Theater session 98. Nutrition in health and welfare in monogastric animals
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Effect of replacement of soybean by Mediterranean legumes on intestinal health of growing pigs

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Introduction

Soy bean facts

Elevated crude protein and lysine

Main protein source for pigs

Anti-nutritional compounds associated (trypsin inhibitors)

92% imported in the EU (from Brazil, USA and Argentina)

Large carbon footprint associated

EU aims to transition to more locally-produced protein-rich plant-based proteins

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Objective

Evaluate the potential of local legumes as replacement of the protein provided by imported soy in pig diets on pig intestinal health

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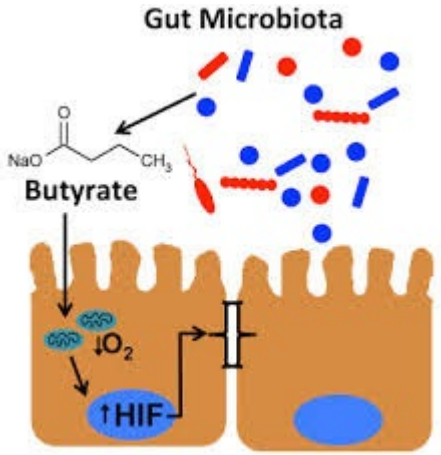
Introduction

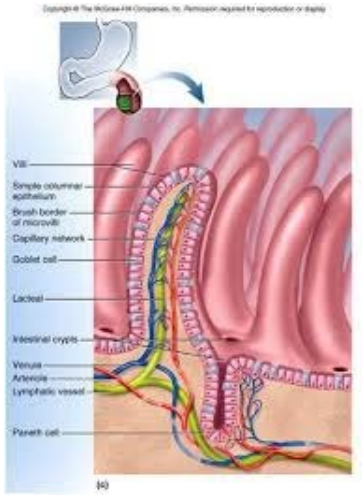
Short chain fatty acids

-Produced as a product of undigested carbohydrates and protein
-Can account for 15-30% of maintenance energy requirement of pigs
-Improve intestinal health (gut functionality)



Mieloperoxidase and calprotectin

Markers of intestinal permeability/inflammation



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Material and methods: diets

Ingredients	Soybean	Pea 1	Pea 2	Lentil 1	Lentil 2	Chickpea 1	Chickpea 2
Ingredients, g/kg							
Barley	349	256	412	466	400	474	414
Corn	145	45	96	220	208	55	138
Soybean 47	155	0	94	0	89	0	93
Wheat	327	180	174	9	150	0	140
Pea	-	495	200	-	-	-	-
Lentil	-	-	-	280	129	-	-
Chickpea	-	-	-	-	-	444	190
Calculated nutrient composition, g/kg							
Total CP	160	160	160	160	161	161	160
CP from soybean	74	0	42	0	42	0	43
CP from legume	0	102	42	94	42	104	43
ME, MJ/kg	13.0	12.9	12.9	13.2	13.1	13.3	13.2
Lipids	18.4	16.1	17.6	19.7	19.4	34.7	27.0
Lys SID	7.7	7.8	7.9	7.8	7.9	7.8	7.9

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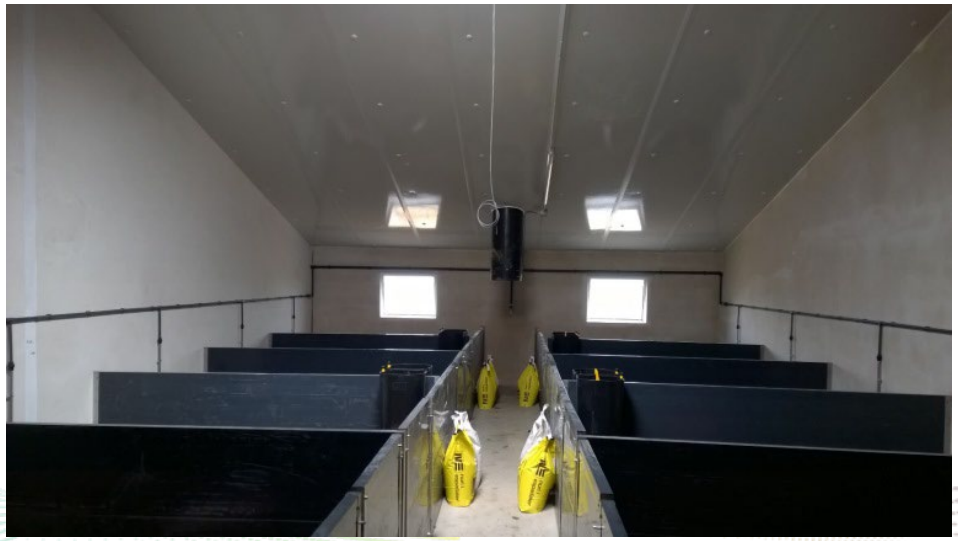
Material and methods: animals and facilities

- ✓ Commercial farm
- ✓ 252 pigs (Pietrain boar x DNA sow)
- ✓ 6 pens/treatment; 6 pigs (3 barrows, 3 gilts /pen

- ✓ Initial age: 56 days of life (20.3 ± 1.34 kg)
- ✓ Final age: 84 days of life



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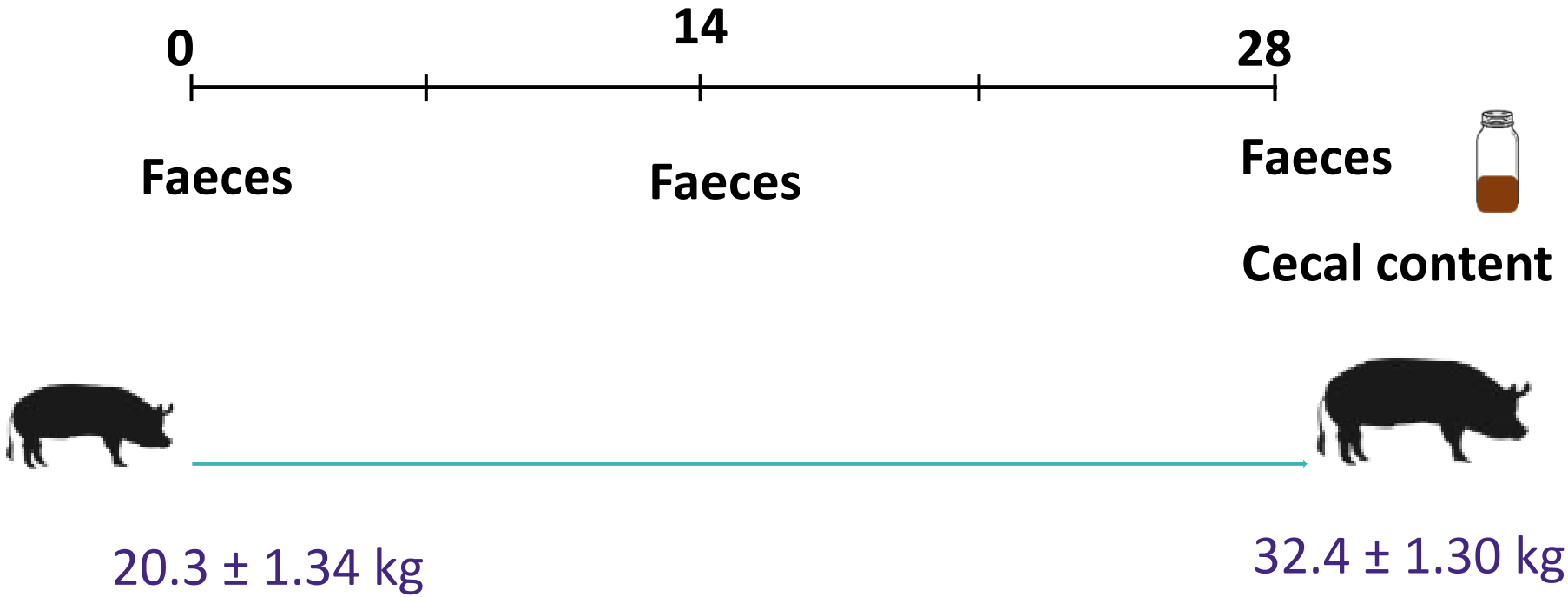
Material and methods: experimental design



Analyses:

Faeces for MPO and calprotectin analysis (ELISA)

Cecal content for SCFA analysis (Gas chromatography)

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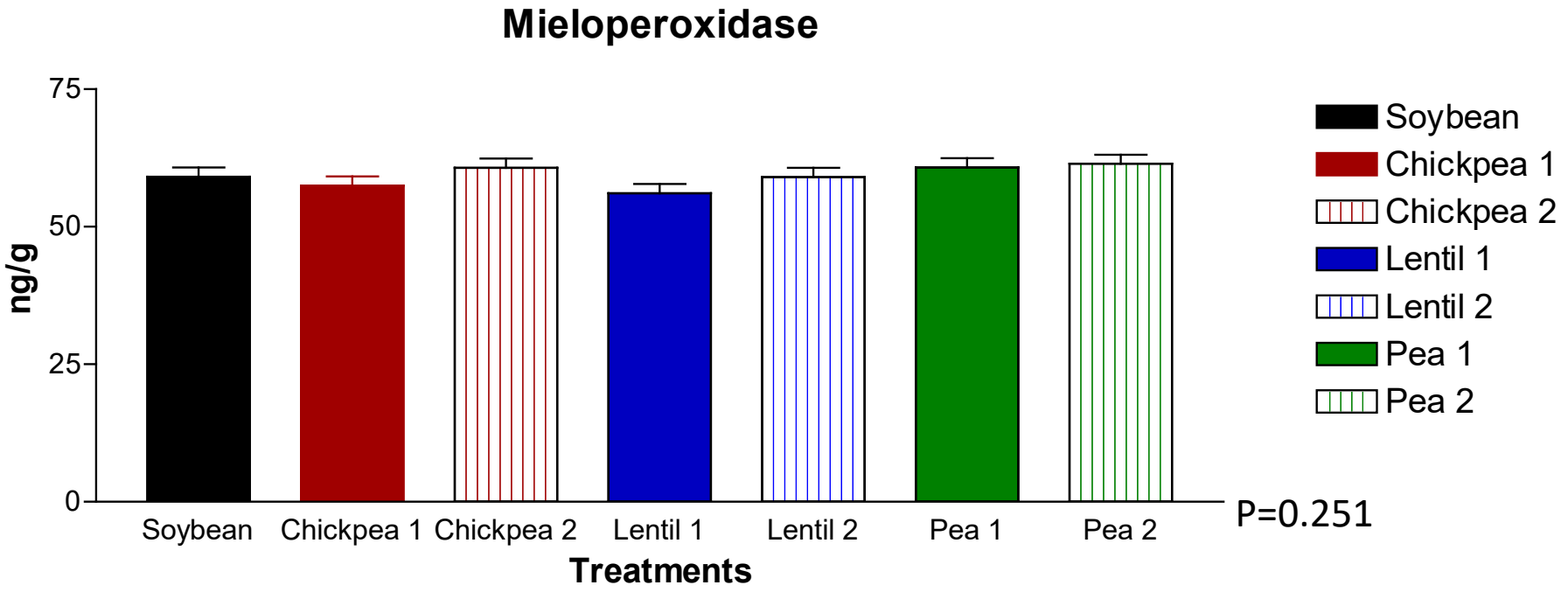
Results



Faecal mieloperoxidase in pigs fed isoproteic diets based on different legumes. Control is soybean, 1 stands for total substitution of soybea, 2 stands for substitution of half of soybean of control diet.

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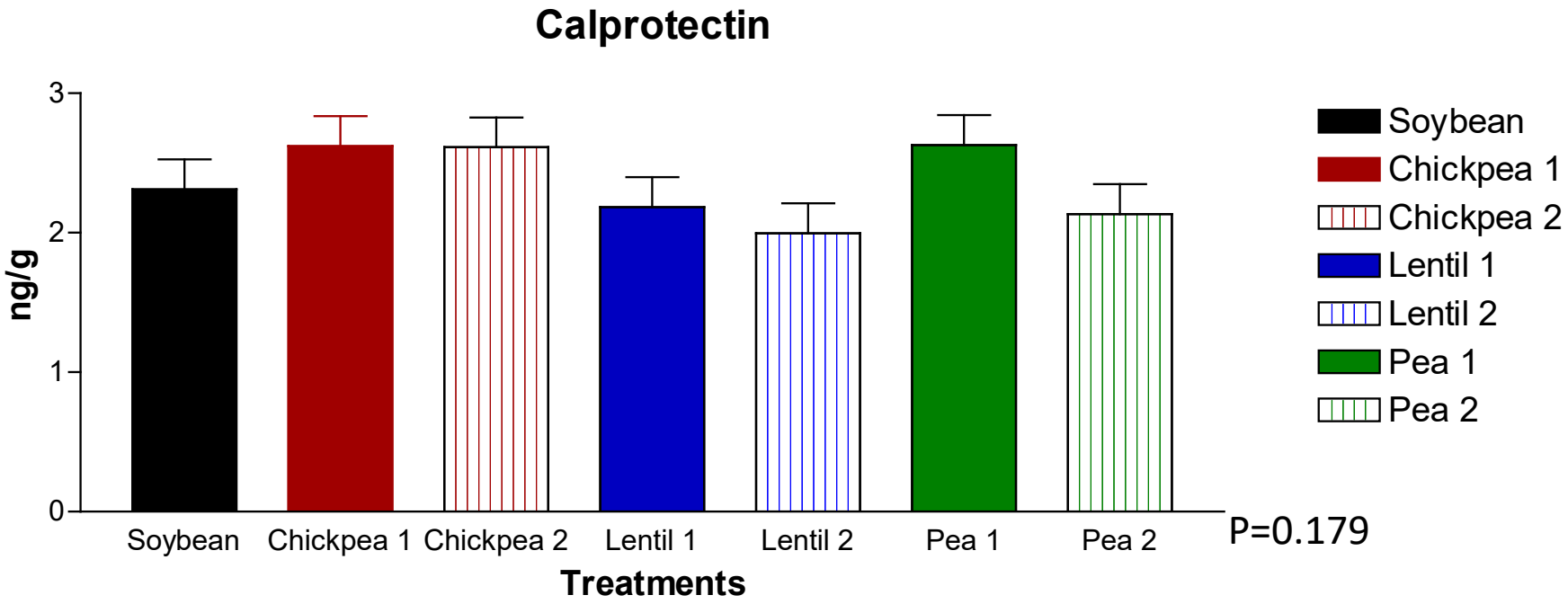

Faecal calprotectin in pigs fed isoproteic diets based on different legumes. 1 stands for total substitution of soybean, 2 stands for substitution of half of soybean of the Soybean diet.

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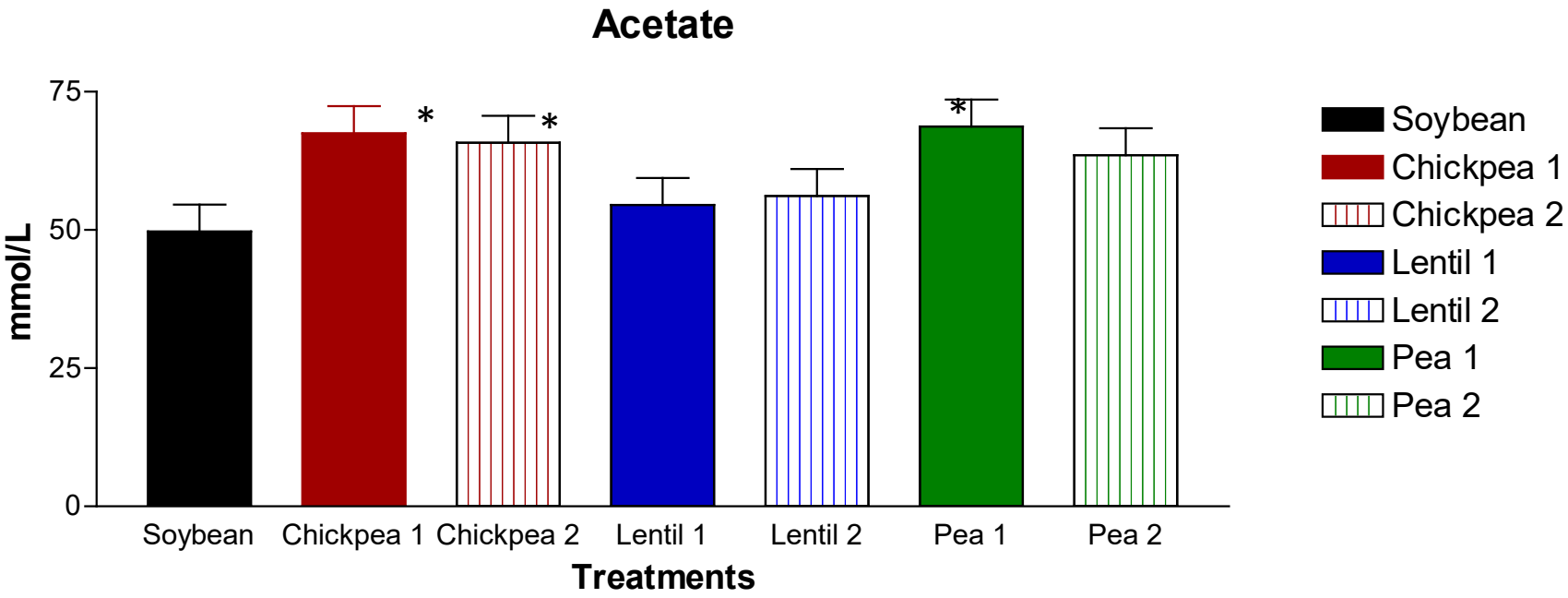

Cecal concentration of acetate in pigs fed isoproteic diets based on different legumes. 1 stands for total substitution of soybean, 2 stands for substitution of half of soybean of the Soybean diet.

* Different from soybean, P<0.05

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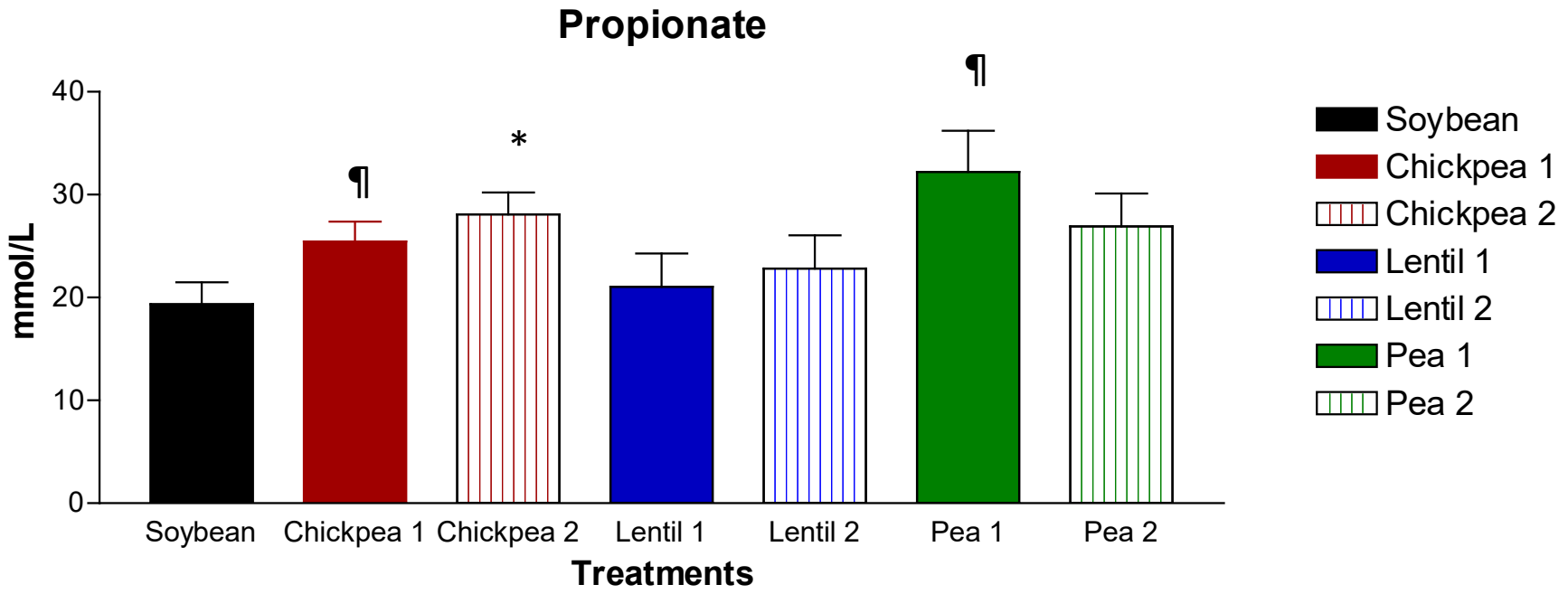

Cecal concentration of propionate in pigs fed isoproteic diets based on different legumes. 1 stands for total substitution of soybean, 2 stands for substitution of half of soybean of the Soybean diet.

¶ Different from Soybean, 0.05<P<0.10

* Different from Soybean, P<0.05

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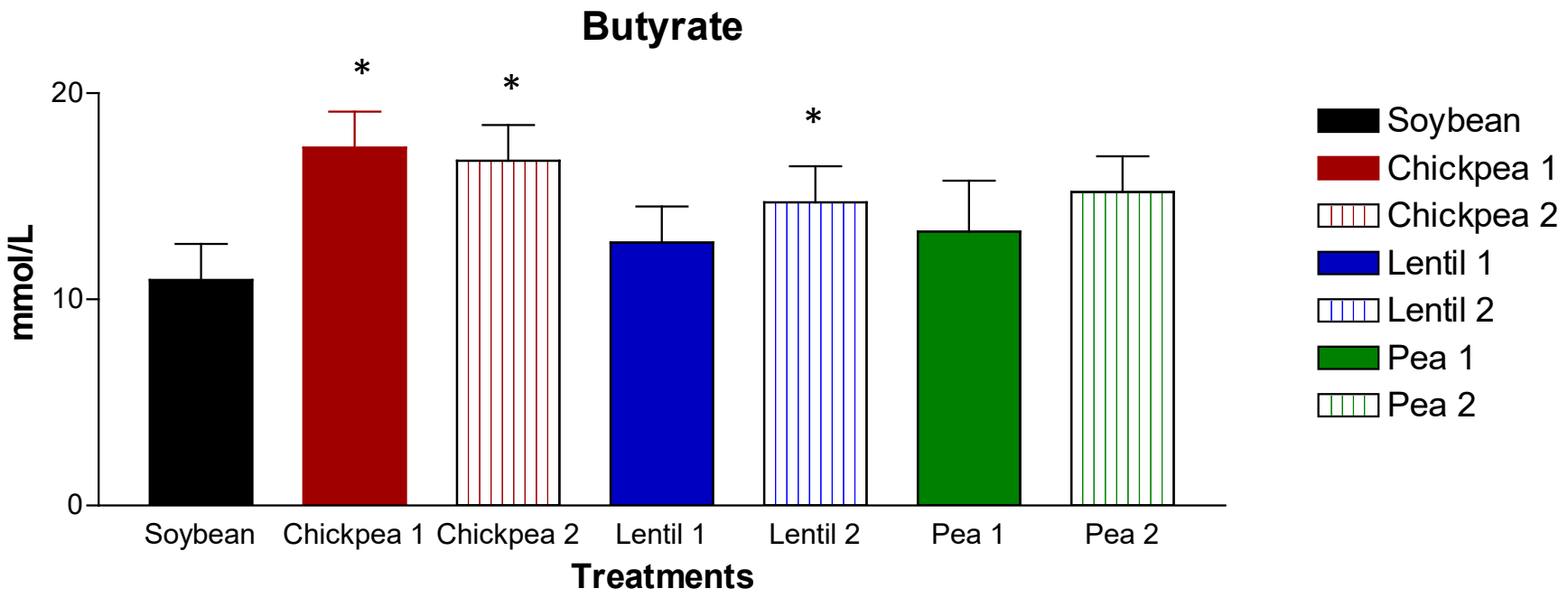

Cecal concentration of butyrate in pigs fed isoproteic diets based on different legumes. 1 stands for total substitution of soybean, 2 stands for substitution of half of soybean of the Soybean diet.

* Different from Soybean, $P<0.05$

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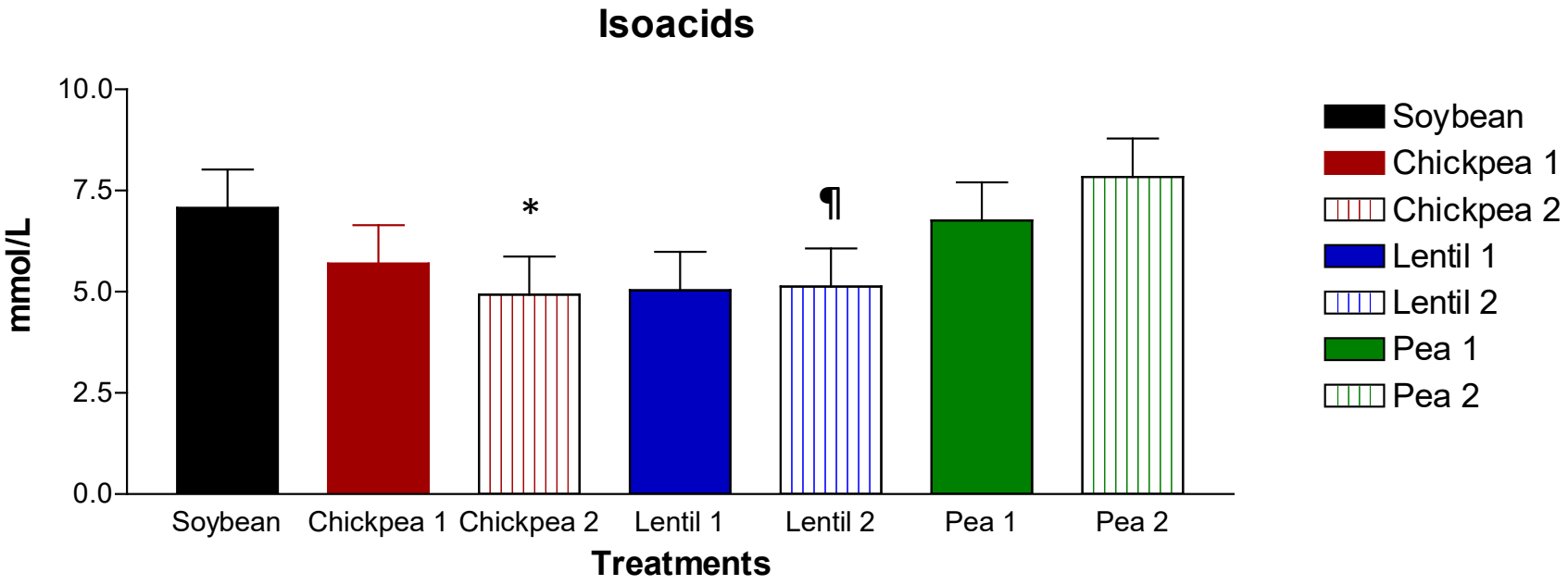

Cecal concentration of isoacids (Isobutyrate + Isovalerate + Valerate) in pigs fed isoproteic diets based on different legumes. 1 stands for total substitution of soybean, 2 stands for substitution of half of soybean of the Soybean diet.

¶ Different from Soybean, 0.05<P<0.10

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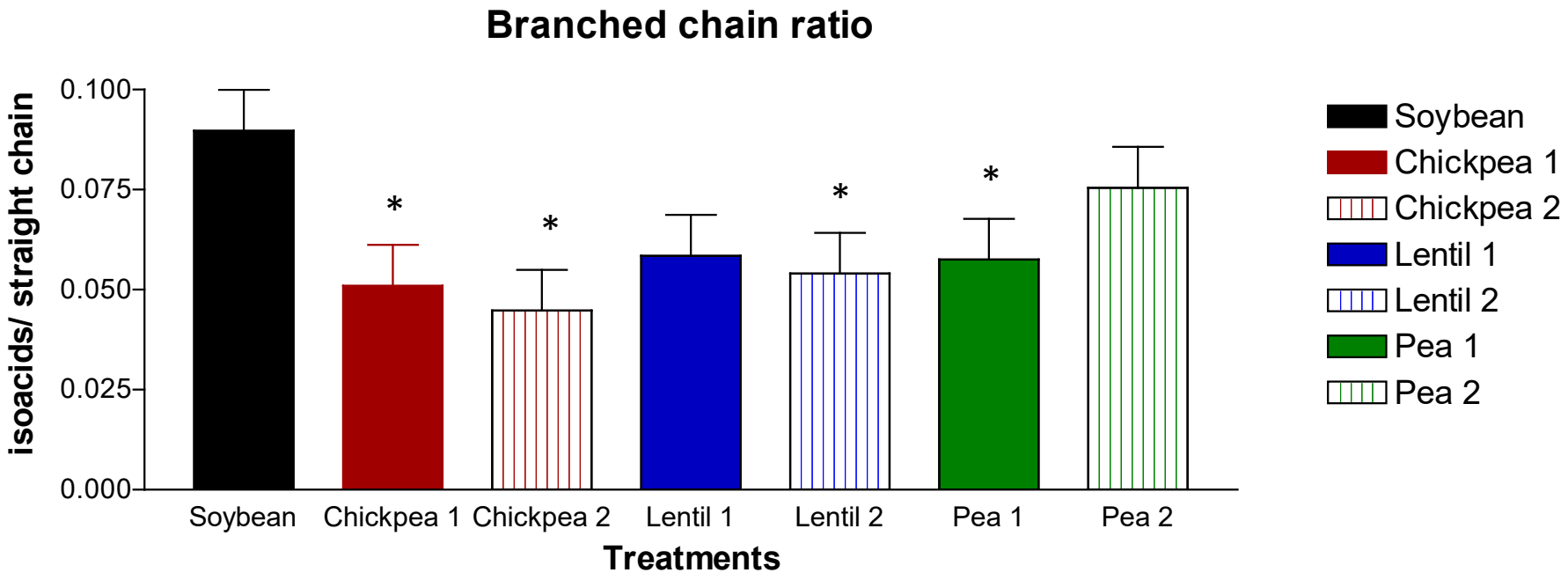

Ratio of isoacids (Isobutyrate + Isovalerate + Valerate) to straight chain VFA (Acetate + Propionate + Butyrate) in pigs fed isoproteic diets based on different legumes. 1 stands for total substitution of soybean, 2 stands for substitution of half of soybean of the Soybean diet.

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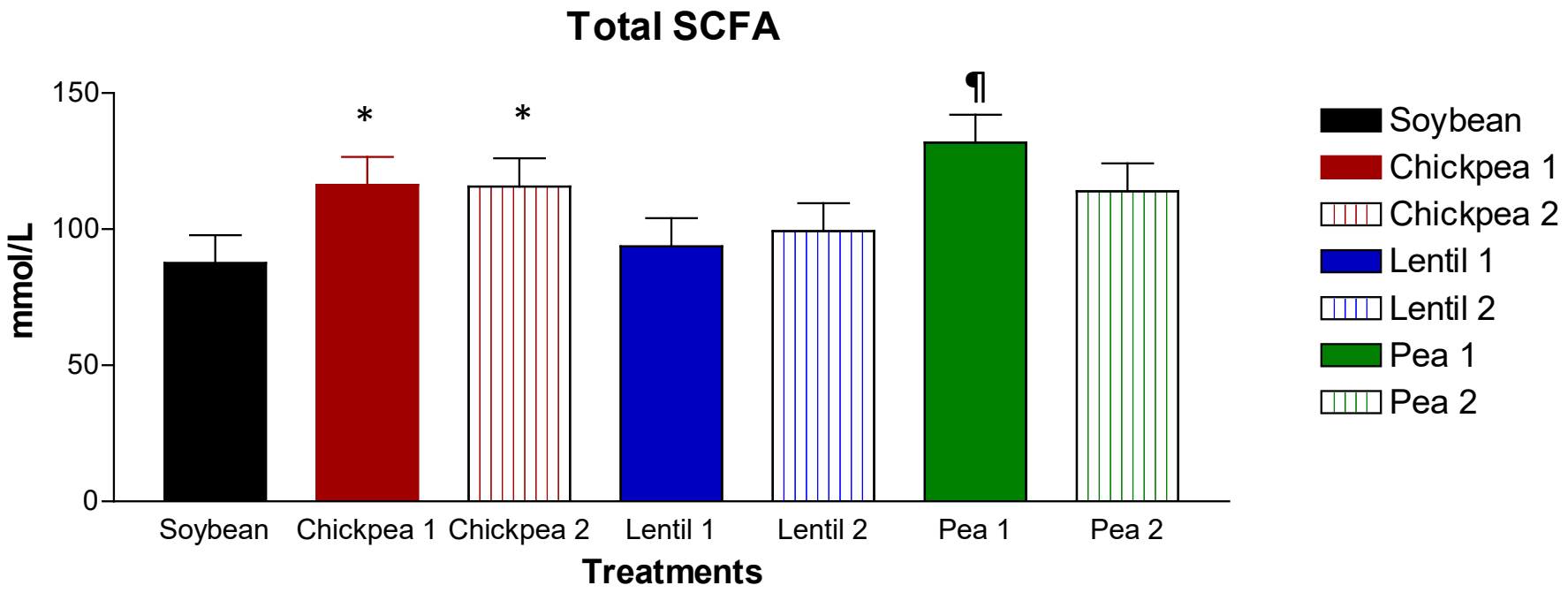

Cecal concentration of total short chain fatty acids, SCFA, in pigs fed isoproteic diets based on different legumes. 1 stands for total substitution of soybean, 2 stands for substitution of half of soybean of the Soybean diet.

¶ Different from Soybean, 0.05<P<0.10

* Different from Soybean, P<0.05

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Conclusion

- ✓ **Analysis of cecal SCFA in pigs fed diets with local legumes suggest improved intestinal health compared with pigs fed soybean meal**

Acknowledgment

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Animal Data Analytics