



断奶期仔猪健康的氧化应激生物标记物

OXIDATIVE STRESS AS BIOMARKER OF PIGLET HEALTH AT WEANING

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引言 Introduction



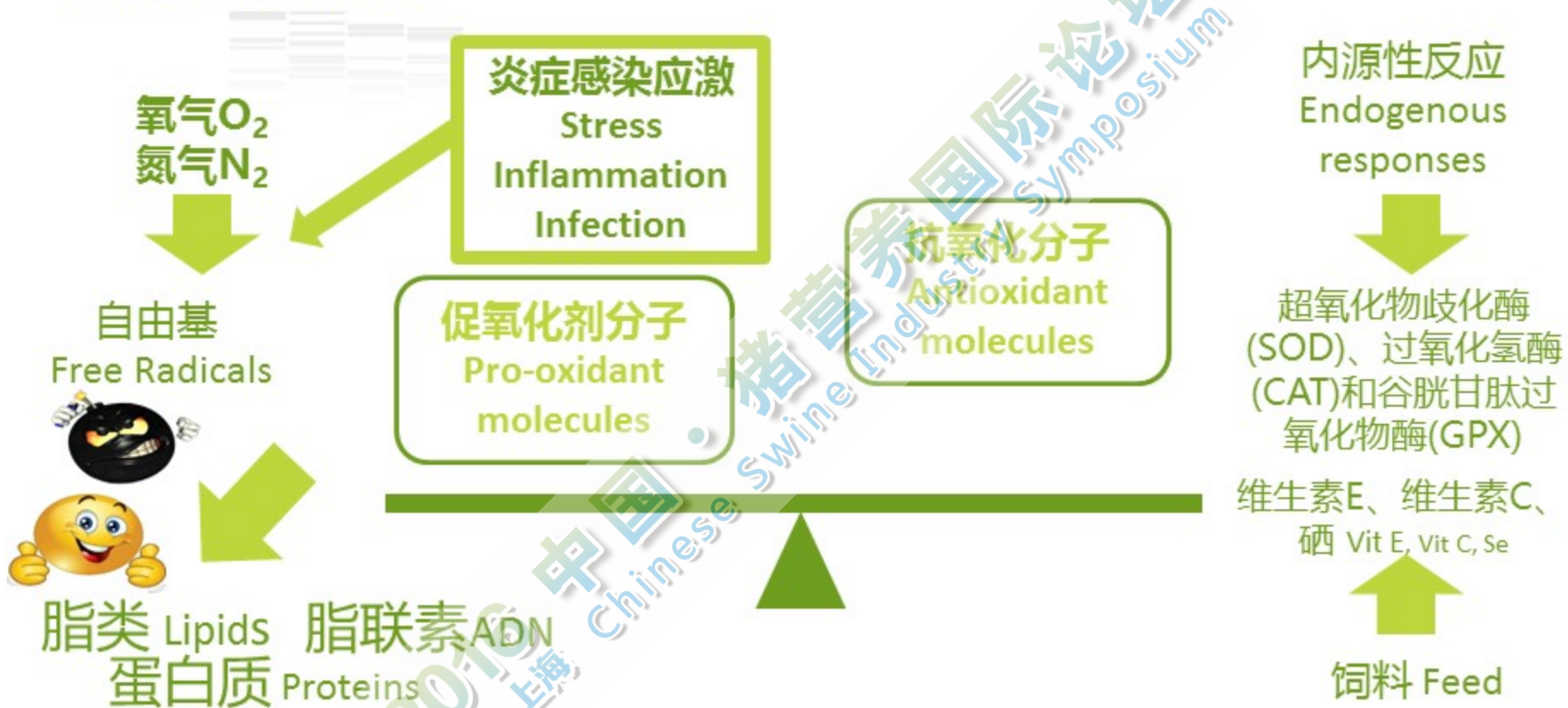
断奶仔猪健壮的生物标记鉴定

Identification of biomarkers of the robustness of piglets at weaning

重点关注氧化状态

Focus on oxidative status

氧化应激机制 Mechanism of Oxidative Stress



引言 Introduction



- ❖ 断奶可导致腹泻和生长率降低是抗生素使用的原因
Weaning can lead to diarrhea and reduced growth justifying why antibiotics are used (Madec et al. 1998)
- ❖ 断奶是氧化应激源，饲料中添加抗氧化剂有可能使氧化应激衰减
Weaning is source of oxidative stress (Pig: Robert, 2009, Sauerwein, 2005, Zhu, 2012; Pastorelli, 2012, Corino, 2007) and attenuation of oxidative stress is possible with antioxidant in feed (Pastorelli et al., 2012, Gerasopoulos et al. 2015)
- ❖ 农场动物氧化应激与疾病有关 Oxidative stress is associated with diseases in farm animals (Lykkesfeldt and Svendsen, 2007)

在断奶情况下，氧化应激是否可以被用作仔猪健康的生物标记？

In the context of weaning, can oxidative stress be used as biomarker of health of piglets?

材料和方法 Material and Methods

- ❖ 4批×16头猪 4 batches of 16 animals
 - ❖ 断奶日龄 21或28天 Weaning at 21 or 28 days of age
 - ❖ 恶劣或最优条件 Deteriorated or Optimal Conditions

条件 Conditions	最优条件 Optimal (OC)	最差条件 Deteriorated (DC)
密度 Density	4头仔猪/栏 4 piglets/pen	8头仔猪/栏 8 piglets/pen
动物混群 Animals mixing	2窝/栏 2 litters/pen	8窝/栏, 断奶一周后动物混合 8 litters/pen, Animals mixing 1 week after weaning
室内清洁度 Room cleanliness	清洗消毒 Cleaned + disinfected	不清洗消毒 Non Cleaned + non disinfected
猪转移期温度 Temperature during animals transfer	直接在28°C Directly at 28°C	在20°C等待4小时 4h waiting at 20°C
1/2饲料过渡1/2日龄 1/2 Transition feed 1 st Age/2 nd age	在3天 On 3 days	直接 Direct

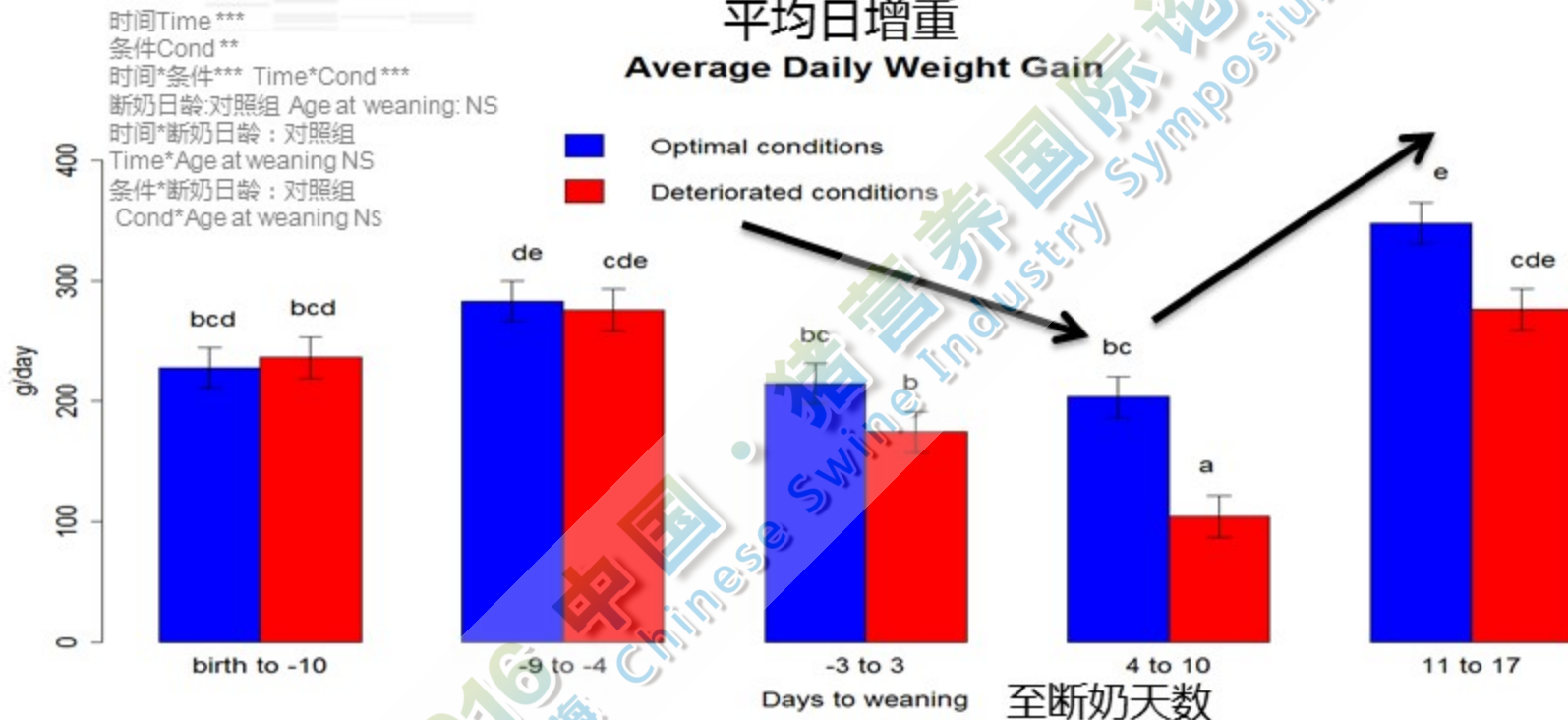
- ❖ 非抗生素处理组 No antibiotic treatment
- ❖ 日龄从12-61天每周血液取样和称重 Blood samplings and weighing weekly from 12 to 61 days of age

恶劣条件下断奶期生长率严重降低

More severe reduction of growth rate in deteriorated conditions around weaning

平均日增重

Average Daily Weight Gain



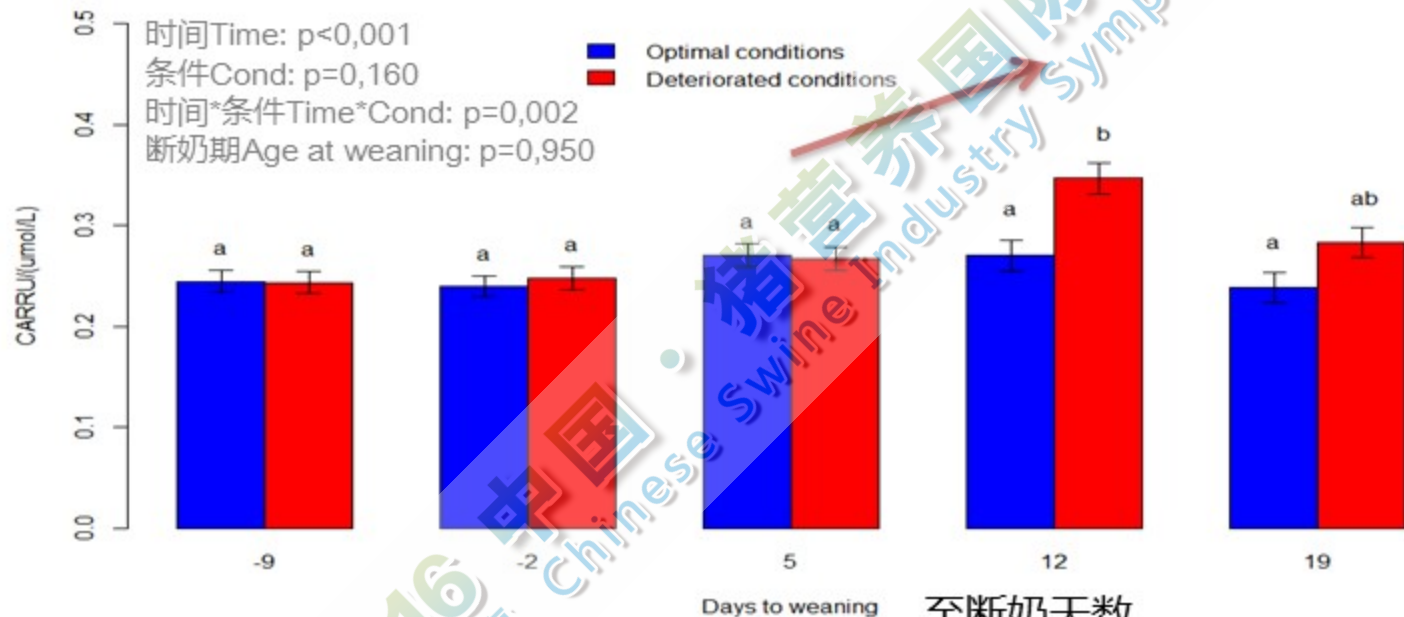
断奶日龄无差异 No effect of age at weaning

断奶后期恶劣条件下较高的氧化应激指数

Higher oxidative stress index in deteriorated conditions after weaning

根据农场条件断奶期氧化应激指数 (氢过氧化物/骨碱性磷脂酶)

Oxidative Stress Index (dROM/BAP) around weaning and according to farming conditions



断奶日龄无差异 No effect of age at weaning

断奶后恶劣条件下仔猪氢过氧化物增加

Increased dROM for piglets in deteriorated conditions after weaning

根据农场条件断奶期氢过氧化物

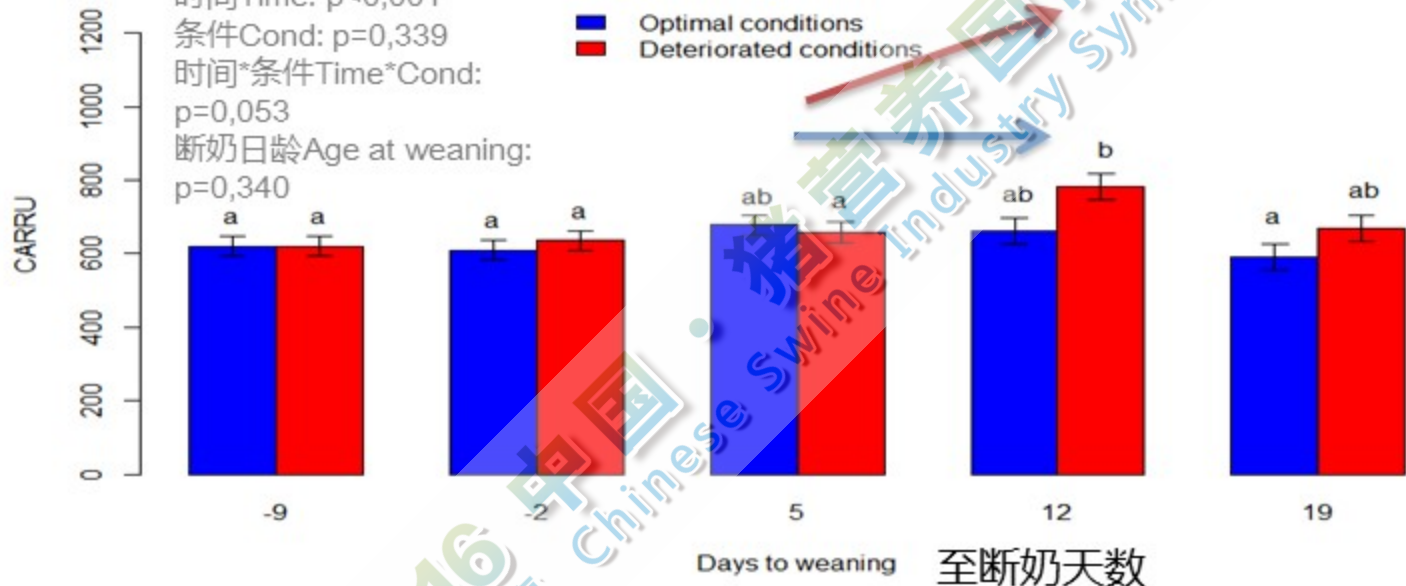
Hydroperoxides (dROM) around weaning and according to farming conditions

时间Time: $p < 0,001$

条件Cond: $p = 0,339$

时间*条件Time*Cond: $p = 0,053$

断奶日龄Age at weaning: $p = 0,340$



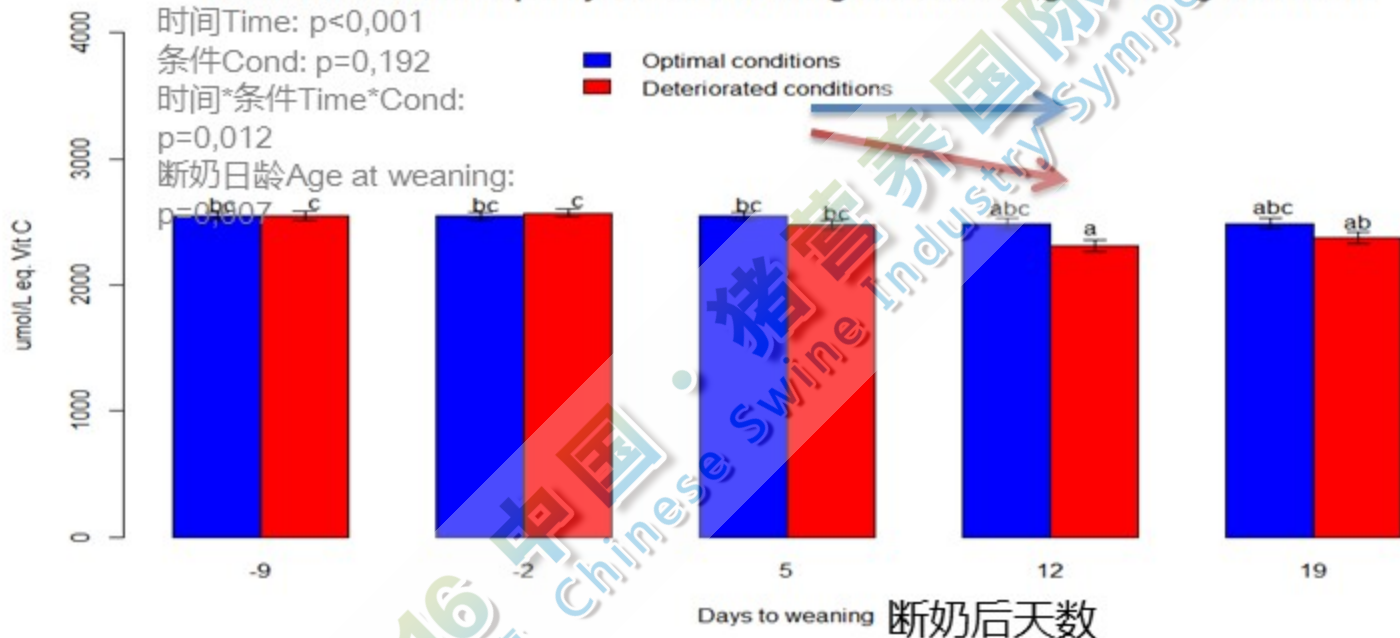
断奶年龄无影响 No effects of age at weaning

恶劣条件下仔猪血浆抗氧化能力降低

Decreased plasma antioxidant capacity for piglets in deteriorated conditions

根据农场条件断奶期血浆抗氧化能力

Plasma antioxidant capacity around weaning and according to farming conditions



28日龄断奶仔猪骨碱性磷酸酶较低

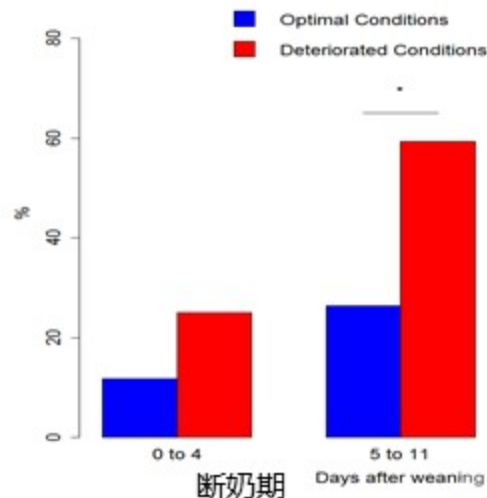
Whatever time lower BAP for piglets weaned at 28 days of age

恶劣条件下腹泻增加

More diarrhea in deteriorated conditions

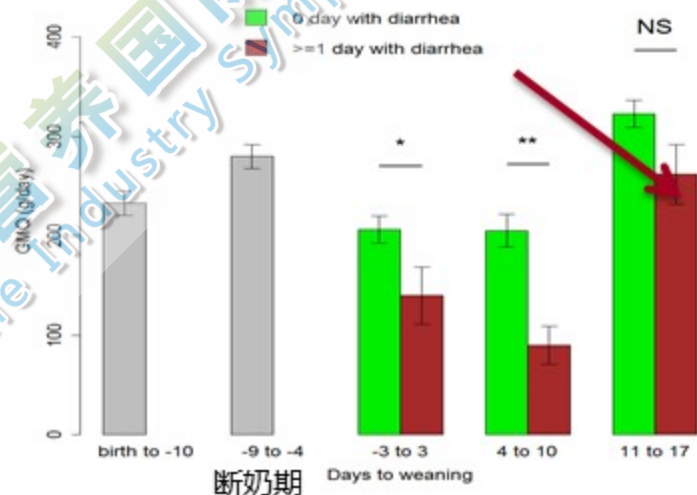
仔猪腹泻百分率

Percentage of piglets which exhibited diarrhea



日增重 (克/天)

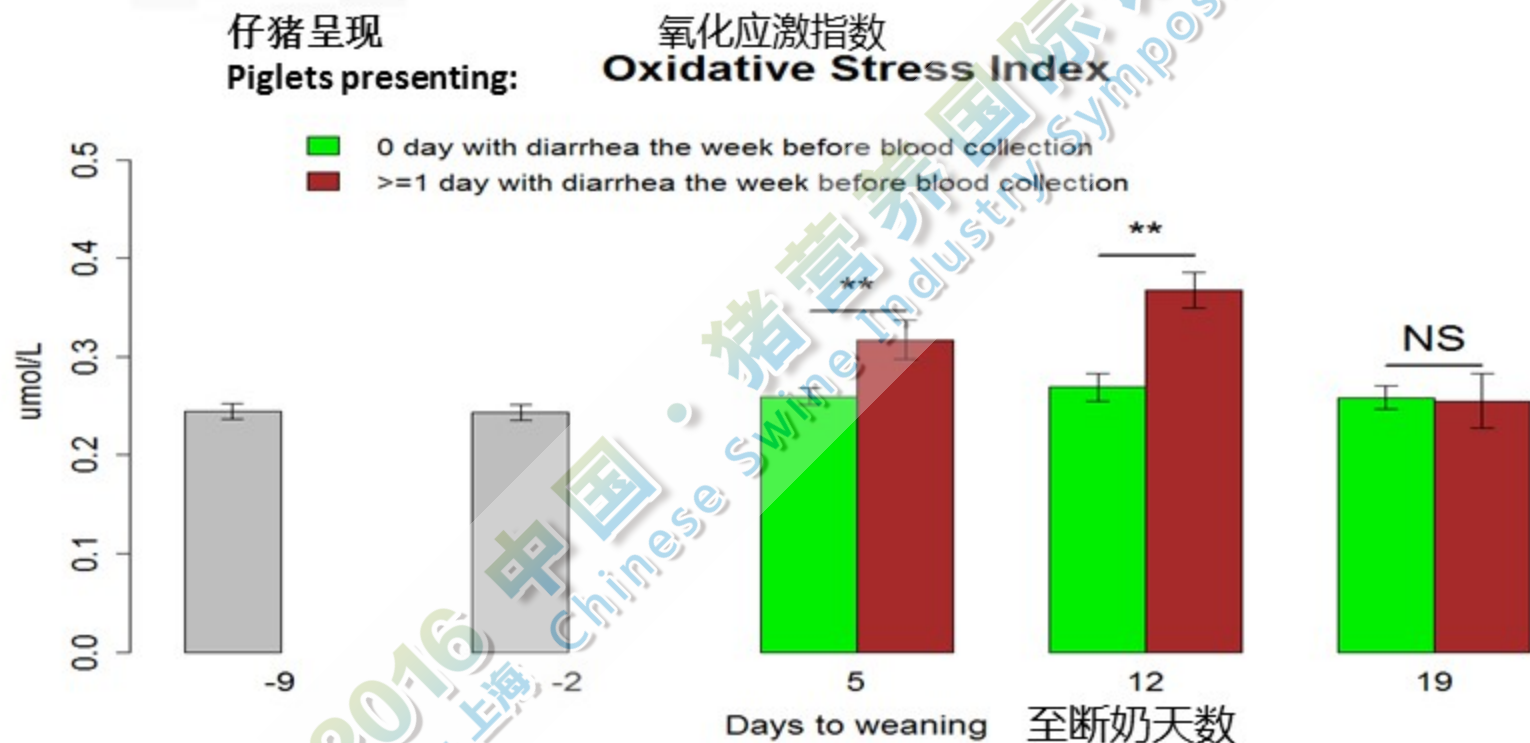
Average Daily Gain (g/day)



- ❖ 恶劣条件下仔猪腹泻增加 More piglets with diarrhea in deteriorated conditions
- ❖ 腹泻仔猪生长率严重下降 More severe slowing down of growth for piglets with diarrhea

仔猪较高的氧化应激指数呈现腹泻

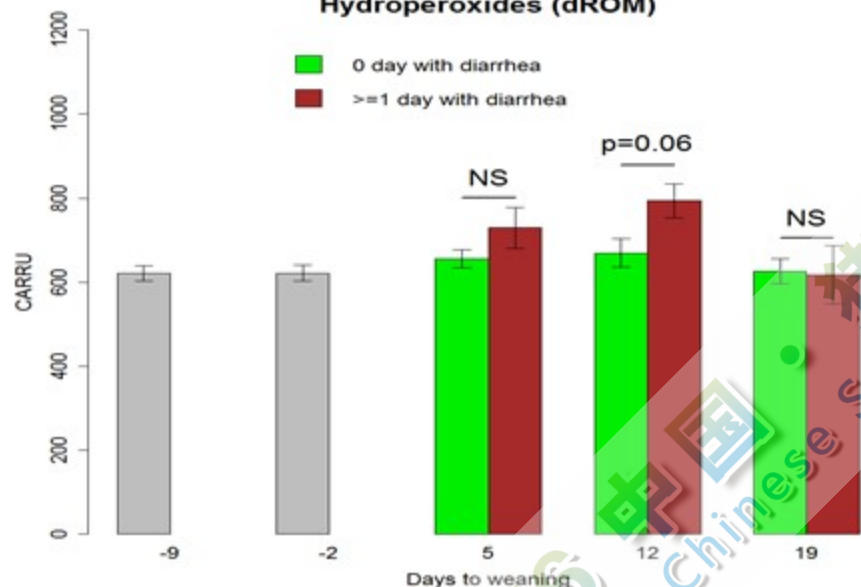
Higher oxydative stress index for piglets exhibiting diarrhea



相同的过氧化氢较低骨碱性磷酸酶的仔猪呈现腹泻

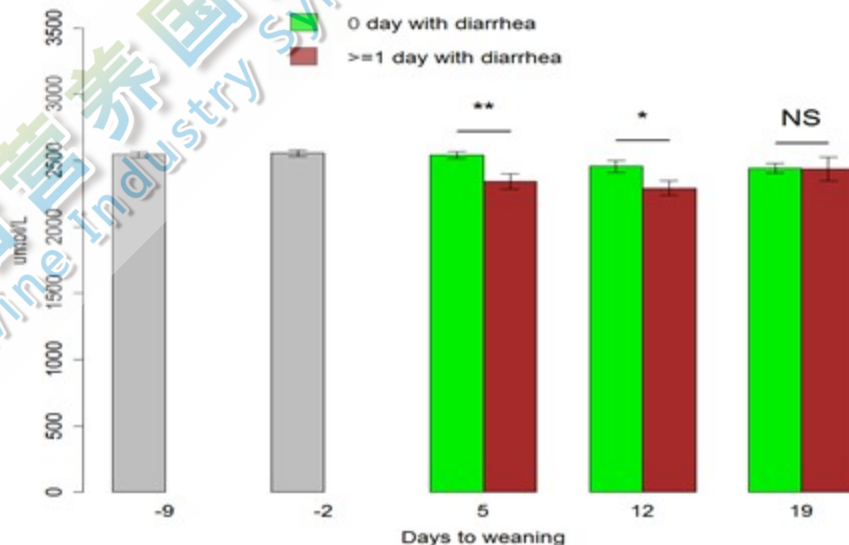
Lower BAP but same dROM for piglets exhibiting diarrhea

氢过氧化物
Hydroperoxides (dROM)



至断奶天数

生物抗氧化能力
Biological Antioxidant Potential



至断奶天数

结论 Conclusion



❖ 我们的研究 In our study:

❖ 恶劣条件下断奶后期腹泻增加

More diarrhea after weaning in deteriorated conditions

❖ 只有在最佳条件下断奶期无氧化应激

No oxidative stress due to weaning only (optimal conditions)

❖ 恶劣条件下仔猪氧化应激和腹泻

Oxidative stress in deteriorated conditions and for piglets with diarrhea

❖ → 有可能可以使用氧化应激作为断奶仔猪健康的生物标志物

There is an opportunity to use oxidative stress as biomarker of piglet's health at weaning

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