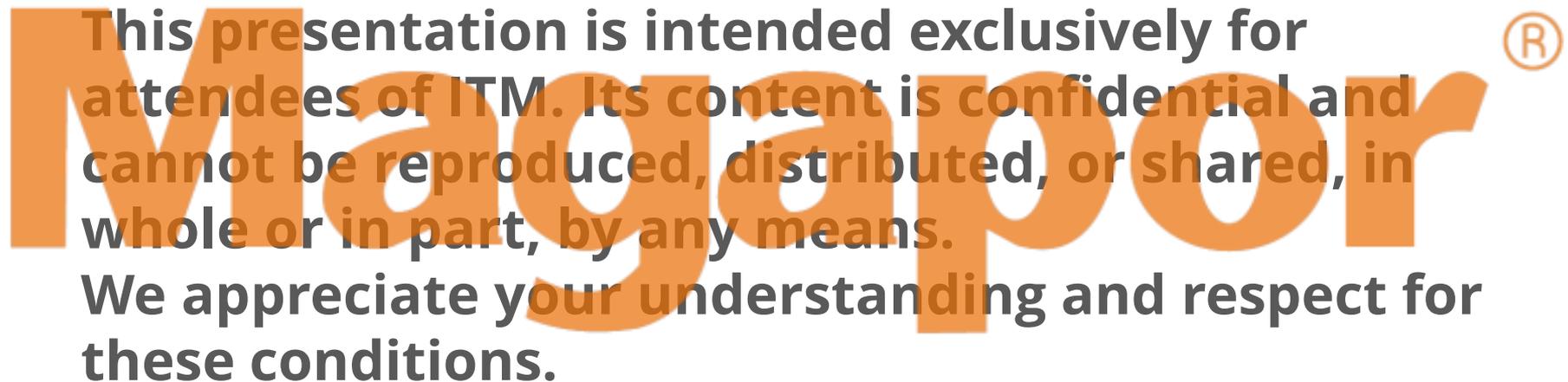




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Hemoglobin level in weaned pigs

Michael Aksel Ellermann

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ABOUT GREENFEED

GREENFEED is a leading Agri-Food corporation in Vietnam with an integrated food chain 3F Plus (Feed - Farm - Food) that brings “Goodness from farm to table”. Since our founding in 2003, we have remained committed to building quality and trusted brands that relentlessly innovate and create sustainable values for customers and society.

With a network of dozens of internationally certified factories and farms across Vietnam, Laos, Cambodia, and Myanmar, GREENFEED strives to become a leading, effective, and trusted brand across the food value chain globally, accompanied with technological advancements.

Integrated value
supply chain
model



OPERATION NETWORK

FARM

- 36 PIG FARMS
- 5 POULTRY FARMS

AQUA

- 3 AQUACULTURE FARMS

FEED

- 9 ANIMAL FEED FACTORIES in Vietnam, Laos, Cambodia and Myanmar

VET

- 1 VETERINARY MEDICINE FACTORY

FOOD

- 2 FOOD PROCESSING FACTORIES
- 19 MEAT SHOPS
- 20,000+ SALES POINTS across 48 provinces and cities nationwide

INTERNATIONAL STANDARD QUALITY MANAGEMENT SYSTEM





A FOOD CHAIN OF GOODNESS FROM FARM TO TABLE

ANIMAL FEED



Livestock Feed | 3-Pillar Integrated Solutions | Veterinary Medicine

LIVESTOCK FARM

GF24 GF399 GF337

Farm Model | Livestock Breeding Stock | Boar Semen | Livestock Commercial Business

FOOD



AQUACULTURE



Aqua Feed | Aqua Farm & Breeds | Aqua Food | Exports

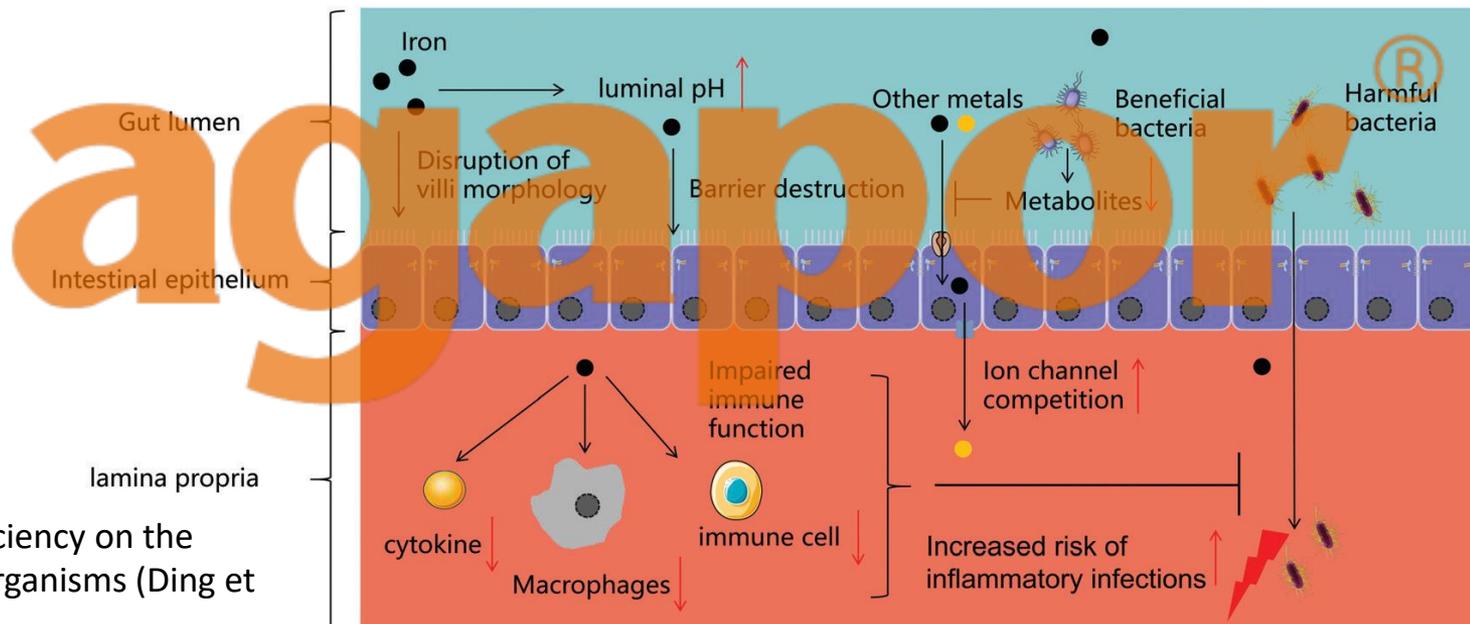
PLUS



Magapor®

- Biological function: bind and transfer oxygen, DNA synthesis, involve in redox reactions
- Hb / red blood cells synthesis
- Involve in immune system
 - Proliferation and differentiation of immune cells
 - Gut health

M



The effect of iron deficiency on the intestines and microorganisms (Ding et al., 2020)

- **Neonatal piglets:**

- Storage: 50 – 60 mg
- Need 7 – 16mg Fe/day --> weight gain 200 – 250g/day

- Piglets can receive up to 1 mg Fe daily from milk

- Selection for reproductive traits: exceed physiological potential of sows to provide sufficient iron to piglets

- In modern husbandry, piglets cannot receive a natural Fe source

- Iron supplementation in suckling piglets is necessary

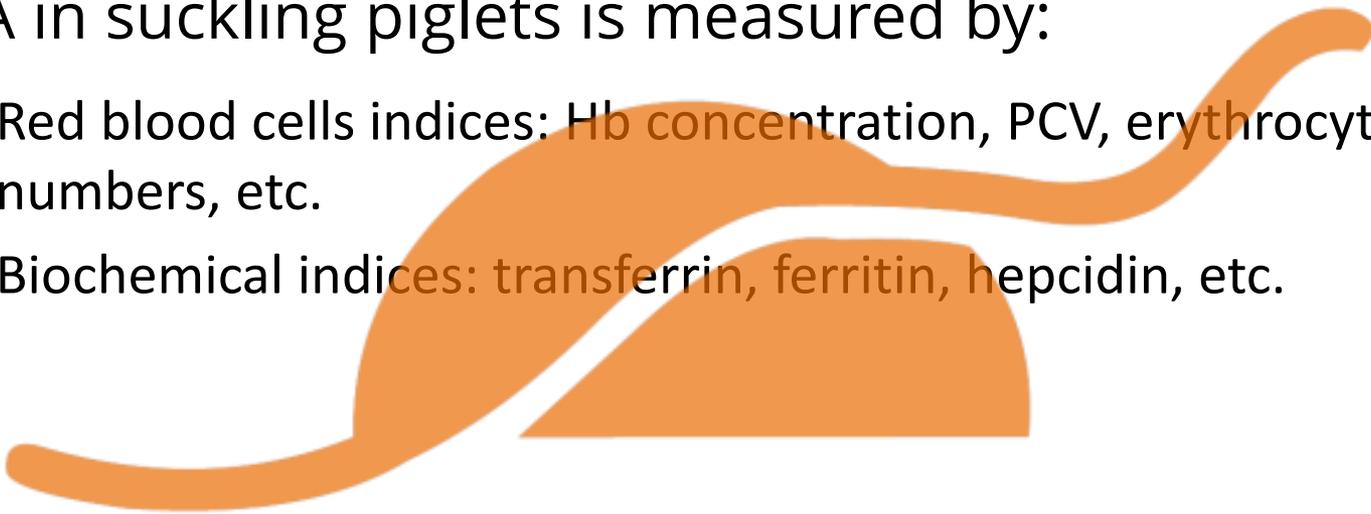
A top PIC L03 multiplier producing Camborough litters, 2014



- Without iron supplementation, piglets will develop anemic clinical signs at 7 – 10 days after birth
- Dose: iron dextran 200 – 400 mg Fe/piglet
- Iron toxicity:
 - Overdosing
 - deficient in antioxidants (vit E, Se)
 - limited amount of vit E transported via placenta
 - 1-day-old piglets more sensitive to iron poisoning

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- IDA in suckling piglets is measured by:
 - Red blood cells indices: Hb concentration, PCV, erythrocyte numbers, etc.
 - Biochemical indices: transferrin, ferritin, hepcidin, etc.

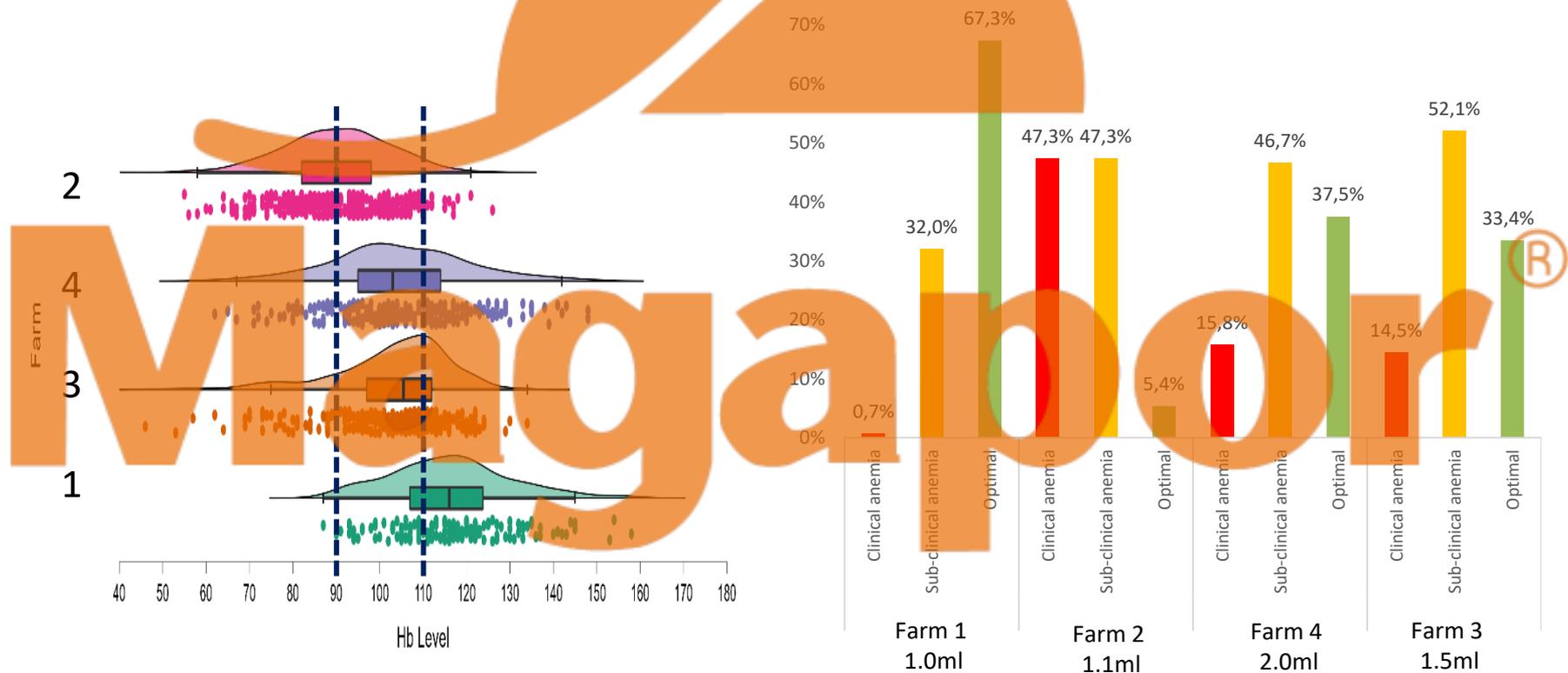


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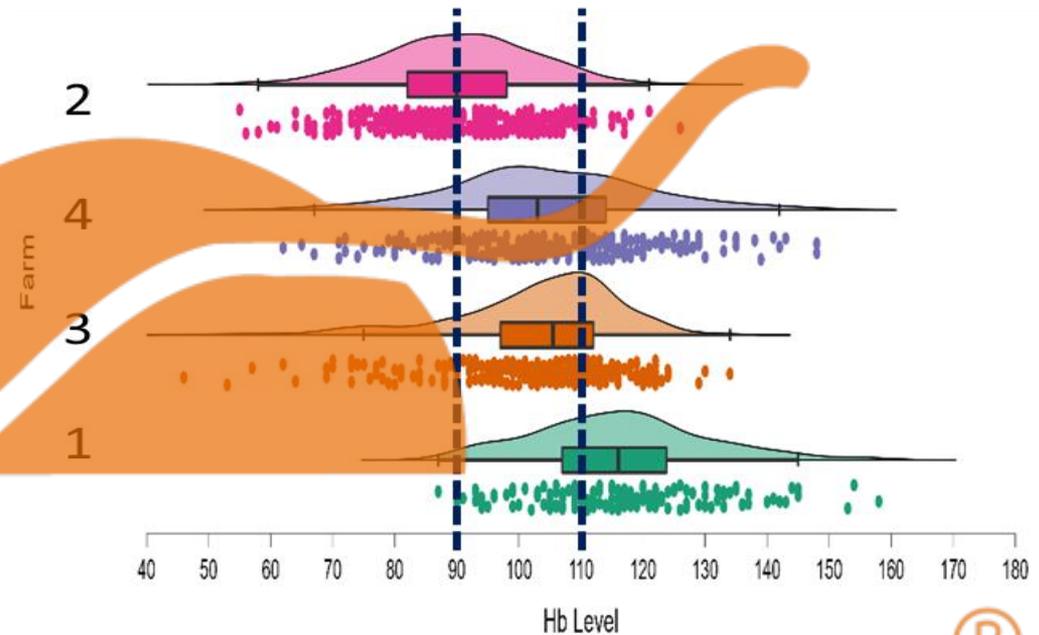
- Hb levels in pigs (National Research Council, 1979):
 - ≥ 100 g/L: normal
 - 90 g/L: minimum level for optimum performance
 - 80 g/L: borderline anemia
 - 70 g/L: anemia retards growth
 - 60 g/L: severe anemia
 - 40 g/L: increase mortality
- Hb levels in suckling piglets (Bhattarai et al., 2015):
 - ≥ 110 g/L: Normal
 - 90 – 110 g/L: Iron deficiency
 - ≤ 90 g/L: clinical anemia

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Survey conducted in 4 farms (Farm 1, Farm 2, Farm 3, Farm 4), 3 piglets per litter, blood samples collected 1 - 3 days before weaning.

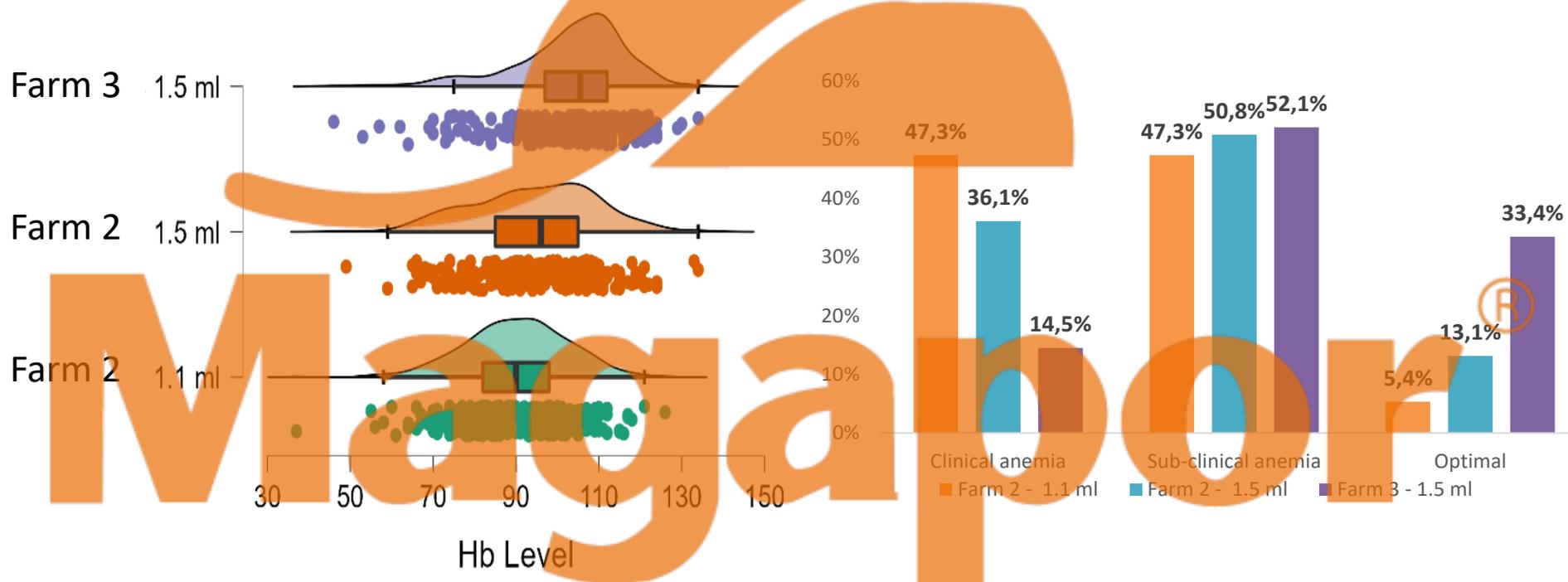


- Piglets injected 1.0 – 1.1 ml Fe 20% at 1 day old had lower LDG at weaning compared to those injected 1.5 – 2.0 ml Fe.



	Survey week	Average wean age (d)	Avg weight/ wean pig (kg)	LDG (g)
Farm 1 (1.0ml) n = 150	W30	22.7	5.9	260
Farm 3 (1.5ml) n = 290	W30	25.9	7.3	283
Farm 4 (2.0ml) n = 240	W28	26.1	7.2	275
Farm 2 (1.1ml) n = 336	W26	21.0	5.6	269

- At Farm 2, increase the dose of iron injection (Fe+B12 20%) from 1.1 ml to 1.5 ml. Measuring Hb levels of piglets at weaning.



⇒ Increasing the Fe dose has improved the anemic status in piglets but not significant

- At Farm 2, increase the dose of iron injection (Fe+B12 20%) from 1.1 ml to 1.5 ml. Measuring Hb levels of piglets at weaning.

	Survey week	Average wean age (d)	Avg weight/ wean pig (kg)	LDG (g)
Farm 2 (1.1ml) n = 120	W26	21.0	5.6	269
Farm 2 (1.5ml) n = 244	W34	21.6	6.0	278
Farm 3 (1.5ml) n = 290	W30	25.9	7.3	283

- **There was improvement of weight gain when increasing dose to 1.5 Fe 20%**

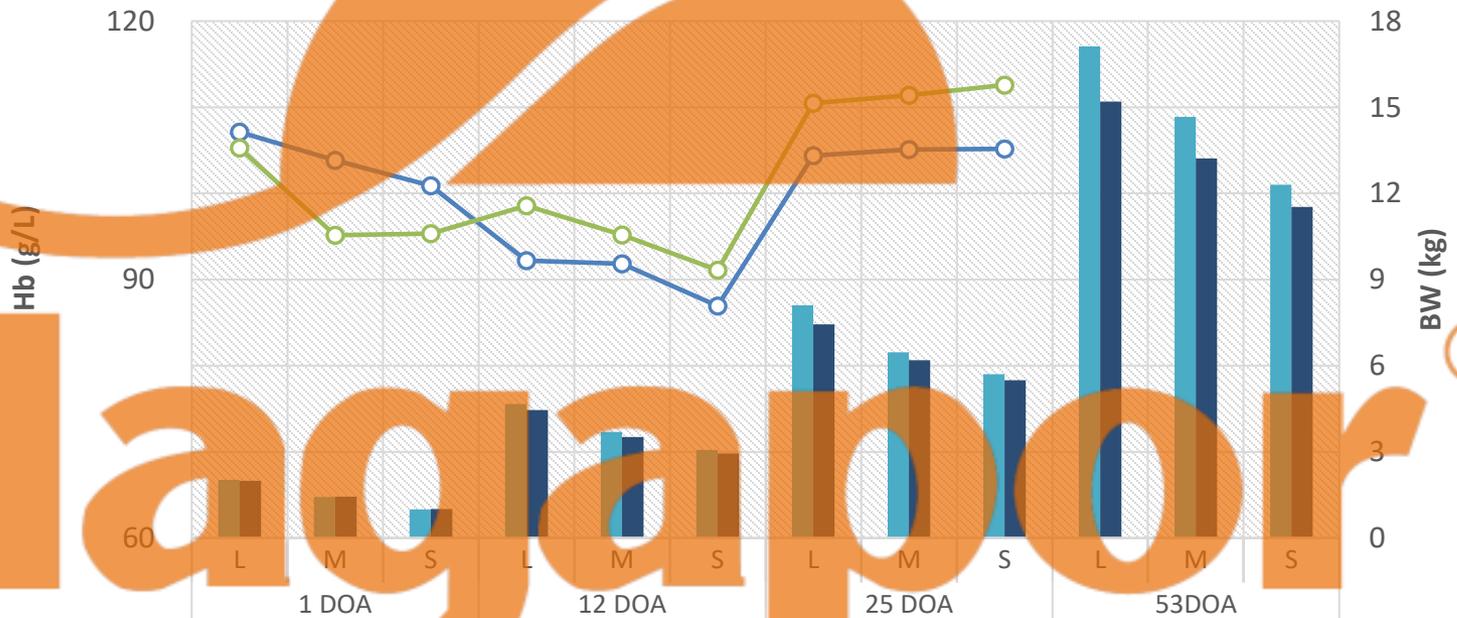
- Current product: Fe+B12 20% (iron dextran)
- Trial product: (gleptoferron 20%)

Group	Explain
Group 1 Control	1 farrowing room (50 sows): Inject Fe 20% (dose: 1.5ml/piglet), provide oral Toltrazuril (dose: 1ml/piglet)
Group 2 (Gleptoferron)	1 farrowing room (50 sows): inject Fe 20% (gleptoferron) (dose: 1.5ml/piglet)

Current product: Fe+B12 20% (iron dextran)

Trial product: (gleptoferron 20%)

Correlation of Hb level and BW



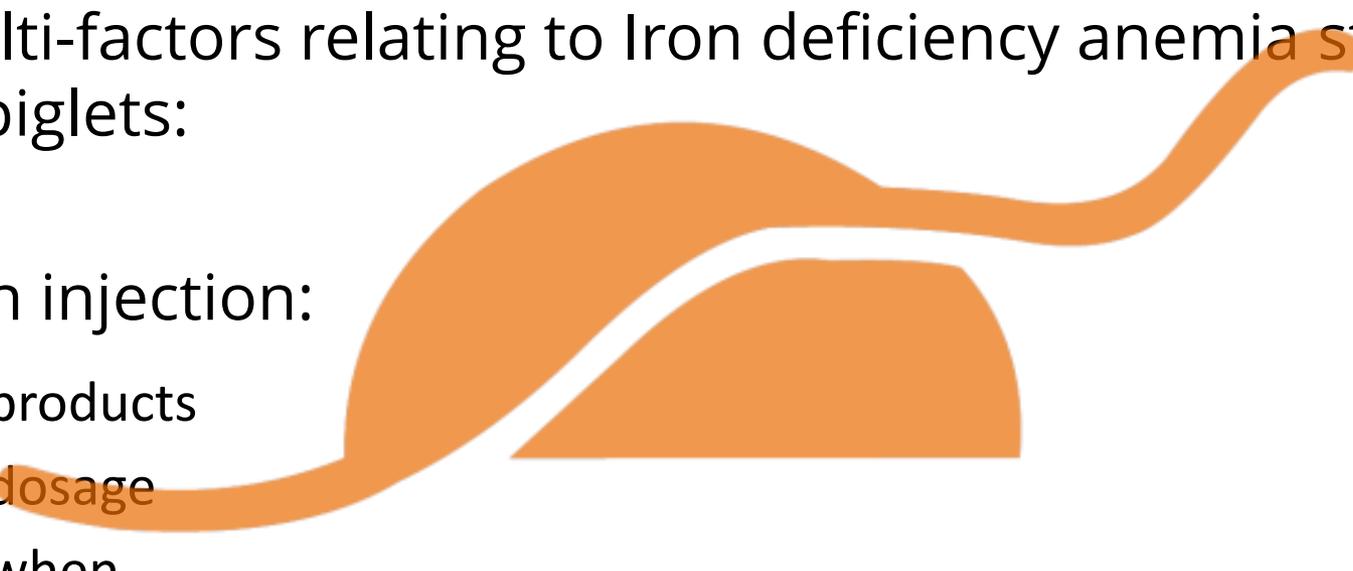
	1 DOA			12 DOA			25 DOA			53DOA		
	L	M	S	L	M	S	L	M	S	L	M	S
Average of BW Group 1	2,02	1,42	1,00	4,66	3,69	3,07	8,11	6,47	5,70	17,13	14,67	12,30
Average of BW Group 2	1,99	1,44	1,01	4,45	3,51	2,94	7,44	6,19	5,50	15,20	13,22	11,53
Average of Hb - Group 1	107	104	101	92	92	87	104	105	105			
Average of Hb - Group 2	105	95	95	99	95	91	110	111	113			

⇒ New product improved anemic status but no effectivity of growth

- Current procedure: 1 dose of 1 – 1.5ml Fe 20% at 1-day-old
- Trial procedure: 2 doses of 1 ml Fe 20% at 3 and 14 days old

Group	Birth Weight 24h	wean Weight	Wean age, days	Avg ADG [®]
Group 1	1.45	7.15	24	239
Group 2	1.43	7.03	25	220
2 doses	1.47	7.18	25	226

- Multi-factors relating to Iron deficiency anemia status in piglets:
- Iron injection:
 - products
 - dosage
 - when
 - how many injection
- Management:
 - Tying umbilical cord
 - Suckling colostrum
 - Feeding creep feed



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THANKS
GRACIAS

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