SCIENCE AND EDUCATION FOR SUSTAINABLE LIFE

Silage juice in diets to weaner pigs and pregnant sows

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Green bio-refineries and fractions from ley crops – future protein feed?

Background

- Ley crops – theoretically potential to contribute with nutrients to pigs
  - A locally prouduced sustainable energy and protein feed ingredient in diets to pigs
- Press juice from fresh or ensiled ley in biorefinery – theoretically increased possibilities for pigs to utilise nutrients compared with if intact ley crops or silage is fed
- Fractions from fresh and ensiled green biomass show high nutrient quality and can replace parts of other feed ingredients in rations to pigs

  (Adler et al., 2018; Rinne et al, 2018; Damborg et al., 2020; Keto et al. 2021; Stødkilde et al, 2021)
- Important results, however not comparable
  - Need of more studies and more of digestibility and applicability focus

Fresh or ensiled ley crops through a screw press

Photos: Karolina Bergstöm, Magdalena Åkerfeldt

Juice fraction is separated and stored

Photos: Karolina Bergstöm, Magdalena Åkerfeldt

Quality of different juice fractions

Material	Crop	CP (g/kg DM)	Lys (g/kg CP)	Reference
Fresh	80% timothy and meadow fescue, 20% red clover	204	50.0	Adler et al., 2018
	White clover	282	42.7	Damborg et al., 2020
	Red clover	238	40.2	Damborg et al., 2020
	Lucerne	323	48.8	Damborg et al., 2020
	Perennial ryegrass	151	41.1	Damborg et al., 2020
	Mixed timothy, meadow fescue, English ryegrass, red clover and white clover	140	-	Presto Åkerfeldt (pers. comm)
Ensiled	Mixed timothy and meadow fescue sward	279	48.0	Keto et al., 2021
	Mixed timothy, meadow fescue, English ryegrass, red clover and white clover	157 193	43.8 36.3	Presto Åkerfeldt et al., 2022 Presto Åkerfeldt (pers. comm)

Objective

- Evaluate the applicability of silage juice in liquid diets to weaner pigs and pregnant sows and its' effects on production and health

Photo: Emelie Brindbergs

Photo: Magdalena Åkerfeldt

Objective

- Study the ”theoretical potential” in practice
  - GreenValleys-project focus on innovation and development
  - An applied feeding trial designed for the practical conditions at a commercial farm

Photo: Emelie Brindbergs

Photo: Magdalena Åkerfeldt

Experiments

- Weaned pigs
  - 96 (LYxH) from four batches (in each batch: 4 groups with 6 pigs/group)
  - 6 w age until delivery to fattening unit at 11 w age
  - Control (C) = commercial feed mixed with water prior to feeding
  - Silage juice (SJ) = commercial feed mixed with SJ instead of water

  (SJ theoretically replacing 10% of crude protein content)
- Pregnant sows
  - 24 (LY) from three batches (in each batch: 8 sows)
  - 6 w after service until 1 w pre-farrowing (56 days)
  - Control (C) = commercial feed mixed with water prior to feeding
  - Silage juice (SJ) = commercial feed mixed with SJ instead of water

  (SJ theoretically replacing 15% of crude protein content)

Registrations

- Weaned pigs
  - Growth, cleanliness of pens and pigs, clinical health indicators
- Pregnant sows
  - Weight and body condition, cleanliness sows, clinical health indicators, litter characteristics at farrowing

Results

Health – Weaned pigs and sows

- Weaned pigs: No deviations in body condition, leg health (lameness), shaking, gasping, breathing or sneezing were observed
- Sows: No deviations in udder, injuries on body/legs/hoofs/ears, leg health (lameness), shaking, gasping, breathing or sneezing, distorted snout or rectal prolapse

Results

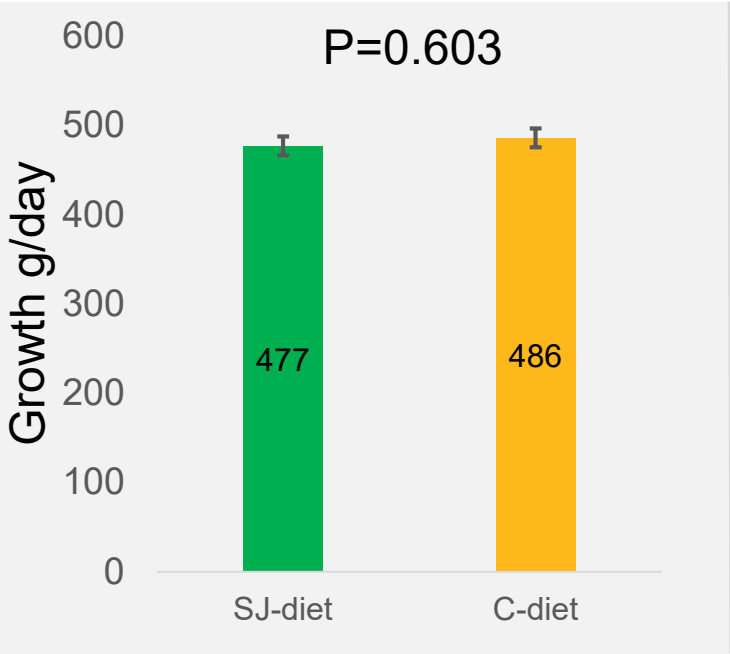
Growth – Weaned pigs

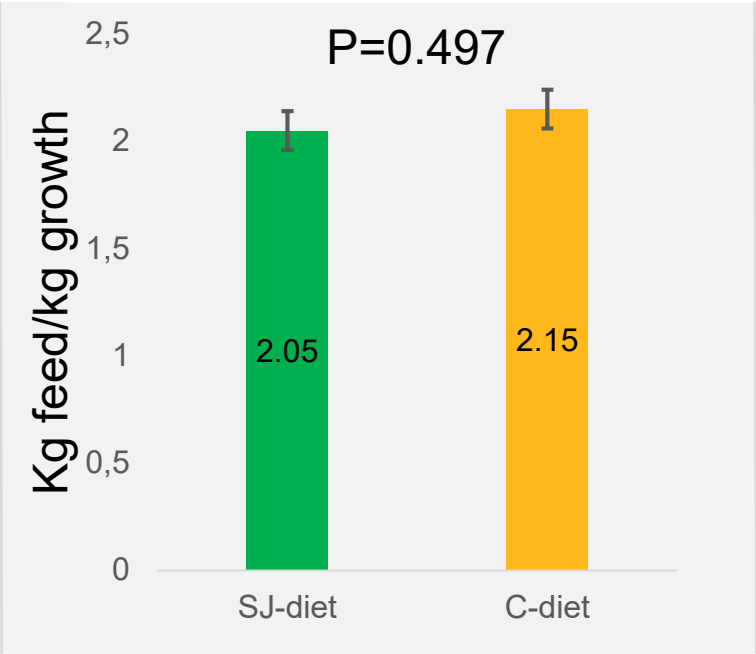
Variable	SJ-diet	C-diet
Live weight at study start (kg)	14.0 ± 2.04	13.6 ± 2.36
Live weight at study end (kg)	30.0 ± 4.48	29.5 ± 4.62
Days from study start to end	32.9 ± 3.64	33.0 ± 3.70
Commercial feed intake in total (kg)	30.7 ± 5.0	34.2 ± 5.4
SJ intake in total (kg)	54.3 ± 8.9	0 ± 0.0
Water intake (kg)	1.6 ± 0.4	56.0 ± 8.8

Individual pig weights, number of days, feed, silage juice and water intake (Mean ± StD). Individual intake of commercial feed, SJ and water is based on the amount provided per pen divided with the number of pigs per pen (six pigs/pen). N = 16 groups, 8 groups/treatment.

Results

Growth and feed intake – Weaned pigs

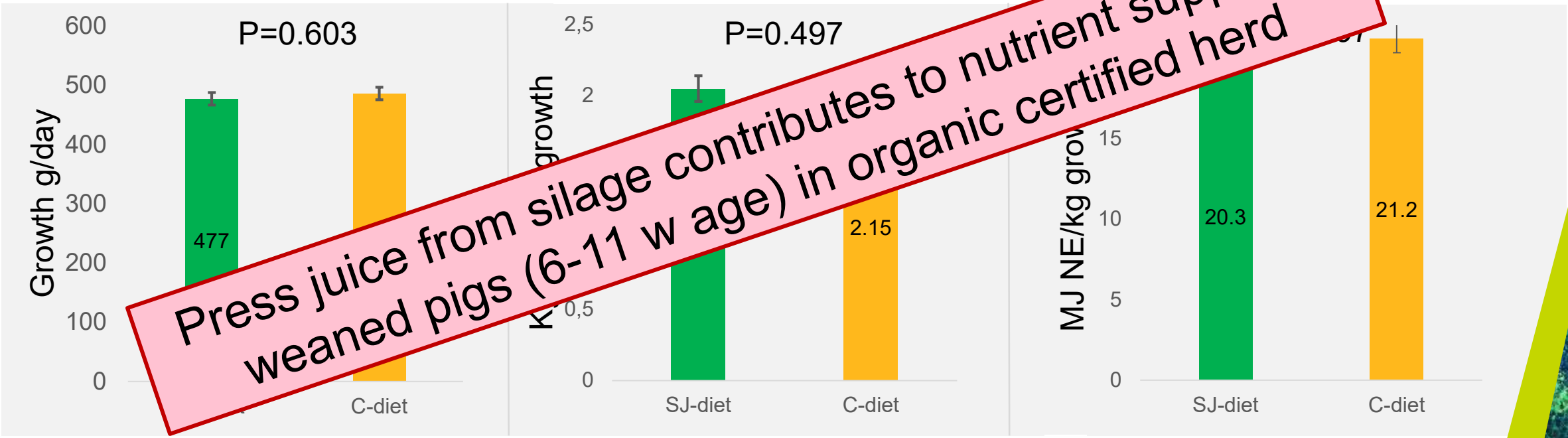




Individual pig growth and feed conversion (kg commercial feed/kg growth and MJ NE/kg growth), LS-means and SE values.
N = 16 groups, 8 groups/treatment.

Results

Growth and feed intake – Weaned pigs

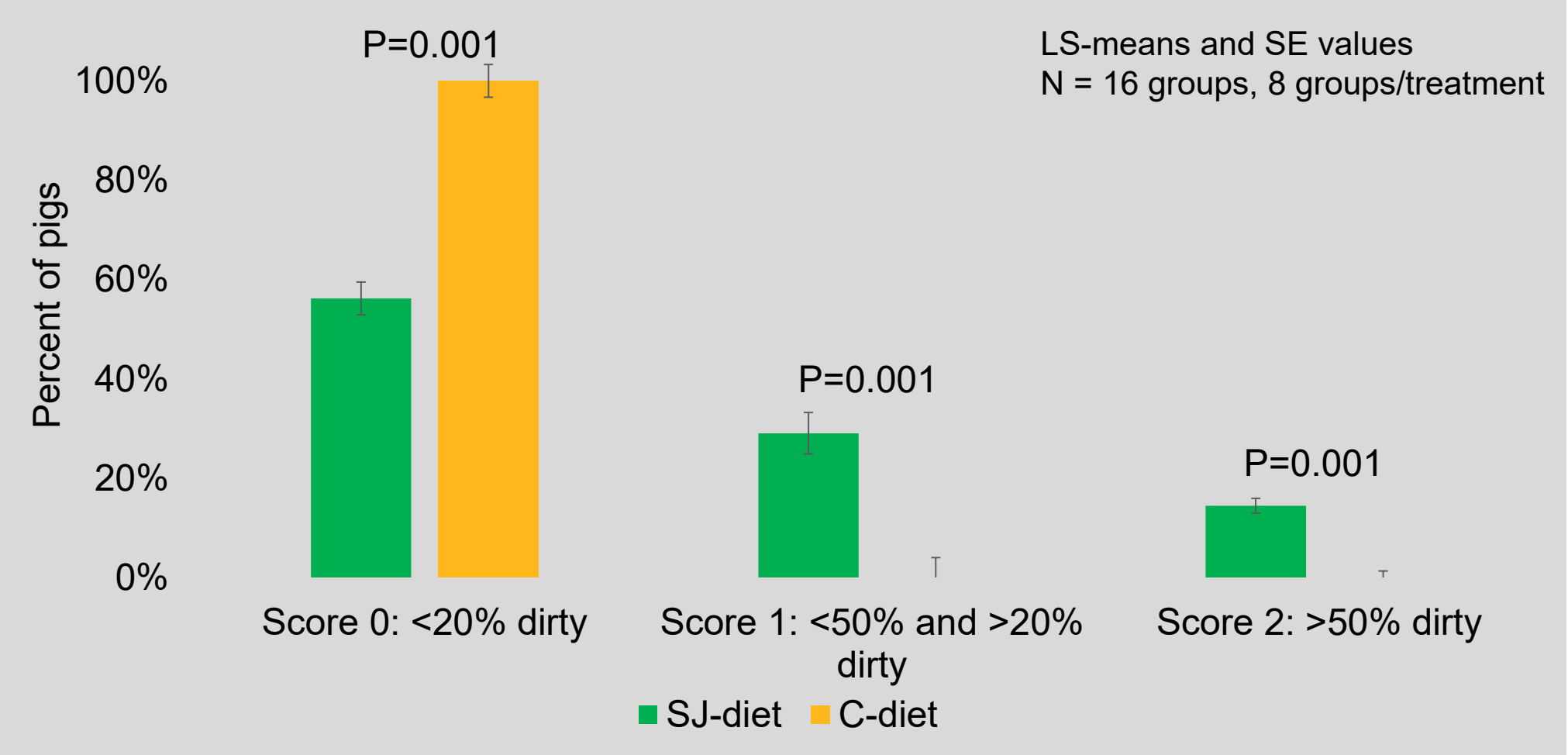


Press juice from silage contributes to nutrient supply to weaned pigs (6-11 w age) in organic certified herd

Individual pig growth and feed conversion (kg commercial feed/kg growth and MJ NE/kg growth), LS-means and SE values.
N = 16 groups, 8 groups/treatment.

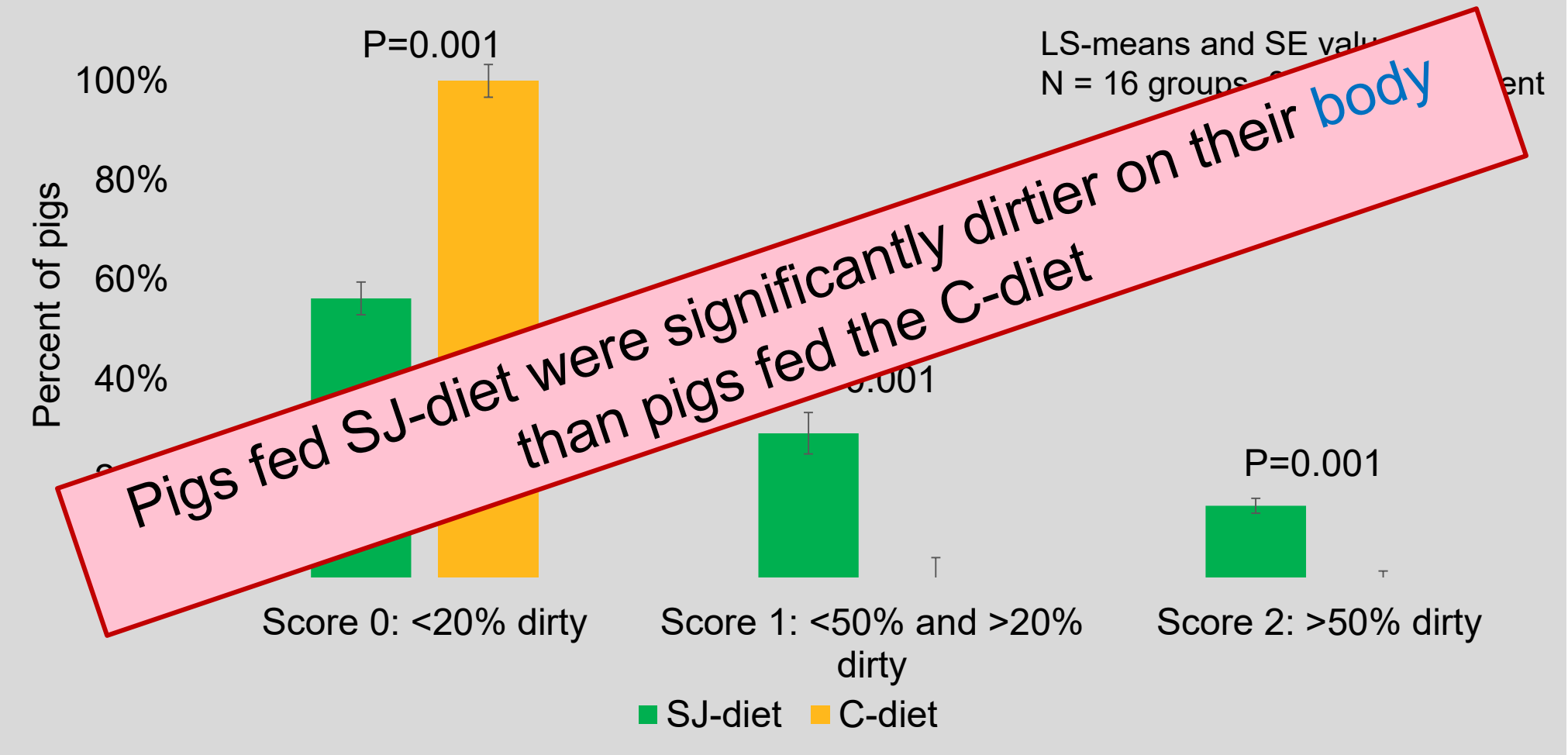
Results

Cleanliness body – Weaned pigs



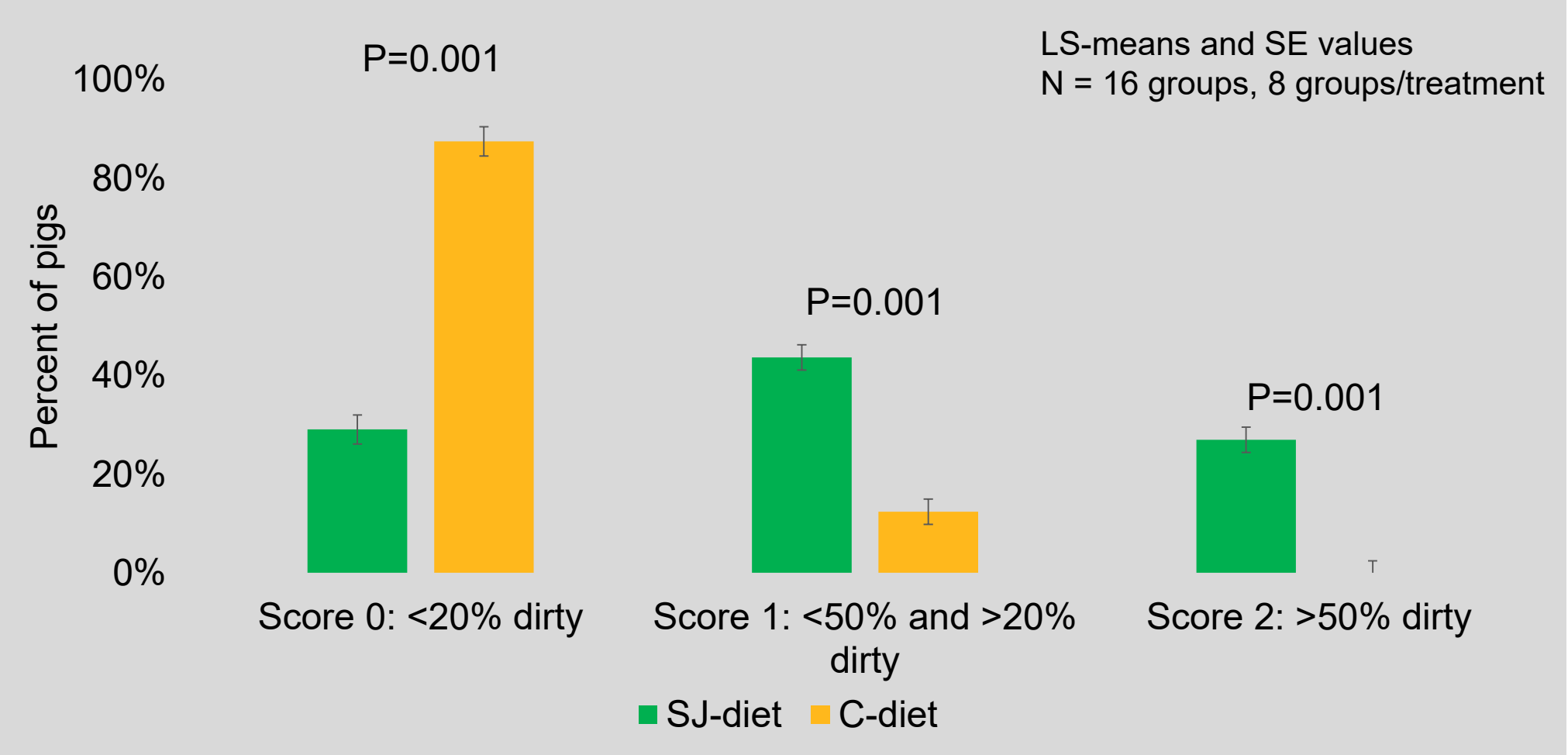
Results

Cleanliness body – Weaned pigs



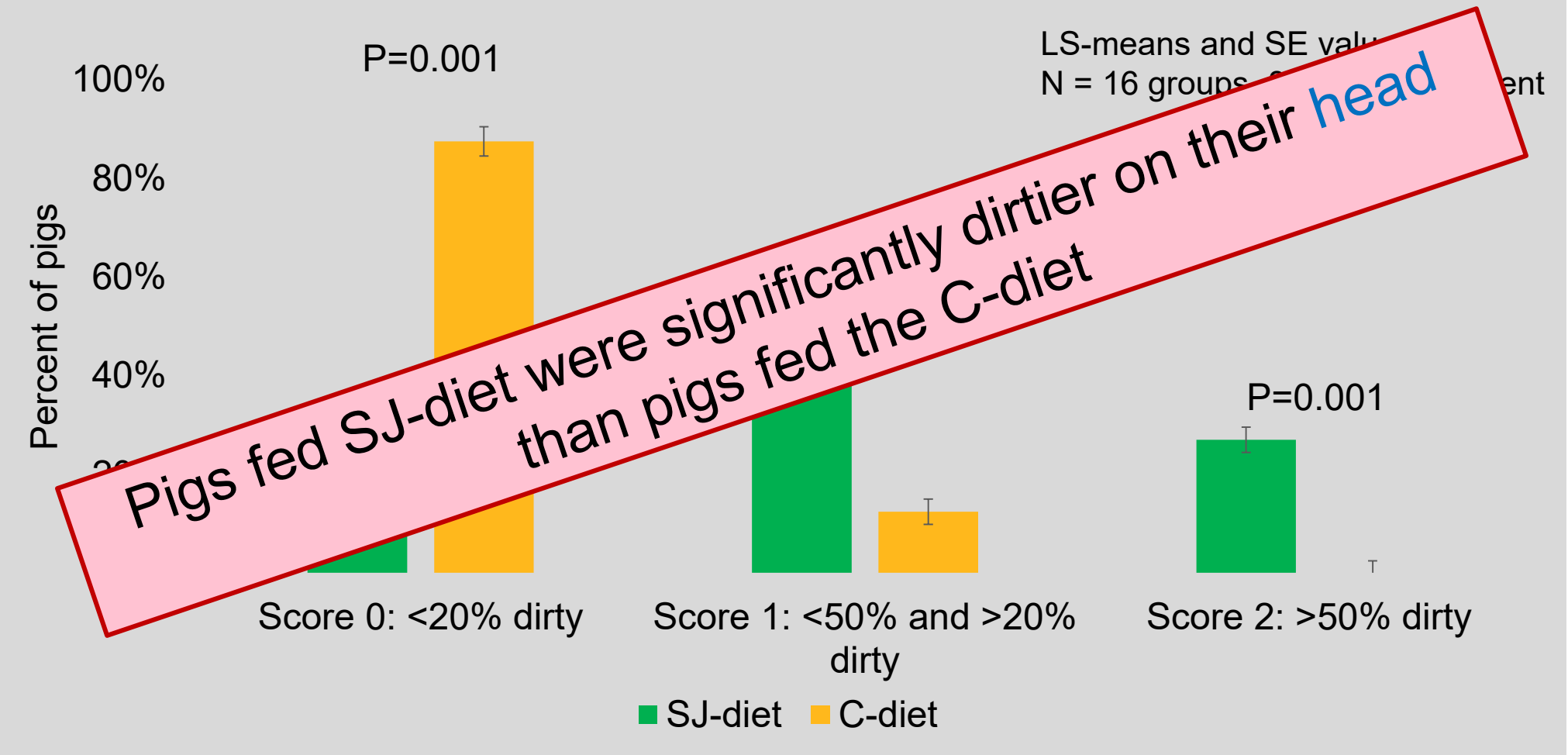
Results

Cleanliness head – Weaned pigs



Results

Cleanliness head – Weaned pigs



Results

Cleanliness rectum and pens – Weaned pigs

Cleanliness variable	SJ-diet	C-diet	SE	P-value
Rectum (% of pigs)				
Score 0: *clean*	54.2	64.6	10.10	**0.487**
Score 1: *dirty around rectum but not tail or legs*	33.3	27.1	9.88	**0.667**
Score 2: *dirty around rectum, tail and legs*	12.5	8.3	6.91	**0.681**
Pen (deviation cleanliness, % of pens)				
Near feed trough	37.5	12.5	12.50	**0.195**
Lying area	25.0	12.5	15.31	**0.580**
Near water source	62.5	62.5	21.65	**1.000**

Results

Cleanliness rectum and pens – Weaned pigs

Cleanliness variable	SJ-diet	C[illegible]	[illegible]	[illegible]alue
Rectum (% of pigs)				
Score 0: *clean*			10.10	**0.487**
Score 1: *dirty around rectum [illegible] or legs*		27.1	9.88	**0.667**
Score 2: *dirt[illegible] leg[illegible]*	12.5	8.3	6.91	**0.681**
Pe[illegible]leanliness, % of pens)				
Ne[illegible]ed trough	37.5	12.5	12.50	**0.195**
Lying area	25.0	12.5	15.31	**0.580**
Near water source	62.5	62.5	21.65	**1.000**

No significant differences in dirtiness in the rectum area or cleanliness in the pen

Weight and back fat thickness – Sows

- No significant difference in weight and body condition changes during pregnancy. SJ-diet sows gained numerically less. *Small sample size – results should be interpreted with some caution.*

	Weight (kg)		Body condition (mm back fat)	
	Start	**Weight** change	Start	**Back fat thickness** change
SJ-diet	285.8 ± 49.2	50.8 ± 9.5	16.8 ± 3.5	2.9 ± 2.0
C-diet	275.6 ± 34.6	54.8 ± 9.2	18.1 ± 3.7	4.1 ± 4.0
		P=0.477		P=0.267

Individual sow weight and back fat thickness (mm) at start and changes during the study period (Mean ± StD). N = 12 sows in SJ-diet and N = 11 sows in C-diet.

Litter characteristics – Sows

- Descriptive statistics of litter characteristics. SJ-diet sows performed numerically better (P>0.005). *Small sample size – results should be interpreted with some caution.*

	SJ-diet (N=11)		C-diet (N=10)	
	Mean	Std	Mean	Std
Total number of born	17.6	4.62	15.3	3.13
Live born	15.8	4.55	14.0	2.57
Litter weight (kg)	30.5	7.57	27.1	4.38

Results

Cleanliness – Sows

	SJ-diet (% sows dirty)	C-diet (% sows dirty)	P-value (Chi-square)
Back/body	41.7	27.3	0.469
Left side body	41.7	27.3	0.469
Right side body	33.3	27.3	0.752
Udder/belly	0	0	
Head	91.7	54.6	0.043
Rectum	16.67	0.00	0.157
Legs	41.7	0	0.016

Percent sows that were dirty (> 20% of the area) on the head, body, belly, rectum and legs. N = 12 sows in SJ-diet and N = 11 sows in C-diet.

Results

Cleanliness – Sows

	SJ-diet (% sows dirty)	C-diet (% sows dirty)	
Back/body	41.7		
Left side body	41.7		
Right side body			0.752
Udder/belly			
H		54.6	0.043
		0.00	0.157
	41.7	0	0.016

No significant difference in dirtiness on sow body, but sows fed C-diet were cleaner on their head and legs than sows fed the SJ-diet

Pe that were dirty (> 20% of the area) on the head, body, belly, rectum and legs. N = 12 sows in SJ-diet and N = 11 sows in C-diet.

Summary results & Conclusion

- Quality of silage juice lower than expected
- No deviation in health parameters
- No significant effects on pig growth and feed efficiency in pigs or sow weight, body condition changes or litter characteristics
- Minor effect on hygienic measures
  - Pigs fed silage juice were slightly dirtier on their heads, bodies or legs
  - No difference in cleanliness in rectum or in pens

Conclusion

Summary results & Conclusi

- Quality of silage juice lo
- No deviation i
- No off

We can conclude:

- Press juice from silage is a potential local feed ingredient in liquid feeding system and can contribute to the nutrient supply to weaned pigs and pregnant sows
- In order to estimate the nutritive value of silage juice for pigs to include in feed recipes' for pigs, more studies on nutrient digestibility is needed
- Continue evaluation of the difference in cleanliness

  - ther on their heads, bodies or
  - liness in rectum or in pens

Thank you for your attention!

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