



Table of Contents

1	General introduction and work hypothesis.....	2
1.1	General Introduction.....	2
1.2	Work hypothesis	3
1.3	References.....	3
2	Potential of cereal grains and grain legumes in modulating pigs' intestinal microbiota – A review	6
2.1	Abstract	6
2.2	Introduction	7
2.3	The microbial ecosystem of pigs' GIT: composition and interactions with the host ...	8
2.4	Cereal grains as potential modulators of pigs' intestinal microbiota.....	10
2.4.1	Carbohydrate composition	10
2.4.1.1	Starch	11
2.4.1.2	Non-starch polysaccharides.....	12
2.4.2	Influence of cereal grains in pig diets on intestinal microbial activity and composition.....	12
2.4.2.1	Studies with whole cereal grains	13
2.4.2.2	By-products manufactured from cereal grains	19
2.4.2.3	Purified non-starch polysaccharide fractions manufactured from cereal grains	22
2.5	Grain legumes as potential modulators of pigs' intestinal microbiota.....	29
2.5.1	Carbohydrate composition	30
2.5.1.1	Starch	30
2.5.1.2	Raffinose family oligosaccharides.....	30
2.5.2	Influence of grain legumes in pig diets on intestinal microbial activity and composition.....	31
2.5.2.1	Whole grain legumes and their purified carbohydrate fractions	32
2.5.2.2	Influence of grain legumes and their fractions on experimental challenges with enterotoxigenic Escherichia coli	36
2.6	Conclusion	38
2.7	Acknowledgments.....	39
2.8	References.....	39
3	Wheat and barley differently affect porcine intestinal microbiota.....	56
3.1	Abstract	56
3.2	Introduction	56
3.3	Materials and Methods.....	57



3.4	Results and Discussion	64
3.5	Conclusions	74
3.6	Acknowledgments.....	74
3.7	References.....	77
4	Micronized fibers affect <i>in vitro</i> fermentation under normal buffered and osmotic stress conditions using porcine inocula	84
4.1	Summary.....	84
4.2	Introduction	85
4.3	Materials and Methods.....	86
4.4	Results.....	91
4.5	Discussion.....	93
4.6	Conclusion	99
4.7	References.....	100
5	General discussion	106
5.1	Introduction	106
5.2	Principal possibilities to alter the intestinal microbiota of pigs	106
5.2.1	Stability of the intestinal microbiota in pigs	106
5.2.2	Stability and modulation of the microbiota under pathogenic stress	108
5.2.3	Strategies and considerations to modulate the microbiota with fermentable carbohydrates.....	110
5.3	Importance of the protein to carbohydrate ratio for gut health.....	111
5.4	<i>In vitro</i> evaluation of dietary components with potential for microbiota manipulation	113
5.5	Conclusion	115
5.6	Suggestion for further research	116
5.7	References.....	116
6	Summary.....	126
7	Zusammenfassung	130
8	Appendix	134
	Acknowledgments.....	145