



The agro-economic production model “ACRE” for the Neckar river basin

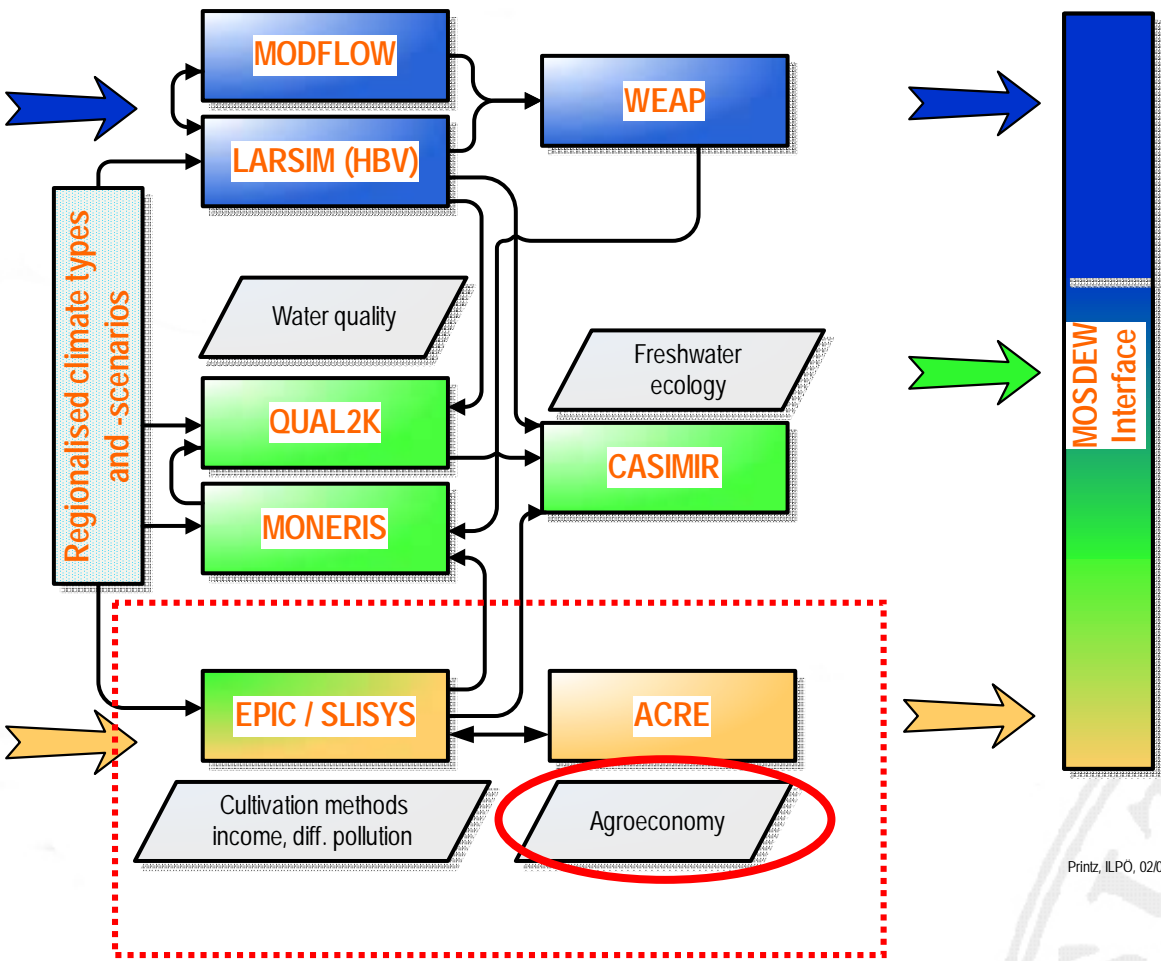
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ACRE-Neckar in the integrated model



Socioeconomic assumptions and measurements



- ACRE-Neckar calculates:**
- total gross margin → agricultural income
 - input of factors (e.g. fertilization) → crop acreages

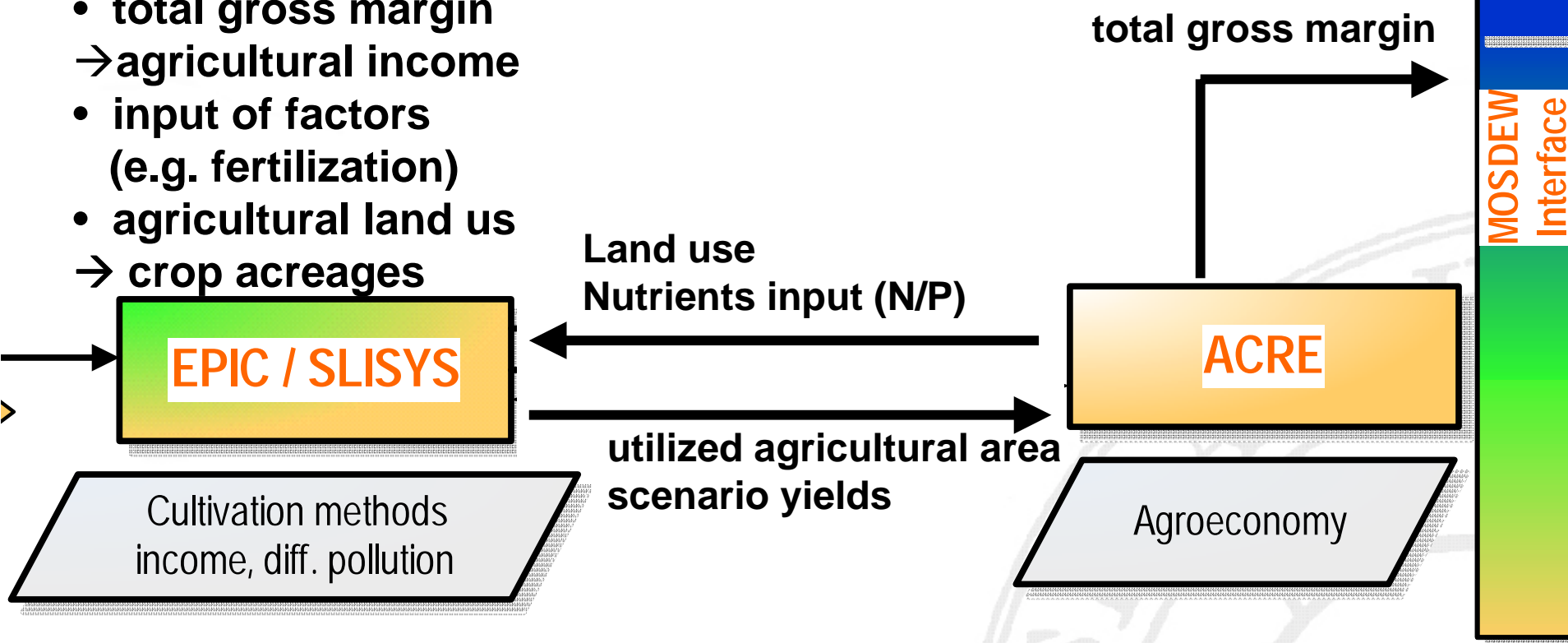
Printz, ILPO, 02/06



Interfaces to SLYSIS and MOSDEW

ACRE-Neckar
calculates:

- total gross margin
→ agricultural income
- input of factors
(e.g. fertilization)
- agricultural land use
→ crop acreages





General features of ACRE-Neckar

ACRE means:

Agro-**e**conomic **p**roduction model at **r**egional level
as model derivative specified as ACRE-Neckar

Modelling features of ACRE

- optimisation of total gross margin on regional level
- regional farm approach
- computing optimal agricultural production
- process analytical approach
- simulated period: 1 year
- agricultural production:
 - 24 food and non food crops
 - 12 production processes for livestock
- not simulated: trade between the districts



Regional farm approach

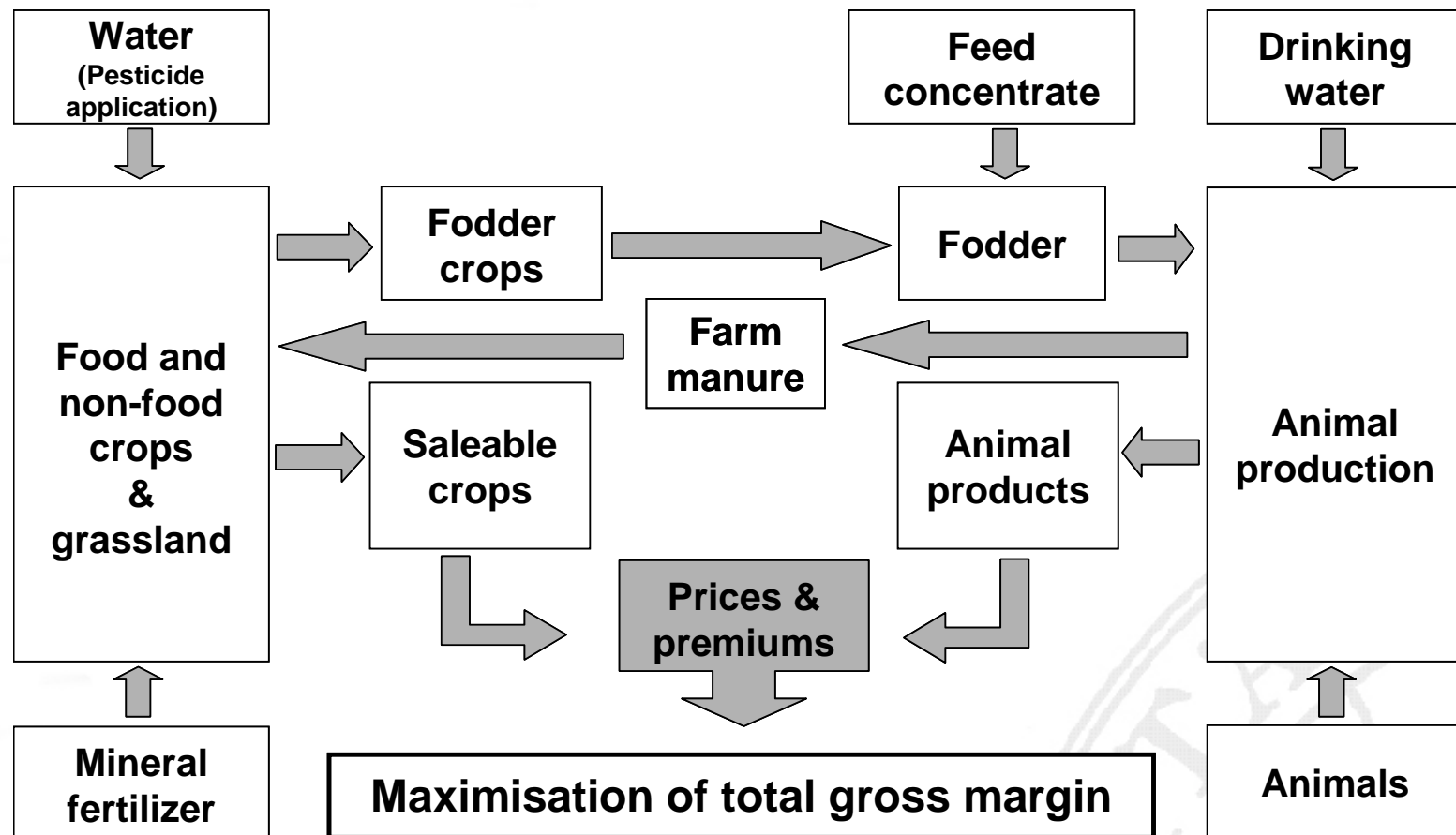
8111	SKR STUTT GART	s
8115	LKR BOEBLINGEN	bb
8116	LKR ESSLINGEN	es
8117	LKR GOEPPINGEN	gp
8118	LKR LUDWIGSBURG	lb
8119	LKR REIMS-MJRR-KREIS	w.n
8121	SKR HEILBRONN	hnsk
8125	LKR HEILBRONN	hnk
8126	LKR HOHENLOHEKREIS	kuen
8127	LKR SCHWAEBISCH HALL	sha
8128	LKR MAIN-TAUBER-KREIS	tbb
8135	LKR HEIDENHEIM	hdh
8136	LKR OSTALBKREIS	aa
8215	LKR KARLSRUHE	ka
8216	LKR RASTATT	ra
8221	SKR HEIDELBERG	hd
8222	SKR MANNHEIM	ma
8225	LKR NECKAR-ODENWALD-KR	mos
8226	LKR RHEIN-NECKAR-KREIS	rnk
8231	SKR PFORZHEIM	pf
8235	LKR CALW	cw
8236	LKR ENZKREIS	enzk
8237	LKR FREUDENSTADT	fds
8325	LKR ROTTWEIL	rw
8326	LKR SCHWARZW.-BAAR-KR.	vs
8327	LKR TUTTLINGEN	tut
8415	LKR REUTLINGEN	rt
8416	LKR TUEBINGEN	tue
8417	LKR ZOLLERNALBKREIS	bl
8425	LKR ALB-DONAU-KREIS	ulk



**assumption:
only 1 single farm manages
the agricultural production
in each district**



Scheme of the flow of products in ACRE



Scenarios simulated in ACRE-Neckar



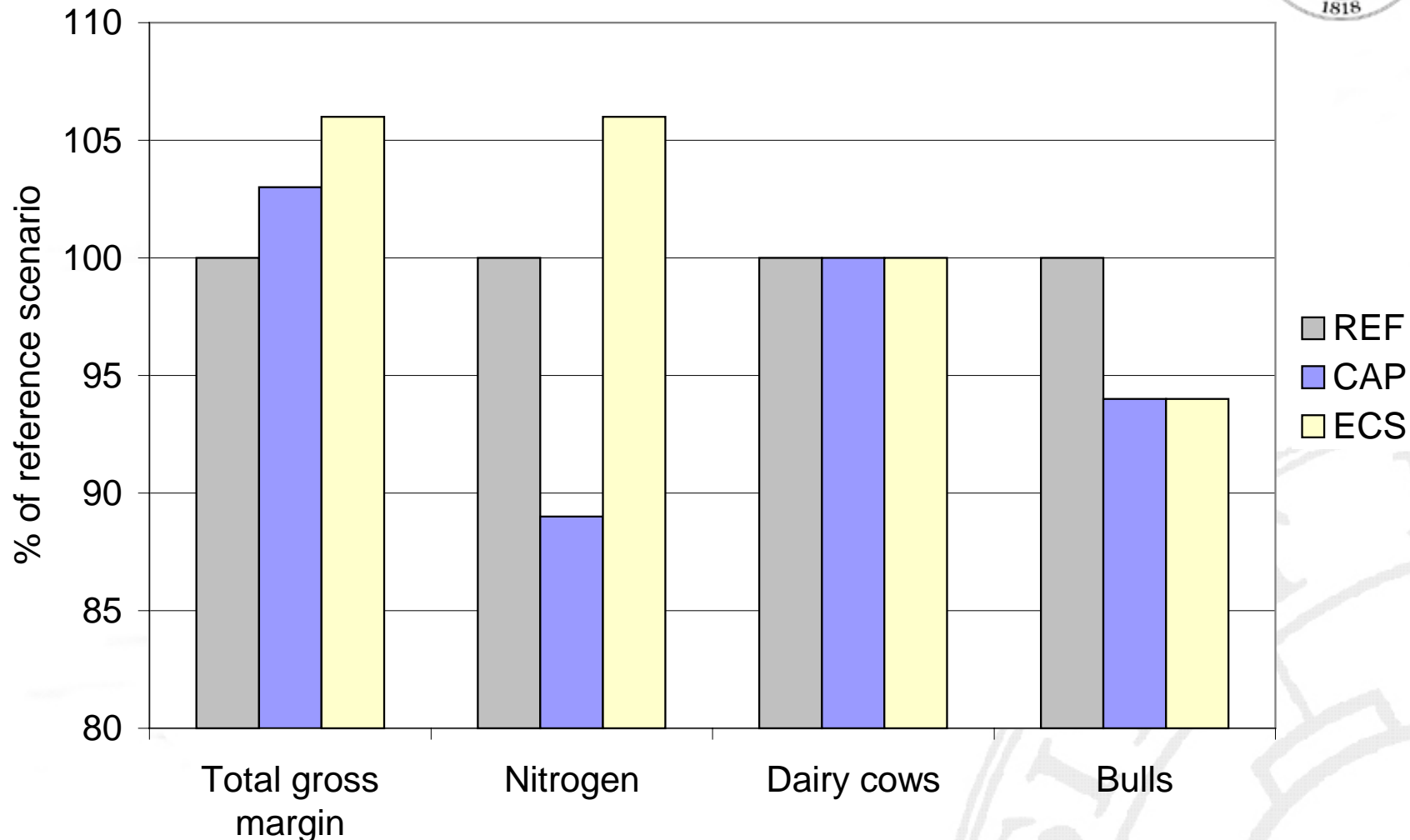
CAP reform scenario (CAP)

- decoupled premiums
- cross compliance

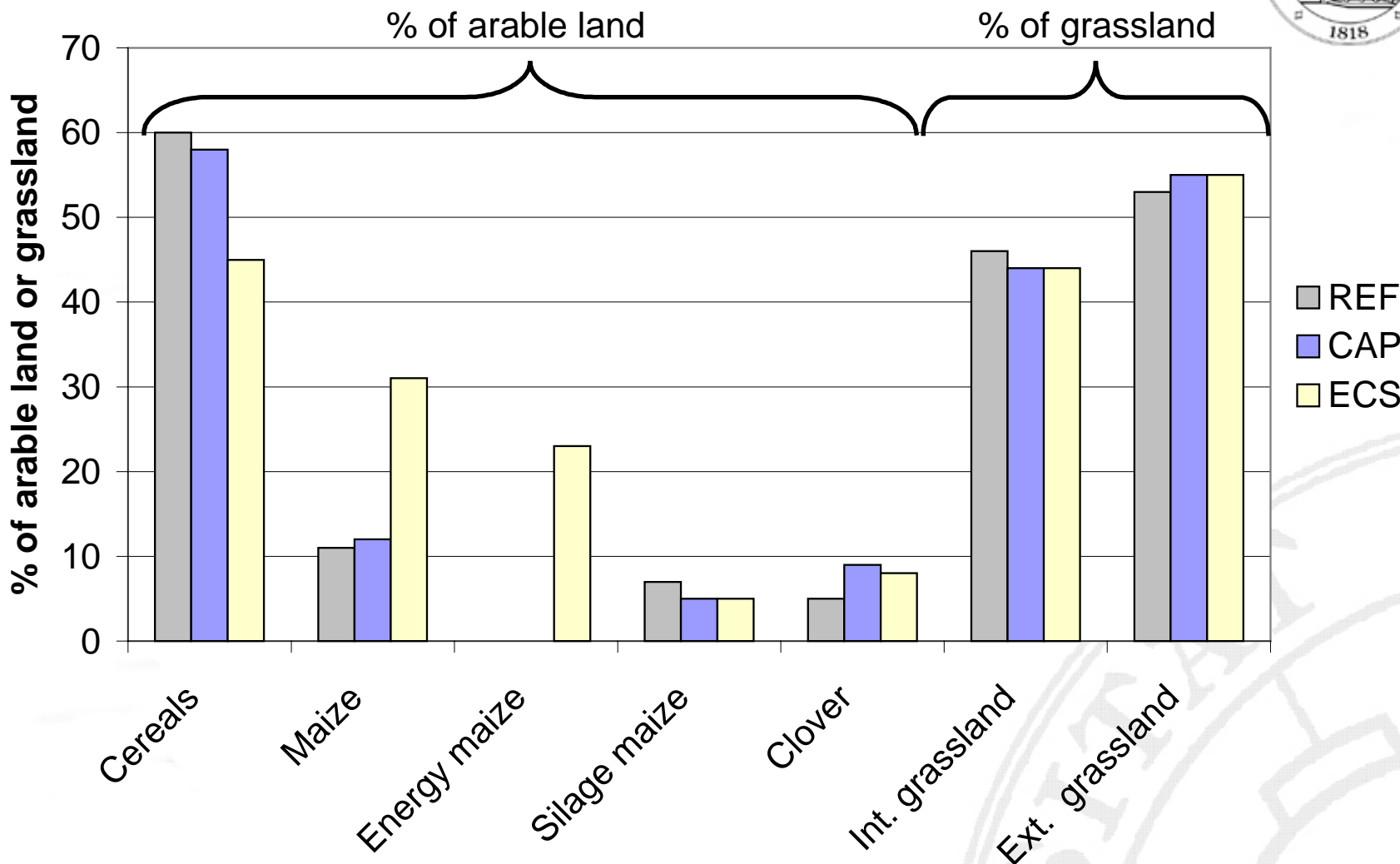
Energy crop scenario (ECS)

- CAP reform
- production of energy crops on set aside area
- production of energy maize

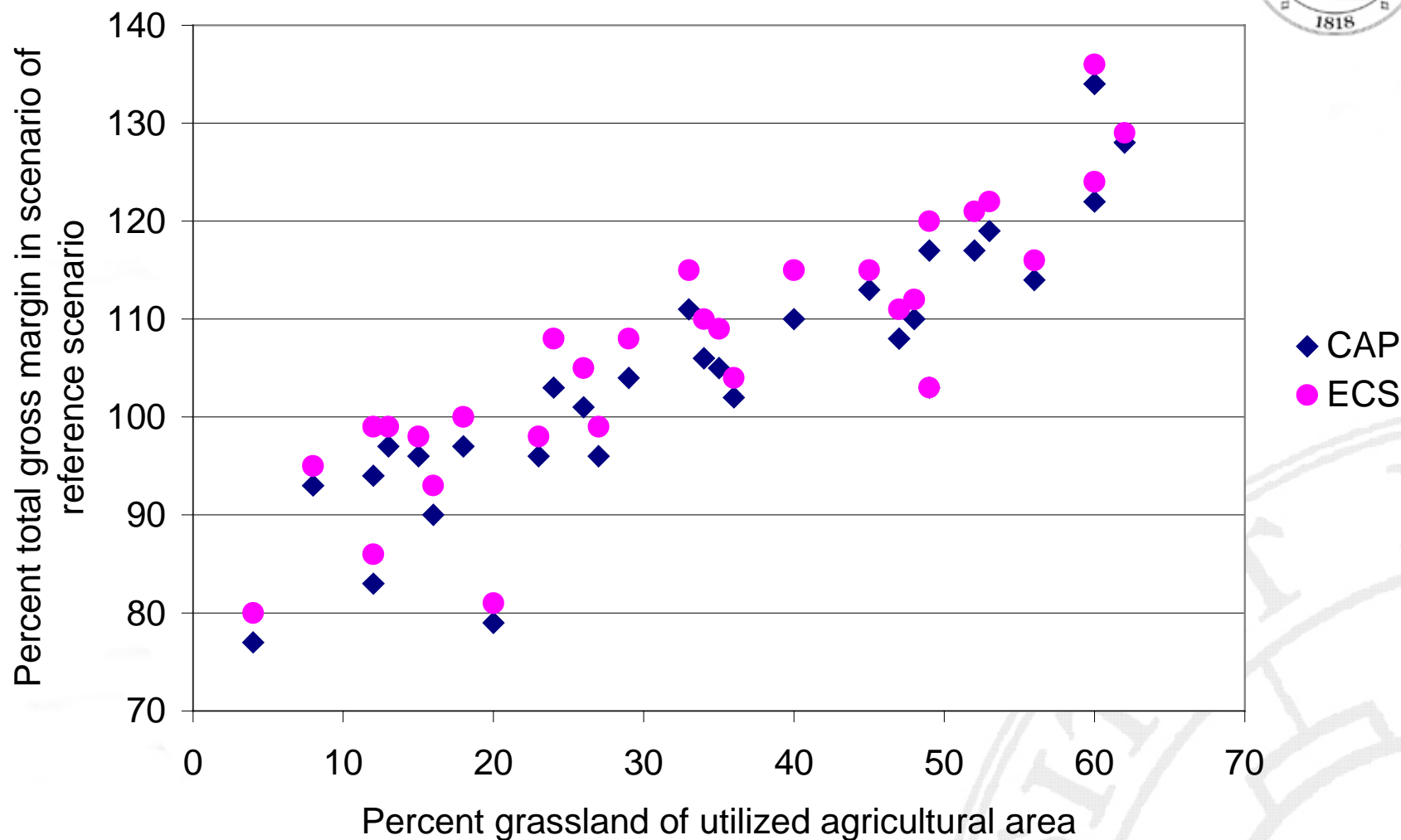
Development of income, fertilizer input and livestock



Development of land use



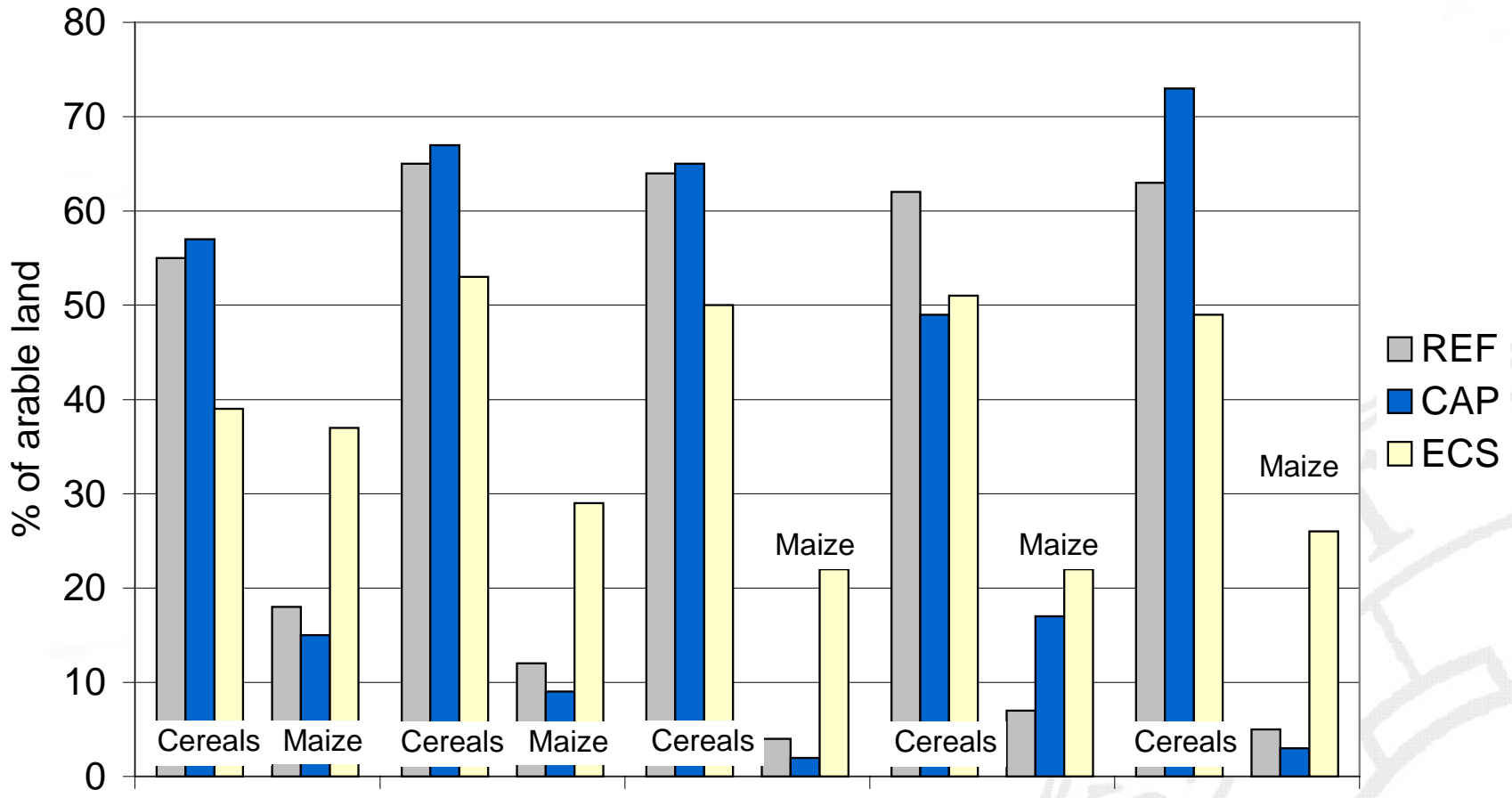
Regional development of total gross margin



Development of land use: cereals and maize



Rems-Murr-Kreis Schwaebisch Hall Rottweil Reutlingen Tuebingen



Summary of the results



2 agricultural land use scenarios were calculated with ACRE-Neckar:

- CAP reform scenario
- Energy crop scenario

Both scenarios impact the agriculture in:

- Total gross margin
- Fertilizer input
- Land use

The impacts are partially different for the

- total Neckar river basin
- single districts

Validation: comparison with other studies



Results of CAP:

- European Commission (2003) Directorate-General for Agriculture (2003): Reform of the Common Agricultural Policy – A Long-Term Perspective for Sustainable Agriculture.
- Segger (2005): Decoupling and hybridmodel.
- Plausible according theoretical expectations

Results of ECS:

- Breuer and Holm-Müller (2006): Assessment of the rural development in North Rhine-Westphalia through the promotion of biofuels



References

Howitt, R.E. and Mean, P. (1983). A Positive Approach to Microeconomic Programming Models. Working Paper 6, Department of Agricultural Economics, University of California. Davis, USA.

Röhm, O. and Dabbert, S. (2003). Integrating Agri-Environmental Programs into Regional Production Models – An Extension of Positive Mathematical Programming. American Journal of Agricultural Economics 85: 254-265.

Winter, T. (2005). Ein Nichtlineares Prozessanalytisches Agrarsektormodell für das Einzugsgebiet der Oberen Donau – Ein Beitrag zum Decision-Support-System Glowa-Danubia. PhD-Thesis, University of Hohenheim, Stuttgart.



		arable land	permanent crops	grassland	AL of UAA	permanent croppss of UAA	GL of UAA	cereals	maize	protein crops	root crops	oil seeds	vegetables	permanten crops	set aside	silage maize	clover	intensive grassland	extensive grassland	TGM_NRB[%]	TGM_district[%]	TGM_district[%]	nitrogen_NRB[%]	nitrogen_dist[%]	nitrogen_dist[%]	phosphorous_NRB[%]
																				REF	CAP	ECS	REF	CAP	ECS	REF
8111	STUTTGART (SKR)a	1,558	461	484	62	18	19	830	122	47	145	64	187	461	42	73	70	253	405	101	79	81	100	93	104	100
8115	BOEBLINGEN	16,123	124	6,721	70	1	29	10,563	211	390	1,048	1,784	193	124	692	812	592	2,525	5,486	100	104	108	100	91	105	100
8116	ESSLINGEN	10,449	407	9,439	51	2	47	5,892	501	323	382	706	792	407	612	784	628	2,956	8,069	100	108	111	100	96	109	100
8117	GOEPPINGEN	12,879	94	16,359	44	0	56	7,708	77	301	138	1,103	65	94	367	1,627	1,600	8,125	11,812	100	114	116	100	93	105	100
8118	LUDWIGSBURG	25,561	2,076	5,137	78	6	16	14,342	1,514	162	3,533	1,457	678	2,076	1,127	2,183	669	3,414	4,362	100	90	93	100	90	105	100
8119	REMS-MURR-KREIS	12,346	1,633	13,310	45	6	49	6,755	745	368	620	460	428	1,633	571	1,515	1,151	5,760	9,152	100	103	103	100	101	106	100
8121	HEILBRONN (SKR)	3,709	672	197	81	15	4	1,960	108	40	938	143	208	672	180	69	64	174	190	101	77	80	100	95	105	100
8125	HEILBRONN	42,544	5,915	6,567	77	11	12	23,441	2,079	616	7,592	2,344	1,550	5,915	2,210	2,270	788	4,115	5,270	101	83	86	100	94	106	100
8126	HOHENLOHEKREIS	30,922	1,453	9,917	73	3	23	18,591	1,268	372	2,077	3,027	589	1,453	1,639	2,336	1,120	6,136	7,649	100	96	98	100	94	107	100
8127	SCHWAEBISCH HALL	49,983	132	28,618	63	0	36	32,662	1,038	697	876	6,294	218	132	1,448	4,910	2,042	15,783	17,578	100	102	104	100	93	104	100
8128	MAIN-TAUBER-KREIS	60,591	901	8,454	87	1	12	38,581	323	634	2,166	9,493	72	901	4,231	3,240	2,008	5,938	7,350	100	94	99	100	94	108	100
8135	HEIDENHEIM	17,415	9	9,320	65	0	35	10,962	102	595	338	1,986	60	9	374	1,741	1,404	5,272	8,173	100	105	109	100	91	105	100
8136	OSTALBKREIS	35,133	24	33,059	52	0	48	21,223	292	651	406	3,742	95	24	1,066	5,798	2,145	18,730	22,410	100	110	112	100	92	106	100
8215	KARLSRUHE	30,691	905	5,702	82	2	15	16,085	4,828	615	2,013	2,671	582	905	2,757	799	566	1,953	4,585	100	96	98	100	68	112	100
8216	RASTATT	9,699	849	3,941	67	6	27	3,434	3,303	237	183	456	451	849	1,201	430	111	744	1,290	100	96	99	100	66	80	100
8221	HEIDELBERG (SKR)	1,533	69	243	83	4	13	803	77	7	232	58	129	69	63	95	76	199	93	100	97	99	100	38	50	100
8222	SKR MANNHEIM (SKR)	2,849	7	233	92	0	8	1,593	468	23	240	161	86	7	266	7	25	205	28	100	93	95	100	93	107	100
8225	NECKAR-ODENWALD-KR	36,034	72	11,181	76	0	24	21,162	535	346	828	5,185	42	72	3,284	2,982	1,675	6,376	9,100	100	103	108	100	96	110	100
8226	RHEIN-NECKAR-KREIS	30,514	1,049	6,976	79	3	18	16,026	2,966	227	2,585	2,307	857	1,049	2,250	2,345	982	4,571	3,782	100	97	100	100	80	109	100
8231	PFORZHEIM (SKR)	724	1	482	60	0	40	384	65	26	9	117	25	1	48	34	23	104	407	99	110	115	100	95	108	100
8235	CALW	8,491	6	9,116	48	0	52	5,350	0	135	148	831	33	6	644	552	824	3,415	6,507	100	117	121	100	96	108	100
8236	ENZKREIS	12,435	214	6,605	65	1	34	7,152	579	146	363	1,585	63	214	828	1,085	710	2,237	4,882	100	106	110	100	96	110	100
8237	FREUDENSTADT	10,286	22	10,091	50	0	49	6,472	0	170	82	1,450	35	22	752	400	995	3,679	6,281	100	117	120	100	95	107	100
8325	ROTTWEIL	17,704	11	14,401	55	0	45	11,321	26	207	158	2,968	25	11	729	653	1,693	6,072	7,182	100	113	115	100	96	101	100
8326	SCHWARZW.-BAAR-KR.	16,061	0	24,341	40	0	60	9,764	6	441	216	2,467	25	0	1,112	703	1,511	12,742	9,522	100	122	124	100	95	106	100
8327	TUTTLINGEN	9,764	3	15,563	39	0	61	6,010	0	156	76	1,326	6	3	886	459	915	4,195	6,585	100	128	129	100	79	106	99
8415	REUTLINGEN	20,452	124	22,850	47	0	53	12,689	48	608	269	1,578	60	124	1,422	1,383	2,656	7,909	15,812	100	119	122	100	75	117	100
8416	TUEBINGEN	13,553	68	6,582	67	0	33	8,517	251	355	353	1,993	83	68	1,043	452	628	1,218	2,877	100	111	115	100	64	109	100
8417	ZOLLERNALBKREIS	13,732	17	20,684	40	0	60	8,615	33	258	83	2,038	33	17	1,484	357	894	3,269	4,416	100	134	136	100	62	81	100
8425	ALB-DONAU-KREIS	56,273	74	20,268	73	0	26	36,681	897	964	622	7,407	102	74	1,877	4,344	3,575	13,245	17,520	100	101	105	100	92	105	100