

A photograph of a pig in a metal cage. The pig is lying down on a bed of straw. The cage has metal bars and a red water dispenser is visible in the foreground. The background is a solid blue color with white text.

Inclusion of 5% palmitoleic acid (C16:1 n-7) of marine origin to supplementary milk did not increase preweaning daily litter gain

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Background

Biological functions of palmitoleic acid

- Synthesized *de novo* from C16:0 in fat tissue and udder by the action of $\Delta 9$ desaturase (Kloareg et al. 2007)
- Upregulates fatty acid oxidation and downregulates de novo lipogenesis – shown in vitro (Burns et al. 2012)
- Upregulates lipases and lipolysis in mice (Bolsoni-Lopes et al. 2013)

Background

Excellent research indicating the potential of palmitoleic acid

Design

- Using 48 piglets from 0-7 days post partum
 - Colostrum received from the sow
 - Fed 4 levels of palmitoleic acid using an orogastric tube
 - Fed every 2nd hour
 - 0.3 to 10.7% of the total fatty acid content
 - Isocaloric diets (palm oil to balance out palmitoleic acid)
 - Daily 2-hour temperature challenge (34°C vs 24°C)



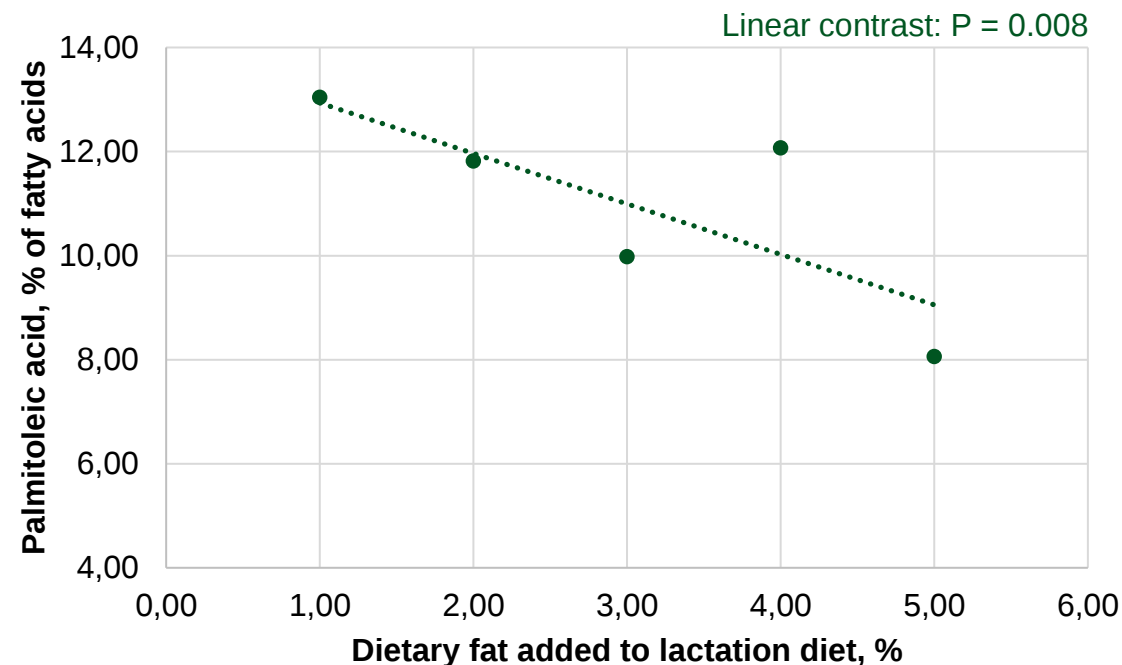
Picture: Aarhus University

This state of the art research was carried out at Aarhus University
Feyera et al. (under review)

Background

Palmitoleic acid in sow milk

- Sow milk has a high content of palmitoleic acid (Mathiasen et al. unpublished; Strathe et al. unpublished)
- Palmitoleic acid is hard to detect in vegetable oils (Christensen 2005)
 - Corn oil: 0.07%
 - Palm oil: 0.16 %
 - Rape seed oil: 0.19%
 - Soy oil: 0.10%
- Interesting difference between animal fat sources (Christensen 2005)
 - Lard: 2.5 %
 - Tallow: 4.7 %



Effect of dietary fat level (50% palm oil + 50% rape seed lecithin) in lactation on concentration of palmitoleic acid in sow milk on day 17 of lactation (P = 0.015; Mathiasen et al., unpublished)

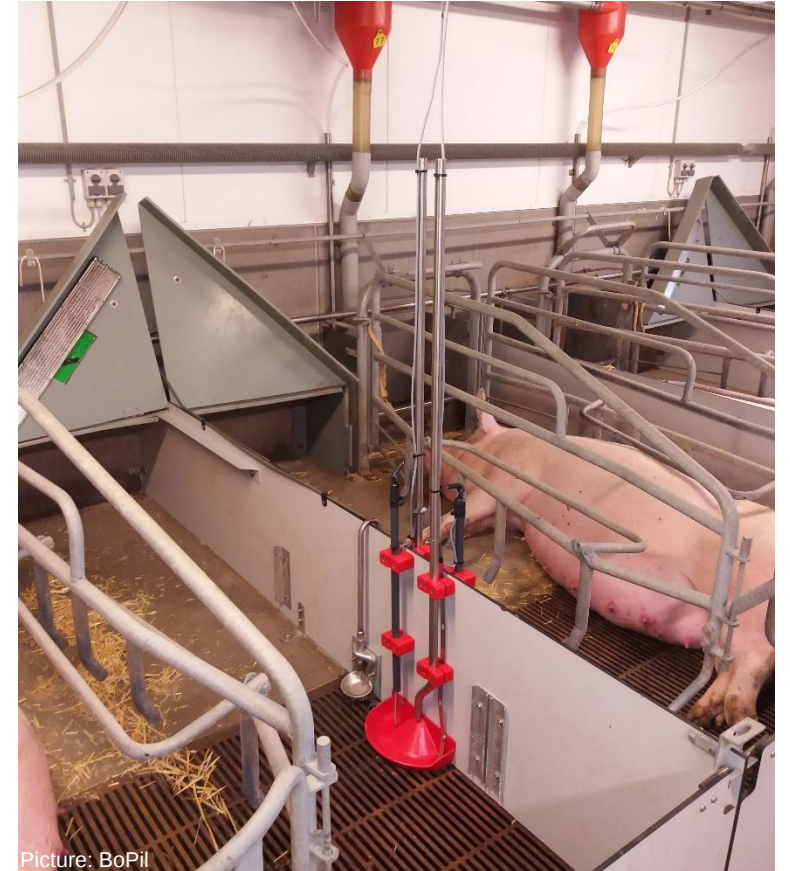
Aim

... To evaluate whether ADG of litters can be increased by inclusion of palmitoleic acid in supplementary milk fed to piglets 0-11 days post farrowing ...

Materials & Methods

Feeding system & feeding strategy

- A remnant free mini liquid feeding system was used
(Babyfeed, Schauer Agrotronic G.m.b.H)
 - Pipes were cleaned using air pressure
- Creeps placed between two sows
 - A sensor monitored whether the creep was empty
- Up to 15 feedings per day depending on appetite
 - 0.1 L per feeding at farrowing
 - 0.6 L per feeding at weaning



Picture: BoPil

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Materials & Methods

Dietary treatments

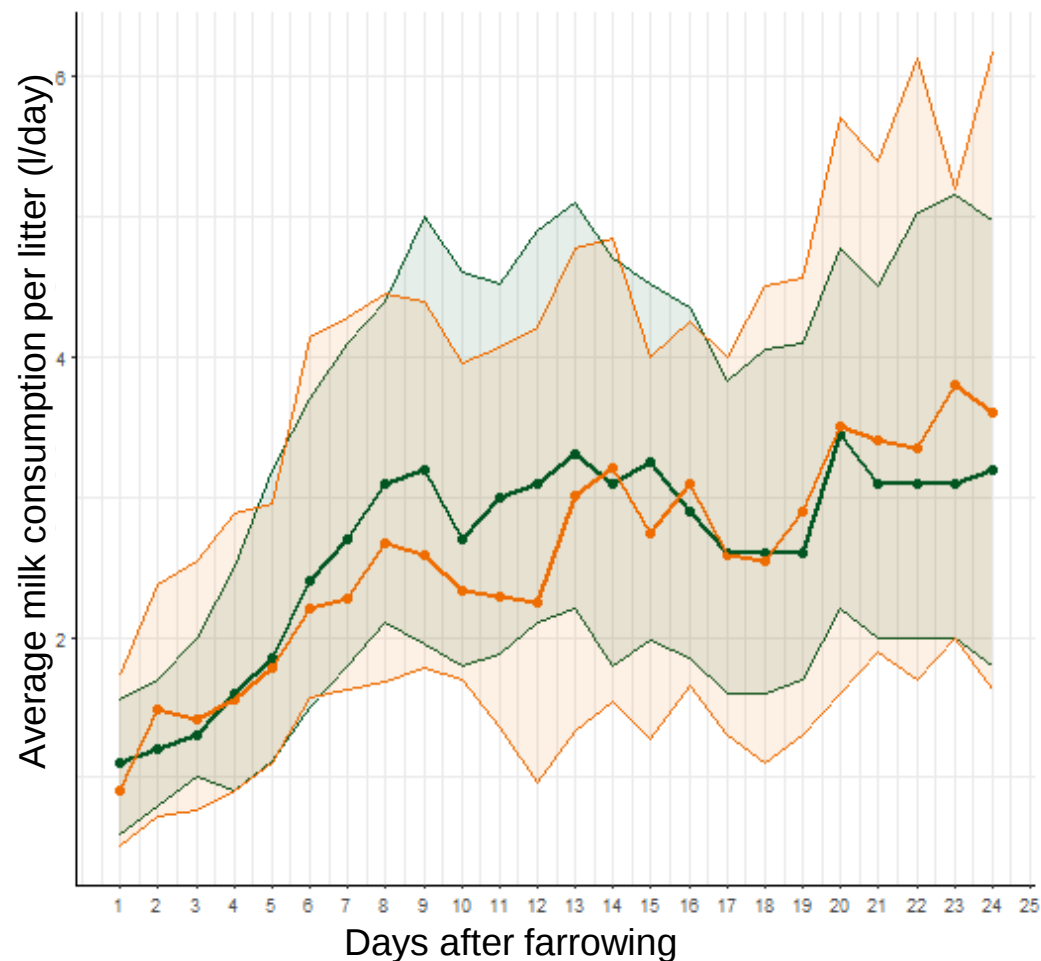
- A milk replacer containing 5% blood plasma was used day 0-11 (NutriMilk Power, Nutrimin)
- From day 11 to weaning a prestarter optimized for liquid feed was used (Nutri Liq 2 Power Cup, Nutrimin)
- To provide palmitoleic acid 10% oil (of dry weight) was added to the experimental group while mixing this diet separately (day 0-11)
- A marine oil containing >50% palmitoleic acid was used (AlaskOmega® Omega-7, AlaskOmega)
 - Realized content of palmitoleic acid 66.7%
(5 samples analysed in duplicates)



Picture: Colourbox

Results

Milk consumption (preliminary results)



Average daily milk consumption and 25% and 75% percentiles in group 1 (●) and 2 (●)

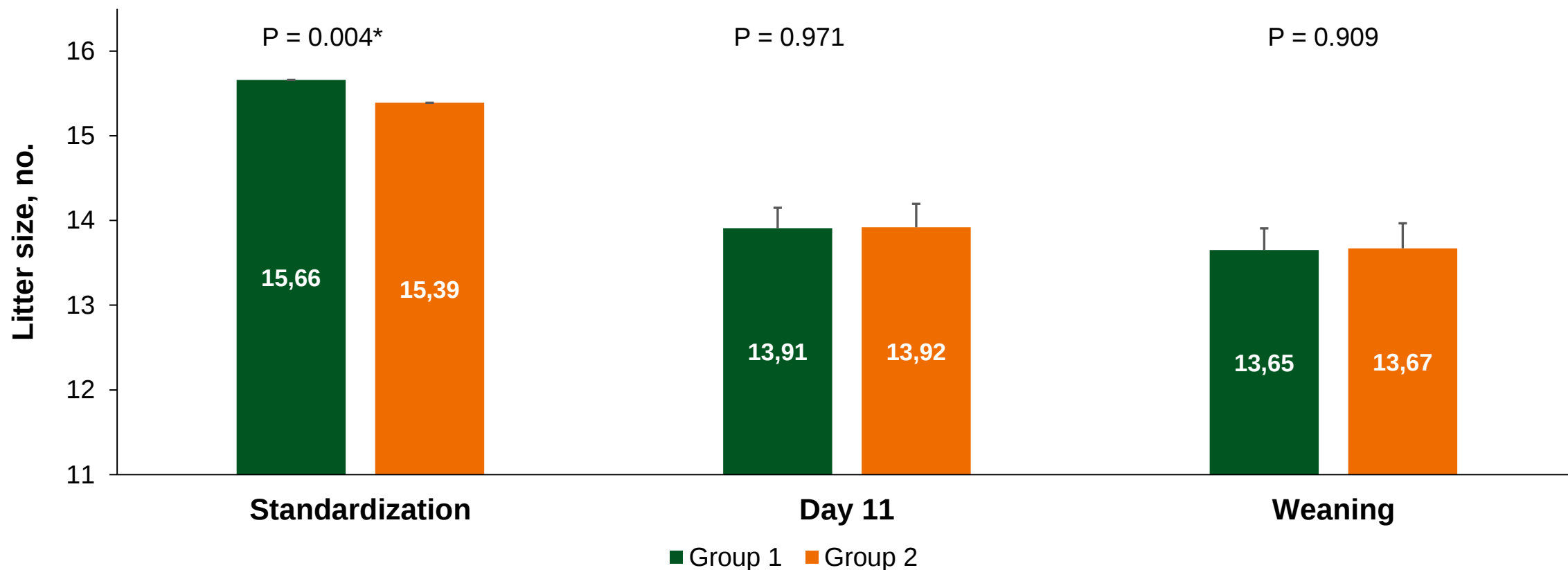
Analysed content of palmitoleic acid (% of fatty acids)

Group 1: 0.33%

Group 2: 5.76%

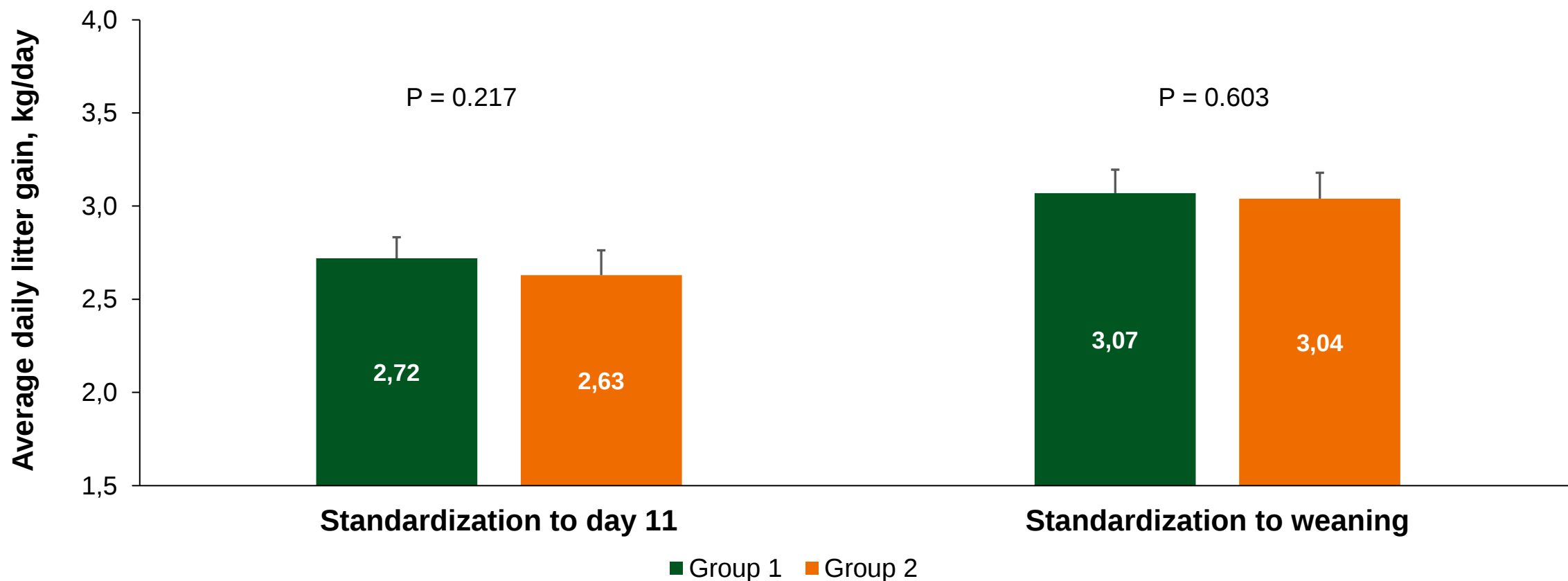
Results

Litter size



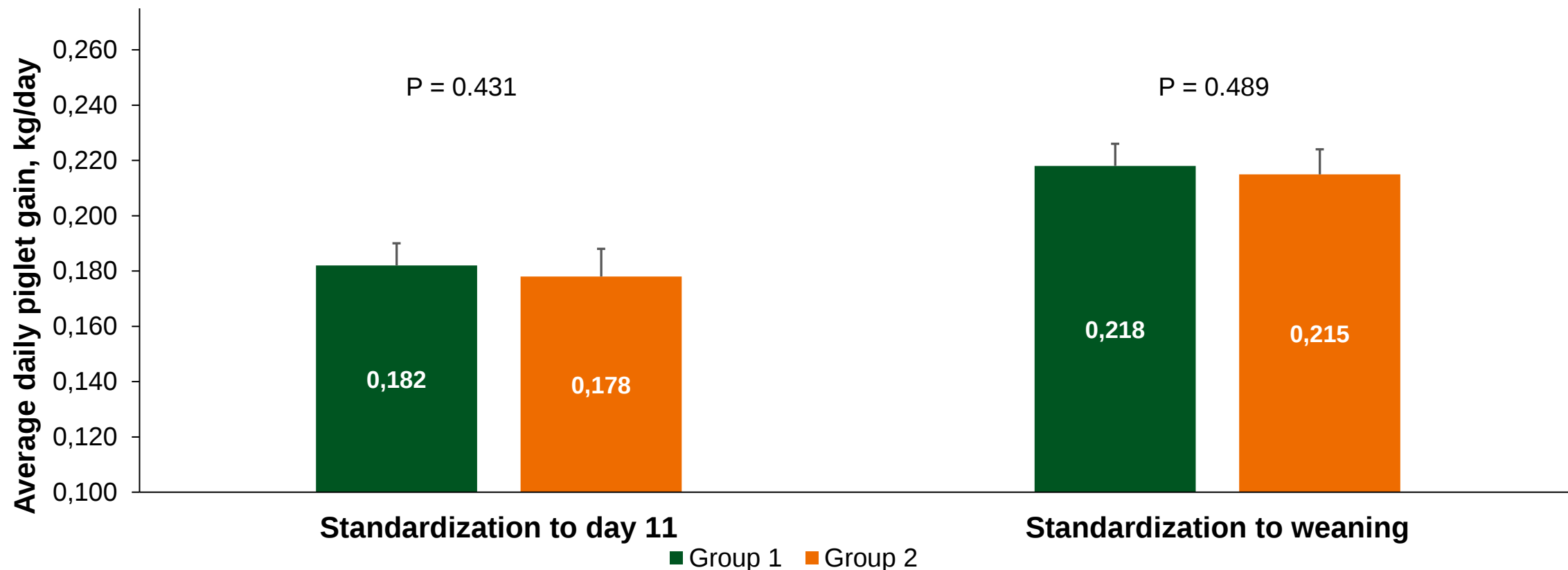
Results

Average daily litter gain



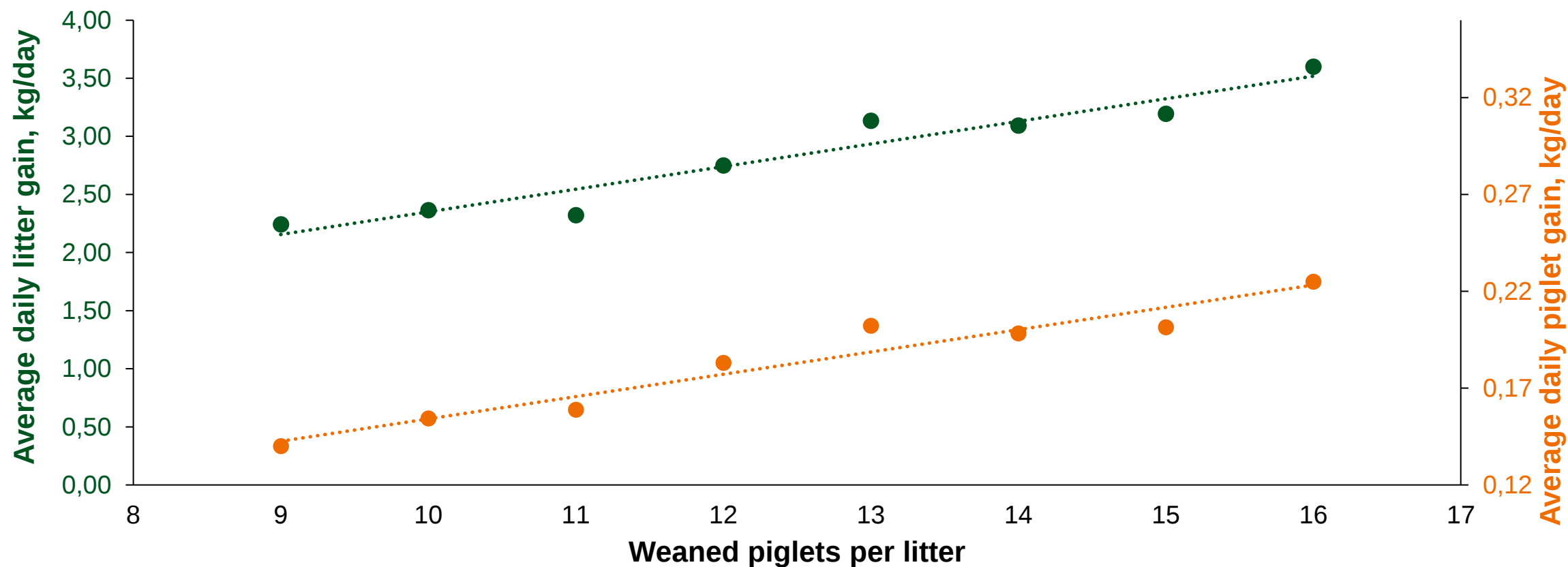
Results

Average daily piglet gain



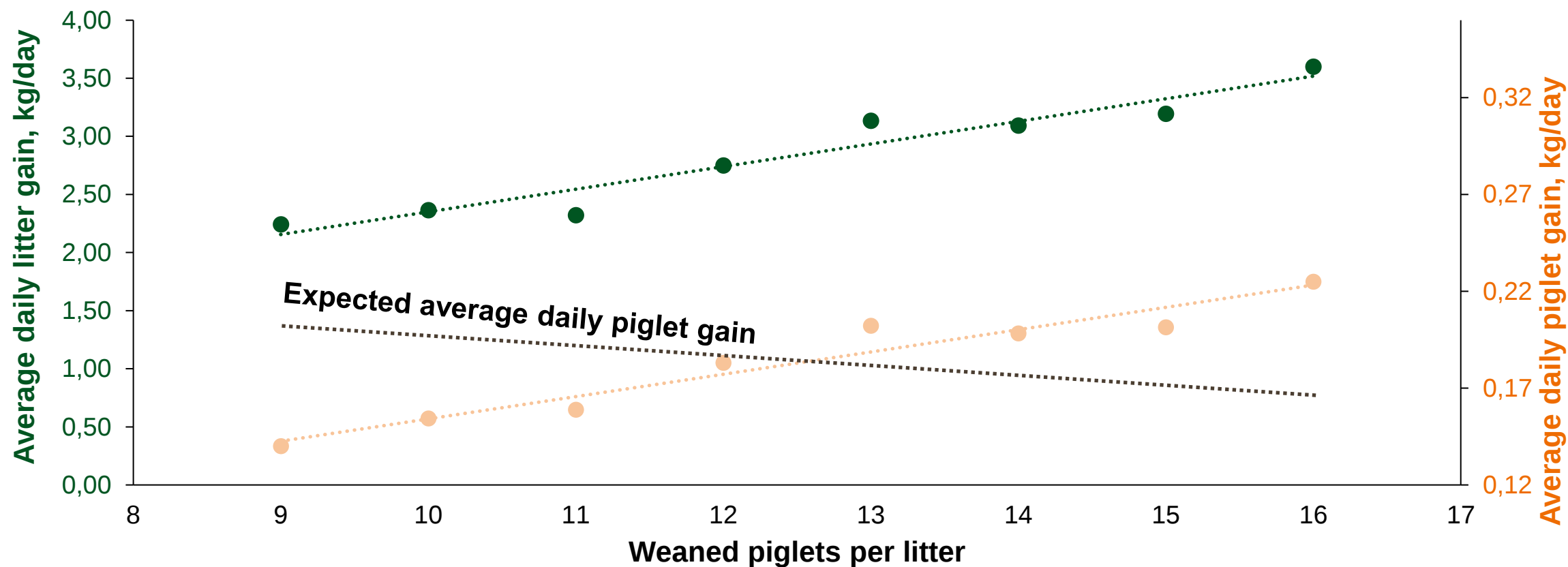
Results

Correlation between litter gain and piglet gain



Results

Correlation between litter gain and piglet gain



Conclusions & perspectives

- No effect of adding palmitoleic acid to milk replacer on litter size at weaning and on average daily litter gain
 - Most likely piglets received a sufficient amount of palmitoleic acid from sow milk
- When brown fat is lacking at birth, palmitoleic acid may be of great importance post partum
 - Lipolytic and glucose sparing effects (robustness)
- Use of specific palmitoleic acid sources is expensive
 - Highest potential when sow milk is lacking