Effect of Essential Fatty Acid (Docosahexanoic acid) supplementation of sow diets on piglet survival in two farrowing systems

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INTRODUCTION

- Piglet mortality is a major problem causing great loss to the swine industry and significant animal welfare issues

- The majority of piglet deaths occur during farrowing and the early stages of life

- Selection of sows for increased prolificacy has resulted in increased litter size, prolonging farrowing duration and reducing piglet birthweight

INTRODUCTION (ctd)

- Most sows farrow in crates
- Welfare concerns about farrowing crates
- Alternative loose farrowing accommodation is being promoted
- Inherent piglet viability may therefore become more important

INTRODUCTION (ctd)

- Viability may be influenced by sow nutrition
- Docosahexaenoic acid (DHA) is a long chain, omega 3 fatty acid which is essential for development of neural tissue
- It can not be synthesized by fetal piglets, but comes from marine sources in maternal diet
- Fish oil supplementation has improved piglet survival but reduced birth weight

AIM

- To investigate the effect of inclusion of DHA from algal biomass in the diets of sows on piglet survival
- To see if the effect differs between crated and loose farrowing systems

EXPERIMENTAL DESIGN

- A 2 x 3 factorial design
- 10 replicates per treatment combination
- 60 crossbred sows (Landrace x Large White)
  - mean parity 4.7 (sem 0.32)

MATERIALS AND METHODS

- 2 types of housing

Farrowing Crates

PigSAFE

loose farrowing pens

MATERIALS AND METHODS

- 3 levels of DHA inclusion from algal biomass (DHA Gold® , Novus Europe SA)

% DHA	g algal biomass / kg feed
0	0
0.03	1.5
0.30	15.0

Included in last 4 weeks of gestation and in 4 week lactation

Composition of sow diets

	Gestation diet	Lactation diet
Protein (%)	13.8	17.9
Oil (%)	2.5	4.4
Fibre (%)	4.4	4.2
Digestible energy (MJ/kg)	13.14	13.76
Lysine (%)	0.6	0.9

Data Collection: Sows

- Weekly feed intake
- Body weight and condition score
- Gestation length

Data Collection: Piglets

- Total number born – alive and dead
  - Individual piglet weight at birth
  - Crown rump length
- Total number of piglet deaths
  - Birth to 3 days
  - Birth till weaning
- Weaning weight

Main effect of Housing on Mortality

Parameters	Farrowing Crate	PigSafe pen	Significance
Mortality to day 3 (no/litter)	1.10	0.53	ns
Total mortality of liveborn (no/litter over whole lactation)	1.10	0.70	ns
Average weaning weight per piglet (kg)	7.43	7.52	ns

Main effect of Feed on Sow Parameters

Parameters	DHA 0%	DHA 0.03%	DHA 0.3%	Significance
Weight gain in gestation (kg)	21.9	18.0	19.7	ns
Weight pre farrowing (kg)	283.6	273.9	285.8	ns
Feed total during gestation (kg)	75.1	75.0	74.9	ns
Feed total during lactation (kg)	171.7	170.5	169.7	ns

Main effect of Feed on Piglet Parameters

Parameters	DHA 0%	DHA 0.03%	DHA 0.3%	Significance
Litter size	13.60	12.90	12.70	ns
Number of piglet born alive	12.40	12.25	12.50	ns
Stillborn (piglets/litter)	1.20	0.65	0.20	0.010
Stillborn (piglets/litter) with litter size covariate	1.13	0.67	0.25	0.014

Main effect of Feed on Piglet Parameters

Parameters	DHA 0%	DHA 0.03%	DHA 0.3%	Significance
Average weight at birth (kg, with litter size covariate)	1.49	1.44	1.41	ns
Crown rump length (cm)	27.9	27.2	27.4	ns

Main effect of Feed on Piglet Parameters

Parameters	DHA 0%	DHA 0.03%	DHA 0.3%	Significance
Mortality to day 3 (no/litter)	0.65	1.00	0.80	ns
Total mortality of liveborn (no/litter over whole lactation)	0.85	1.05	0.95	ns
Number weaned / litter (includes fostering)	10.70	10.70	10.60	ns
Average weaning weight/piglet (kg)	7.87	7.64	6.91	0.01

CONCLUSIONS

- No effect of housing system on survival
- No interactive effect between housing and diet
- Maternal diet supplementation with DHA improved piglet survival by reduction of stillbirths
  - The mechanisms are currently being studied
- DHA reduced the weaning weight of piglets

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