

Fetal development in hyper-prolific SOWS

CPH Pig seminar
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Introduction

GUDP project: **Feed4Life (2017-2021)**



Collaboration between DLG, SEGES and KU.

Background

Increased number of small/IUGR piglets

-> Increased mortality in IUGR piglets

It takes a lot of work to make the very small piglets survive

-> **SO it would be better if we could decrease the number of small/IUGR piglets at birth!!**



Slaughter trial on gestating sows

- **The goal was to gain new knowledge on:**
 - Fetal development in sows with high litter size
 - How early can we detect differences in fetal size within the litter?
when does the damage happen??
 - What defines small versus large fetuses?

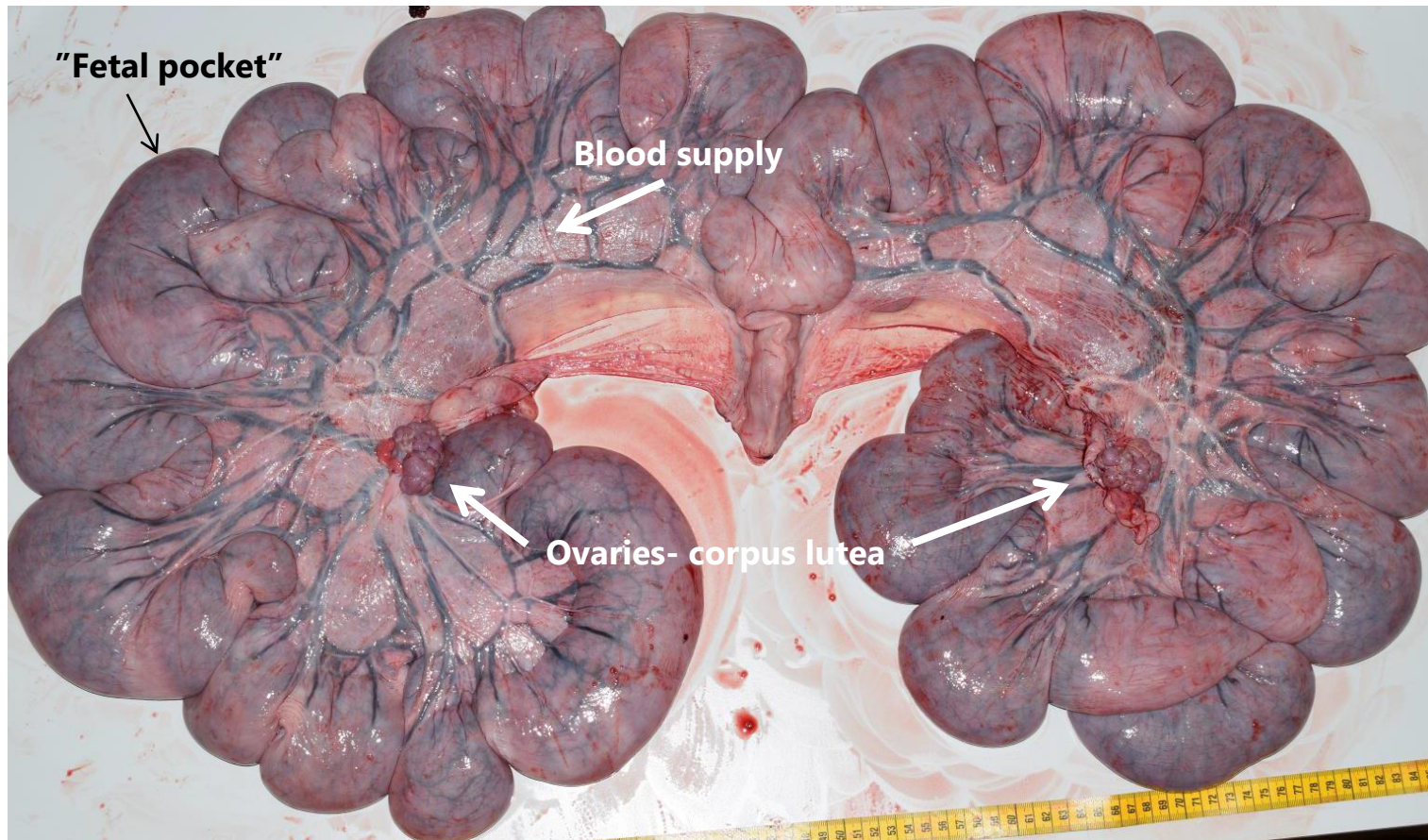
Animals

- **47 parity 4-9 sows from a commercial farm**
- **Criteria for entering trial:**
 - **Above 16 total born in previous litter**
 - **Culling reason should not be reproductive failure**
- **Landrace x Yorkshire sows mated with Duroc semen (DanBred)**
- **Euthanization and removal of reproductive tract at commercial slaughter house**
- **Slaughtered at day 28, 33, 45, 50, 56 of gestation**

Measurements

Sow level	Fetus level
Blood sample before slaughter (IGF-1, Progesterone, insulin, glucose)	Weight of fetus
Weight + width of empty uterus	Sex of fetus
Litter size (live and dead fetuses)	Weight, length and area of placenta
Number of corpus lutea	Length of umbilical cord
	Weight of organs (brain, liver, intestine, stomach, kidneys, spleen, lungs, heart)
	Placement in uterine horns
	Histology of umbilical cord, placenta and endometrium of smallest, largest and medium pig in litter

The pregnant uterus

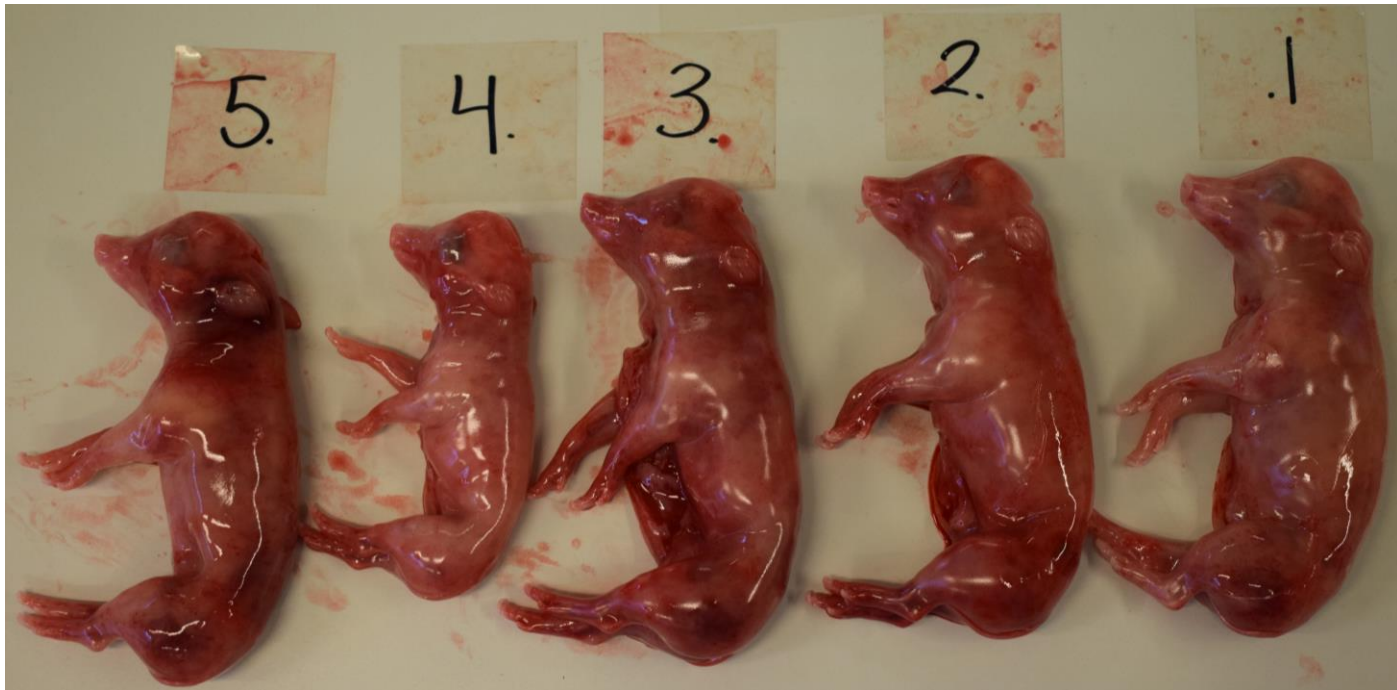


Fetal weight

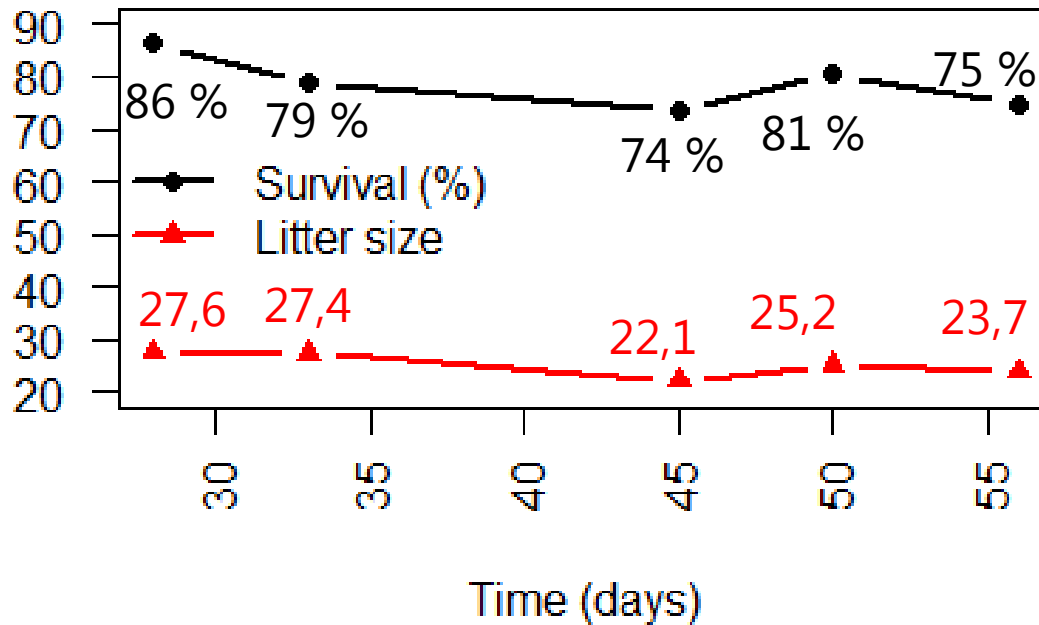


Slaughter day	28	33	45	50	56
Fetal weight, g	0,82	2,76	18,8	36,3	89,5
Coefficient of variation, %	21	16	14	12	13

Variation in fetal size within the litter – Day 56



Litter size and fetal survival



Day	Fetuses
28 (9 sows)	20-40
33 (10 sows)	14-38
45 (9 sows)	14-30
50 (8 sows)	15-34
56 (11 sows)	16-31

Organ size of fetuses

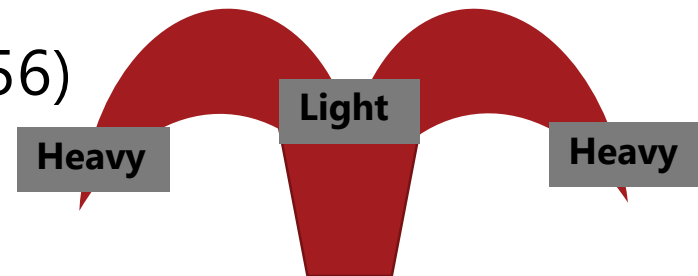
Small fetuses have:

- **Relatively larger brain** (day 45, 50 and 56)
- **Relatively smaller intestine** (day 45,50 and 56)
- **Relatively smaller lungs** (day 45 and 50)
- **Relatively smaller spleen** (day 50 and 56)



What characterized small vs. large fetuses?

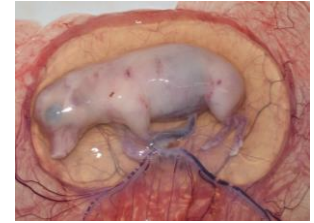
- Placement in the uterus (day 56)



- Males are heavier than females
- Larger fetuses has:
 - Longer umbilical cords
 - Larger placentas



Conclusions



- **Altered organ growth in small vs. large fetuses**
 - Compromised nutrient supply in small fetuses
- **Small fetuses have smaller placentas and umbilical cord**
 - Development of placenta might be the key to understand why some fetuses become very small
- **Variation within the litter can be detected very early**
 - Nutritional interventions must be initiated very early in gestation

What is next?

- **Feeding trials in early gestation to improve:**
 - Fetal and placental growth
 - Birth weight

QUESTIONS?