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## SURFACE DRAINAGE TRIAL - 86V1

Poor surface drainage can result in waterlogging, localised flooding and in some areas salt accumulation. These factors will limit the range of pasture species, their seasonal dry matter production and digestible energy content. This limitation then restricts animal productivity and ultimately farm profitability.

Current laser levelling demonstration areas at Vasse Research Station to improve surface drainage have given encouraging indications of both a) reduced waterlogging and flooding and b) alleviation of salt accumulation. This has markedly increased the grazing capacity.

However, the potential increases in grazing capacity needs to be equated to the cost of laser levelling, at up to \$400/ha.

The aim of this experiment was

- 1) to quantify the response of annual pastures to improved surface drainage by laser levelling.
- 2) from the pasture response data determine the cost/benefit ratio of pasture improvement following laser levelling.

3 treatments

- A) Control - no change - old deteriorated waterlogged, salt prone pasture.
- B) Pasture renovation - light cultivation and reseeding according to recommended district practice.
- C) Laser levelled and reseeded.

These 3 treatments are replicated four times. Each plot, 150 m x 35 m, is stocked by sheep wethers on a 12 monthly basis according to the amount of pasture on offer.

### RESULTS AND DISCUSSION

In 1986 the poor start to the growing season (false break) resulted in a staggered and highly variable oats/volunteer pasture germination and early growth situation in the renovation and laser + renovation treatments, relative to the untouched control plots. However, by mid to late season pasture growth and availability and consequently grazing capacities were fairly even across all treatments.

In 1987 all but the control plots were sown to annual ryegrass and trikkala. Unfortunately this sowing was delayed by poor opening rains and once again germination and early sward establishment was slow relative to the untouched control plots.

Mid to late season pasture growth rates in the renovation and laser + renovation plots were limited by high soil salinity levels. This unexpected "negative" treatment effect is to be explored during the 1988 growing season.

The 1987 pasture assessment data is attached.

SURFACE DRAINAGE TRIAL - 86VI/5164EX

1987 PASTURE ON OFFER (kg/ha)

SAMPLING DATE	06.05	25.05	15.06	06.07	27.07	17.08	07.09	30.09	19.10	09.11	MEAN
Plot Treatment Nos											
1	B			1070	1130	1700	2180	4250	6150	4600	2110
2	C			1040	1010	1610	1950	3840	5740	3660	1890
3	A	820	1260	1720	1570	1710	1730	2450	4830	4010	2150
4	C			1080	1060	1540	1790	2780	4950	3870	1710
5	A	1110	1320	1530	1570	1740	1760	2470	4780	4030	2150
6	B			1100	910	1540	1860	2970	5370	4550	1830
7	A	830	1140	1300	1380	1790	2000	2900	5180	4500	2210
8	B			1170	1080	1660	1940	3090	5290	4710	1890
9	C			1120	970	1530	1710	2710	4970	4150	1720
10	B			1230	1110	1630	1900	3100	5120	4490	1860
11	A	1060	1350	1600	1630	1840	1780	2930	4960	4000	2250
12	C			1160	1110	1680	1950	3320	5460	4950	1960
CONTROL (A)	960	1270	1540	1240	1540	1770	1820	2690	4940	4130	2190
RENOVATION (B)				1140	1060	1630	1970	3350	5480	4590	1920
LASER + RENOVATION (C)				1100	1040	1590	1850	3160	5280	4160	1820
MEAN				1160	1210	1660	1880	3070	5230	4290	

SURFACE DRAINAGE TRIAL - 86VI/5164EX

1987 PASTURE ASSESSMENT

Plot	Treatment	Pasture on Offer* (kg/ha)	Total Pasture Production (kg/ha)	Pasture Growth Rate* (kg/ha/day)	Visual Pasture Composition*			Stocking Rate (APR- DEC) (Sheep/ha)
					Subclover (%)	Grass (%)	Other (%)	
1	B	2110	6300	29	30	32	38	5.9
2	C	1890	4650	22	30	39	28	5.4
3	A	2150	6740	31	16	36	43	5.3
4	C	1710	3140	15	34	36	31	3.4
5	A	2150	6760	31	10	42	41	8.0
6	B	1830	3950	18	27	32	41	3.6
7	A	2210	7200	33	25	36	24	7.4
8	B	1890	4270	20	18	37	46	3.6
9	C	1720	3250	15	27	26	47	3.2
10	B	1860	3540	16	33	28	39	3.5
11	A	2250	8300	39	32	36	31	10.1
12	C	1960	4740	22	22	48	30	3.8
CONTROL (A)		2190	7250	34	21	38	35	8.7
RENOVATION (B)		1920	4510	21	27	32	41	4.2
LASER + RENOVATION (C)		1820	3950	18	29	37	34	4.0
MEAN		1980	5280	24	25	36	37	5.3

\* AVERAGED OVER DURATION OF GROWING SEASON

SURFACE DRAINAGE TRIAL - 86VI/5164EX

1987 PASTURE GROWTH RATES (kg/ha/day)

SAMPLING DATE	08.04	06.05	25.05	15.06	06.07	07.08	17.08	07.09	30.09	19.10	MEAN
Plot Treatment Nos											
1					11	28	16	156	33	45	29
2					12	26	4	97	114	-30	22
3	44	38	32	-1	32	23	3	43	124	-21	31
4					15	19	6	52	90	-28	15
5	57	16	32	2	34	28	1	57	90	-9	31
6					14	23	5	46	120	-13	18
7	36	23	20	-3	36	30	11	86	96	0	33
8					17	25	5	70	100	-11	20
9					12	22	1	42	107	-24	15
10					22	20	8	59	98	-35	16
11	70	20	25	-3	33	28	8	83	108	2	39
12					27	24	10	79	86	1	22
CONTROL (A)	51	25	27	-1	34	27	6	67	105	-7	34
RENOVATION (B)					16	24	8	83	88	-4	21
LASER + RENOVATION (C)					16	23	5	68	99	-20	18
MEAN					22	24	6	73	97	-10	

SURFACE DRAINAGE TRIAL - 86VI/5164EX

1987 CUMULATIVE PASTURE GROWTH (kg/ha)

SAMPLING DATE	06.05	25.05	15.06	06.07	27.07	17.08	07.09	30.09	19.10	09.11
Plot Treatment Nos										
1					230	820	1160	4740	5360	6300
2					250	790	870	3100	5260	4650
3	1220	1940	2620	2600	3290	3770	3830	4820	7190	6740
4					310	700	830	2020	3730	3140
5	1590	1890	2550	2590	3310	3890	3910	5230	6950	6760
6					290	760	870	1940	4220	3950
7	1000	1440	1870	1820	2560	3190	3410	5380	7200	7200
8					360	880	980	2600	4500	4270
9					250	720	740	1720	3750	3250
10					460	890	1050	2410	4280	3540
11	1960	2380	2900	2840	3540	4130	4300	6200	8260	8300
12					560	1060	1260	3090	4710	4740
CONTROL (A)					3170	3740	3860	5410	7400	7250
RENOVATION (B)					340	840	1010	2920	4590	4510
LASER + RENOVATION (C)					340	820	930	2480	4360	3950
MEAN					1280	1800	1930	3600	5450	5280

SURFACE DRAINAGE TRIAL - 86VI/5164EX

1987 VISUAL PASTURE COMPOSITION (% SUBCLOVER)

SAMPLING DATE	06.05.87	15.06.87	17.07.87	07.09.87	19.10.87	MEAN
Plot Treatment Nos						
1	B		27	39	25	30
2	C		28	35	28	30
3	A	20	8	10	26	16
4	C		34	38	29	34
5	A	8	12	14	10	10
6	B		34	20	26	27
7	A	20	29	37	18	25
8	B		24	18	11	18
9	C		29	27	25	27
10	B		41	36	21	33
11	A	20	27	38	44	32
12	C		27	30	10	22
CONTROL (A)	17	20	19	25	24	21
RENOVATION (B)			32	28	21	27
LASER + RENOVATION (C)			30	32	26	29
MEAN			27	28	24	

SURFACE DRAINAGE TRIAL - 86VI/5164EX

1987 VISUAL PASTURE COMPOSITION (% GRASS)

	SAMPLING DATE	06.05.87	15.06.87	17.07.87	07.09.87	19.10.87	MEAN
Plot Treatment Nos							
1	B			40	27	29	32
2	C			53	37	26	39
3	A	28	26	46	53	25	36
4	C			45	33	29	36
5	A	31	44	52	49	36	42
6	B			35	36	26	32
7	A	23	42	50	34	32	36
8	B			43	36	31	37
9	C			31	25	23	26
10	B			33	24	27	28
11	A	42	28	43	35	31	36
12	C			54	41	48	48
CONTROL (A)		32	35	48	43	32	38
RENOVATION (B)				38	31	28	32
LASER + RENOVATION (C)				46	34	32	37
MEAN				44	36	30	



SURFACE DRAINAGE TRIAL - 86VI/5164EX

1987 VISUAL PASTURE COMPOSITION (% OTHER PASTURE SPECIES)

	SAMPLING DATE	06.05.87	15.06.87	17.07.87	07.09.87	19.10.87	MEAN
Plot Treatment Nos							
1	B			33	34	46	38
2	C			19	28	36	28
3	A	31	54	46	37	49	43
4	C			21	29	42	31
5	A	34	42	36	37	54	41
6	B			31	44	48	41
7	A	9	12	21	29	50	24
8	B			33	46	58	46
9	C			40	48	52	47
10	B			26	40	52	39
11	A	32	40	30	27	25	31
12	C			19	29	42	30
CONTROL (A)		26	37	33	32	45	35
RENOVATION (B)				31	41	51	41
LASER + RENOVATION (C)				25	34	43	34
MEAN				29	36	46	

SURFACE DRAINAGE TRIAL - 86VI/5164EX

1987 SHEEP GRAZING DAYS

Plot Nos	Treatment	MONTH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	SHEEP/HA	
												MEAN	(APR-DEC)
1	B			60	0	168	161	275	155	91	5.9		
2	C			60	0	128	137	284	155	85	5.4		
3	A	61	97	148	248	204	42	96	155	143	5.3		
4	C			90	0	88	38	105	155	53	3.4		
5	A	59	101	164	200	190	48	105	155	134	8.0		
6	B			75	0	88	56	135	155	57	3.6		
7	A	60	93	90	135	208	65	125	155	114	7.4		
8	B			75	0	88	56	135	155	57	3.6		
9	C			60	0	66	39	125	155	49	3.2		
10	B			90	0	88	44	115	155	55	3.5		
11	A	60	101	164	276	217	66	135	155	157	10.1		
12	C			90	0	109	55	125	155	59	3.8		
CONTROL (A)		60	98	142	215	205	55	115	155	137	8.7		
RENOVATION (B)				75	0	108	79	165	155	65	4.2		
LASER + RENOVATION (C)				75	0	98	67	160	155	62	4.0		
MEAN				113	72	137	67	147	155				

SURFACE DRAINAGE TRIAL - 86VI/5164EX

1987 CUMULATIVE SHEEP GRAZING DAYS

Plot Treatment	MONTH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
Nos										
1	B				60	60	228	289	664	819
2	C				60	60	188	318	602	757
3	A	61	158	306	542	790	994	1036	1132	1287
4	C				90	90	178	212	317	472
5	A	59	160	324	510	710	800	853	958	1113
6	B				75	75	163	215	350	505
7	A	60	153	243	336	471	679	744	869	1024
8	B				75	75	163	215	350	505
9	C				60	60	126	162	287	442
10	B				90	90	178	218	333	488
11	A	60	161	325	561	837	1054	1120	1255	1410
12	C				90	90	199	249	374	529
CONTROL (A)		60	158	300	487	702	882	938	1054	1209
RENOVATION (B)					75	75	183	259	424	579
LASER + RENOVATION (C)					75	75	173	235	395	550
MEAN					212	284	413	478	624	779