

Table of Contents

Table of Contents	I
List of Abbreviations	IV
List of Figures	VIII
List of Tables	XI
1 Introduction	1
1.1 General Introduction.....	1
1.2 The Gastrointestinal Tract of Chicken	1
1.2.1 Crop, Proventriculus and Gizzard	2
1.2.2 Intestine	3
1.2.2.1 Anatomical Structure of the Chicken's Intestine.....	3
1.2.2.2 Small Intestine.....	4
1.2.2.3 Large Intestine.....	5
1.2.3 Innervation of the Gastrointestinal Tract of the Chicken	6
1.2.4 Gastrointestinal Motility.....	7
1.2.5 Microbial Colonization of the Gastrointestinal Tract of Chicken	8
1.3 Myo-inositol: Metabolism and Biological Function.....	10
1.4 Methodology	15
1.4.1 Ussing Chamber	15
1.4.2 Isometric Force Measurement of Muscle Contraction.....	17
1.5 Objectives	18
2 Materials & Methods	20
2.1 Animals and Feeding	20
2.2 Tissue and Sample Preparation.....	20
2.3 MI Transport Mechanism	21
2.3.1 Buffers and Solutions for Ussing Chamber Experiments	21
2.3.2 Ussing Chamber Experiments	22

2.3.3	Spectrophotometric Measurements	24
2.3.4	¹³ C-labeled Myo-inositol Experiments	24
2.4	Measurements of the Caecal Smooth Muscle Contraction	25
2.4.1	Buffers and Solutions	25
2.4.2	Preparation of Muscle Strips	26
2.4.3	Isometric Force Measurement of the Muscle Strips	26
2.5	Identification of Phytases and Phosphatases in Bacterial OMVs	27
2.5.1	OMV Preparation	27
2.5.2	Protein Quantification	27
2.5.3	Phytase/Phosphatase Assay	28
2.5.4	Proteomics	28
2.5.5	Mass Spectrometry Analysis	29
2.6	Data Analyzes	30
2.6.1	Ussing Chamber and Organ Bath Experiments	30
2.6.2	Photometric Measurements	30
2.6.3	Mass Spectrometric Data	30
2.6.4	Statistics	31
3	Results	32
3.1	MI Transport Mechanism	32
3.1.1	Electrophysiological Features of the Tissue	32
3.1.2	Glucose Transport	33
3.1.3	Potential Intestinal MI Transport	34
3.1.3.1	Electrogenic Transport	34
3.1.3.2	Spectrophotometric Measurement of MI	34
3.1.3.3	NMR Measurement of ¹³ C-labeled Myo-inositol	35
3.2	Caecal Smooth Muscle Contraction	35
3.2.1	Spontaneous Muscle Contraction	36
3.2.2	Calcium free Buffer	36

3.2.3	Potassium enriched Buffer	37
3.2.4	Carbachol	37
3.2.5	Nitroprusside	38
3.2.6	Isoprenaline	38
3.2.7	Verapamil	38
3.3	Identification of Phytases and Phosphatases in Bacterial OMVs	40
3.3.1	Phytase/Phosphatase Assay	40
3.3.2	Proteomics	42
4	Discussion	44
4.1	Experimental Design	44
4.1.1	Animals and Feeding	44
4.1.2	Euthanasia and Sampling Procedure	44
4.2	Methodology	44
4.2.1	Ussing Chamber	44
4.2.2	Isometric Force Measurement	46
4.3	Myo-inositol Transport Mechanism	47
4.3.1	Electrophysiological Features of the Tissue	47
4.3.2	Glucose Transport	47
4.3.3	Potential MI Transport	48
4.4	Caecal Smooth Muscle Contraction	51
4.5	Identification of Phytases and Phosphatases in Bacterial OMVs	54
5	Summary	59
6	Zusammenfassung	61
7	Appendix	63
8	Bibliography	89
9	Eigene Publikationen	101
10	Danksagung	102
11	Erklärung	104