

INTRODUCTION

This is the Second Annual Report on the Sonoma County Irrigated Pasture Management Study. This study is being conducted by the Agricultural Extension Service in cooperation with local dairymen for the purpose of learning more about this economical feed for dairy cattle.

The number of records for 1949 is not large and there is quite a range in production and costs among the fifteen records. Hence, the average of these records is not represented as typical or average for the county. This average applies only to these fifteen records and only for the year 1949. The study is being continued in 1950. More records over more years will make more valid figures available.

Sonoma County is an important dairy and livestock county. Most dairy and livestock farms are based upon the use of natural range or pastures. Natural feed on non-irrigated hills and valley lands is in rapid growth and of high quality only about four months in the spring. Yet economical and maximum milk and meat production require adequate feed the year around. So irrigated pasture is an excellent supplement to the natural range. It extends the flush green pasture season through the summer. It is considerably cheaper than hay and silage, since cattle walk to the feed and do the harvesting.

Irrigated pasture is a highly variable crop or use of land in the feed produced and in its cost of production. The mixture of plants used as influenced by local climate and soil are varied. The method of pasturing or feeding off the several fields in rotation probably gives rise to some variation in production. The irrigation interval, the total number of irrigations and the water applied vary somewhat. Table 1 shows some information about the pastures and the cultural care received in fertilization and irrigation. There must be some best method for obtaining the maximum feed from local pastures.

MEASUREMENT OF PASTURE

Pasturage is estimated as to quantity in the animal unit month. An animal unit is a mature head of cattle---cow, bull, or steer---and the animal unit month is the total feed required by such an animal for one month. It is further defined as furnishing 400 pounds of total digestible nutrients---the amount of nutrients in 0.4 tons of hay. Other livestock are converted to animal units on the basis of their feed requirement as follows: Dairy calf (3 months to 1 year) 0.40 animal unit; yearling dairy heifer (1 to 2 years) 0.70; and stock over two, 1.0 animal unit. In this study use of pasture was reported daily by kind of animal, number of head, and percent of total feed obtained from pasture. Milking cows getting 50% of their forage (roughage) from pasture were converted to full animal units by multiplying by 50%. The yield or production per acre is shown in the following tables to have varied from a high of 20.9 animal unit months to a low of 3.6. Table 4 shows how this feed was distributed through the year, and the costs per animal unit month.

Table 1: General Summary of Individual Records, 1949

Ser. No.	Soil Type (See Key Below)	Year Stand Planted	Most Important Plants Now (See Abbrev. Below)	Water From	Number of Irrigations	Acre Inches Applied Per A.	Method of Application	Fertilizers Used (See Abbrev. Below)	Yield A.U. Mo. Per A.	Total Cost Per Acre	Cost Per A.U. Mo.
8.	G,Fs,L	1947	L	Creek	12	20.3	Spr.	Dairy Manure	19.5	66.40	3.40
9.	G,Fs,L	1947	L,B,Grasses	Creek	28	22.8	Spr.	Dairy M. & Sup.	16.0	65.50	4.10
10.	D	1947	L,G	Well	14	30.8	Spr.	Dairy Manure	20.6	90.67	4.40
5.	Y	1936-40-48	L,R,AF	Lagoon	16	52.3	P.p.	Pm. Am. N. Sup.	14.5	64.44	4.45
6.	D	1946-48-49	R,L,H,AF	Creek	10	21.1	Sp.	Pm., Dm., Am. S.	13.9	66.25	4.77
3.	Fl.	1940	L,A,R	Creek	6	8.4	Sp.	Dm, 4-12-4	11.6	55.74	4.82
11.	Afsl	1947-48	L,R,AF	Well	13	37.6	Sp.	Am. N., Sup.	20.9	108.30	5.18
4.	D	1940	L,R	Well	25	28.2	P.p.	Dairy Manure	12.2	85.97	7.03
1.	Fl,Y	1943-46	L,B,A	Well	13	22.5	Sp.	Dm., 4-12-4	8.5	61.95	7.25
2.	Fl,Y	1945-49	L,G	Well	21	86.4	Sp.	Dm, AmN, 10-10-0	15.0	120.06	8.02
12.	D	1947	L,G	Well	10	16.8	Sp.	Dm, Am N.	20.8	181.76	8.72
13.	Y	1947	L,G	Well	16	47.8	Sp.	Dairy Manure	11.0	97.24	8.87
14.	Fl	1947-48	L,G	Well	15	24.5	Sp.	Dairy Manure	10.5	98.59	9.41
15.	Fl	1946	L,R	Well	15	---	Sp.	Sup. Lime	8.8	106.95	12.16
16.	Fl,Y	1947-48	L,G	Well	32	28.9	Sp.	Dairy Manure	3.6	53.63	14.77
AVE.						27.7			11.1	70.01	6.32
1948 AVE.						28.6			9.2	60.23	6.52

The above table presents descriptive data on the individual records which are listed in order of cost per animal unit month which appears in the last column. Notice that the first 7 records with the lowest costs per animal unit month all had rather good yield or production---over 11.6 animal unit months per acre.

Key to Soil Types: G,Fs,L--Goldridge Fine Sandy Loam, D--Dublin, Fl--Fresno Loam, Y--Yolo, Afsl--Altamont Fine Sandy Loam

Key to Plants: L--Ladino, B--Birdsfoot Trefoil, G--Grasses, R--Rye, Af--Alta Fescue, H--Harding, A--Alfalfa

Key to Method of Application: Sp--Sprinkler, P.p.--Perforated Pipes, Fl--Flooding,

Key to Fertilizers: Sup.--Superphosphate, Pm.--Poultry Manure, Dm.--Dairy Manure, Am. N.--Ammonium Nitrate

Table 2: Costs Per Acre in Individual Pastures, 1949

Ser. No.	Harrow Fence Work & Miscel.	Apply Fertilizer	Clip Or Mow	Irrigation Labor	Total Labor Cost	Water Or Power To Pump	Fertilizer Cost	Total Material Cost	Total Cash Overhead	Total Cash Costs	Depreciation	Int. On Invest.	Total All Costs Per Acre
8.	\$2.00	\$4.92	\$---	\$17.88	\$24.80	\$5.42	\$4.25	\$9.67	\$4.72	\$39.19	\$8.17	\$19.04	\$66.40
9.	.81	.74	2.35	7.85	11.75	2.18	7.36	9.54	4.07	25.36	6.76	33.38	65.50
10.	2.00	.12	.63	15.25	18.00	14.19	17.78	31.97	12.00	61.97	17.00	11.70	90.67
5.	.03	.71	1.21	26.45	28.40	8.96	5.90	14.86	5.16	48.42	5.94	10.08	64.44
6.	.92	2.98	3.33	11.91	19.14	2.13	19.12	21.25	4.80	45.19	7.74	13.32	66.25
3.	--	2.80	3.73	2.96	9.49	6.04	9.16	15.20	10.23	34.92	6.59	14.23	55.74
11.	--	---	3.33	25.74	29.07	22.80	6.13	28.93	5.90	63.90	19.37	25.03	108.30
4.	.21	3.37	.52	30.31	34.41	9.92	6.03	15.95	5.34	55.70	12.18	18.09	85.97
1.	--	.24	.45	15.68	16.37	6.19	1.68	7.87	4.71	28.95	11.57	21.43	61.95
2.	--	.62	1.25	31.25	33.12	22.16	17.62	39.78	7.45	80.35	22.12	17.59	120.06
12.	1.20	---	2.40	50.20	53.80	4.22	13.52	17.74	9.57	81.11	47.20	53.45	181.76
13.	3.20	.50	.75	26.80	31.25	12.82	7.60	21.92	5.66	58.83	21.25	17.16	97.24
14.	--	2.77	3.05	19.40	25.22	18.10	5.40	23.50	5.44	54.16	17.70	26.73	98.59
15.	--	---	1.88	17.10	18.98	10.34	25.61	35.95	6.74	61.67	16.74	28.54	106.95
16.	.47	2.29	.82	12.62	16.20	6.24	2.77	9.01	7.26	32.47	7.44	13.72	53.63
AVE.	.35	1.43	1.58	16.66	20.02	8.16	7.14	15.34	6.26	41.62	10.47	17.92	70.01
1948 AVE.	.31	1.12	.78	14.73	16.94	8.01	5.76	13.82	4.39	35.15	8.87	16.21	60.23

Costs as reported by 15 different growers show a considerable range for each of the items or group totals shown above. Irrigation labor varied from a low of \$2.96 per acre to a high of \$50.20. This is to be expected because of the great range in this pasture as to size, shape, methods of irrigation, and quantity of water applied. The cost of pumping irrigation water varied from a low of \$2.13 per acre to a high of \$22.80 with a wide range in quantity applied and water lift. Notice that all but one of the pastures were clipped or mowed during the year—a good practice in weed control and for even grazing. All of the 15 pastures received fertilizer—perhaps also a good practice but one about which we have to learn the most economical kinds and quantities for each pasture.

A study and comparison of costs and returns above might indicate a possible saving in expense in some cases. In others where low yields are a problem increased water and fertilizer, although increasing costs per acre, might with better yields reduce the cost per animal unit month of feed.

Table 4: Pasture Production Per Acre by Months and Costs Per Animal Unit Month

Ser. No.	Animal Unit Months of Feed Per Acre												Total Yield	Costs Per Animal Unit Month					Equi. v. Hay Value Per T.	
	J	F	M	A	M	J	J	A	S	O	N	D		Labor Cost	Water, Fertil. etc.	Costs Over-head	Depreciation	Interest on Invest.		Total Cost
8.	.0	.0	1.4	3.3	2.6	2.2	2.2	2.2	.5	.5	2.9	1.7	19.5	1.27	0.50	0.24	0.42	0.97	3.40	8.50
9.	.0	.0	.0	2.1	2.9	2.6	2.1	2.0	2.0	12	.8	.3	16.0	.73	.60	.26	.42	2.09	4.10	10.25
10.	.0	.0	.5	2.6	2.7	3.1	3.3	2.8	2.4	21	1.1	.0	20.6	.88	1.55	.58	.82	.57	4.40	11.00
5.	.0	.0	1.7	1.9	1.9	1.9	1.9	1.7	1.2	11	.9	.3	14.5	1.96	1.03	.35	.41	.70	4.45	11.12
6.	.0	.0	.7	2.9	1.7	1.2	1.6	2.0	1.7	10	1.1	.0	13.9	1.38	1.53	.34	.56	.96	4.77	11.92
3.	.2	.2	.5	1.1	2.9	1.1	1.3	1.1	1.0	11	.7	.4	11.6	.82	1.31	.89	.57	1.23	4.82	12.05
11.	.0	.0	.6	1.2	2.3	2.3	3.6	3.1	2.8	21	1.6	1.3	20.9	1.39	1.38	.28	.93	1.20	5.18	12.95
4.	.0	.0	.4	1.8	1.6	1.6	1.6	1.7	1.6	13	.4	.2	12.2	2.81	1.30	.44	1.00	1.48	7.03	17.57
1.	.0	.0	.6	.8	1.7	.9	.9	1.0	1.0	9	.6	.1	8.5	1.92	.92	.55	1.35	2.51	7.25	18.12
2.	.0	.3	.5	1.3	1.1	1.9	1.9	1.3	1.4	40	1.1	.2	15.0	2.21	2.66	.50	1.48	1.17	8.02	20.05
12.	.0	.0	.0	6.0	3.3	4.0	2.0	1.8	2.0	10	.7	.0	20.8	2.58	.85	.46	2.27	2.56	8.72	21.80
13.	.0	.0	.0	.5	3.4	2.4	1.6	.9	.9	11	.2	.0	11.0	2.85	2.00	.52	1.94	1.56	8.87	22.17
14.	.0	.0	.0	1.1	2.5	1.8	1.4	1.1	.7	8	.8	.3	10.5	2.41	2.24	.52	1.69	2.55	9.41	23.52
15.	.0	.0	.3	1.4	1.4	1.4	1.4	1.4	1.3	2	.0	.0	8.8	2.16	4.09	.76	1.90	3.25	12.16	30.40
16.	.0	.0	.0	.5	.5	.5	.5	.5	.5	4	.1	.1	3.6	4.46	2.48	2.00	2.05	3.78	14.77	36.92
AVE.	.0	.0	.6	1.4	1.9	1.4	1.4	1.3	1.1	10	.7	.3	11.1	1.81	1.38	.57	.94	1.62	6.32	15.80
AV ⁴ 8.	.4	.5	.6	.6	1.4	1.5	1.2	.9	.7	5	.6	.3	9.2	1.83	1.50	.48	.96	1.75	6.52	16.30

Almost no pasturage was obtained during January and February which were unusually cold in 1949. Over 3 animal unit months of feed per acre was obtained in a single month in five of the above 15 pastures. A total of around 20 animal unit months per acre for the year was obtained in 4 pastures. Perhaps not all have the soil, location and water supply to attain this high production, but some of the above yields can probably be improved by better cultural care and grazing management or rotation. It is most important to avoid over-grazing. Leave sufficient top growth for rapid regrowth.

Costs per animal unit month of feed are lower where production per acre is high. The last column shows the price per ton of hay equivalent in cost to nutrient at the costs shown per animal unit month. There are 400 pounds of TDN in an animal unit month of pasture or the equivalent of .4 of a ton of hay. Notice that only the last 2 records had a pasture cost higher than the prevailing cost of hay this last year.

to apply 125 pounds of this material per acre. Irrigated pastures have shown a big response to chicken litter and this fertilizer is cheap, costing nothing up to \$1.00 per cubic yard.

Proper Grazing is important to high pasture yields. The pastures should be cross fenced so that they can be rotated and should be divided into at least four fields (more would be better). Pastures should not be grazed down lower than about three inches which leaves enough leaf surface for rapid recovery. Internal parasites are concentrated on the pasture growth near the ground and therefore overgrazing tends to allow the stock to pick up more of these parasites.

Cattle do better, will produce more milk, and the possible bloat hazard is diminished if they have free access to hay while in irrigated pasture. Where not enough irrigated pasture is available for the number of cattle, it is important to limit the hours the stock are on the pasture so that they will get approximately the same amount every day, and the pasture is not over-grazed.

Clipping Ungrazed Portions of the irrigated pasture several times a year is important. Clumps of grass which have headed out are unpalatable and if not clipped these spots are unproductive and therefore cut the pasture yield down.

Droppings spread by use of a harrow several times a year helps to fertilize a larger area and doesn't leave unpalatable manure spots for such a long period of time. Droppings in pastures are at the approximate rate of 100 tons per acre and therefore should be scattered over a larger area.

Weed Control can be accomplished by clipping, proper grazing and irrigation to some extent. Where Ladino Clover is the only legume in the pasture mixture, it is possible to eliminate some broad leaf weeds with 2,4-D if properly applied at the right time, and not harm the Ladino and grass mixture.

Summary of Important Practices

1. Plant proper mixture from October 1 to November 15.
2. Between 25 to 30 inches water must be applied by 10 to 20 irrigations. (Do not let pasture wilt.)
3. Fertilize twice a year with animal or chicken fertilizers is possible. (October or November and June.)
4. Use Superphosphate with cow manure.
5. Cross fence at least four fields.
6. Do not over-graze.
7. Clip at least twice a year.
8. Spread droppings with a harrow.
9. Control weeds.