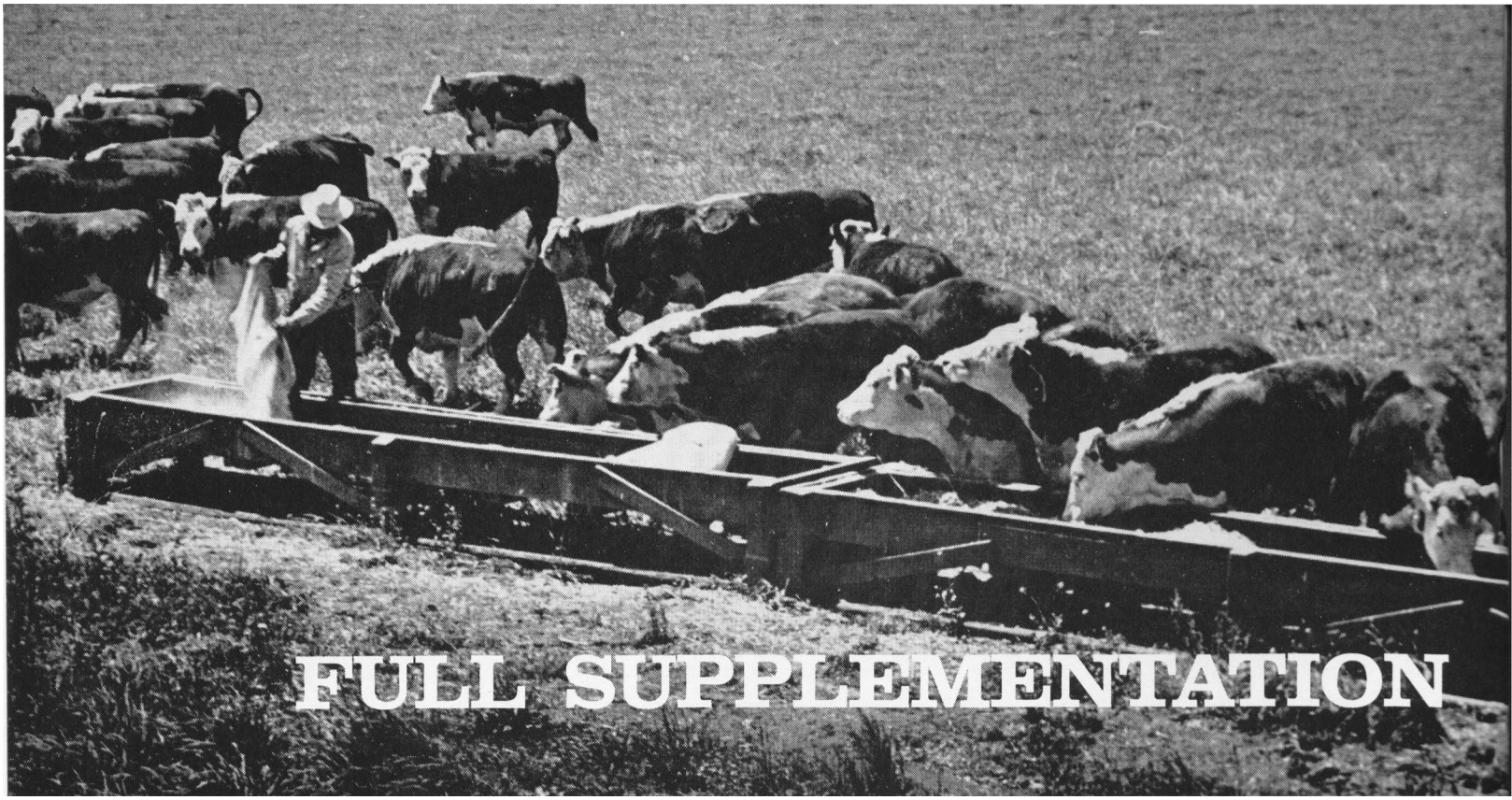

FULL SUPPLEMENTATION

A new method of fattening beef cattle on pasture . . .

J. L. HULL · J. H. MEYER

Full supplementation by free-choice feeding of rolled or ground barley to cattle on irrigated pastures brought them to acceptable slaughter condition within a 120 to 150 day feeding period in recent trials at Davis. Other factors also considered essential to the program included plenty of water nearby; a stocking rate of 5 to 7 head per acre or at least double the normal rate without supplement feeding; rotation of pastures to keep forage palatable and to facilitate irrigation; implanting each animal with 30 mg of diethylstilbesterol; and careful control of internal parasites.

Although relatively good cattle gains can be achieved when the sole source of feed is high-quality pasture forage, it is well recognized that supplementation for an additional source of energy is needed to produce a finished animal—with a high dressing percentage and a high grading carcass—in a reasonable feeding period. The effects of supplementation were studied at Davis in conjunction with other pasture experiments using irrigated pastures containing a mixture of orchardgrass and Ladino clover. All live weights were taken after 14 hours without feed and water.

The first trial was the limited feeding of ground barley to steers grazing irrigated pasture. The intake of the barley was controlled by mixing salt with the barley. The results tabulated below show that an increased daily gain can be obtained along with improvement in dressing per cent and carcass grade. This limited consumption of barley in addition to pasture did not produce "choice" animals at end of the feeding period.

Further trials included feeding cattle all of the barley, rolled or ground, that they would consume free choice—in addition to the pasture. This comparison was made each year to a group receiving only irrigated forage and to one receiving a 70 per cent concentrate ration in the feedlot. The stocking rate, over normal carrying capacity with no supplement, was doubled to 5.4 head per acre. The table, "Effects of Full Feeding" gives the results obtained during two different years using both ground and rolled barley.

It is difficult to compare years but it was concluded that either physical form of the barley proved satisfactory for fattening the cattle. Another aspect of

EFFECTS OF FULL FEEDING

	1960—Rolled Barley			1961—Ground Barley		
	Pasture		Drylot	Pasture		Drylot
Amount of concentrate fed, % of ration[1]	0	100[a]	70	0	100[a]	70
Days on feed	119	134	134	126	118	133
No. of animals	8	12	8	8	12	8
Daily intake of concentrate, lb.	0	12.3	12.5	0	13.5	11.8
Initial weight, lb.	555	560	596	624	675	652
Average daily gain, lb.	1.49	2.63	2.59	0.93	2.33	1.93
Dressing %	56.3	60.0	62.5	54.0	61.2	60.5
Average per cent fat in carcass[2]	15.1	19.8	22.2	11.9	23.3	20.1
Average carcass score[3]	3.0	5.7	6.0	4.2	7.3	7.1
Average carcass wt., lb.	386	556	584	423	594	565
Average corrected carcass wt., lb.[4]	332	555	684	326	651	567

[a] Includes barley only.

[1] The pasture plus barley and drylot steers were implanted with 30 mg. of diethylstilbesterol at the start of the trial.

[2] Average % fat in a choice carcass = 23.6.

[3] 9 = average choice, 6 = average good, 3 = average standard.

[4] Corrected to a carcass weight equivalent to a carcass containing 1,297 kcal. per lb., 17.3% protein and 20% fat.

EFFECTS OF LIMITED SUPPLEMENTATION

	Amount of supplement fed	
	Zero	5 lb per head per day
Days on feed	142	142
No. of animals	21	21
Initial wt., lb.	634	631
Average daily gain, lb.	1.5	1.75
Dressing per cent	57.9	60.8
Carcass grade: % of animals in grade		
Good	5	67
Standard	86	33
Utility	9	0

these trials was that the animals receiving barley free choice, in addition to the pasture, showed no signs of "yellow" fat in the carcasses at slaughter.

Under this system, steers consumed 10 to 15 pounds of barley per head plus enough pasture to gain between 2.25 and 2.75 pounds daily. Acceptable slaughter condition was attained in the usual 120 to 150 day feeding period. This system compensates for periods of short forage supply because the cattle merely increase barley consumption and maintain weight gains. This is particularly important towards the end of the pasture season.

J. L. Hall is Associate Specialist in Animal Husbandry and J. H. Meyer is Chairman of the Department of Animal Husbandry, University of California, Davis.

CONTAINER RESEARCH FOR VEGETABLE SEED

THE RESULTS of the research on containers for vegetable seed show that, in order to maintain the vigor and germination that the seed possessed at harvest, it is necessary to dry the seed and package it in moisture-resistant containers. Completely satisfactory containers are tin cans, pouches of aluminum foil laminated to polyester or polyethylene, or pouches of powdered aluminum in polyester. Containers almost as satisfactory and adequate for most storage conditions are aluminum laminated paper bags, thick polyethylene bags, and asphalt laminated paper bags.

In progress now is a study of why increasing moisture content in seeds shortens the life of seeds. This problem is being approached by studying the biochemical processes which change with aging, particularly loss in activity of enzymes.—*James F. Harrington, Department of Vegetable Crops, University of California, Davis.*

CONTROLLED AVAILABILITY FERTILIZERS

PART V OF A FIVE-PART SERIES

Ion Exchange Fertilizers and Ammoniated Organic Matter

O. R. LUNT · R. H. SCIARONI · A. M. KOFRANEK

The feasibility of supplying fertilizer minerals to plants by means of ion exchange resins has been known—and used for research purposes—for many years. Recently this technique has received attention as a commercial means of supplying nutrients safely and in large quantities for prolonged availability to high value plantings. Investigations have shown that the method can be very effective on commercial flower and nursery crops. It remains to be seen if this approach will be economically competitive with other controlled availability fertilizers being developed.

In principal, the exchange resins supply nutrients in much the same way as clay in soils. The adsorbed positively charged particles on the resins may be exchanged for other positive ions supplied by the plant root or by the irrigation water. Negatively charged particles such as phosphate and nitrate are supplied by exchange reactions to the roots of plants in the same manner as are the positive ions. The analogy with soil clays does not hold too well since clays have little anion exchange capacity.

The mixture of resins being used for fertilizer carriers was found to have a positive ion exchange capacity of 109 me (milli-equivalents) per 100 g (grams) and a negative ion exchange capacity of 233 me per 100 g. The positive ion exchange capacity of the mixture is about the same as most reactive clays. Leaching losses of nutrients from the fertilizer are relatively small if irrigation waters are low in salts and only moderate even when irrigation waters are fairly high in salts. The analysis of the fertilizer is reported to be 3.2–3.5–2.5 in N, P_2O_5 and K_2O.

Surface dressings of the exchange resin fertilizers are not very effective unless the irrigation water contains moderate concentrations of soluble salts. When the resin is in the root zone, the roots of plants have no difficulty in obtaining nutrients from the resins. In contrast to coated fertilizers and metal ammonium phosphates, exchange resin fertilizers can be stored in moist soils for long periods without loss of effectiveness or contributing to the salinity level of the soil. They can also be steam sterilized without apparently affecting subsequent availability of the fertilizer.

Application rates of the exchange resin fertilizers are usually expressed in terms of volume percentages to be used because bulk densities of soil mixes used for ornamentals vary greatly. Excellent quality potted chrysanthemums were produced with no further maintenance other than tap water during a three month period by incorporating exchange resin fertilizers at the rate of 10 per cent by volume. The soil mix used was highly susceptible to leaching. Several nursery plants including cyclamen, aphelandra, *Philodendron selloum*, sheffelera and gloxinia (grown using a sub-irrigation technique) produced good to excellent growth over a seven week period when 8 per cent, by