



# AMINO ACID LOSS IN LIQUID FEED

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Vet Team  
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# AGENDA

- Amino acid loss - current recommendation
- Effect of benzoic acid?
- Effect of formic acid?
- Amino acid loss - new recommendation
  - Residual feed
  - Addition of acid

St. F. Råprotein	g	33,96	126,00
St. Ford. lysin	g	2,30	8,53
St. Ford. lysin i vådfoder	g	2,06	7,63

# CURRENT RECOMMENDATIONS COMPENSATE AND MINIMIZE

## Formulation of liquid feed

- FK = 75% for free lysine and threonine
- Loss of free methionine, tryptophan and valine not included



## AND

- Feeding asap after mixing
- If possible, raise protein level in feed formulation

Photo: Skiold



# RECENT LAB TRIAL – BENZOIC ACID

Group	1	2	3
Benzoic acid, % of dry feed	0	0.5	1.0

Four rounds with inoculum from four herds (finisher feed)

16 replicates per group  
(four replicates per round)



# RECENT LAB TRIAL – BENZOIC ACID

Mixing:

50% residual feed + 50% fresh liquid feed

Fermentation at 20 °C

Sampling d 7 after 0, 2 and 8 hours

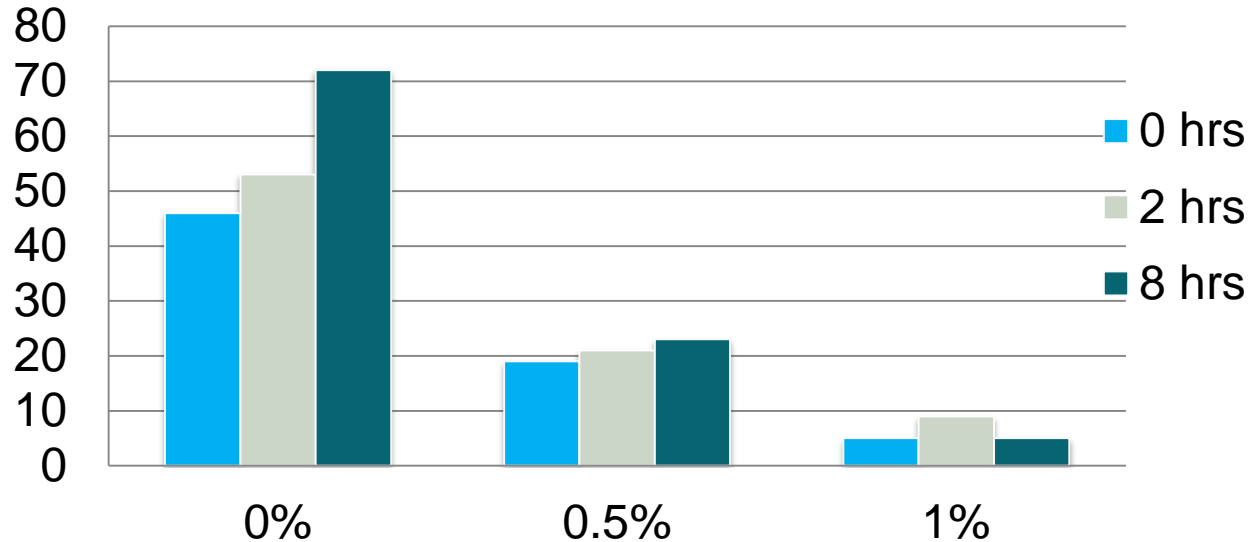


Photo: Nuria Canibe

Day	1	2	3	4	5	6	7
Mixing	At 12:30 (start)	At 8:30 & 14:30	At 8:30	At 8:30	At 8:30 & 14:30	At 8:30 & 14:30	At 8

# RESULTS BENZOIC ACID LOSS OF FREE LYSINE, %

(PRELIMINARY RESULTS)

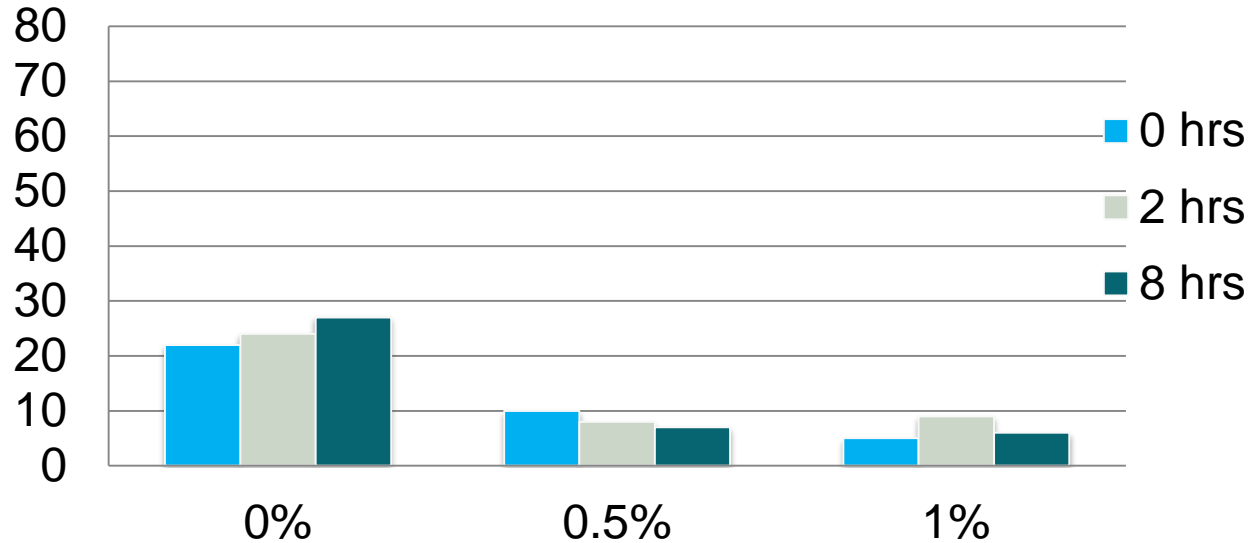


Factor	Effect
Benzoic acid	***
Time	*
Group x time	*

# LOSS OF FREE THREONINE, %

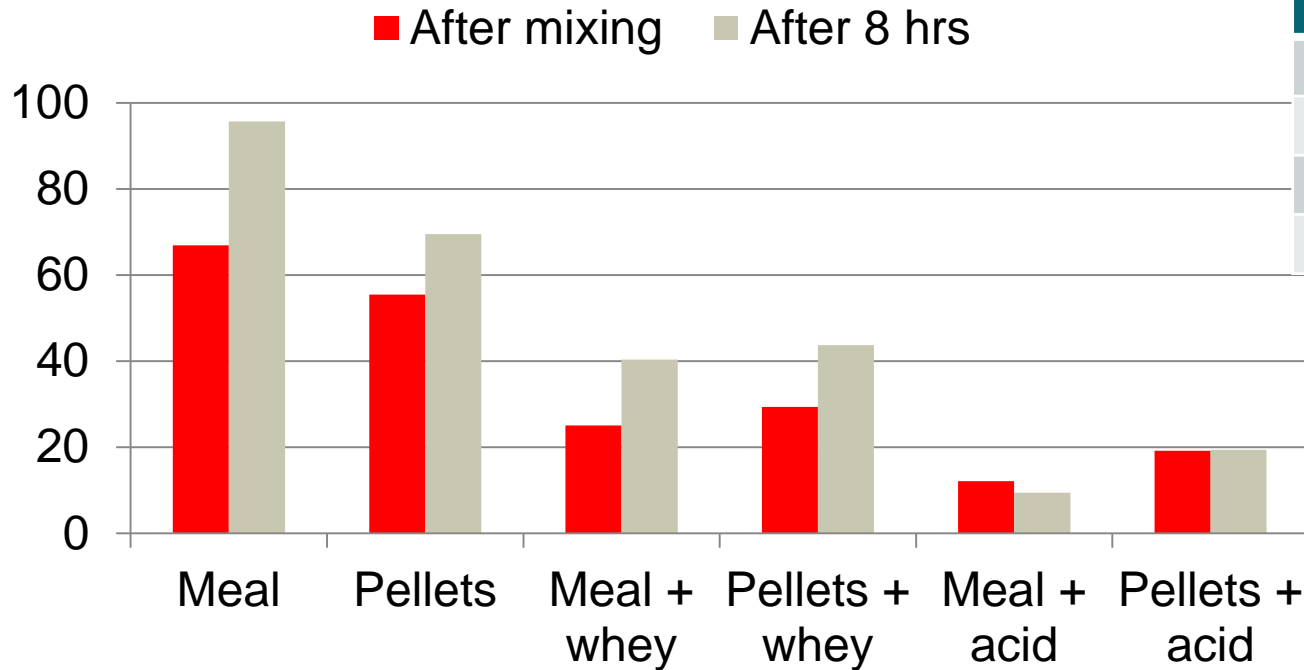
(PRELIMINARY RESULTS)

Factor	Effect
Benzoic acid	***
Time	NS



# RESULTS FROM PREVIOUS TRIALS

## LOSS OF FREE LYSINE, %



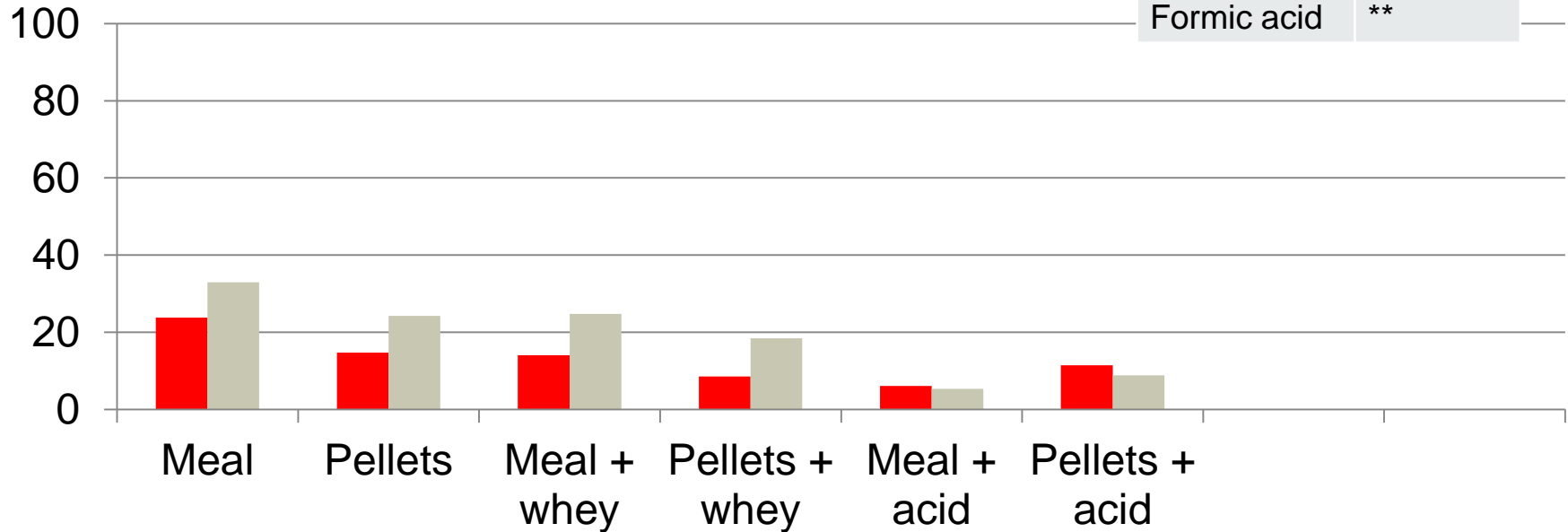
Factor	Effect
Time	*
Meal/pellets	NS
Whey	***
Formic acid	***



# PREVIOUS TRIALS

## LOSS OF FREE THREONINE, %

■ After mixing    ■ After 8 hrs



Factor	Effect
Time	NS
Meal/pellets	NS
Whey	NS
Formic acid	**

# FEED FORMULATION MODEL

	FK lysine	FK threonine
50% residual feed		
25% residual feed		

# HOW TO DETERMINE % RESIDUAL FEED

Residual feed =

*residual feed in tank, kg +  
pipe length, m x kg feed per m pipe*

Residual feed % =

*residual feed x 100*  

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*(residual feed + amount fed)*

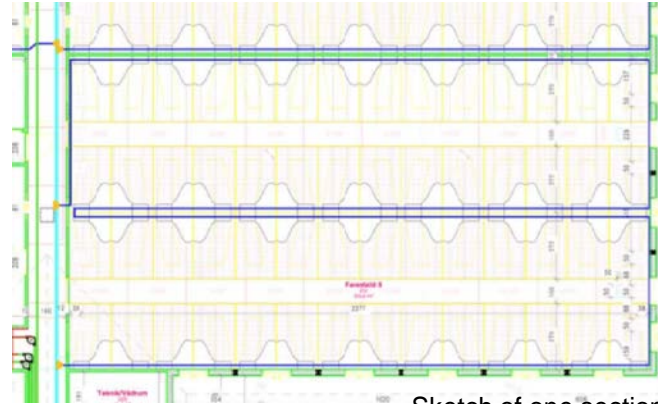
# DETERMINE RESIDUAL FEED – EXAMPLE: FARROWING FACILITY WITH FIVE SECTIONS

Ø63mm pipe,  
approx. 2.6 kg  
per m

Ø50mm pipe,  
approx. 1.5 kg  
per m



Photo: Skiold



Sketch of one section

Residual feed:  $800 \text{ m} \times 1.5 \text{ kg/m} + 100 \text{ kg} = 1300 \text{ kg}$

Feeding (3 x a day):  $6 \text{ kg per sow} \times 280 \text{ sows} = 1680 \text{ kg}$

Residual feed in pipe %:  $1300 \text{ kg} / (1300 + 1680) \text{ kg} = 44\%$

# REVISED RECOMMENDATION 2018 (PRELIMINARY)

	FK lysine	FK threonine
35-50% residual feed, acid not added	50	75
15-35% residual feed, acid not added	75	75

# REVISED RECOMMENDATION 2018 (PRELIMINARY)

	FK lysine	FK threonine
35-50% residual feed, acid not added	50	75
15-35% residual feed, acid not added	75	75
Addition of 2‰ formic acid, liquid feed, or addition of 1% benzoic acid, dry feed	100	100
Feeding, no residual feed	100	100

# REVISED RECOMMENDATION 2018 (PRELIMINARY)

	FK lysine	FK threonine
35-50% residual feed, acid not added	50	75
15-35% residual feed, acid not added	75	75
Addition of 1‰ formic acid, liquid feed, or addition of 0.5% benzoic acid, dry feed, and max 50% residual feed	75	75
Addition of 2‰ formic acid, liquid feed, or addition of 1% benzoic acid, dry feed	100	100
Feeding, no residual feed	100	100

# LOSS OF FREE LYSINE: CONSEQUENCE AND PRICE

## - EXAMPLES

Diet for	Lactating sows	Weaned pigs	Finishers
Standard: Dig. lysine, g/FU	7.7	10.6	7.7
At loss 25%	7.1	9.8	7.0
FK 75 cost per sow/year/pig	DKK 5	DKK 0.5	DKK 2.1
At loss 50%	6.6	9.0	
FK 50 cost per sow/year/pig	DKK 15	DKK 1.4	



# LOSS OF FREE THREONINE: CONSEQUENCE AND PRICE - EXAMPLES

Diet for	Lactating sows	Weaned pigs	Finishers
Standard: Dig. threonine, g/FU	5.0	6.5	5.1
At loss 25%	4.8	6.2	4.8
FK 75 cost per sow/year/pig	DKK 1.6	DKK 0.2	DKK 0.8

# PRICE OF ADDING ACID

2‰ formic acid: DKK 670 per 100 kg =

DKK 1.34 per 100 kg: 0.3 FUgp/100 kg = DKK 0.045 per FUgp

1% benzoic acid in dry feed: DKK 1,050 per kg = DKK 0.10 per FUgp

# CONCLUSION

Significant loss of free lysine and threonine during fermentation of liquid feed.

Benzoic acid and formic acid reduce fermentation losses.

New recommendations for compensation for fermentation loss depend on:

- % residual feed
- The addition of acid

# TAK og husk!

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