Oral alternatives for intramuscular iron administration in suckling pigs

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Standard: intramuscular injection of iron complexes

Mostly: single parenteral injection of iron dextran (200 mg Fe^{3+})

laborious, time consuming, injection site reactions, risk of disease transmission, risk for overdosing

under discussion in organic pig farming

Alternatives?

- Through sow's diet
- Oral route: via drinking water, oral iron paste or feed

Options: different iron sources, forced versus voluntary intake

Comparison of standard iron injection with different methods of oral iron supplementation on

- Iron status (hemoglobin levels at weaning)
- Growth performance (during lactation, post-weaning and long-term effects)
- Carcass quality

5 treatments

1) IM: intramuscular injection at d3
   1 mL of a 200 mg/ml iron dextran complex

Ad libitum access to O1, O2 and O3 between d3-d12

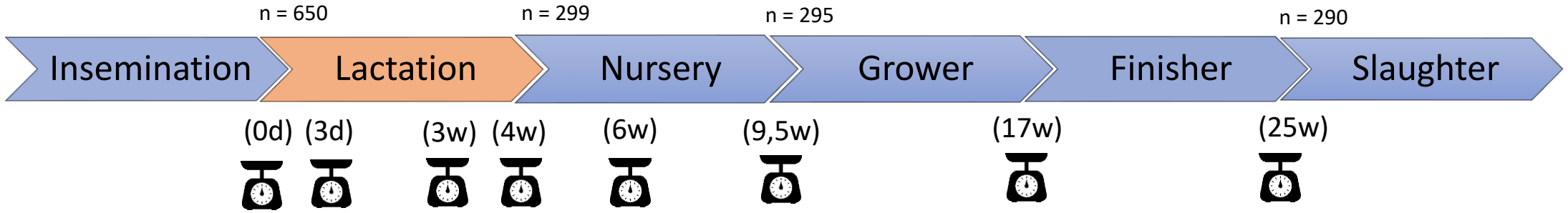
2) O1: mineral powder (Lava rock dust, Orgamé)
   10-12% Fe_2O_3

3) O2: Farmafer (Farm'apro)
   22.5% ferrous sulphate

4) O3: Hemoral (Agro Logic)
   24% iron in a mixture of ferrous fumarate, ferrous glycine chelate, ferrous amino acid chelates and ferrous sulphate

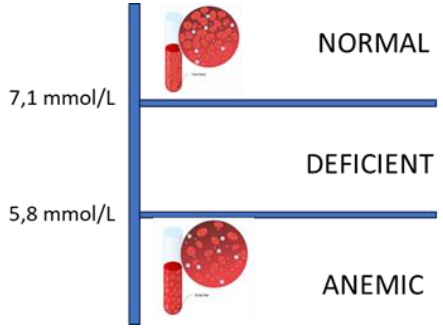
5) O3 APPLE: blend of Hemoral with applesauce (1:2 ratio)
   individually administered via a syringe at d3, d5, d7, d10, and d12 to provide each piglet ± 10 g of Hemoral in total

650 piglets from 46 litters; 9 (or 10) litters/treatment



Body weight and feed intake

Hemoglobin level

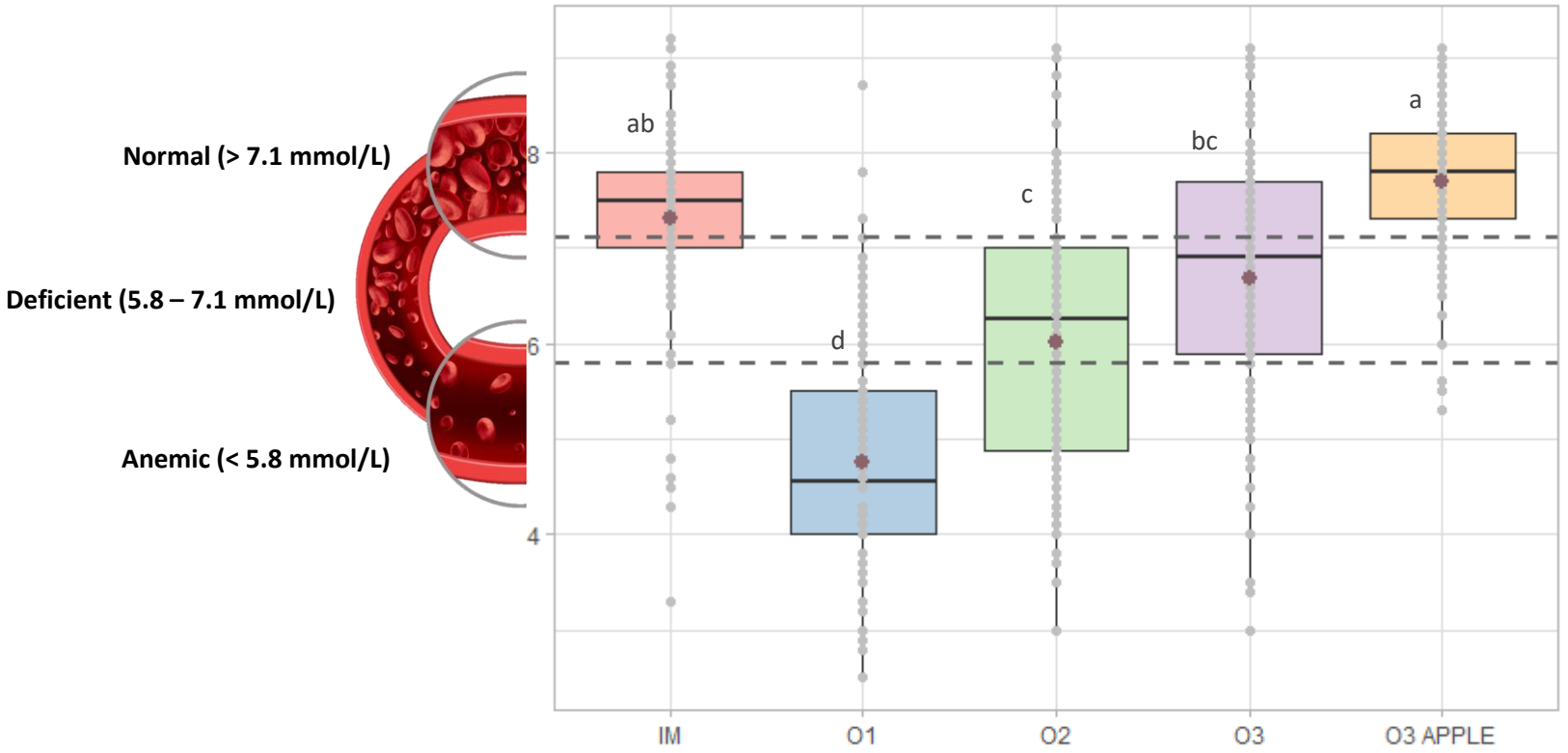


Carcass data

No clear association between iron supplementation and mortality during lactation

number of piglets	born alive	weaned	died
Intramuscular injection	128	119	9
O1	123	116	7
O2	128	120	8
O3	127	118	9
O3 apple	144	135	9
total	650	608	42

Hemoglobin level (mmol/L) at weaning



	IM	O1	O2	O3	O3 APPLE
n	119	112	119	116	134
Normal (%)	68.9	3.6	19.3	43.1	79.1
Deficient (%)	26.1	20.5	39.5	35.3	18.7
Anemic (%)	5.0	75.9	41.2	21.6	2.2

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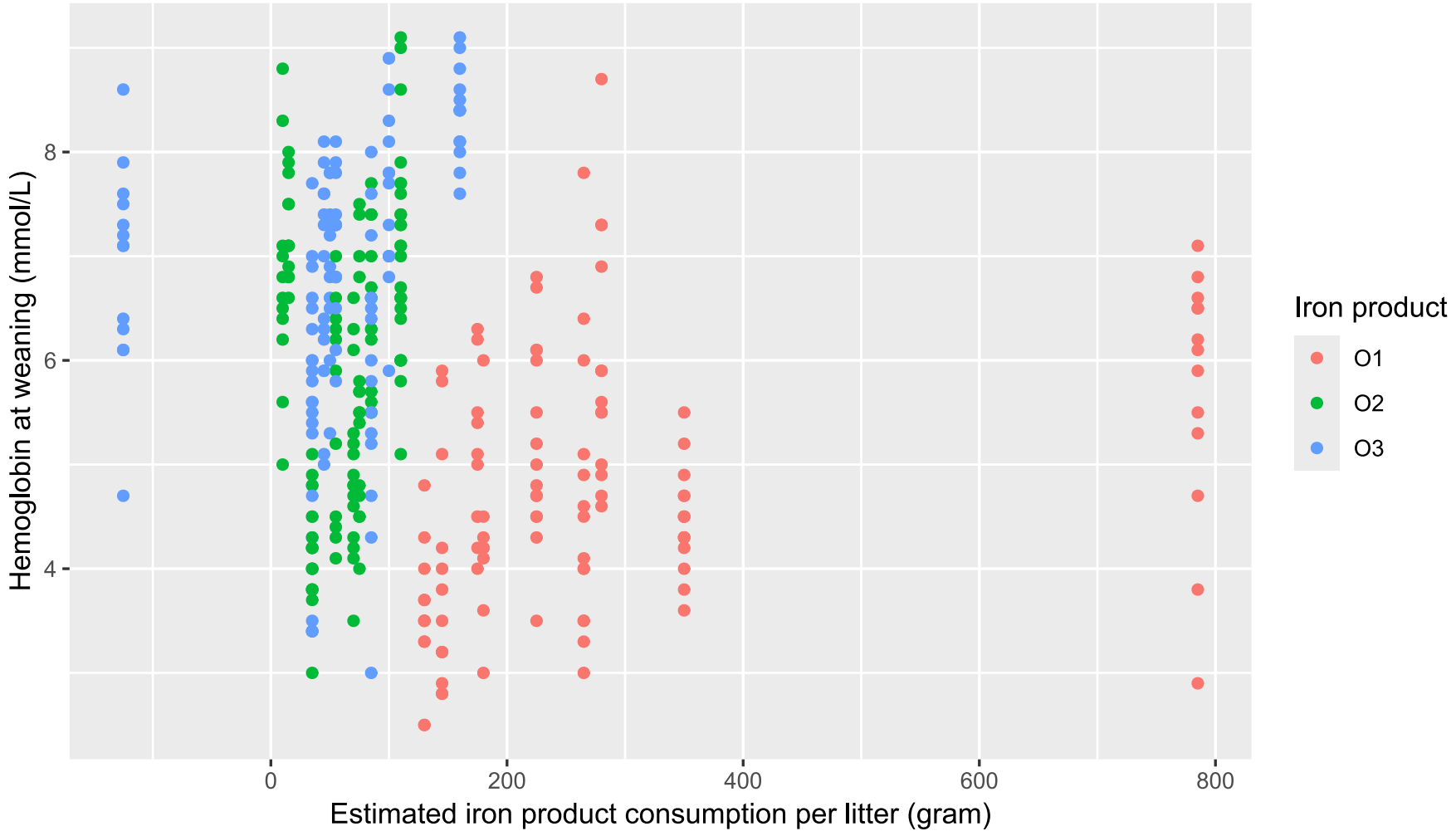
Hemoglobin level was not related to “iron intake”



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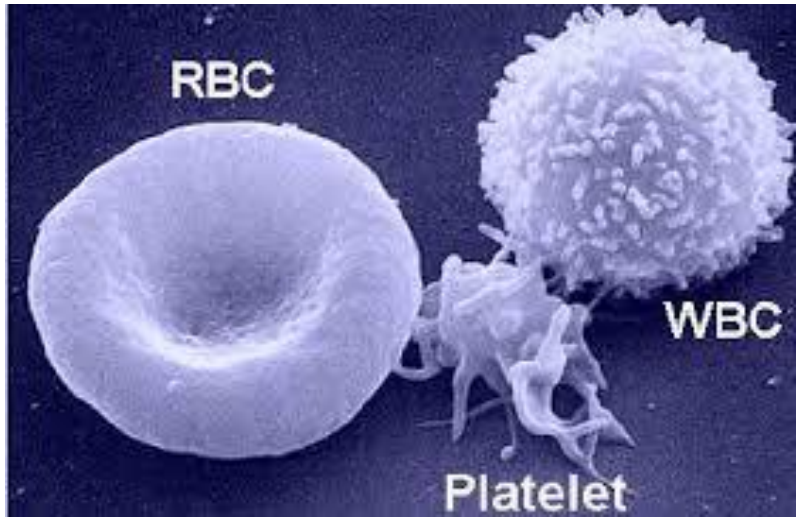
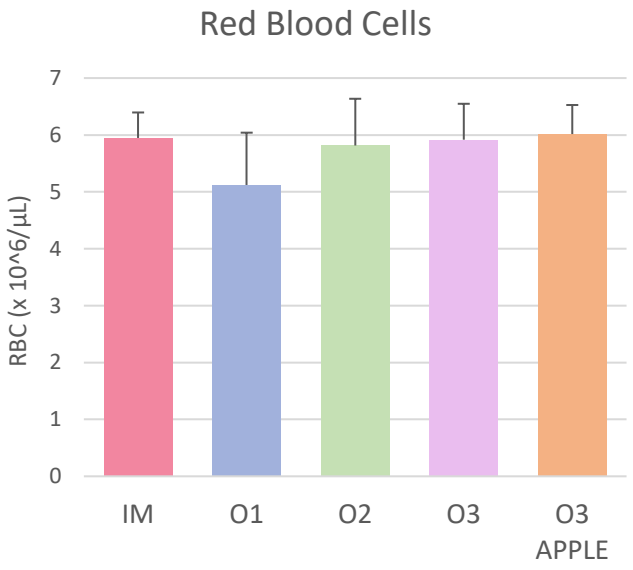
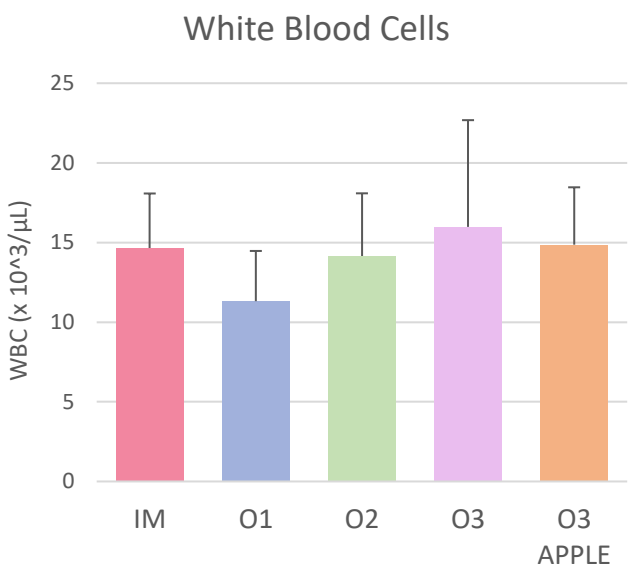
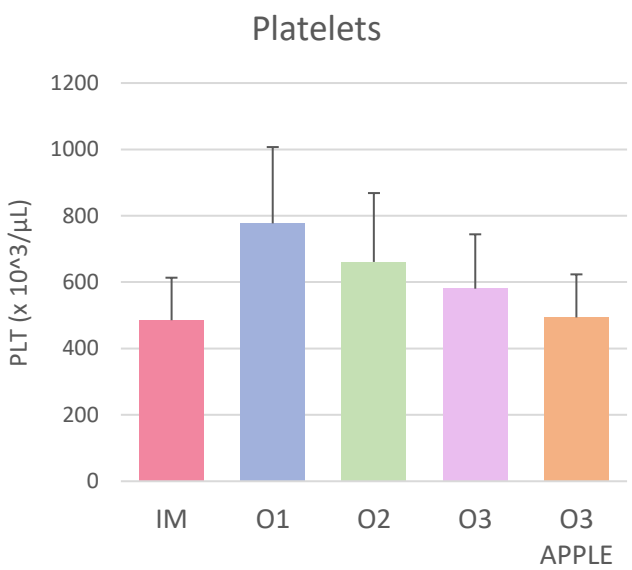
Hematology profile at weaning









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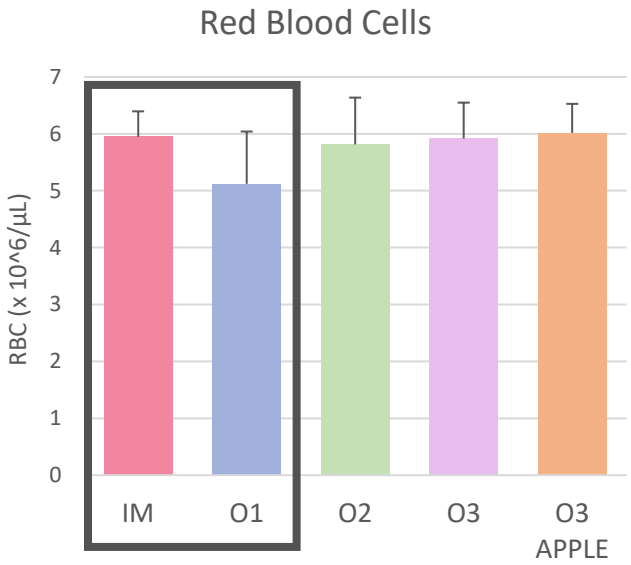
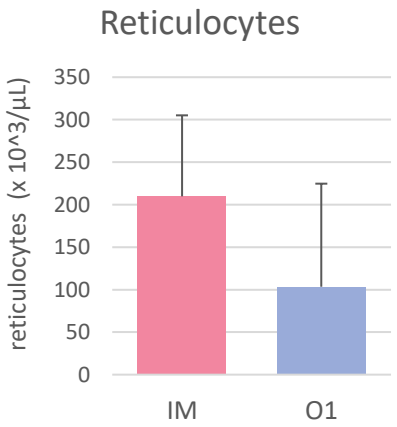
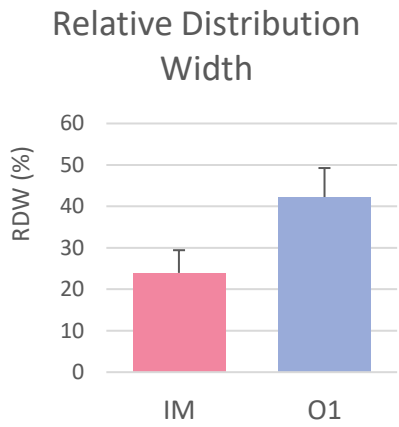
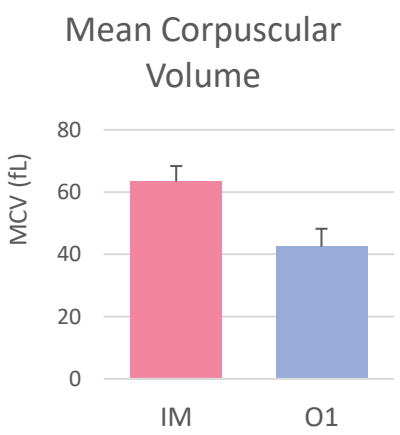
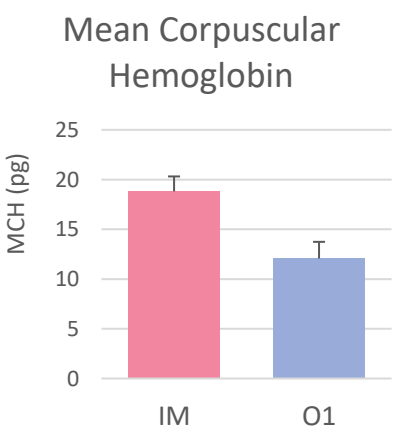
Less, smaller and hypochromic RBC in O1 piglets

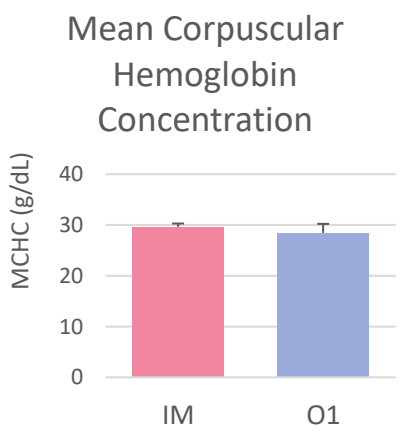












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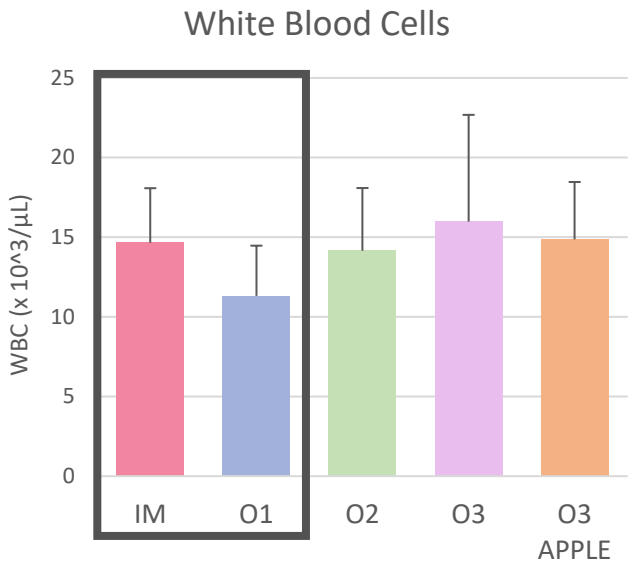
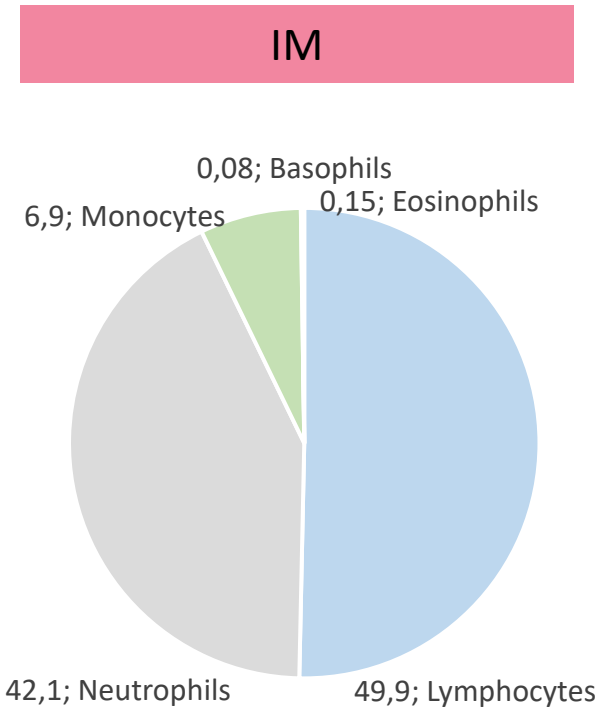
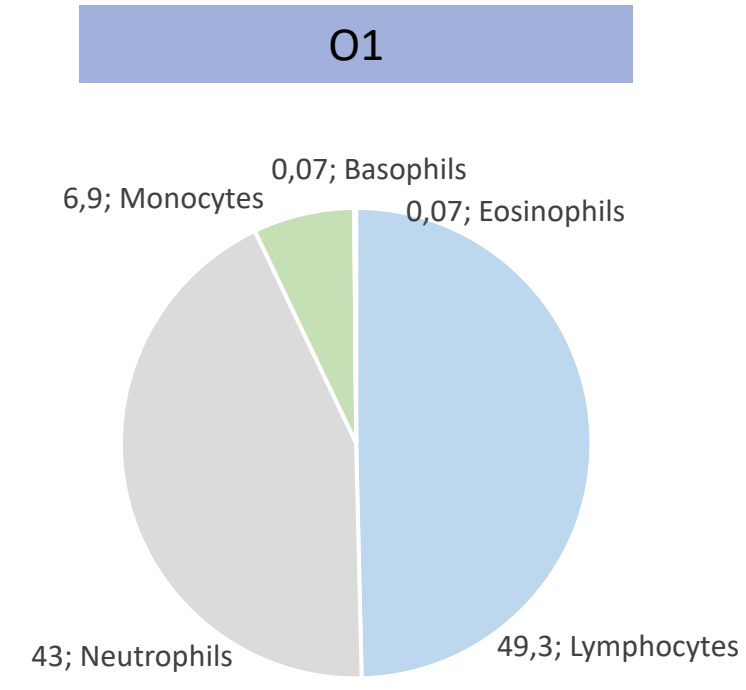
Less but similar proportions of WBCs







Growth performance was minimally affected

		IM	O1	O2	O3	O3 APPLE	p-value
	BW (kg)						
	d28 (*n = 600*)	8.0	7.7	7.4	8.1	8.0	NS
	d70 (*n = 299*)	25.8	24.5	24.9	24.3	25.7	NS
	d119 *(n = 295)*	70.0	67.6	69.8	68.2	69.5	NS
	Final weight, d175 (*n = 295)*	121.6	118.4	121.4	120.0	120.5	NS
	Average daily gain (g/d)						
Lactation	d0-d28 (*n = 600*)	238	230	217	240	232	NS
Lactation	d21-d28 (*n = 600*)	298	287	262	312	293	NS
Nursery	d28-d70 (*n = 299*)	438	407	432	404	438	NS
Nursery	d28-d42 (*n = 299*)	137 ^{ab}	122 ^{b}	139 ^{ab}	125 ^{b}	176 ^{a}	**0.025**
Nursery	d42-d70 (*n = 299*)	578	540	571	532	560	NS
Grower - finisher	d70-d175 (*n = 295)*	959	935	969	956	953	NS
Grower - finisher	d70-d119 (*n = 295)*	889	863	904	883	880	NS
Grower - finisher	d119-d175 (*n = 295)*	1027	1006	1032	1027	1025	NS

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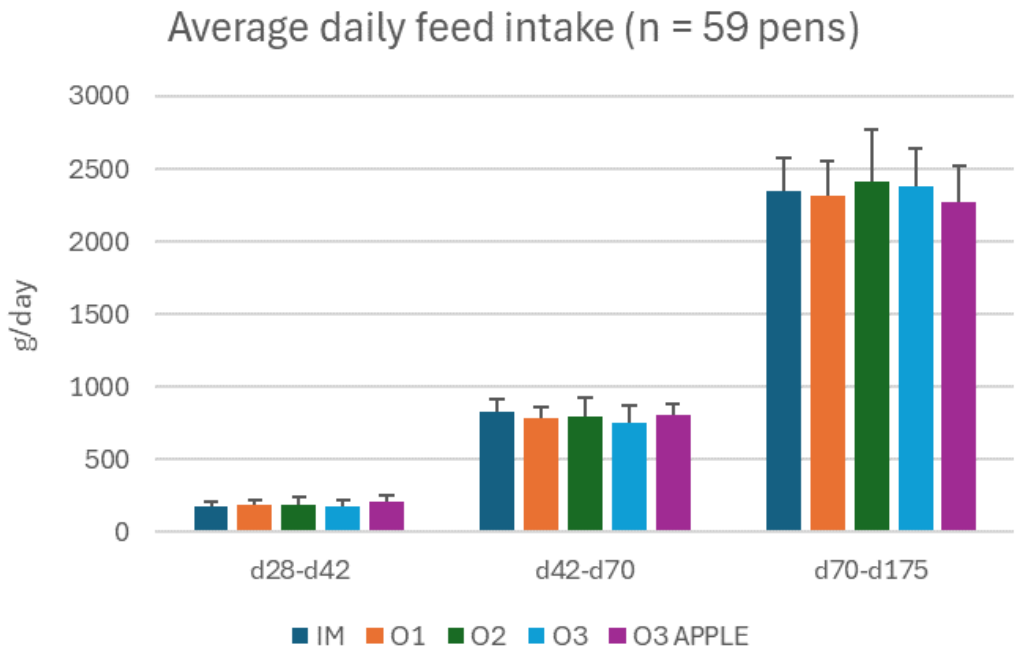
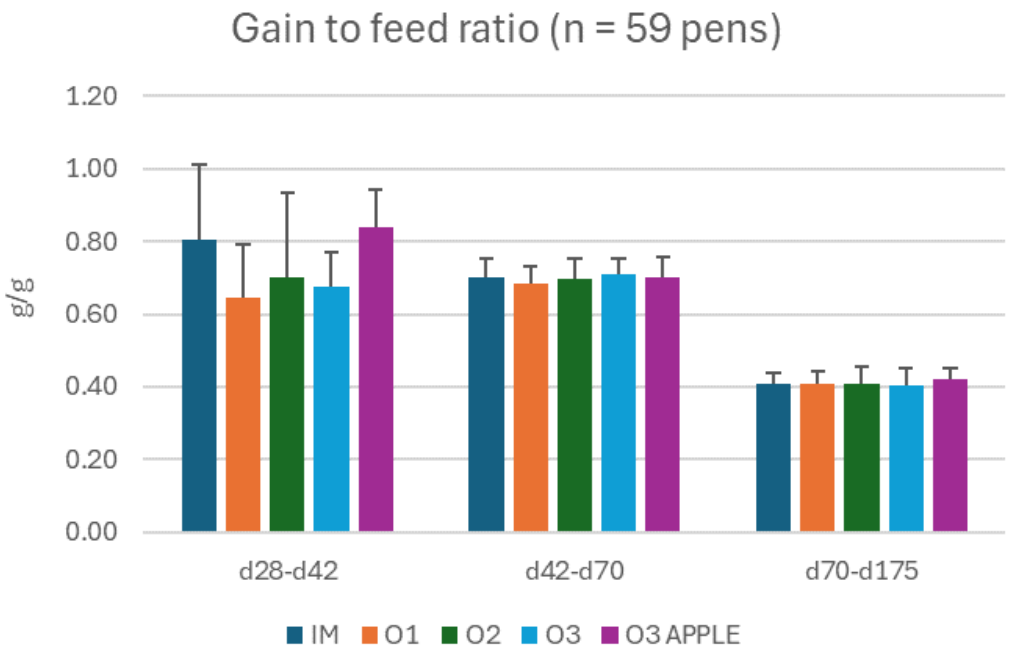
Feed intake and feed efficiency were not affected





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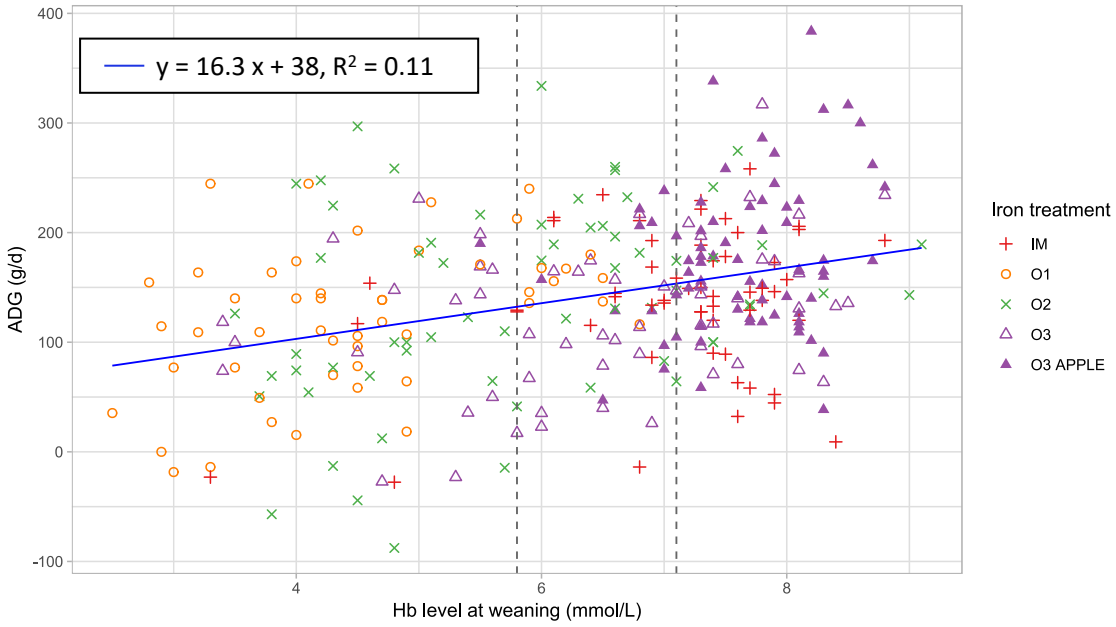
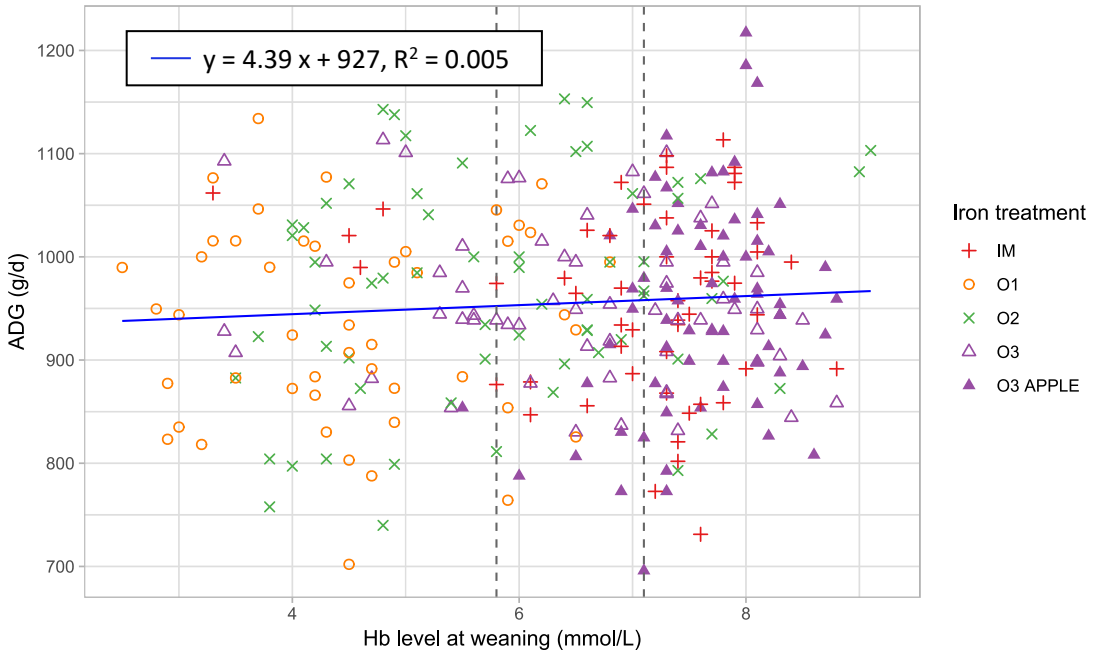
Association between iron status & growth performance

Early post-weaning (d28-42)



Grower and fattening (d70-175)



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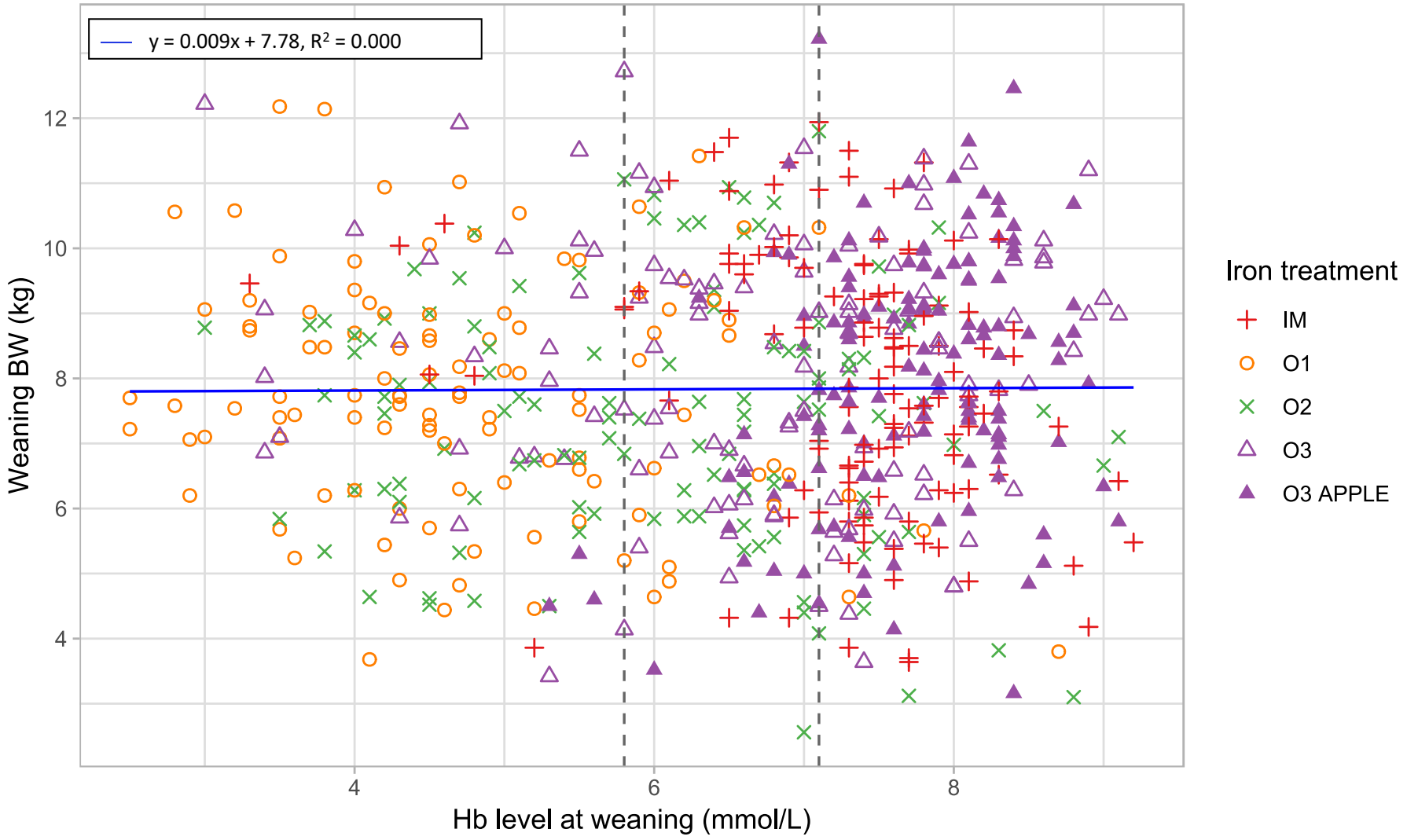
No association between iron status and weaning BW



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No effect on carcass quality

	IM	O1	O2	O3	O3 APPLE	p-value
Cold carcass weight (kg)	92.6	90.8	93.8	91.8	93.0	NS
Dressing yield (%)	79.7	79.7	79.6	79.1	79.5	NS
Lean meat content (%)	62.9	63.1	62.2	62.2	62.8	NS
Daily lean meat gain (g/d)	460	455	469	456	465	NS

Conclusion

Can orally administering iron achieve an iron status comparable to that achieved by standard injection?

Yes, the administration of hemoral (O3) through voluntary or forced intake resulted in Hb levels comparable to those achieved with the standard injection.

What is the effect of iron treatments on growth performance, overall health and carcass quality?

Growth performance and carcass quality remained unaffected by the iron treatments (except for the early post-weaning period). However, the reduced RBC and WBC counts in anemic piglets may indicate compromised immune resilience, suggesting a potential vulnerability to infections.

Thank you!

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