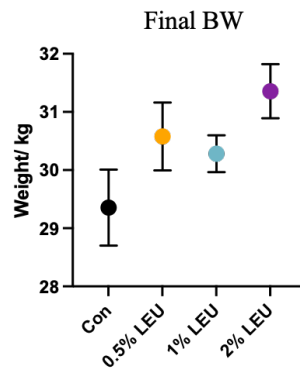
Experiment Design



Reveale the specific concentrations of Leu could improve meat quality in native Chinese pigs by adjusting IMF deposition and fiber type switching

RESULTS- GROWTH PERFORMANCE

Items	Con	0.5% Leu	1% Leu	2% Leu	SEM	<i>P</i>
Initial BW (kg)	9.66	9.95	9.78	9.85	0.46	0.29
Final BW (kg)	29.36b	30.58ab	29.92ab	31.72a	0.69	0.02
ADG (g/d)	328.18b	349.34ab	335.68b	364.90a	0.09	0.02
ADFI (g/d)	969.24	972.93	974.37	981.81	0.18	0.85
FCR	2.96a	2.80ab	2.90b	2.70a	0.18	0.01



➤ Dietary Leu groups have better **growth performance** ➡ **WEIGHT & ADG & FCR**

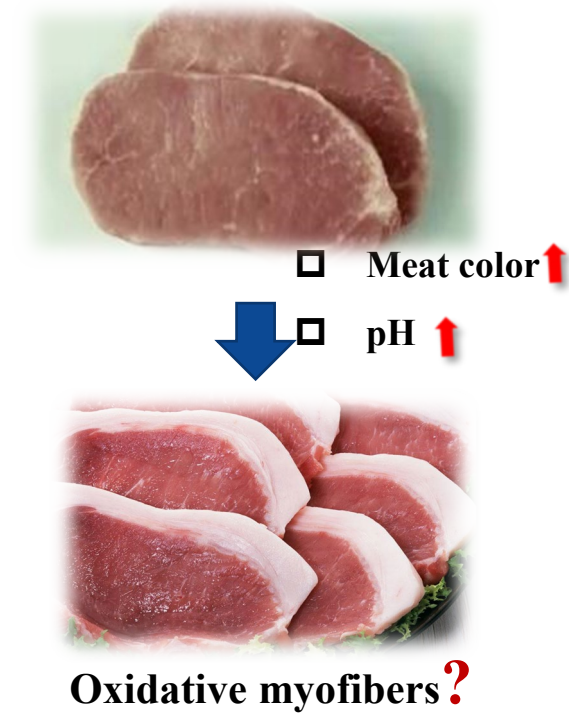
RESULTS- CARCASS CHARACTERISTIC

Items	Con	0.5% Leu	1% Leu	2% Leu	SEM	<i>P</i>
Carcass weight, kg	18.01b	18.76b	19.03ab	20.72a	0.19	0.01
Dressing percentage, %	59.11b	62.63b	61.49ab	63.88a	0.29	0.03
Carcass length, cm	59.29b	60.27ab	61.75ab	62.33a	0.62	0.09
eye muscle area, mm ²	6.18b	7.63a	6.74ab	7.60a	0.47	0.09
IMF, %	2.39b	2.86ab	3.40a	3.66a	0.25	0.05

- The **carcass weight & dressing percentage & IMF** of dietary LEU groups are significantly higher than the control group.

RESULTS- MEAT QUALITY CHARACTERISTIC

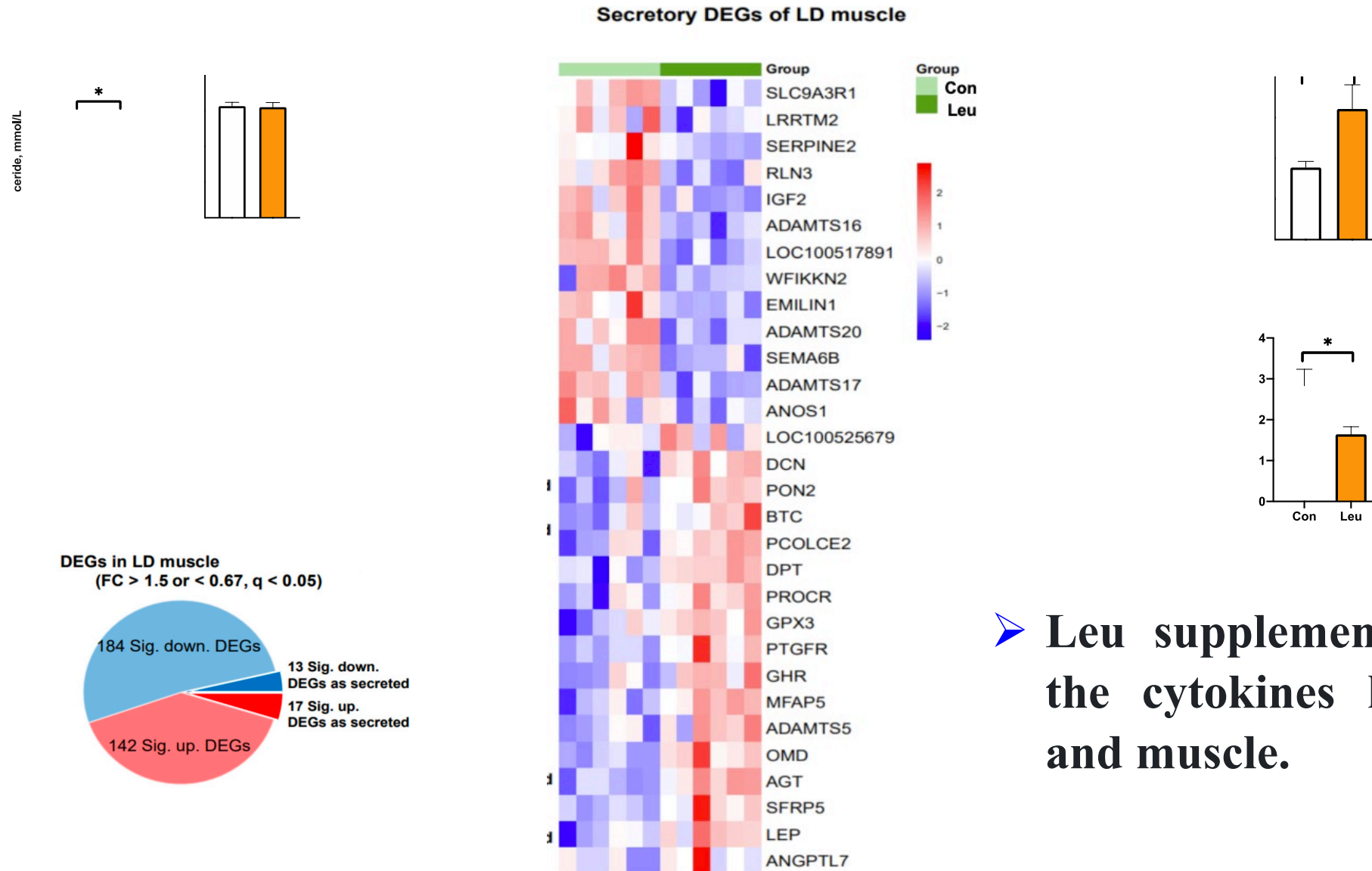
Items	Con	0.5% Leu	1% Leu	2% Leu	SEM	<i>P</i>
pH45	6.18	6.07	6.21	6.38	0.65	0.39
pH24	5.78	5.86	5.79	5.80	0.05	0.97
L*	42.65	42.97	43.00	43.36	0.34	0.92
a*	16.68	17.24	17.38	17.39	0.23	0.68
b*	4.78	4.38	4.49	4.35	0.12	0.65
Shear force	60.61a	55.47ab	49.75b	49.45b	1.50	0.05



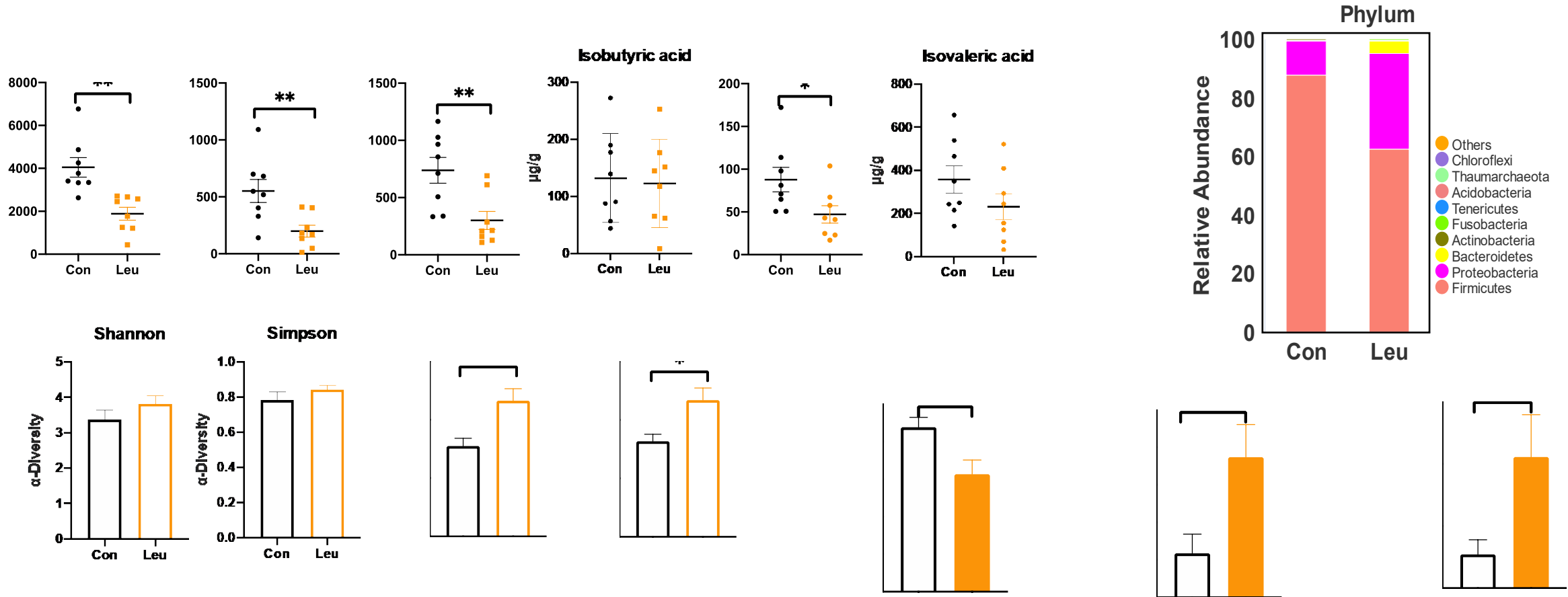
- The **pH & meat color & shear force** of dietary LEU groups had higher tendency than in the control group.

Interactions between Gut microbiota and cytokines

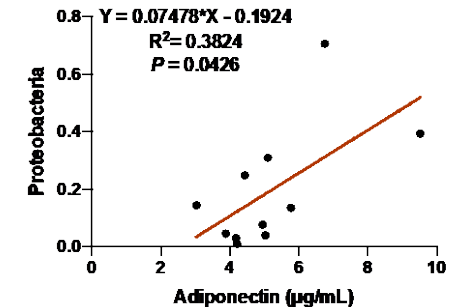
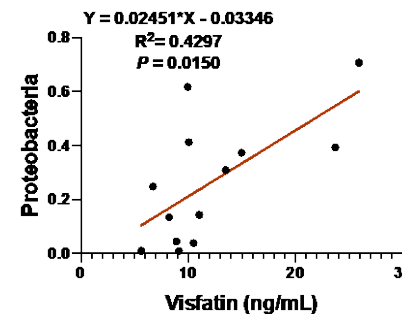
➤ Screening for differential cytokines



Interactions between Gut microbiota and cytokines



Myokines are significantly associated with gut microbiota

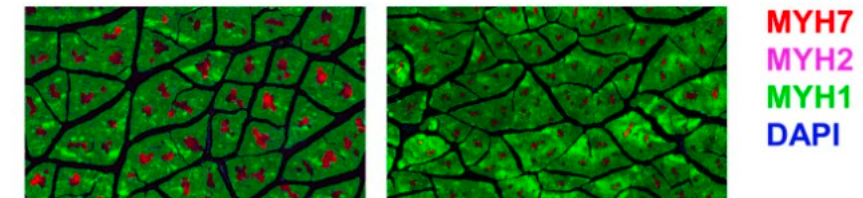
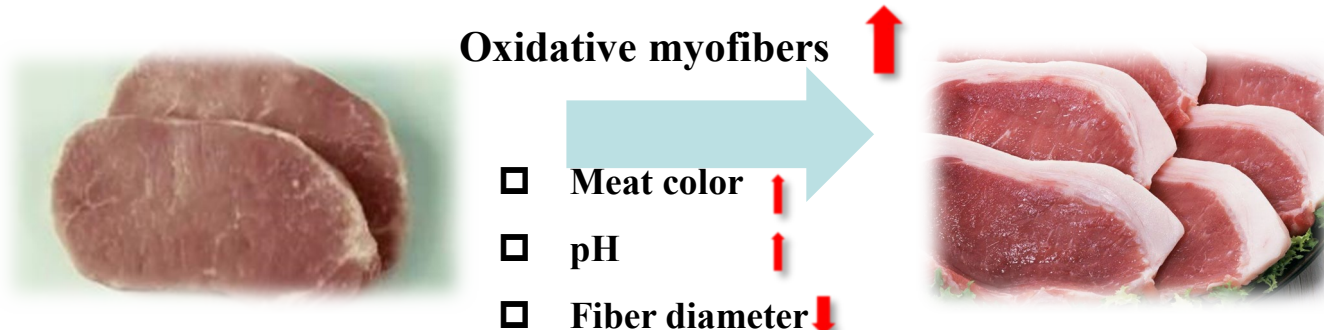
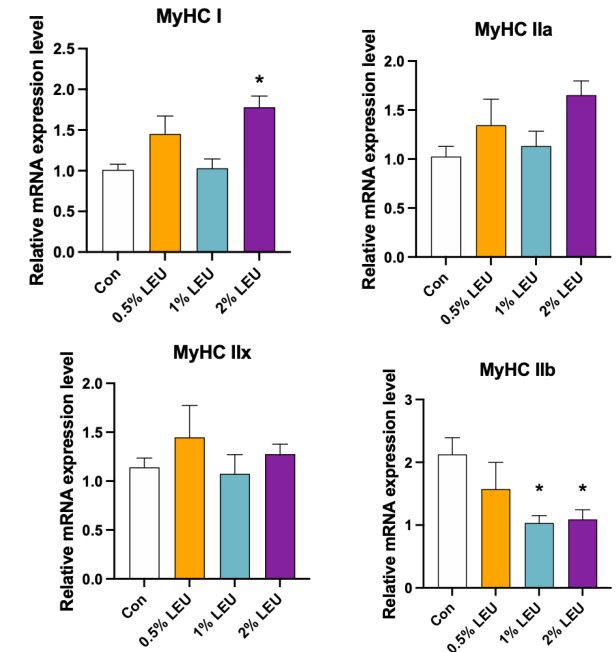


Myofiber Transformation

Increasing the ratio of **oxidative myofibers** is an effective way to improve pork quality

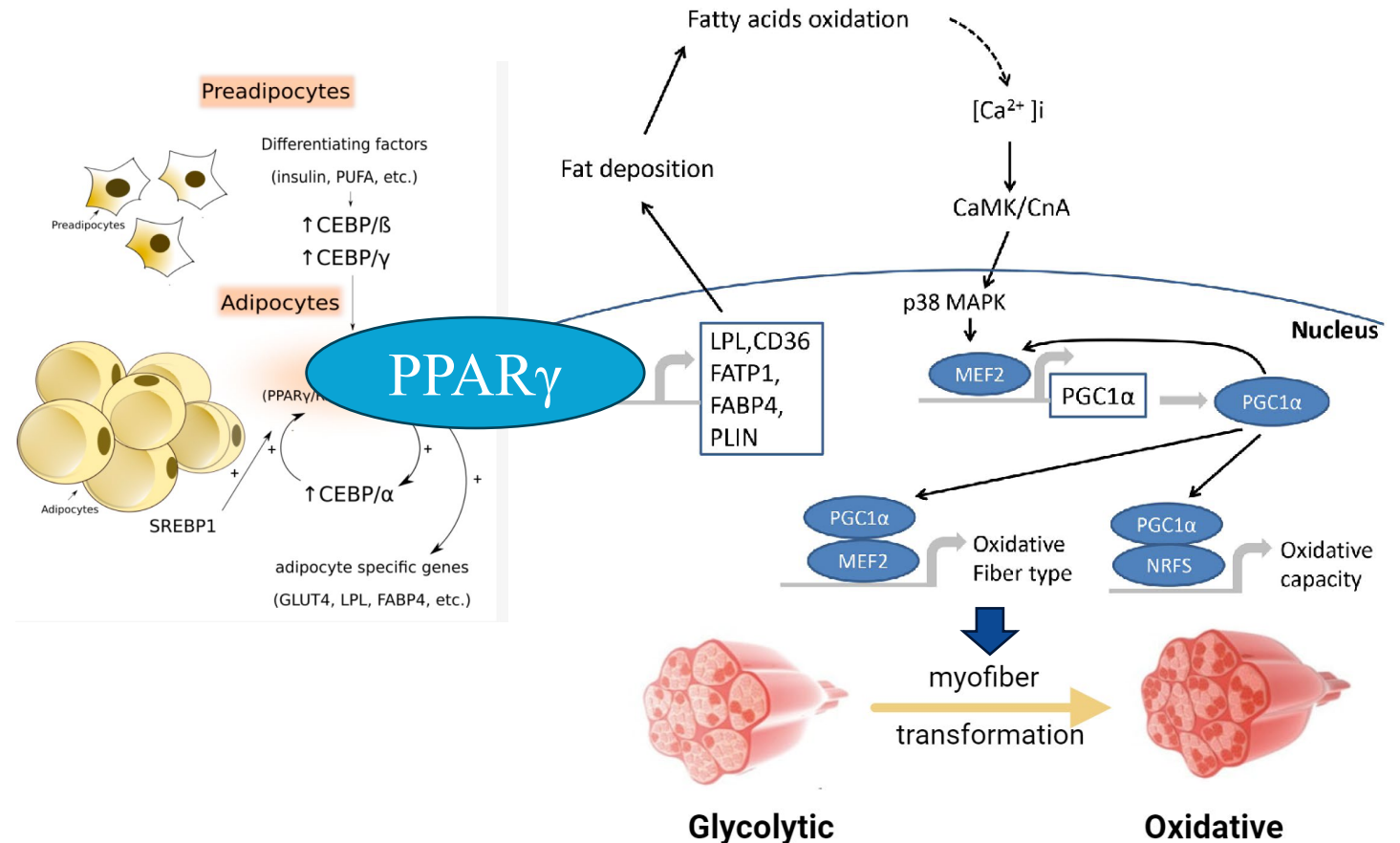
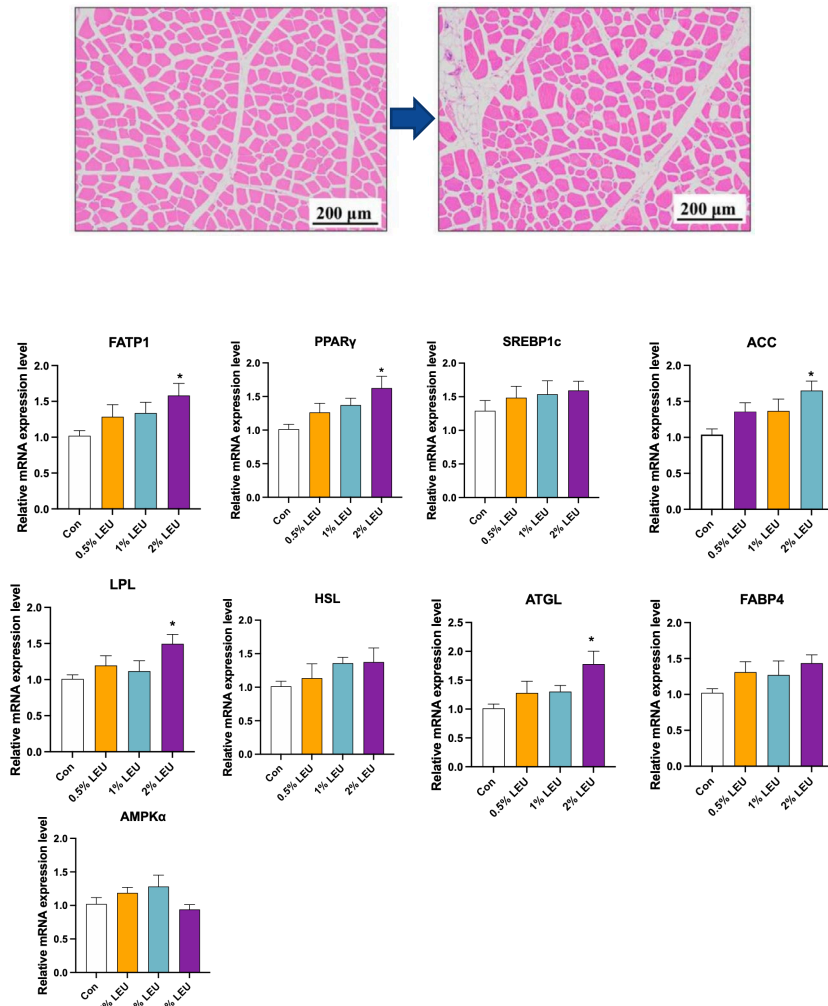
- Muscle fibers constitute the fundamental units of muscle tissue
- Skeletal muscle fibers are categorized into **four types**

Types	I type	Ila type	Ilx type	Ilb type
Contraction rate	slow	fast	fast	fast
Metabolic characteristics	Oxidative	Oxidative	Oxidative-glycolytic	Glycolytic
Myosin heavy chain subtypes	MyHC-I	MyHC-IIa	MyHC-IIx	MyHC-IIb



Intramuscular Fat Deposition

- A **positive** correlation between the intramuscular fat content and the proportion of oxidative myofibers





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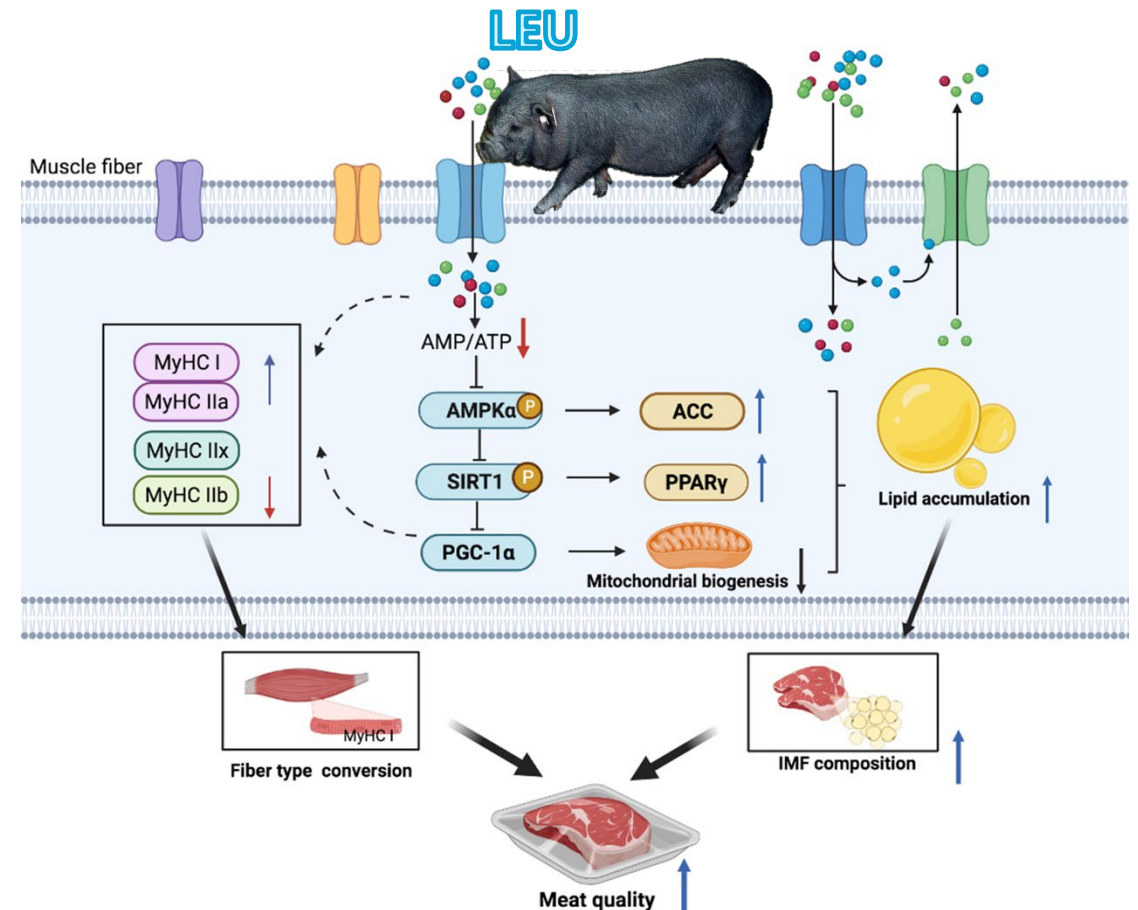
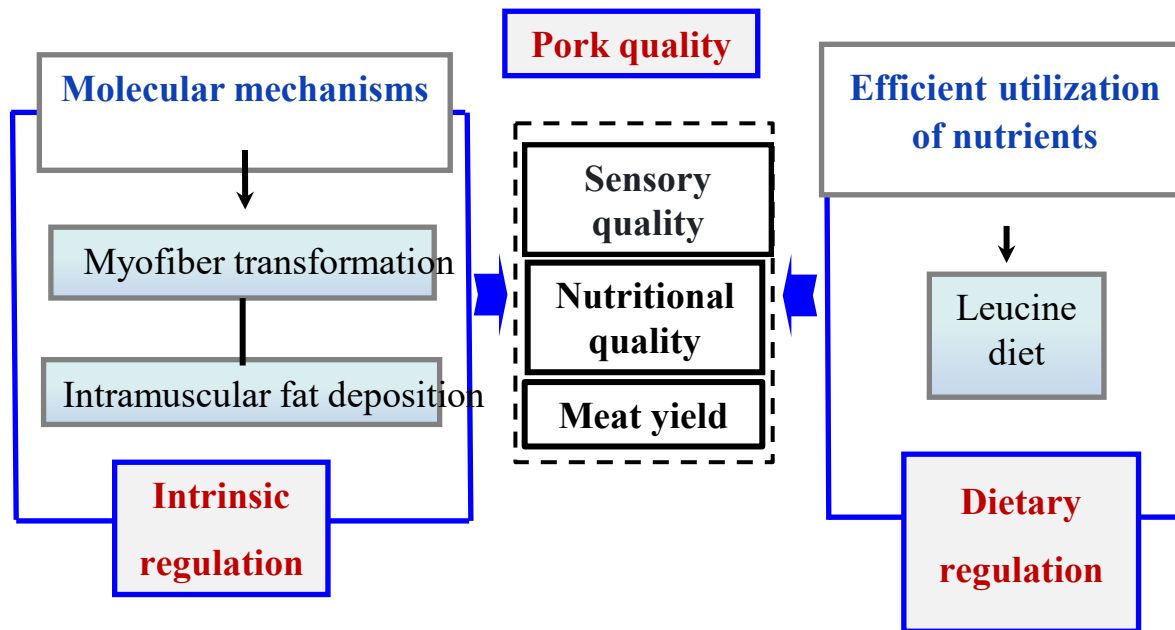
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CONCLUSIONS

CONCLUSION

- Dietary LEU modulate body metabolism, regulate muscle fiber types and control intramuscular fat deposition, consequently improving pork quality.

(Input-output)



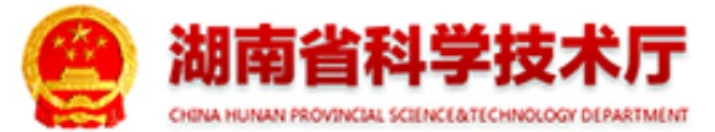


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ACKNOWLEDGEMENT

Acknowledgement





THANKS!



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