

Table of Contents

IMPRESSUM	II
ACKNOWLEDGEMENTS	III
SUMMARY	V
TABLE OF CONTENTS	VI
LIST OF TABLES	X
LIST OF FIGURES	XV
LIST OF ABBREVIATIONS	XVIII
1 INTRODUCTION	1
1.1 PROBLEM STATEMENT	1
1.2 AIM AND SPECIFIC OBJECTIVES	3
1.3 OUTLINE	4
2 THEORETICAL BASIS OF THE ECONOMIC EVALUATION OF AGRI-ENVIRONMENTAL POLICY	7
2.1 ECONOMIC THEORY AS A BASIS FOR AGRI-ENVIRONMENTAL POLICY	8
2.2 EVALUATING AGRI-ENVIRONMENTAL POLICIES ECONOMICALLY	12
2.2.1 <i>Dimensions of economic AEP evaluation</i>	12
2.2.2 <i>Economic concepts for AEP evaluation</i>	14
2.2.3 <i>Qualitative analysis of the applicability of agri-environmental policy instruments</i>	19
2.3 SUMMARY AND CONCLUSIONS	33
3 ENVIRONMENTAL PERFORMANCE AND COSTS ENTAILED BY ORGANIC FARMING	35
3.1 RATIONALE OF ORGANIC FARMING SYSTEMS	35
3.2 ENVIRONMENTAL IMPACTS OF ORGANIC AGRICULTURE	36
3.2.1 <i>Overview of environmental impacts of organic agriculture</i>	37
3.2.2 <i>Fossil energy use</i>	39
3.2.3 <i>Biodiversity</i>	42
3.2.4 <i>Eutrophication</i>	45
3.3 COSTS OF ORGANIC AGRICULTURE AS A POLICY OPTION	47
3.4 COMPARISON OF COSTS AND ENVIRONMENTAL IMPACTS OF ORGANIC AGRICULTURE.....	53
3.5 CONCLUSIONS.....	55
4 THE SWISS AGRI-ENVIRONMENTAL POLICY FRAMEWORK	57
4.1 DEVELOPMENT OF AGRI-ENVIRONMENTAL PROGRAMMES IN SWITZERLAND	57
4.2 AGRI-ENVIRONMENTAL POLICY GOALS AND TARGETS	59
4.2.1 <i>Constitutional mandate of Swiss agriculture</i>	59

4.2.2	<i>Quantitative agri-environmental policy targets</i>	63
4.3	SWISS AGRY-ENVIRONMENTAL MEASURES	67
4.3.1	<i>Proof of ecological performance</i>	68
4.3.2	<i>Organic farming area support payments</i>	71
4.3.3	<i>Ecological compensation areas</i>	75
4.3.4	<i>Extenso payments</i>	80
4.3.5	<i>Other ecological and ethological policy measures</i>	81
4.4	RESULTS OF PRECEDING EVALUATIONS OF SWISS DIRECT PAYMENTS	82
4.4.1	<i>Energy use</i>	83
4.4.2	<i>Biodiversity</i>	84
4.4.3	<i>Eutrophication with nitrogen</i>	85
4.4.4	<i>Eutrophication with phosphorus</i>	86
4.4.5	<i>Farm economics and efficiency</i>	86
4.5	SUMMARY AND CONCLUSIONS	88
5	WORKING HYPOTHESES	91
6	RESEARCH APPROACH	94
6.1	CONCEPTUAL MODEL OF COST-EFFECTIVENESS OF AGRY-ENVIRONMENTAL POLICIES AT SECTOR LEVEL.....	94
6.1.1	<i>Policy uptake</i>	96
6.1.2	<i>Environmental effects</i>	97
6.1.3	<i>Public expenditure</i>	99
6.1.4	<i>Cost-effectiveness at sector level</i>	101
6.2	REVIEW OF EXISTING PROGRAMMING MODELS FOR AEP EVALUATION.....	106
6.2.1	<i>Coverage of environmental effects</i>	106
6.2.2	<i>Coverage of public expenditure</i>	109
6.2.3	<i>Coverage of the uptake decision</i>	109
6.3	MODELLING APPROACH	111
6.3.1	<i>General overview of the modelling approach</i>	112
6.3.2	<i>Data sources</i>	113
6.3.3	<i>Generation of input-output coefficients</i>	116
6.3.4	<i>Model specification</i>	119
6.3.5	<i>Model calibration</i>	124
6.3.6	<i>Uptake of agri-environmental policies</i>	129
6.3.7	<i>Environmental impacts at sector level</i>	132
6.3.8	<i>Public expenditure on agri-environmental policies and farming systems</i>	143
6.3.9	<i>Conceptual levels of the cost-effectiveness evaluation</i>	144
6.3.10	<i>Model validation</i>	149
6.4	SUMMARY AND CONCLUSIONS	151

7	ASSESSMENT OF THE COST-EFFECTIVENESS OF ORGANIC FARMS IN PROVIDING ENVIRONMENTAL SERVICES	153
7.1	DESCRIPTION OF FARM GROUPS	153
7.2	COST-EFFECTIVENESS OF ORGANIC FARMS IN THE BASE YEAR.....	158
7.2.1	<i>Farm structure</i>	158
7.2.2	<i>Financial performance</i>	164
7.2.3	<i>Policy uptake</i>	168
7.2.4	<i>Fossil energy use</i>	174
7.2.5	<i>Habitat quality</i>	181
7.2.6	<i>Eutrophication</i>	187
7.2.7	<i>Public expenditure</i>	194
7.2.8	<i>Cost-effectiveness</i>	200
7.3	COST-EFFECTIVENESS OF AGRI-ENVIRONMENTAL POLICY MEASURES.....	205
7.3.1	<i>Farm structure</i>	206
7.3.2	<i>Financial performance</i>	210
7.3.3	<i>Policy uptake</i>	212
7.3.4	<i>Fossil energy use</i>	216
7.3.5	<i>Habitat quality</i>	218
7.3.6	<i>Eutrophication</i>	220
7.3.7	<i>Public expenditure</i>	222
7.3.8	<i>Cost-effectiveness</i>	224
7.4	COMPARISON OF COST-EFFECTIVENESS OF ORGANIC FARMING WITH AGRI-ENVIRONMENTAL POLICY MEASURES.....	229
7.4.1	<i>Fossil energy use</i>	229
7.4.2	<i>Habitat quality</i>	230
7.4.3	<i>Eutrophication</i>	231
7.4.4	<i>Average cost-effectiveness</i>	232
7.5	SENSITIVITY ANALYSIS	233
7.5.1	<i>Variation in payment levels</i>	233
7.5.2	<i>Variation in policy uptake</i>	237
7.5.3	<i>Variation in the weightings of environmental goals</i>	240
7.5.4	<i>Variation in the number of environmental goals</i>	242
7.6	SUMMARY OF THE CHAPTER	243
8	DISCUSSION	246
8.1	DISCUSSION OF THE RESEARCH APPROACH	246
8.2	DISCUSSION OF THE RESULTS OF THE THESIS	256
9	CONCLUSIONS	275
9.1	CONTRIBUTION TO KNOWLEDGE	275
9.2	IMPLICATIONS FOR AGRI-ENVIRONMENTAL POLICY	282

9.3	IMPLICATIONS FOR RESEARCH ON AGRI-ENVIRONMENTAL POLICY	286
	REFERENCES.....	290
	APPENDICES.....	311
ANNEX A	DETAILS ON SWISS AGRICULTURAL POLICY	311
ANNEX B	DETAILED ASSUMPTIONS FOR THE MODELLING ANALYSIS	315
ANNEX C	DETAILS ON RESULTS OF THE MODEL ANALYSIS	350