



TABLE OF CONTENTS

1. General introduction and work hypothesis	3
1.1. General introduction.....	3
1.2. Work hypothesis.....	4
1.3. References.....	4
2. Nutritive value of wheat and wheat by-products in pig nutrition: a review	9
2.1. Summary.....	9
2.2. Introduction.....	9
2.3. Nutritional composition of spring and winter wheat.....	11
2.3.1. Content of proximate nutrients.....	11
2.3.2. Amino acids.....	13
2.3.3. Carbohydrates.....	14
2.4. Feeding value of wheat.....	17
2.4.1. Energy digestibility and contents of metabolizable and net energy	17
2.4.2. Crude protein and amino acid digestibility	18
2.5. Processing of wheat.....	20
2.5.1. Fermentation.....	20
2.5.2. Grinding and pelleting	21
2.5.3. Other processing techniques.....	22
2.6. Wheat by-products	23
2.7. Nutritional composition of wheat by-products	25
2.7.1. Content of proximate nutrients and energy	25
2.7.2. Crude protein and amino acids	26
2.7.3. Carbohydrates.....	27
2.8. Feeding value of wheat by-products	28
2.9. Enzyme supplementation in wheat and wheat by-product based diets	31
2.10. Conclusions.....	38



2.11. Acknowledgement.....	38
2.12. References.....	38
3. Standardized ileal digestibility of amino acids in eight genotypes of soft winter wheat fed to growing pigs	55
3.1. Summary.....	55
3.2. Introduction.....	56
3.3. Materials and methods.....	57
3.3.1. Animals, Experimental Design, and Diets	57
3.3.2. Experimental Feeding and Sample Collection	59
3.3.3. Sample Analysis	60
3.3.4. Calculations	61
3.3.5. Statistical Analysis.....	62
3.4. Results	62
3.4.1. Physical Characteristics and Contents of Nutrients and Energy in 8 Genotypes of Wheat.....	62
3.4.2. Standardized Ileal Digestibility of CP and AA and Standardized Ileal Digestible Content of CP and AA in 8 Genotypes of Wheat	67
3.5. Discussion.....	70
3.6. Acknowledgements	74
3.7. Literature cited	74
4. Nutritive value of wheat concentrated distillers solubles in diets for growing pigs	83
4.1. Summary text	83
4.2. Abstract.....	83
4.3. Introduction.....	84
4.4. Materials and methods.....	85
4.4.1. Experiment 1	85
4.4.2. Experiment 2	86
4.4.3. Analytical procedure.....	88



4.4.4.	Calculations and statistical analyses	89
4.5.	Results	90
4.5.1.	General observations.....	90
4.5.2.	Chemical composition of wheat concentrated distillers solubles.....	90
4.5.3.	Standardised ileal amino acid digestibility (Exp. 1) and energy content (Exp. 2) of wheat concentrated distillers solubles	90
4.6.	Discussion.....	93
4.6.1.	Chemical composition of wheat concentrated distillers solubles.....	93
4.6.2.	Standardised ileal digestibility of crude protein and amino acids in concentrated distillers solubles	94
4.6.3.	Energy content of wheat concentrated distillers solubles	94
4.7.	Conclusions.....	96
4.8.	Acknowledgements	96
4.9.	References.....	97
5.	General Discussion	105
5.1.	Introduction.....	105
5.2.	Wheat.....	106
5.2.1.	Protein content and composition	106
5.2.2.	Variation in SID of AA and standardized ileal digestible contents of AA in wheat genotypes fed to pigs	107
5.2.3.	Effect of fiber fractions on SID of AA	109
5.3.	Protein and energy content in wheat by-products of bioethanol production	111
5.4.	Conclusion	113
5.5.	Suggestion for further research.....	114
5.6.	References.....	115
6.	Summary	121
7.	Zusammenfassung.....	127