Nitric oxide precursor: Sports nutrition leveraged to increase piglet livability

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Piglet livability

Livability is the percentage of potential viable piglets a sow can raise.

In addition, piglet livability covers the quality of life of piglets linked to health and performance in both the pre-weaning and post-weaning period. Health and performance are driven by amongst other birth weight and vitality that can have a direct effect on piglet livability.
Cargill businesses reported an average piglet livability rate of 83%.

Global trend toward larger litter sizes will continue as pork production matures — increasing risk of mortality.

Highest number of stillborn reported at 1.5 per litter, highest pre-wean mortality at 17%.
Athletes commonly use beetroot juice with has nitrates that convert to nitric oxide. This molecule enhances blood vessel dilation, increasing oxygen and blood flow.

Our Concept

Boost nitric oxide

NITRIC OXIDE INCREASES BLOOD AND OXYGEN FLOW

- Induce vasodilation — relax smooth muscle cells lining blood vessels
- Increase farrowing efficiency — shorten duration and reduce sow fatigue
Materials and Methods

Location: Swine Innovation Center, Sterksel (NL)
Genetics: Topigs 20
Sows: 350. Subsample of 190 sows were monitored intensively.
Treatments: Dose response of Nitrate (0, 0.03, 0.06, 0.09, 0.12 and 0.15%)
Period: From day 108 of gestation until 4 days after farrowing

Sow
- Reproductive performance
- Duration of farrowing
- Placental characteristics

Piglets
- Vitality score
- Acid base blood parameters of umbilical cord blood
- Birth weight
- Mortality
Maternal supplementation of nitrate had a quadratic effect on livability

The trial showed a **reduction in pre-weaning mortality of 4.3%** ($P_{quad} = 0.12$) when piglets were not saved resulting in an **increase in piglet livability of 3.6%**
Increased piglet livability is likely driven by an increased vitality

- Vitality of piglets scored right after birth increased when sows received an increasing dose of the Nitric Oxide boosting technology
- Vital piglets are of less risk for hypothermia and reach the udder sooner after birth which increases their chances for survival.
Increased piglet vitality is linked to higher oxygen levels in umbilical cord blood

pO₂ concentration in umbilical cord blood right after birth tended to increase as maternal dietary level of the Nitric Oxide boosting technology increased which could explain the increased vitality.

Farrowing duration was not affected
Increased birth weight is caused by an increased placenta size

• Piglet birth weight increased linearly which might be caused by an increased placenta width and numerically improved placenta length ($P = 0.12$) with increased dosage.
Farrowing efficiency was not affected

Increased piglet livability was NOT driven by a reduced duration of farrowing

Not Significant
Farrow Duration

- Average duration of farrowing was $236 \pm 121$ min (ranging between 65 min and 758 min)
- High variation seems the reason why no effect was found.
Conclusions

Maternal supplementation of nitrate in the perinatal period tended to increase piglet livability

Increased piglet livability was likely driven by:
1. Increased piglet vitality through higher oxygen levels in the umbilical blood
2. Increased birth weight through increased placenta size
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Our Concept fits the biology

Umbilical cord blood

- pH↑
- pO₂↑
- pCO₂↓
- Lactate↓

Stillbirth

Asphyxia

Breaking umbilical cord

Placental blood flow

Power of contractions

Duration farrowing process

Fatigue

Vasodilation↑

Exercise efficiency↑

Angiogenesis

Vascularisation

Birth weight

Early mortality

Delivery of oxygen and nutrients

Placental efficiency

Technology

NO3 → NO2 → NO Pathway

NO

Legend

- Confirmed in trial
- Not able to measure in trials
- Not found in trials

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LivaPig™

INTRODUCING

LIVA Pig BOOSTS PIGLET LIVABILITY

+ Increases birth weight
+ Creates more vital piglets
+ Improves post wean gain
+ Reduces stillborns
+ Reduces pre-wean mortality
+ Enhances animal welfare
+ Drives profitability
A growing issue

Global trend toward larger litter sizes

3–8% of total born are stillborn

10–20% of piglets are lost before weaning