



# Effects of the diet form on health and performance of weaning or fattening pigs

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S.14 Customised nutrition taking into account the health status of farms and individual animals

## ■ Lack of recent results about effect of feed form...

- Pelleting: ↗ digestibility, ↘ F:G
- Interaction with on-farm conditions, health status... ?

## ■ 4 trials carried out to study ...

- the effect of dietary presentation on performance and health:  
→ a solution to reduce post weaning diarrhea?

weaned  
piglets

- effect of pelleting on performance of restrictively fed pigs:

- interaction with sex (gilts (G) vs. castrated males (CM))
- boar taint risk in entire males (EM)

growing  
pigs

- comparison of dry meal, pellets, liquid feeding

- interaction with feeding level and season

### ■ Animals & design

- 524 weaned piglets (28 d, 9.0 kg) in 2 batches
- (LWxLd) x (LWxPietrain)



### ■ Feeds

Period	d 0 - 14	d 15 - 41
Feeding	Ad libitum	
Composition	cereals, whey, proteins	wheat, barley, wheat feed meal, soybean & rapeseed meals
Net energy*, MJ/kg	10.7	9.6
Lysine dig*., g/kg	13.0	11.5

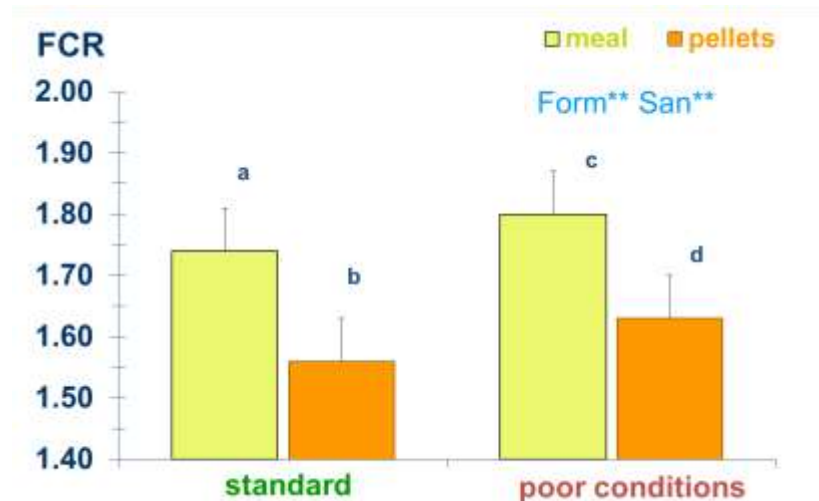
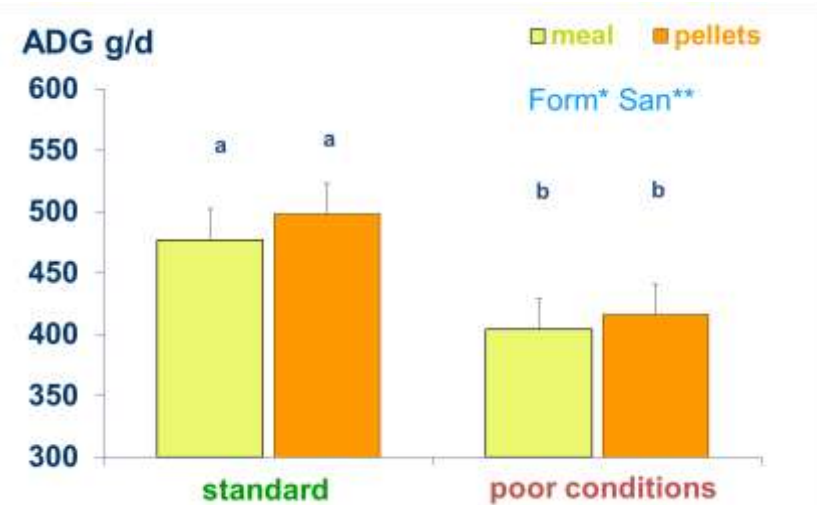
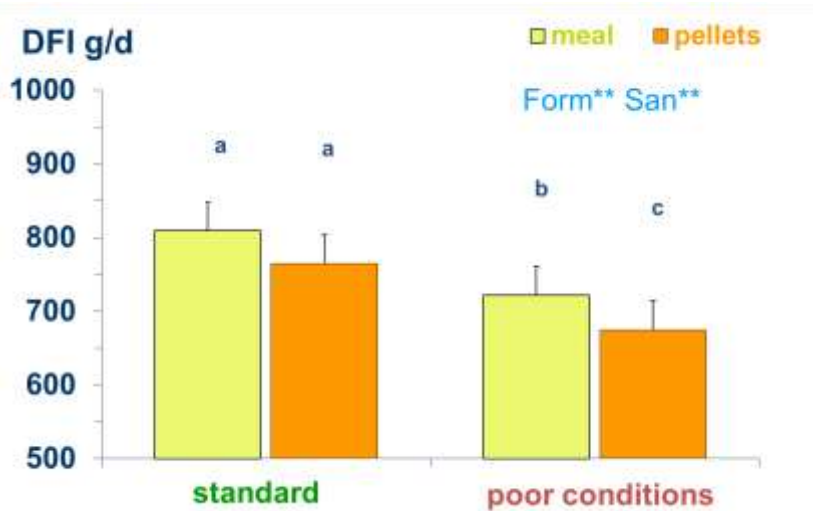
### ■ Treatments

- meal vs pellets
- standard (cleaned room, 0.33 m<sup>2</sup>/p) vs poor sanitary conditions (uncleaned, 0.26 m<sup>2</sup> /p)

\*Estimated from chemical composition of ingredients and Evapig ®

# Trial 1 : weaned pigs

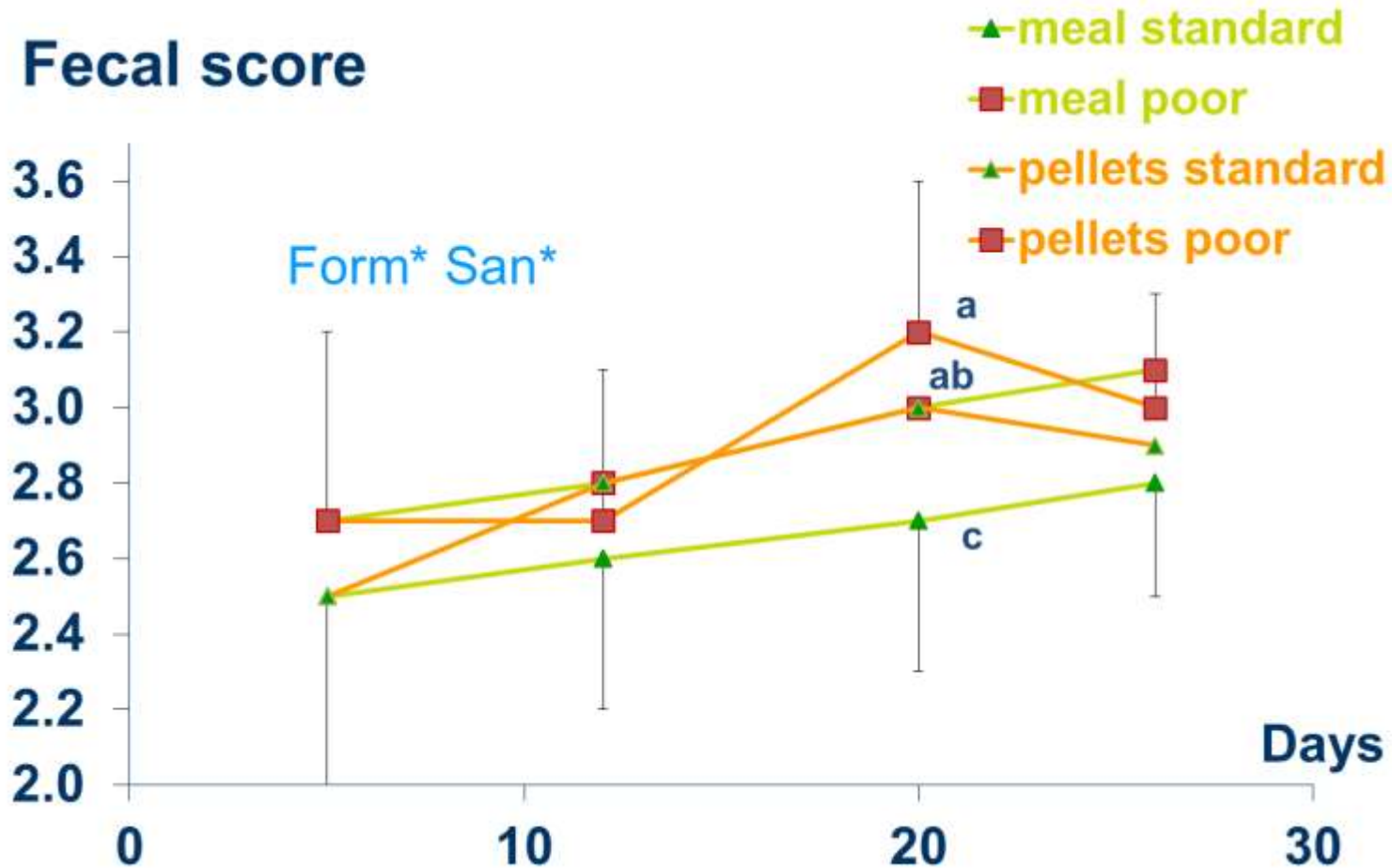
## Results over the 41-d period



# Trial 1 : weaned pigs

## Results over the 41-d period

### Fecal score



# Trials 2 & 3: growing pigs

## Experimental design

- (LW x Ld) x (LW x Pietrain) pigs
- Restricted feeding level
- meal vs ground pellets with liquid feeding system

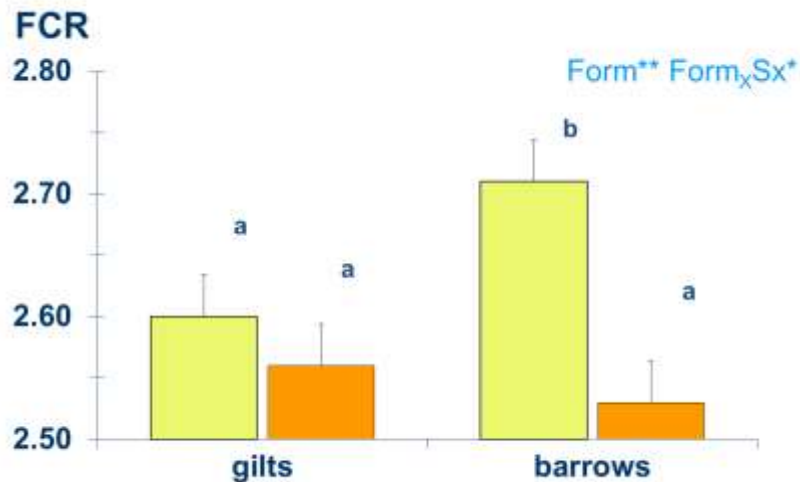
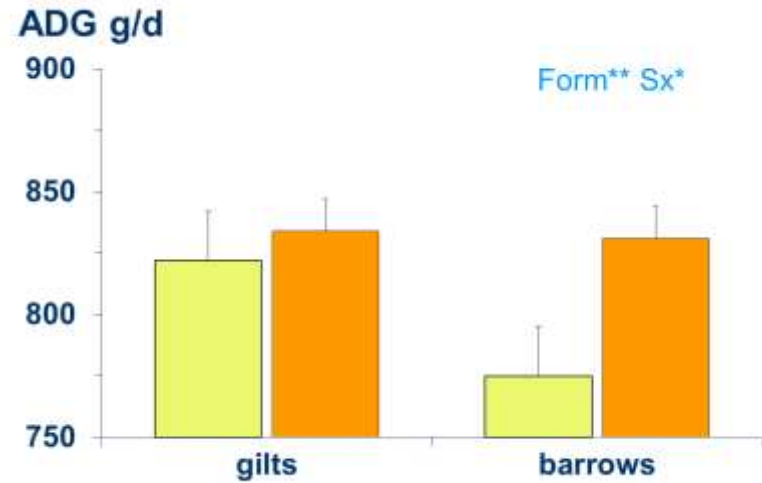
Trial	n / sex	Feedstuffs	Nutritional values*			BW, kg	
			/kg	Growing	Finishing	Initial	Final
<b>2</b>	2 x 120 G+CM	wheat, barley, peas, rapeseed+ soybean+ sunflower meal	EN, MJ Lys. dig, g	9.65 8.3	9.60 7.7	25	115
<b>3</b>	80 EM	wheat, barley, soybean+rapeseed meal	EN, MJ Lys. dig, g	9.6 9.2	9.7 8.2	22	109

\*Estimated from chemical composition of ingredients and Evapig®

# Trials 2 & 3: growing pigs

## Results

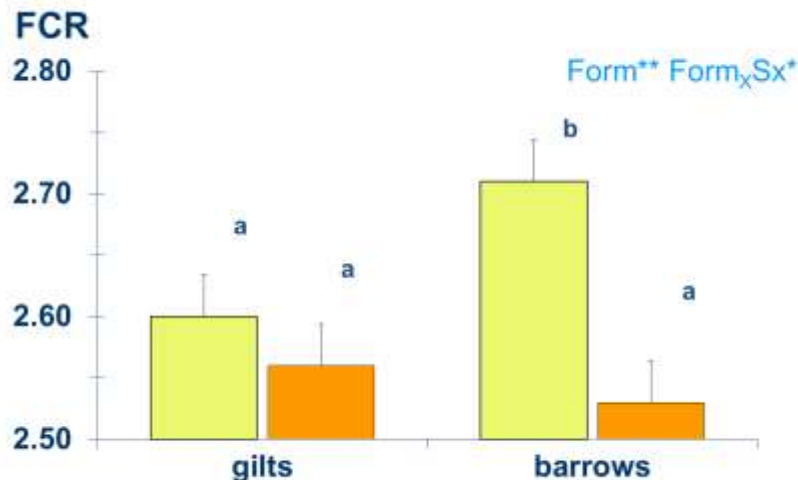
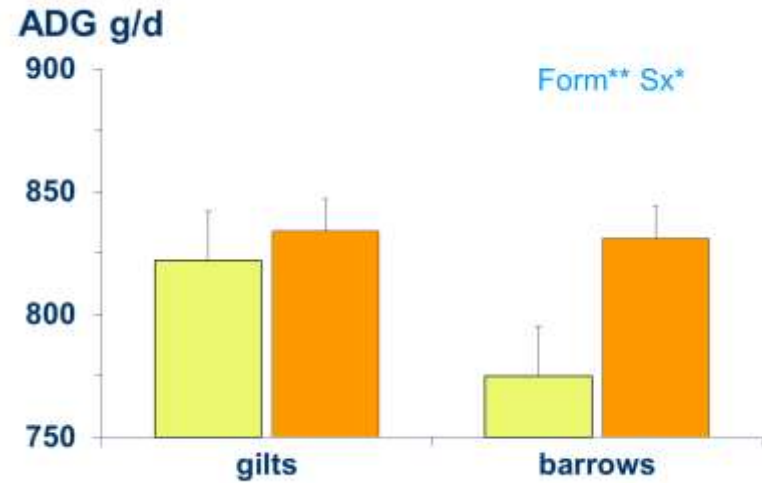
### Trial 2 (G+CM)



# Trials 2 & 3: growing pigs

## Results

### Trial 2 (G+CM)



### comments

- Lower effect of feed form for gilts ?
- Pellets ↗ carcass yield (+1%, P<0.01) & carcass leanness (+0.4%, P=0.09)
- Health parameters ⇔ similar



### ■ Trial 3 (EM)

#### ■ Growth and carcass parameters

	Meal	Pellets	Stat.
DFI, kg/d	1.98	1.95	t
ADG, g/d	882	882	NS
FCR	2.26	2.20	*
Dressing %	76.5	77.3	NS
Muscle %	61.9	62.0	NS

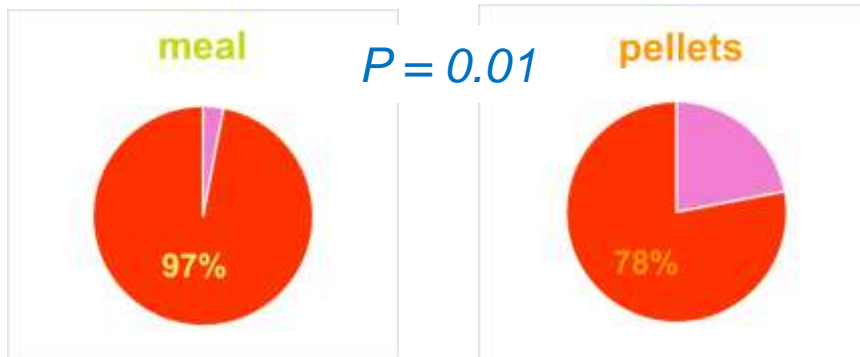
# Trials 2 & 3: growing pigs

## Results

### Trial 3 (EM)

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■ % of boars with [skatole] back fat  
 < ■ or > ■ 30 ng/g

# Trial 4: growing pigs

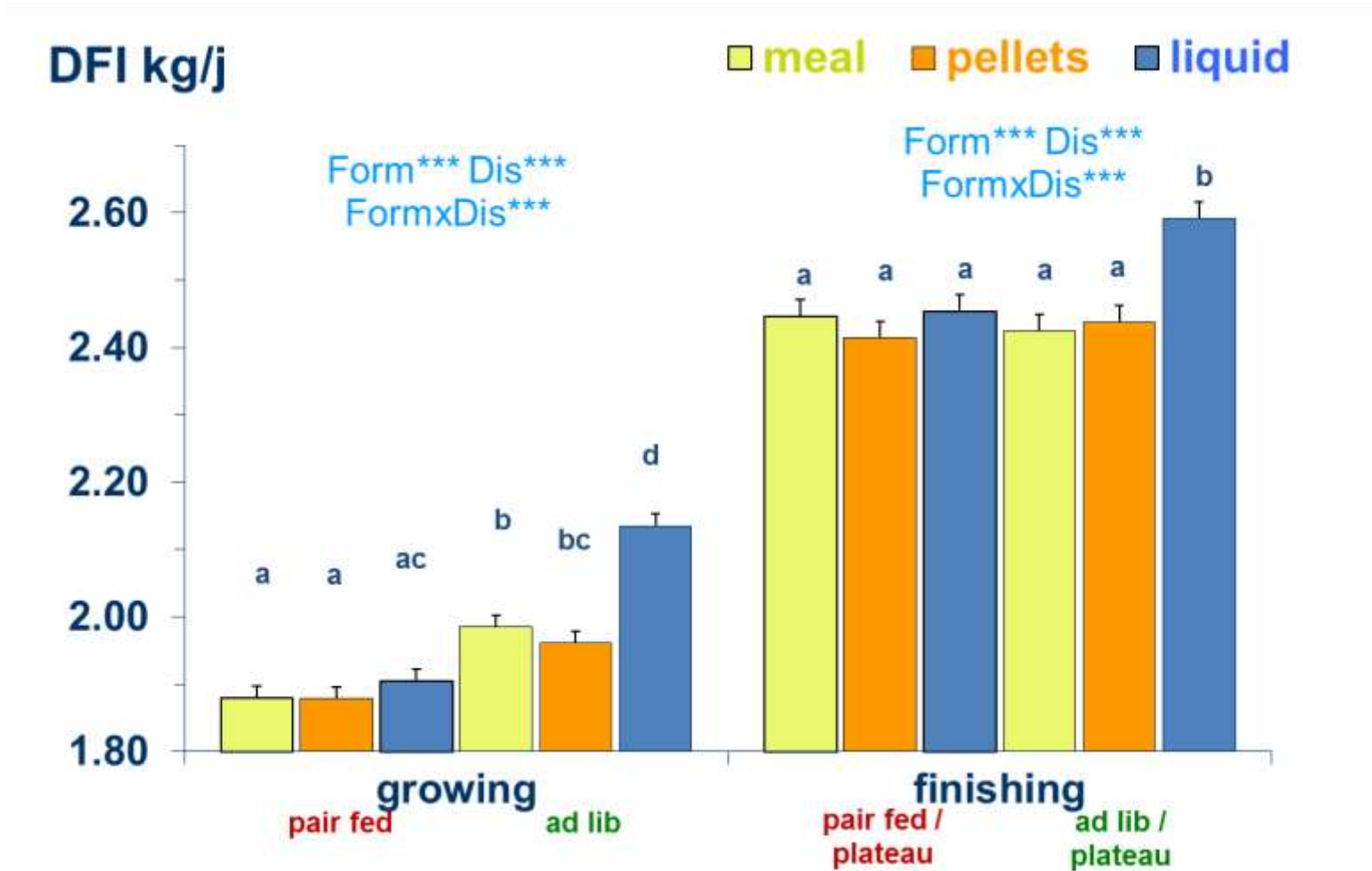
## Experimental design

- (LW x Ld) x Pietrain
- 4 x 120 (G+CM)
- **Dry meal** vs **Dry Pellets** vs **Liquid Feed**

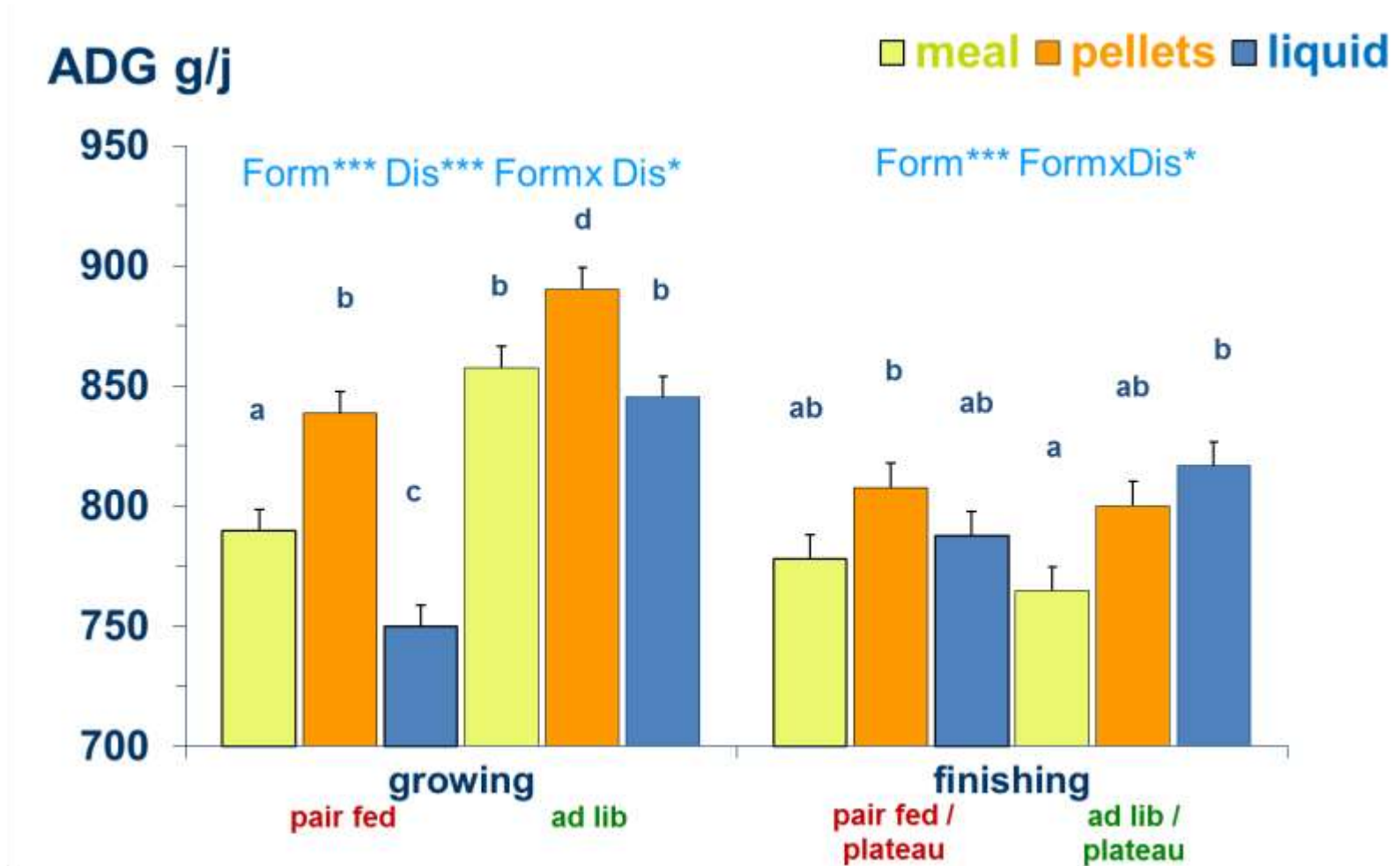
Season	Feeding strategy	Feedstuffs	Nutritional value *, /kg	BW, kg	
				Initial	Final
Summer	Ad libitum → plateau	wheat, corn, rapeseed + soybean+ sunflower meals	EN: 9.6 MJ Lysine dig. : - growing: 8.7 g - finishing: 7.7 g	28.4	114.5
Winter	Pair fed	wheat, barley, soybean + sunflower meals		28.7	115.9
Winter	Ad libitum → plateau	wheat, triticale, rapeseed + soybean + sunflower meals		29.2	112.1
Summer	Pair fed	wheat, barley, soybean + sunflower meals		29.3	116.0

\*Estimated from chemical composition of ingredients and Evapig®

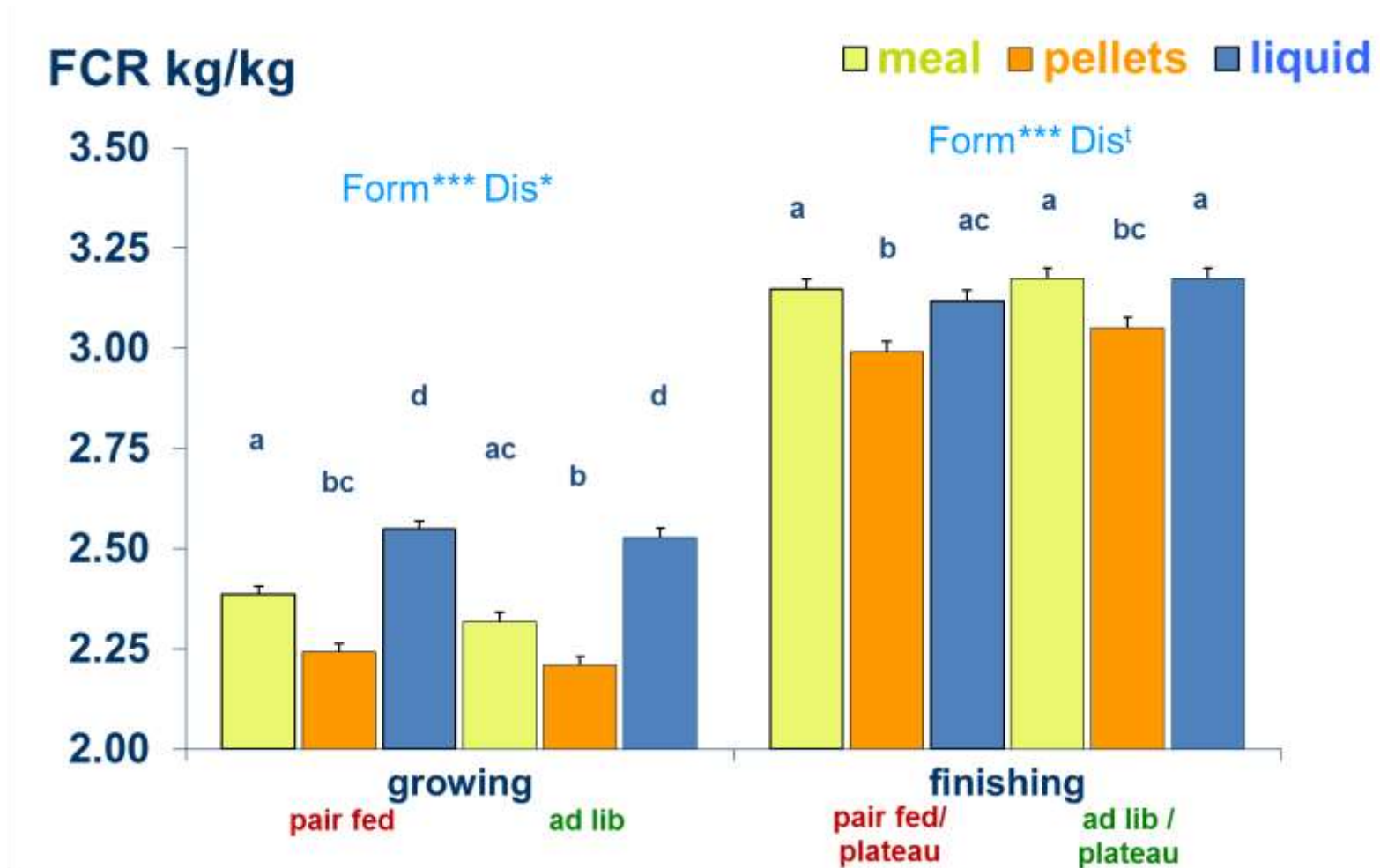
## ■ Results of Exp.4



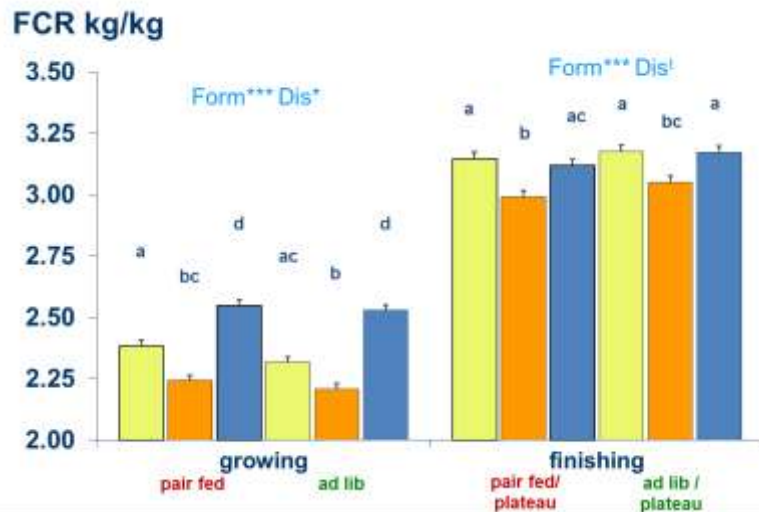
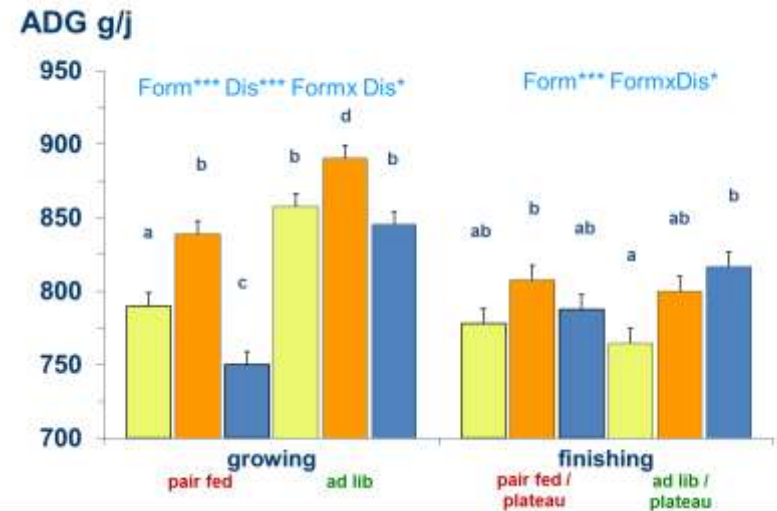
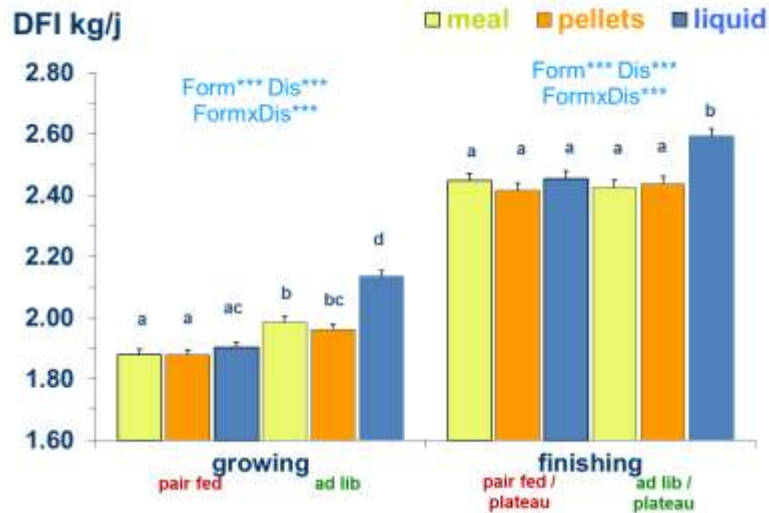
## ■ Results of Exp.4



## ■ Results of Exp.4



## Results of Exp.4



- Gilts ⇒ similar muscle %
- Barrows with liquid feed ↘ leanness ↗ fat depth
- Health parameters ⇒ similar

# Discussion : feed conversion ratio

Trial	Feeding strategy	Dry meal ⇒ pellets	Liquid meal ⇒ pellets	Dry ⇒ liquid meal		
1	ad libitum	-10%				
2	restricted		-5%			
3	restricted		-2%			
4	restricted	-5%		+2%		
	ad libitum	-4%		+4%		
Literature	restricted	-9%		-4%	(Quéméré et al, 1988)	
		-7%			(Wondra et al, 1995)	
		-5%			(Potter et al, 2009)	
	ad libitum			-11%		(Albar et al, 1992)
		-4%		+3%		(Albar & Granier, 1999)
		-3%		+2%		(Myers et al, 2011)
	-6%		+7%		(Ball et al, 2012)	
					(Royer & Quinsac, 2011)	



## ■ Pellets

- ↗ digestibility of nutrients ↔ diet preparation technology
  - Cumulative effects of pelleting and lower particle size (Ball et al, 2012).
- Impact of technological treatment on feed ingredients
  - Limited information / process effects on nutritive value of ingredients (Bikker et al, 2013)

## ■ Liquid feed

- ? ↗ feed digestibility (Sol et al, 2015)
- Probably key effect of distribution system ingredients
  - automatized liquid system, wet feeder,..

## ■ Diet presentation

### ■ Stomach acidification

- Meal  $\searrow$  ulcer scores (Quéméré et al, 1988; Wondra et al, 1995; Albar & Granier, 1999; Liermann et al, 2015)
- Automated liquid systems  $\searrow$  ulcers (Quéméré et al, 1988; Dubroca et al, 2005) but no effect of wet feeder (Albar & Granier, 1999)

### ■ Hygiene of liquid feeding: benefits and drawbacks (Kamphues, 2013, Schenkel, 2013)

- Acidification, positive microorganisms, enzymes activity, anti-nutritional substances,..
- Negative microorganisms, toxins, ammonia, biogenic amines, gas,..

## ■ Salmonella

### ■ Benefits of meal in *Salmonella* infections

- Risk factors studies (Vonnahme et al, 2006 ; Rajić et al, 2007 ; Corrégé et al, 2009)
- Some experimental studies (Jørgensen et al, 1999; Dahl et al, 1999), but not consistent with (Kjærsgaard et al, 2001; Jørgensen et al, 2003)
- Pellets → neutral mucines ↗ adhesion of *Salmonella* in intestine (Hedemann et al, 2005 ; Betscher et al, 2010)

### ■ Liquid feed

- ↘ salmonella in risk factors studies (Dahl et al, 2000 ; Kranker et al, 2001 ; Fablet et al, 2003; Lo Fo Wong et al, 2004; Farzan et al, 2006; Corrégé et al, 2009)

## ■ *E.coli* infections ?

- Benefits of coarse wheat bran on piglet gut health in a K88 challenge (Molist et al, 2010) , but no impact of coarse meal (vs fine pellets) in *E. coli* survival and colonization in GIT (Von und zur Mühlen et al, 2015)

- **Questions or additional information needed..**
  - Effect of process on nutritional value of individual ingredients...
  - Accurate evaluation of impact of liquid feed on feed efficiency...
  - Impact of coarse meal on piglet digestive health ...

## ■ Special thanks to:

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Thank you for your attention



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