

Ryegrass Energy Balance

operation	number of operations	fuel used	energy MJ/ha	labour h/ha
year 1				
fuel				
plough	1	19.6	843	1.66
secondary cultivation	1	6.42	276	0.62
seed bed	1	3.93	169	0.5
drill	1	3.93	169	0.5
roll	1	1.3	56	0.33
fertiliser application	1	1.99	86	0.62
spray	0	0	0	0
forage harvester	1	20.4	877	2
transport silage	1	1.3	56	0.33
fuel total		58.87	2531	6.56
chemicals (kg/ha)				
N	0		0	
P ₂ O ₅	0		0	
K ₂ O	0		0	
number of applications				
sprays	0		0	
chemical total		0	0	0
labour MJ/ha h/ha				
total labour energy		12.7		6.56
year 2+				
number of years	4			
number of operations per year				
fuel				
forage harvester	4	81.6	3508.8	8
transport silage	4	5.2	223.6	1.32
fertiliser application	4	7.96	342.28	2.48
fuel total/year		94.76	4074.68	11.8
fuel total/ha		379.04	16298.72	47.2
labour energy MJ/ha hours h/ha				
total labour energy		91.6		47.2
chemicals (kg/ha/yr) years				
N	0	4	0	
P ₂ O ₅	0	4	0	
K ₂ O	0	4	0	
number of applications				
sprays	0		0	
total		0	0	0
Energy input total 18.9 GJ/ha				
yield				
1st year harvest	10.1	tDM/ha		
year 2+ harvest yield	12.7	tDM/ha/yr		
year 2+ total harvest yield	50.8	tDM/ha		
yield total	60.9	t/DMha		
methane energy				
ODM (89% of yield DM)			53.592	t/ha
1 CH ₄ /kg ODM	342		18328464	l CH ₄
			18328.46	m ³ CH ₄
36 MJ/m ³			659.8247	GJ / ha
production energy (20%)			131.9649	
balance			508.9	GJ/ha
			101.8	GJ/ha/year

Red Clover Energy Balance

operation	number of operations	fuel used	energy MJ/ha	labour h/ha
year 1				
fuel				
plough	1	19.6	843	1.66
secondary cultivation	1	6.42	276	0.62
seed bed	1	3.93	169	0.5
drill	1	3.93	169	0.5
roll	1	1.3	56	0.33
fertiliser application	1	0.62	27	0.3
mow	1	4.91	211	1.2
forage harvester	1	20.4	877	2
transport silage	1	1.3	56	0.33
fuel total		62.41	2684	7.44
chemicals (kg/ha)				
N	0		0	
P ₂ O ₅	0		0	
K ₂ O	0		0	
number of applications				
sprays	0		0	
chemical total		0	0	0
labour MJ/ha h/ha				
total labour energy		14.4		7.44
year 2				
fuel				
fertiliser application	1	0.62	27	0.3
mow	2	9.82	422	2.4
forage harvester	2	40.8	1754	4
transport silage	2	2.6	112	0.66
fuel total		53.84	2315	7.36
labour energy MJ/ha hours h/ha				
1.94 MJ/hr		28.7		14.8
chemicals (kg/ha/yr)				
P ₂ O ₅	90		288	
Energy input total 5.3 GJ/ha				
1st year harvest	14.87	tDM/ha		14.9 t/DMha
2nd year harvest	13.54	tDM/ha		13.5 t/DMha
2 year yield total				28.4 t/DMha
ODM (90% of yield DM)			25.569	t/ha
1 CH ₄ /kg ODM	300		7670700	l CH ₄
			7670.7	m ³ CH ₄
36 MJ/m ³			276.1452	GJ / ha
production energy (20%)			55.22904	
2 year balance		GJ/ha/yr	215.6	GJ/ha
			107.8	GJ/ha/year

Winter Wheat Energy balance

operation	number of operations	fuel used	energy MJ/ha	labour h/ha
year 1				
fuel				
plough	1	19.6	840	1.66
secondary cultivation	1	6.42	280	0.62
seed bed	1	3.93	170	0.5
drill	1	3.93	170	0.5
roll	1	1.3	56	0.33
spray (2herbicide, 3 pesticide)	5	6.05	260	1.55
fertiliser application	2	3.98	192	1.24
combine	1	14.62	630	1
cultivate stubble	1	5.18	220	0.5
cart grain	1	1.3	56	0.33
drying (8t yield)	1		3120	
fuel total		66.31	2874	8.23
chemicals (kg/ha)				
N	130		6058	
P ₂ O ₅	50		160	
K ₂ O	50		355	
sprays				
fungicides	8.3		781	
herbicides	2		509	
chemical total			7863	
labour MJ/ha h/ha				
total labour energy		16.0		8.23
Energy input total 10.8 GJ/ha/year				
yield (15% moisture)			8.7	t/ha
yield (total solids 0%/mc)			7.395	t/ha
1 CH ₄ /kg ODM	384		2839680	l of CH ₄
			2839.68	m ³ of CH ₄
36 MJ/m ³			102.22848	GJ/ha
production energy (20%)			20.445696	
balance			71.0	GJ/ha/year