Effect of weaning conditions on immune parameters of piglets

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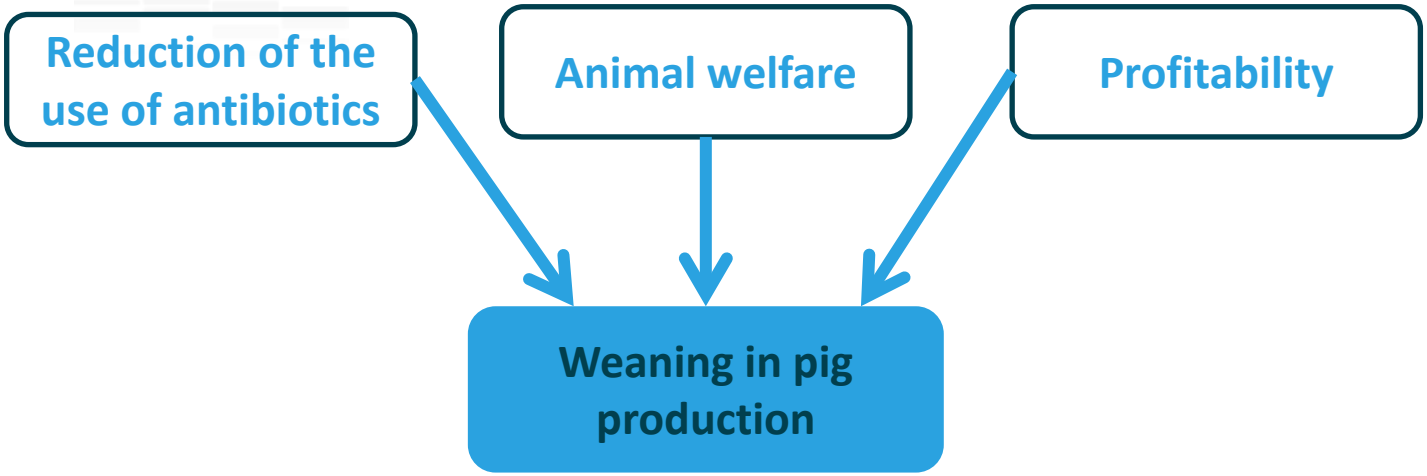
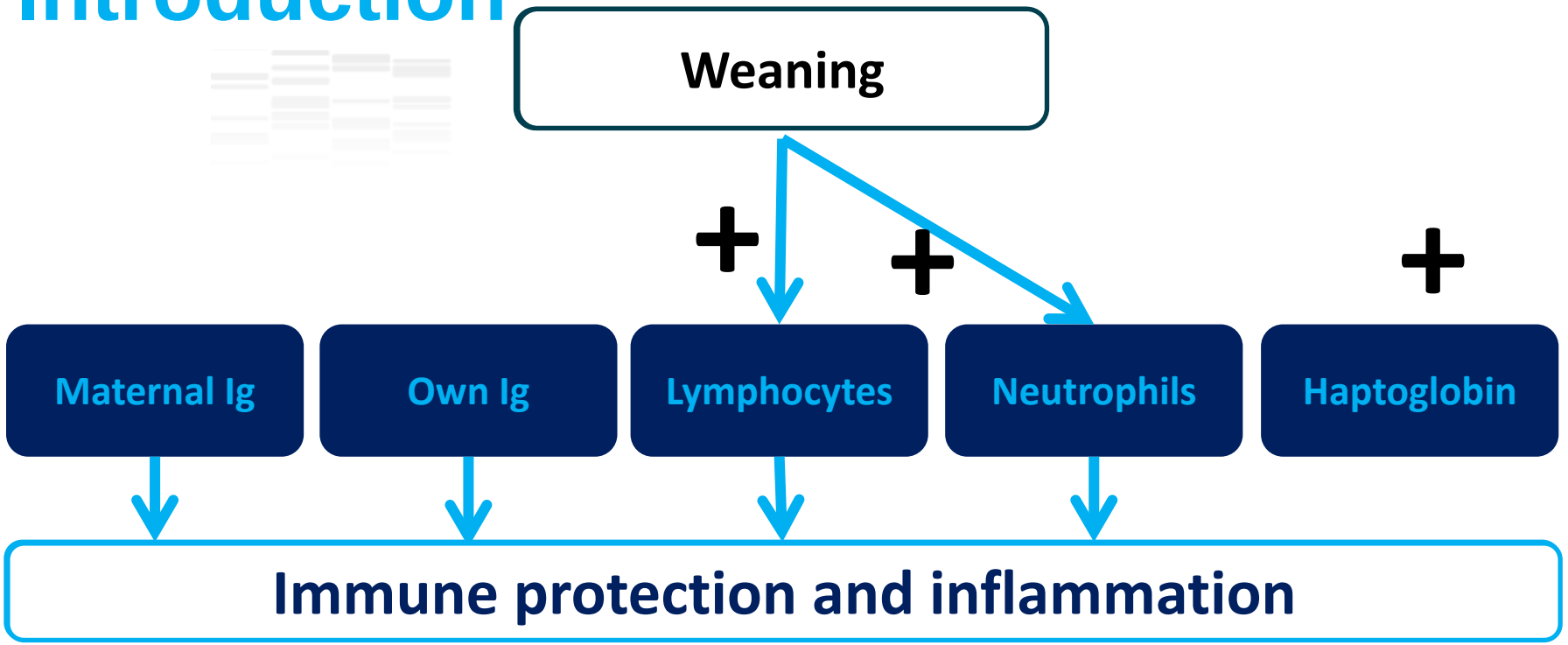
Introduction



Identification of biomarkers of the robustness of piglets at weaning

Introduction



Can those immune parameters be used as biomarkers of adaptation to weaning?

Introduction

Good biomarkers have to be sensitive to weaning factors

- Effect of Age at weaning: few studies. Early age at weaning leads to either:
  - Decrease of Lymphocytes proliferation (Blecha, 1983)
  - No effect (Kick, 2012)

- Effect of management conditions leading to higher stress for piglets:
  - Stress factors are well known to suppress immune system (Merlot, 2004)

Rare and contradictory literature on the subject

What are the effects of weaning age and management conditions on the evolution of immune parameters?

Material and Methods

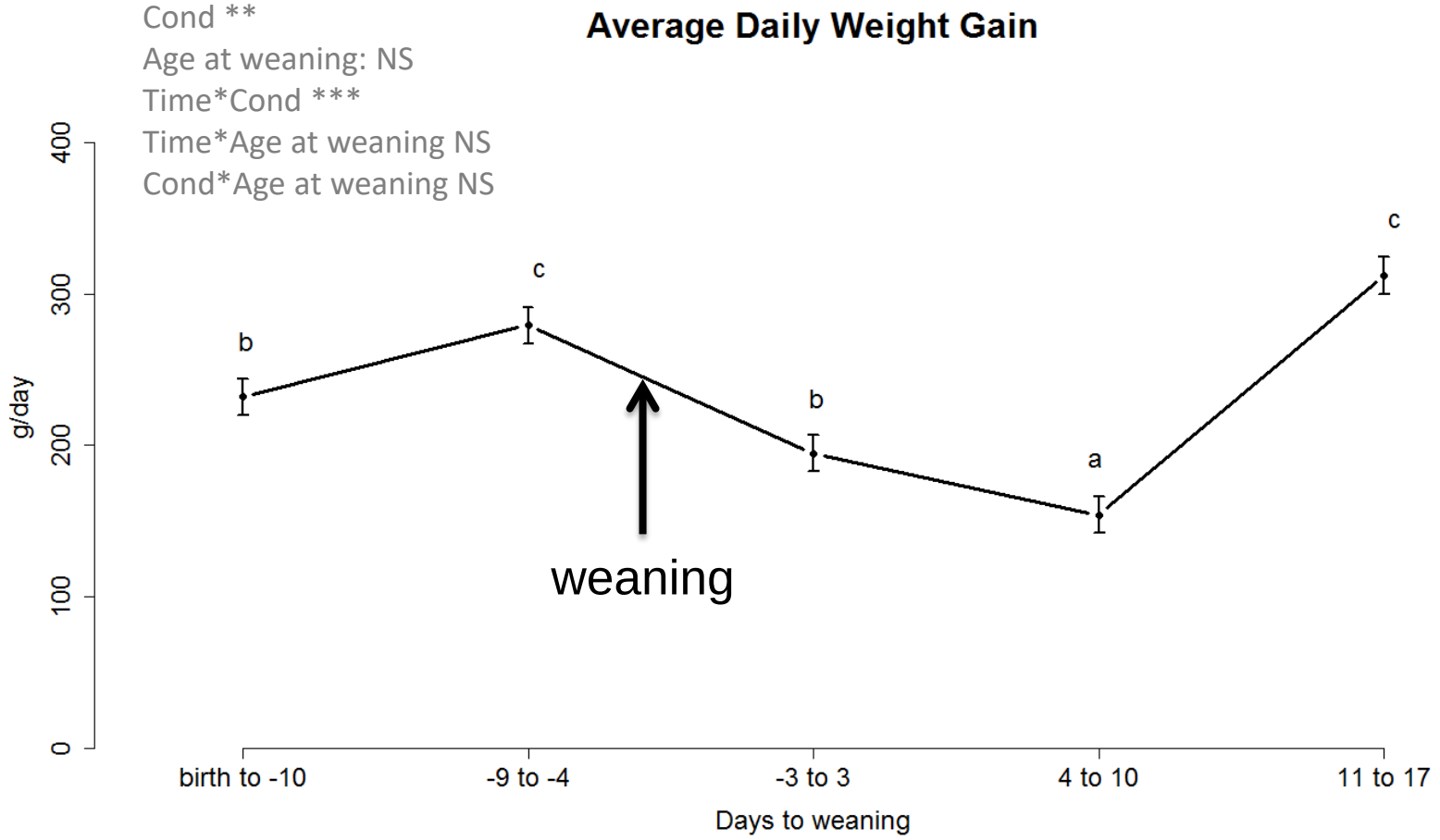
- 4 groups of 16 animals
  - Weaning at 21 or 28 days of age to dissociate age from weaning
  - Deteriorated or Optimal Conditions

Conditions	Optimal (OC)	Deteriorated (DC)
Density	4 piglets/pen	8 piglets/pen
Animals mixing	2 litters/pen	8 litters/pen Animals mixing 1 week after weaning
Room cleanliness	Cleaned + disinfected	Not Cleaned + not disinfected
Temperature during animals transfer	Directly at 28°C	4h waiting at 20°C
Transition feed 1st Age/2nd age	On 3 days	Direct

  - No antibiotic treatment
  - Blood samplings, weighing and clinical observations from 12 to 61 days of age

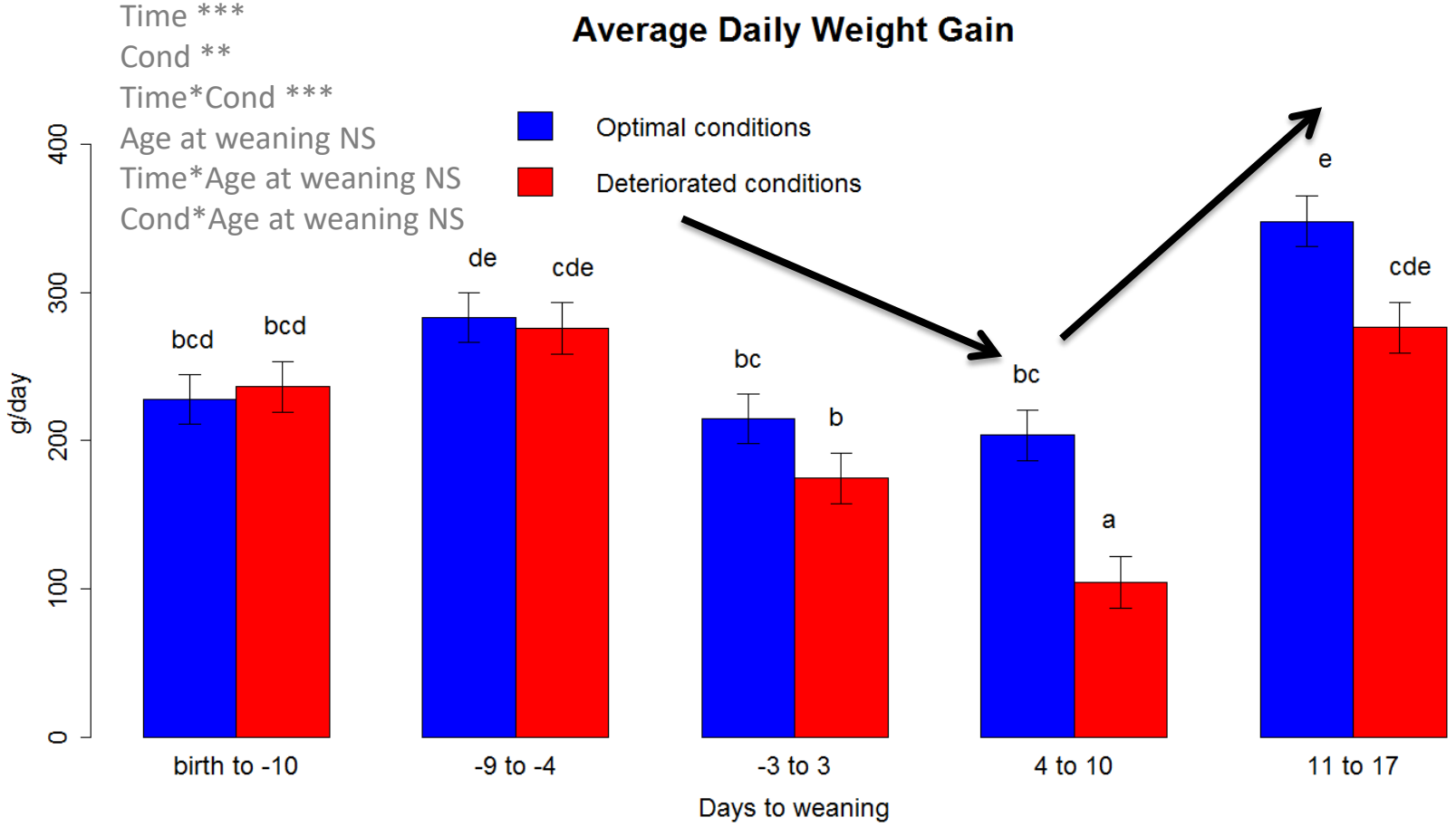
Reduction of growth rate around weaning

Time ***
Cond **
Age at weaning: NS
Time*Cond ***
Time*Age at weaning NS
Cond*Age at weaning NS



More severe reduction of growth rate in deteriorated conditions around weaning

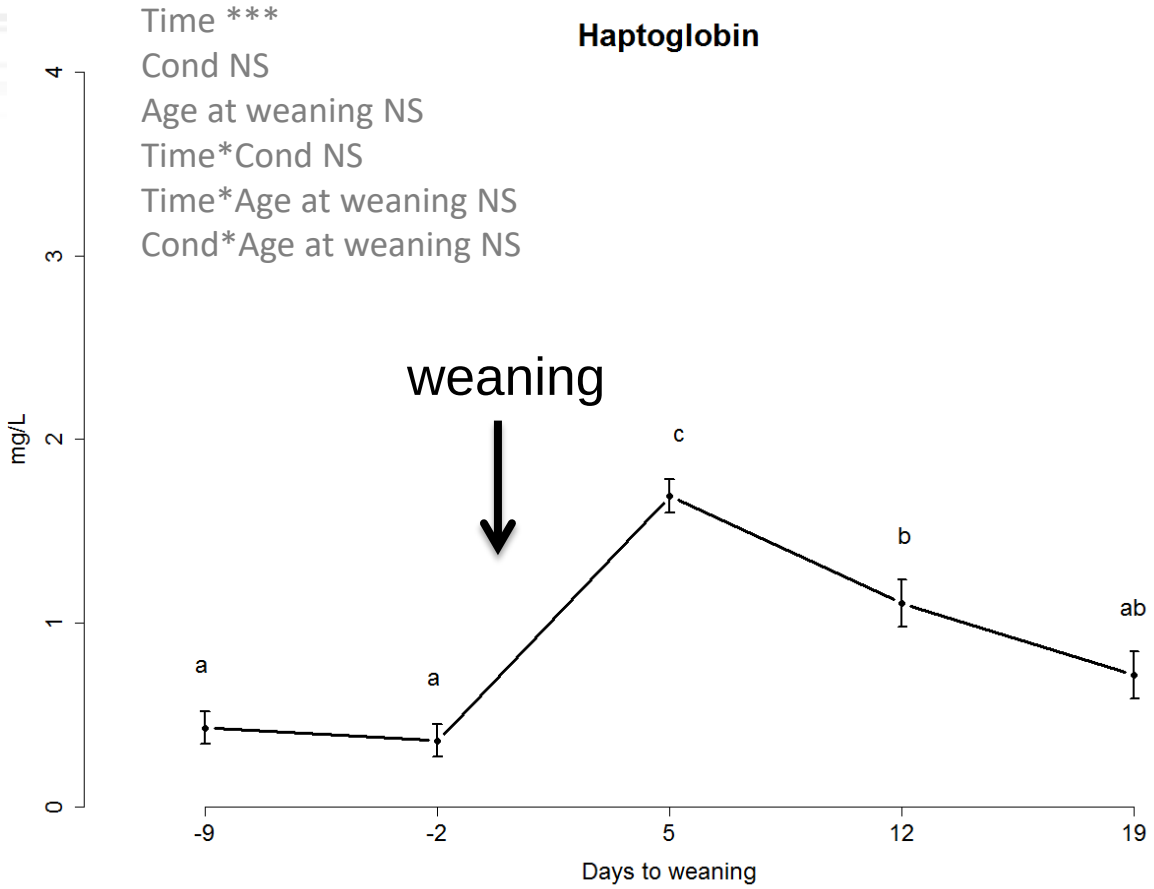
Time ***
Cond **
Time*Cond ***
Age at weaning NS
Time*Age at weaning NS
Cond*Age at weaning NS



No effect of age at weaning

Higher inflammation at weaning

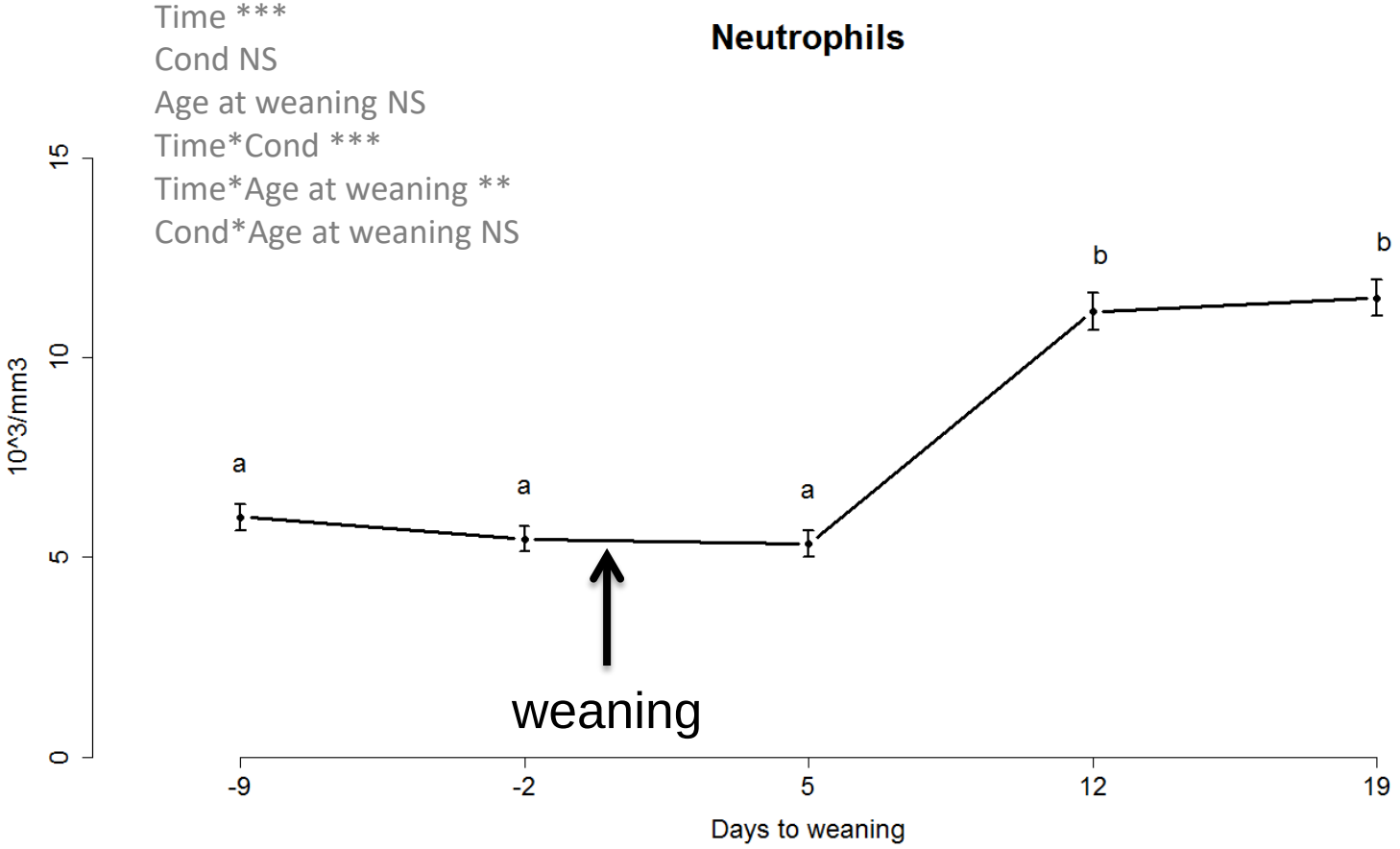
Time ***
Cond NS
Age at weaning NS
Time*Cond NS
Time*Age at weaning NS
Cond*Age at weaning NS



❖ No effect of management conditions

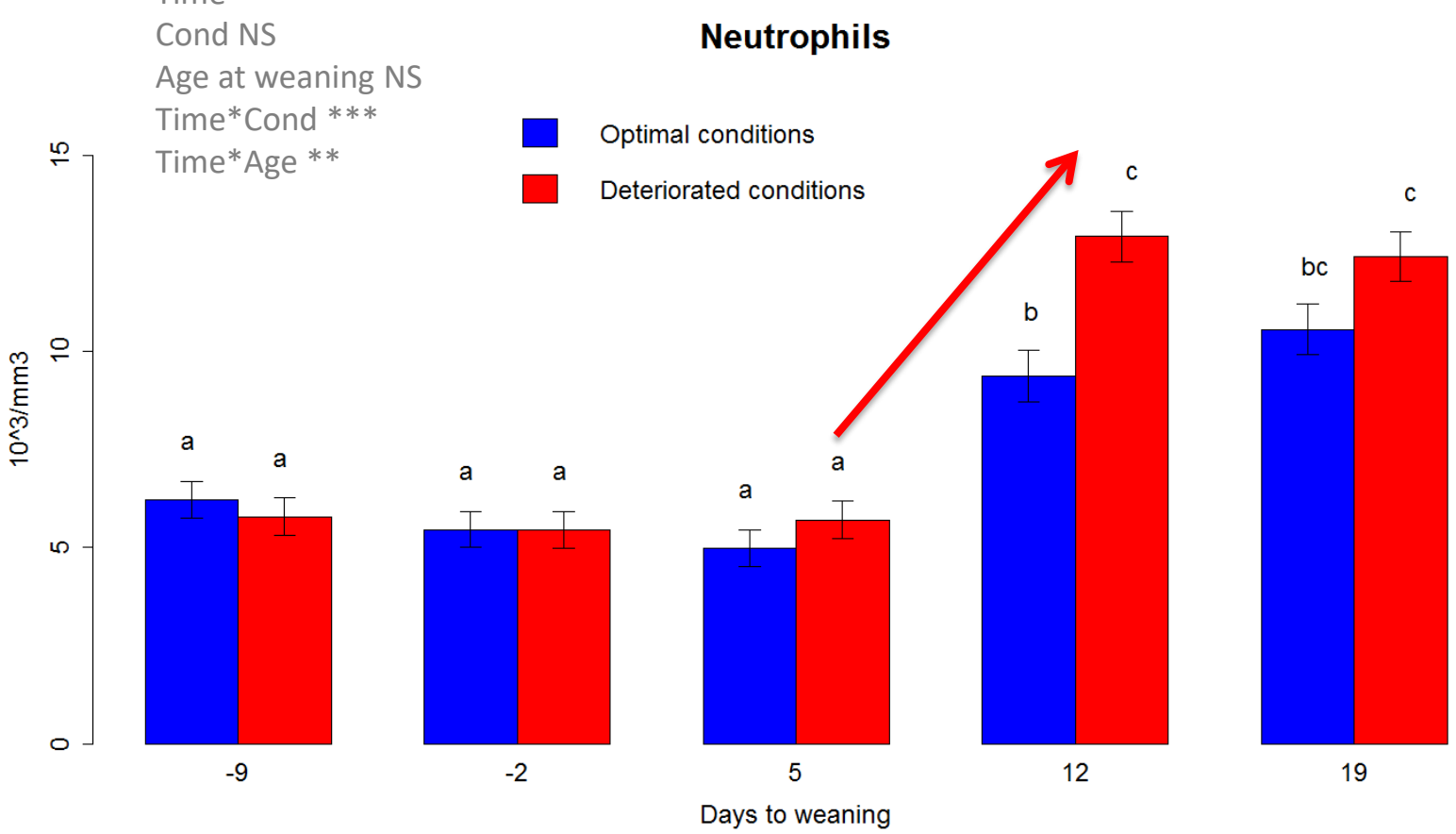
Neutrophils increased at weaning

Time ***
Cond NS
Age at weaning NS
Time*Cond ***
Time*Age at weaning **
Cond*Age at weaning NS



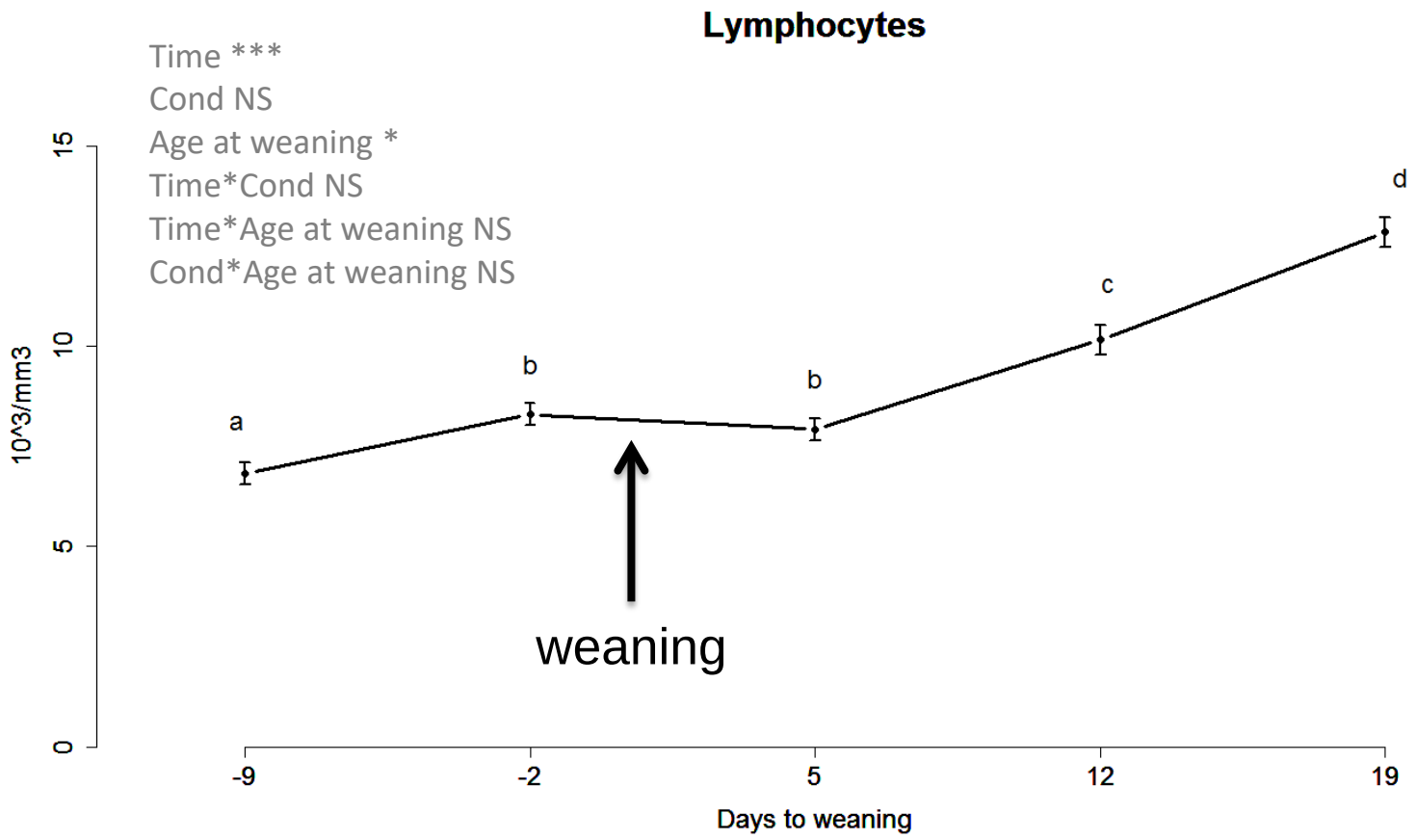
Greater neutrophil increase at weaning in deteriorated conditions

Time ***
Cond NS
Age at weaning NS
Time*Cond ***
Time*Age **



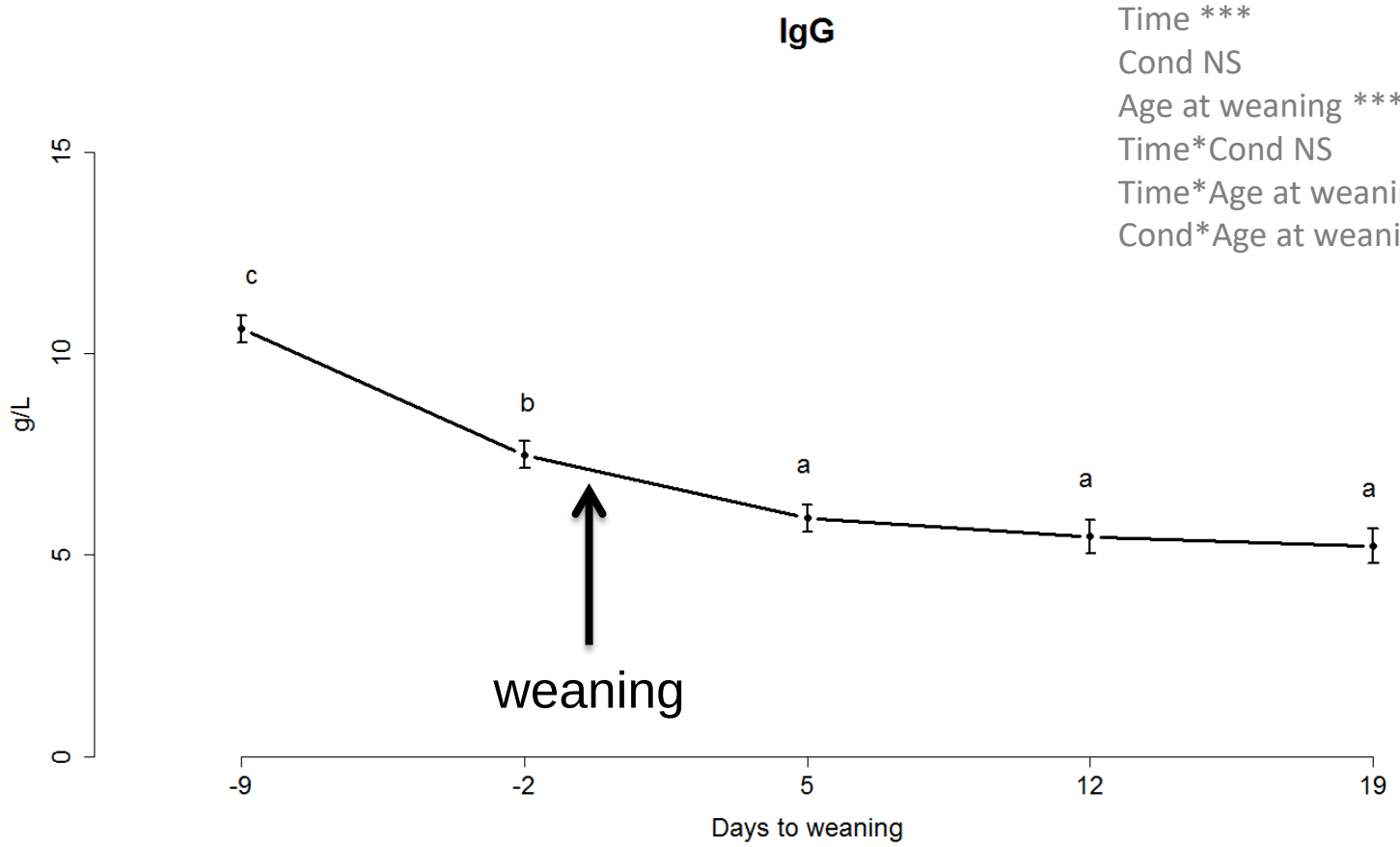
- No effect of age at weaning

Lymphocytes increased at weaning



- No interaction with management conditions nor age at weaning

IgG decreased with age

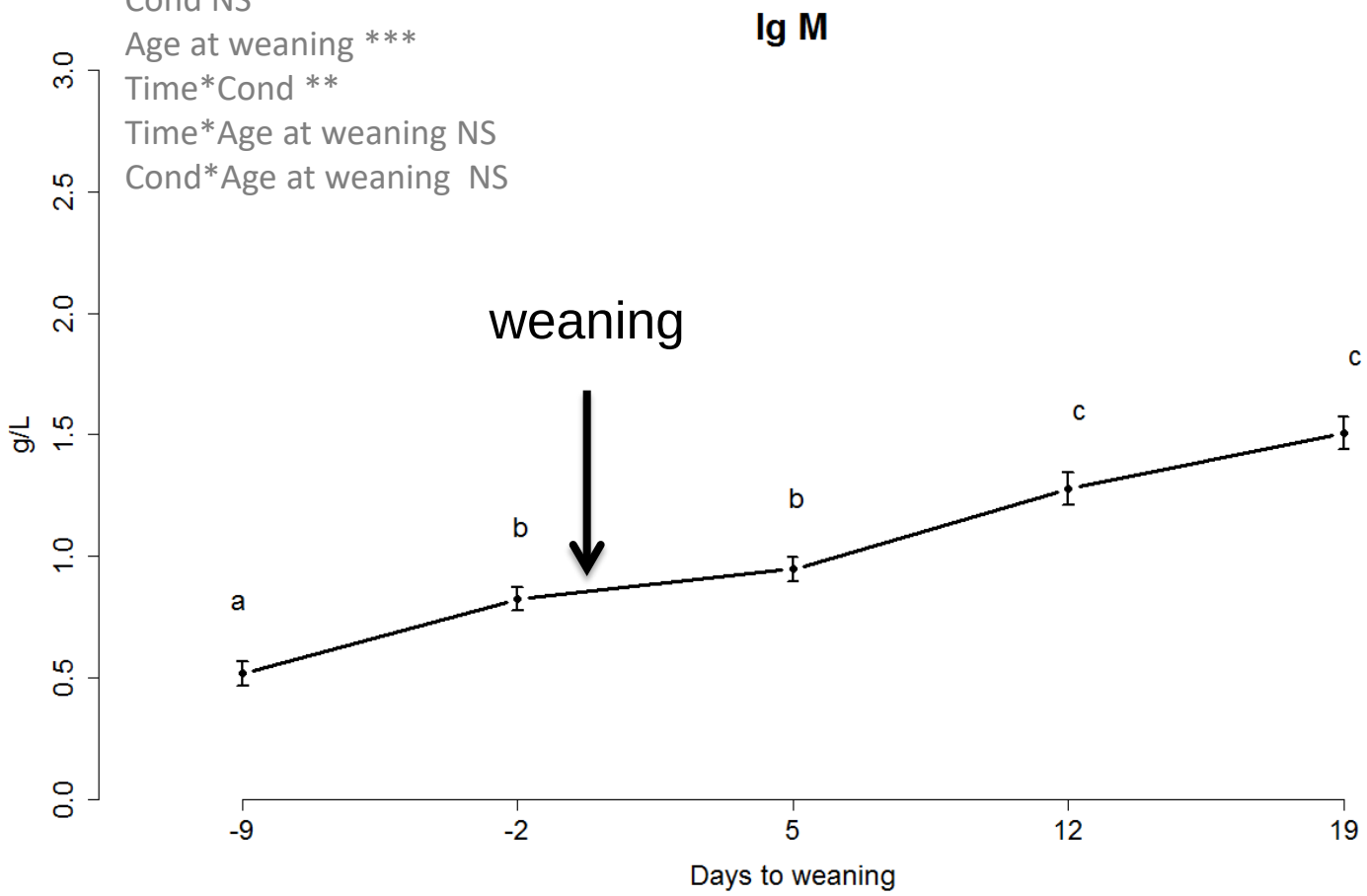


Time ***
Cond NS
Age at weaning ***
Time*Cond NS
Time*Age at weaning ***
Cond*Age at weaning NS

- No interaction with management conditions

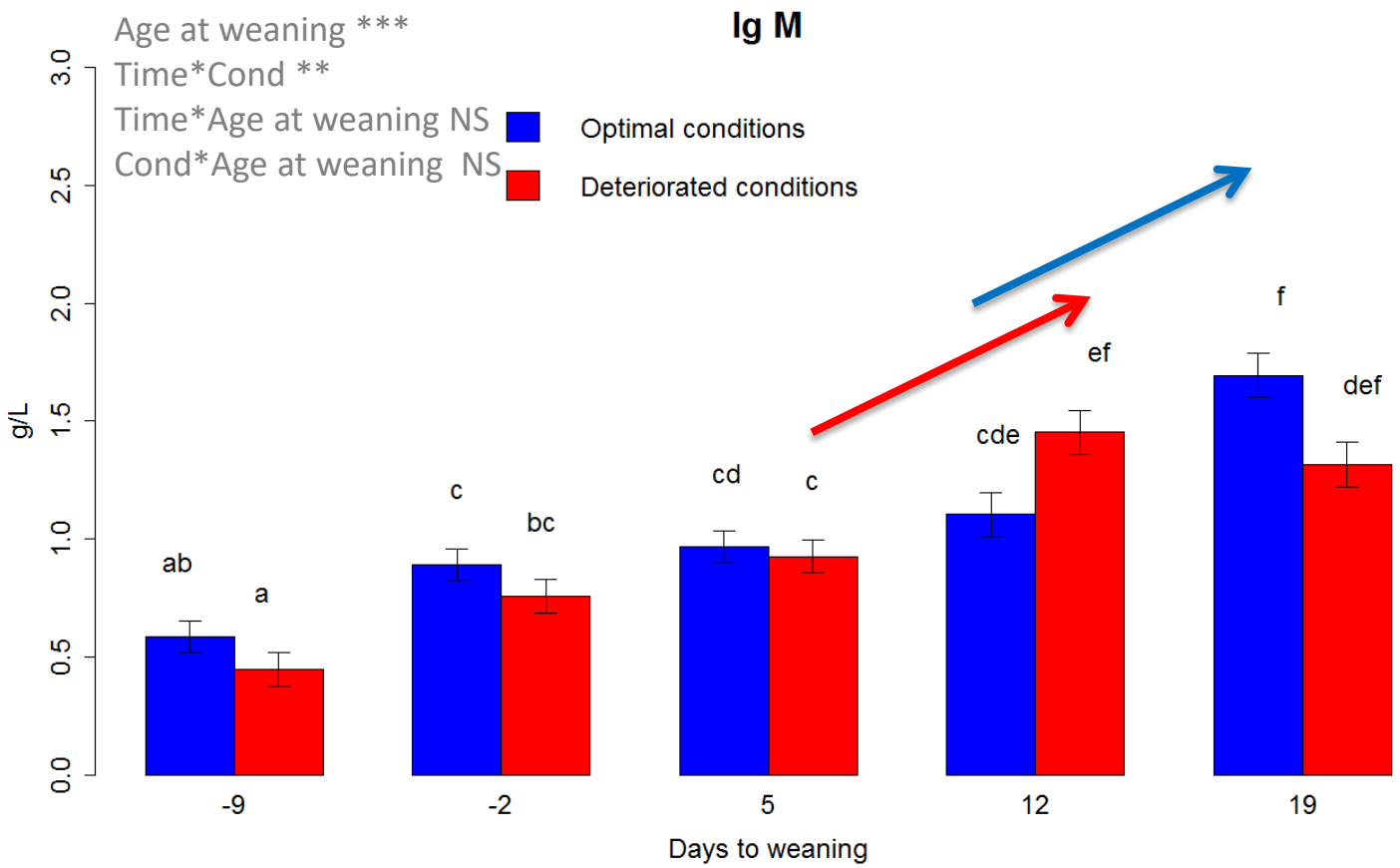
IgM increased with age

Time ***
Cond NS
Age at weaning ***
Time*Cond **
Time*Age at weaning NS
Cond*Age at weaning NS

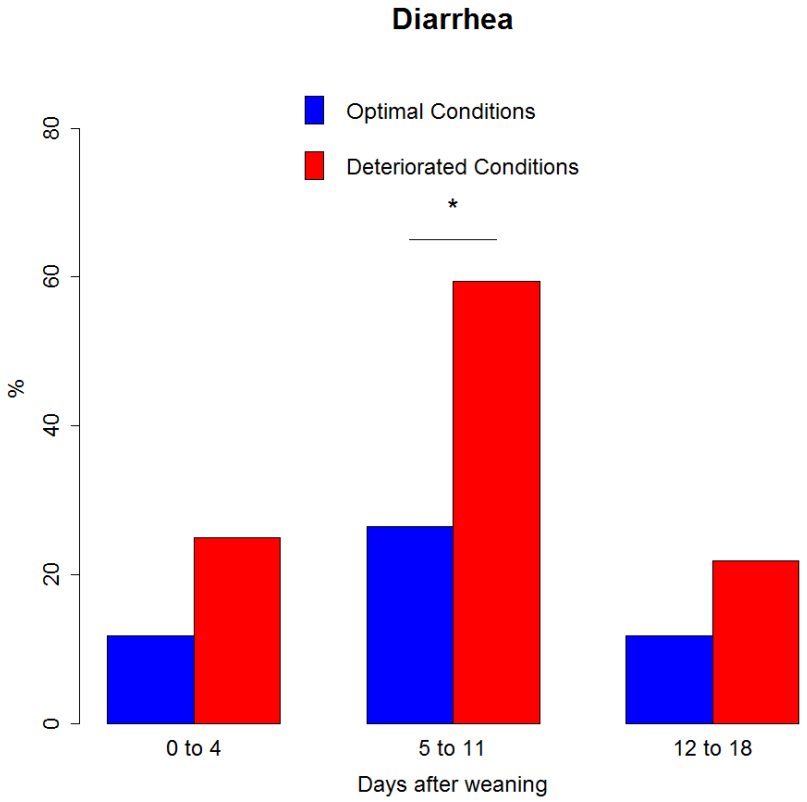


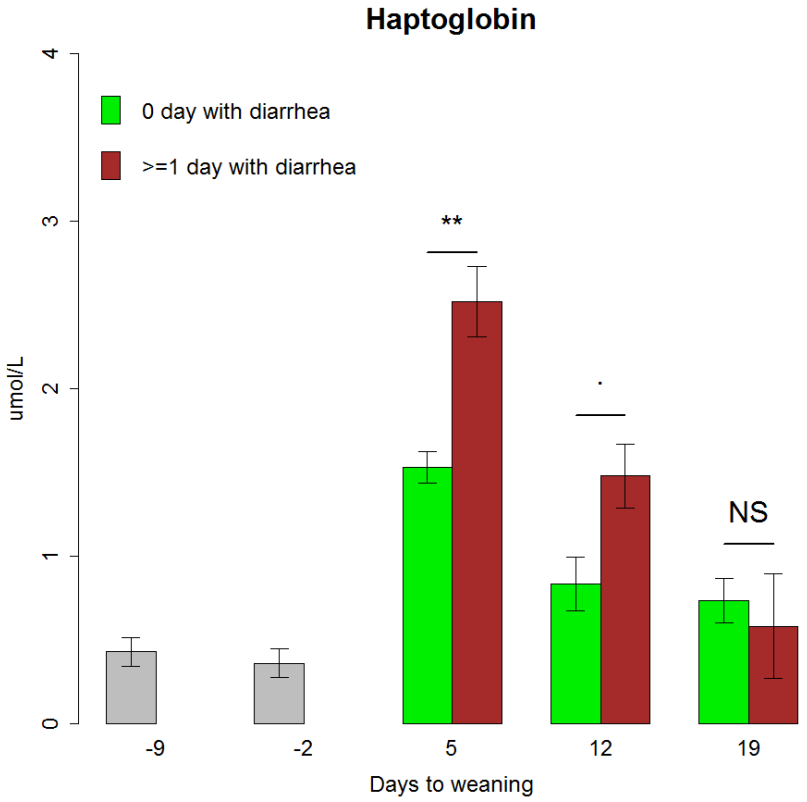
IgM increased earlier for DC piglets

Time ***
Cond NS
Age at weaning ***
Time*Cond **
Time*Age at weaning NS
Cond*Age at weaning NS

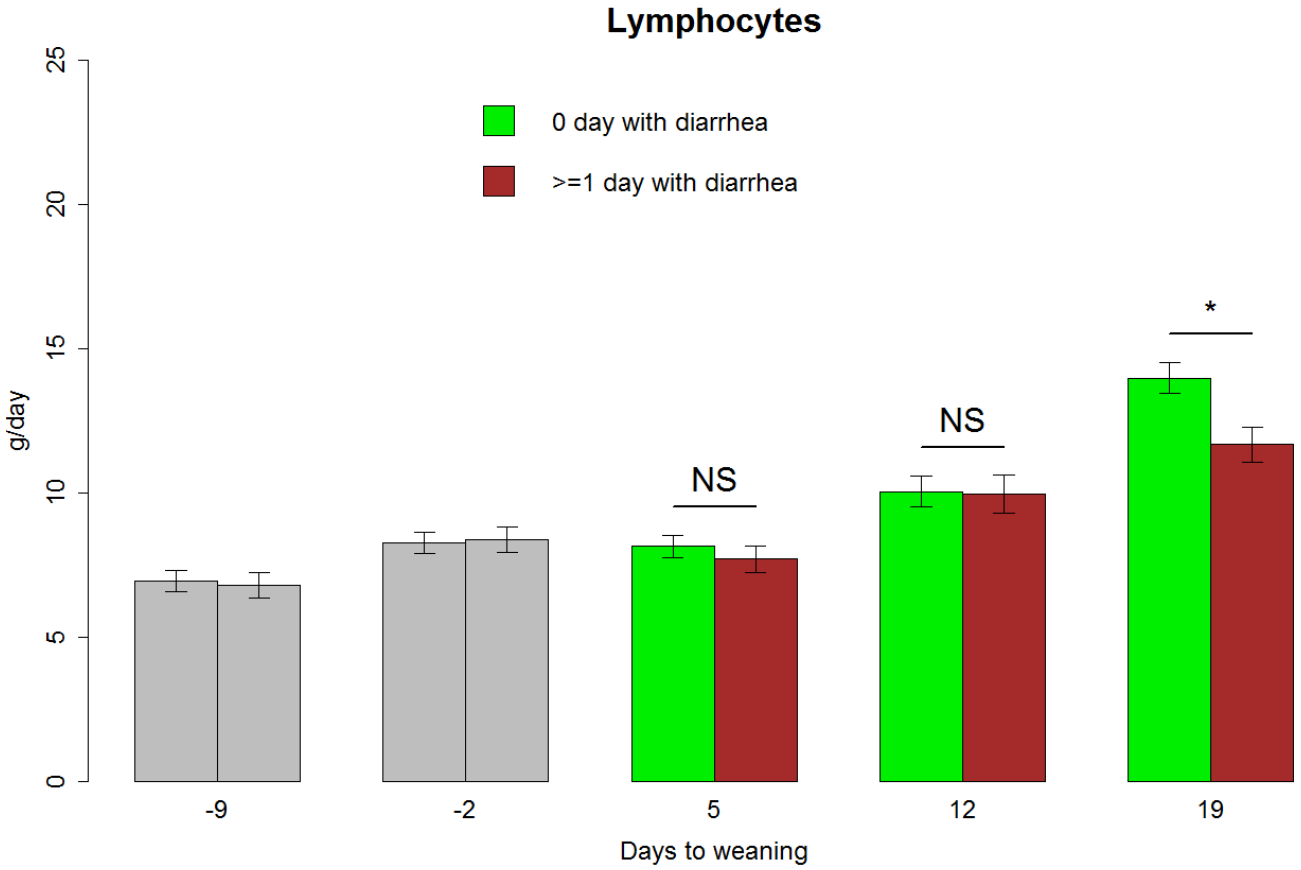


More piglets with diarrhea in deteriorated conditions with higher inflammation



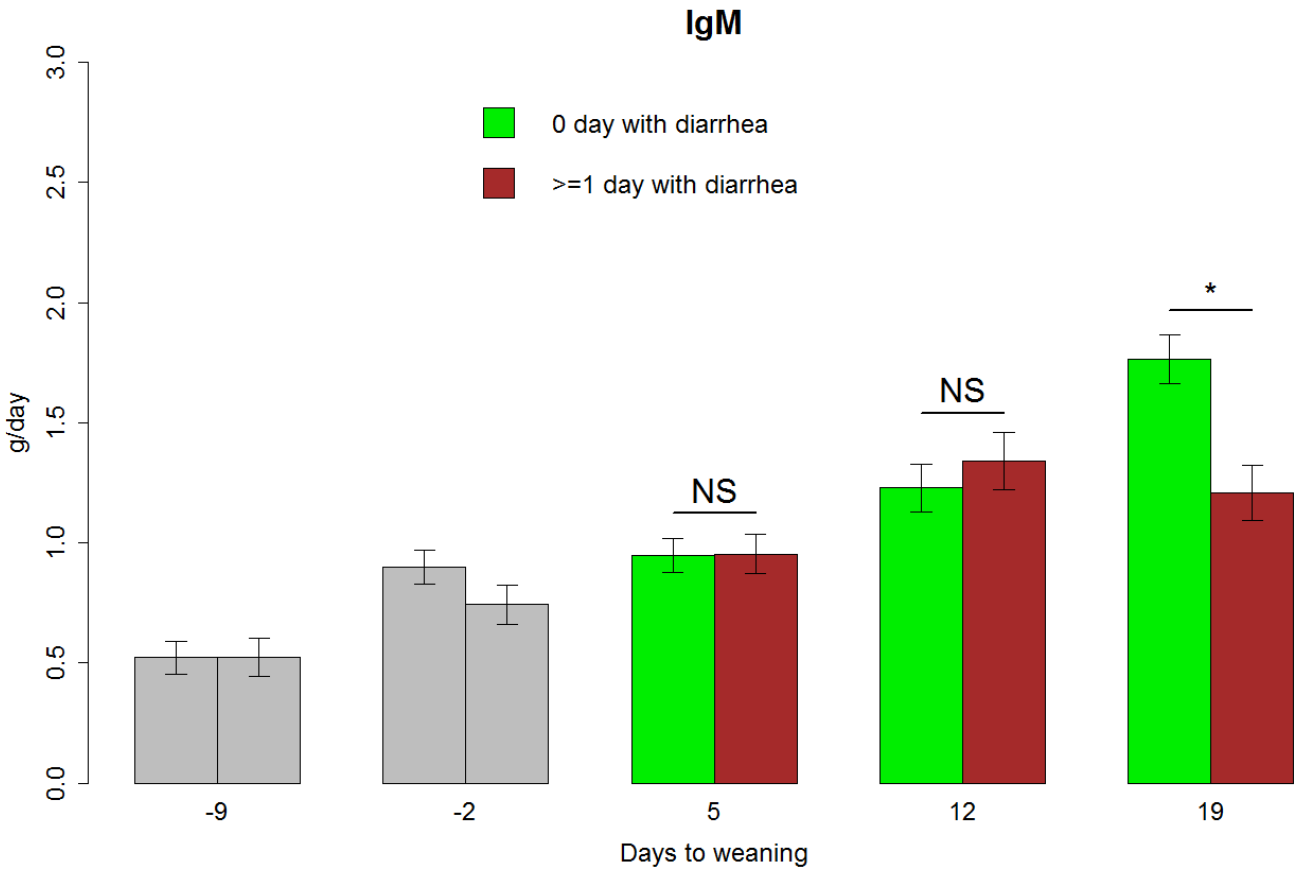


Lower lymphocytes count for piglets which had diarrhea between 5 and 12 days after weaning



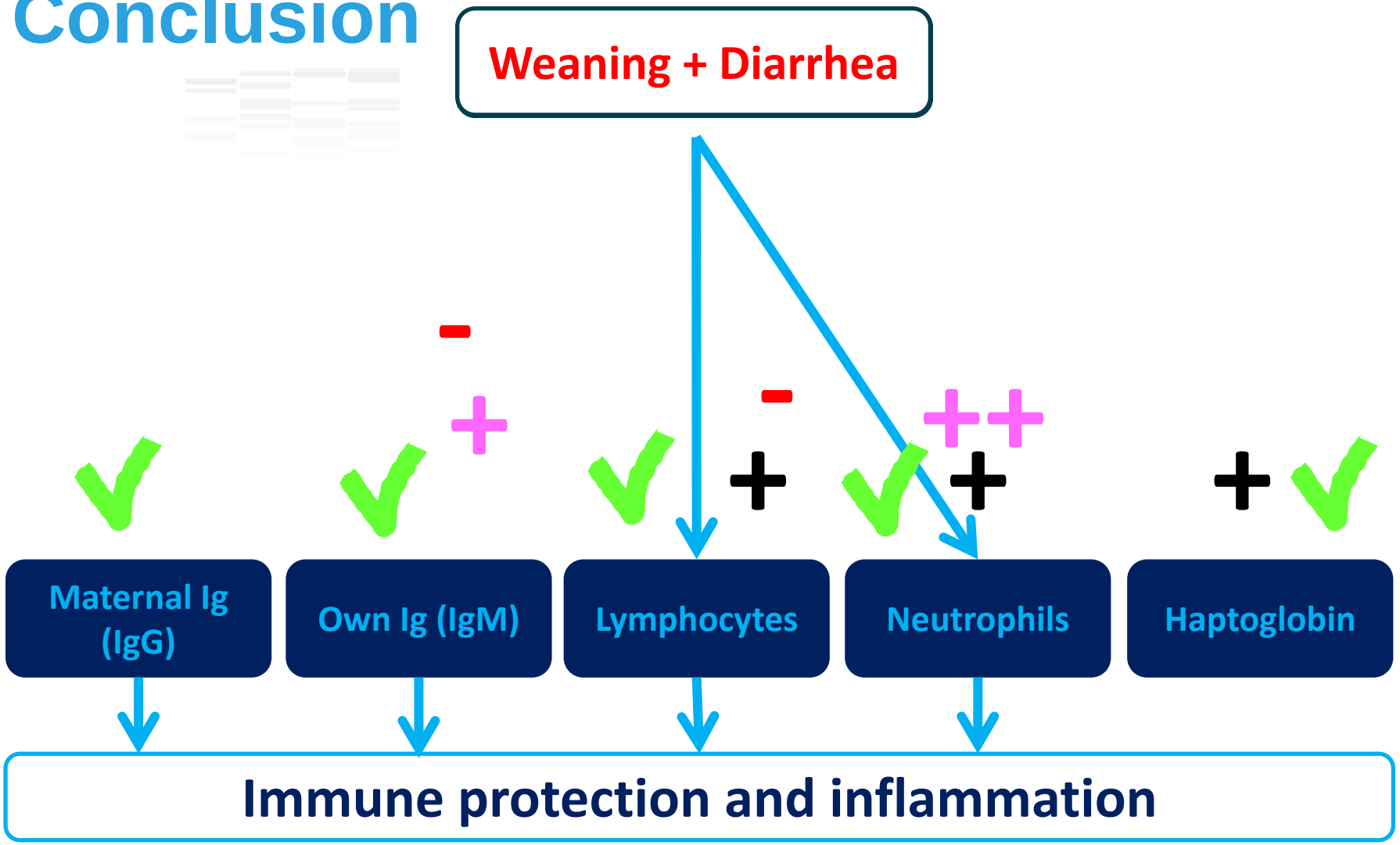
- No effect of diarrhea on neutrophils count

Lower IgM concentration for piglets which had diarrhea between 5 and 12 days after weaning

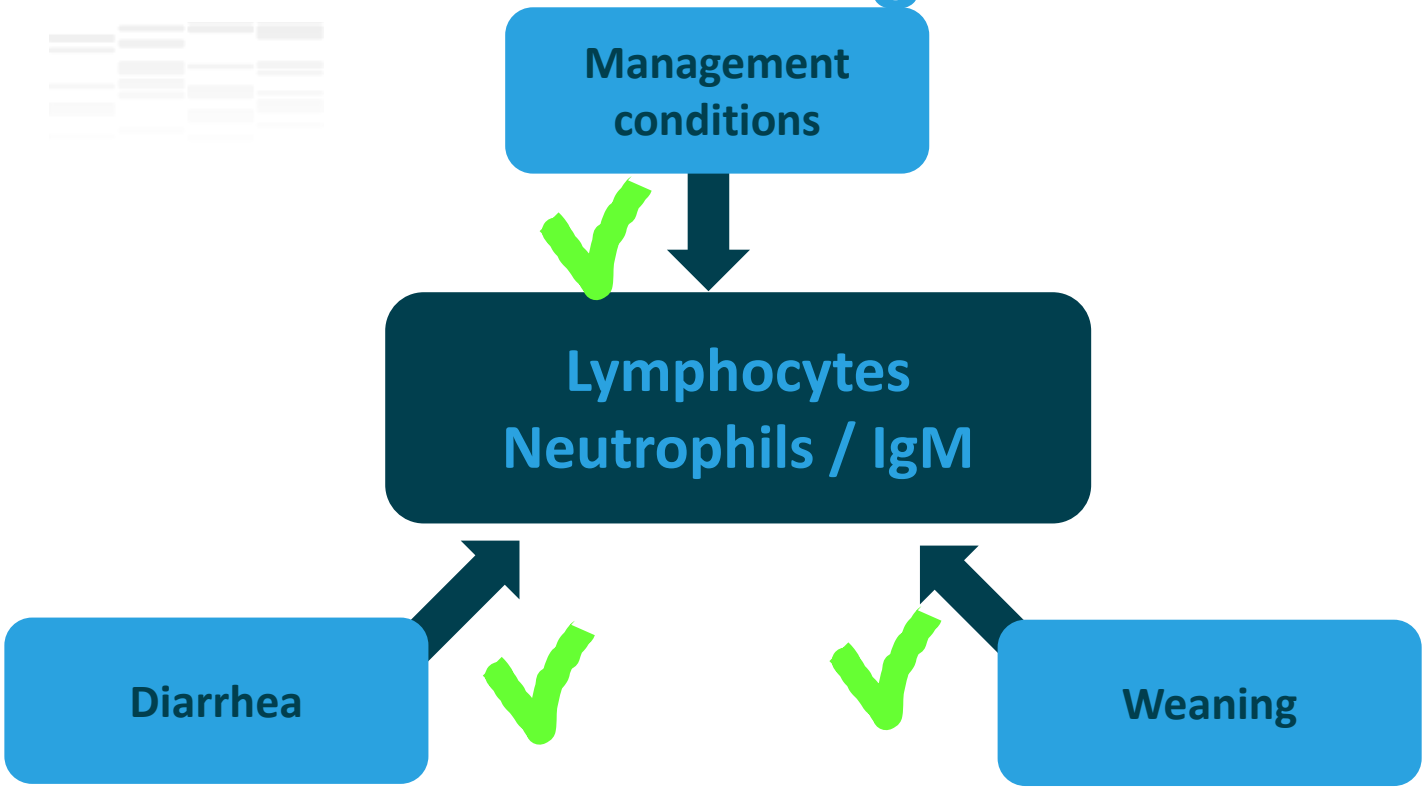


- No effect of diarrhea on IgG concentration

Conclusion


Weaning + Diarrhea
-
+
-
+
++
+
+
Maternal Ig (IgG)
Own Ig (IgM)
Lymphocytes
Neutrophils
Haptoglobin
Immune protection and inflammation

Take home message



There is an opportunity to use those parameters as markers of adaptation to weaning

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