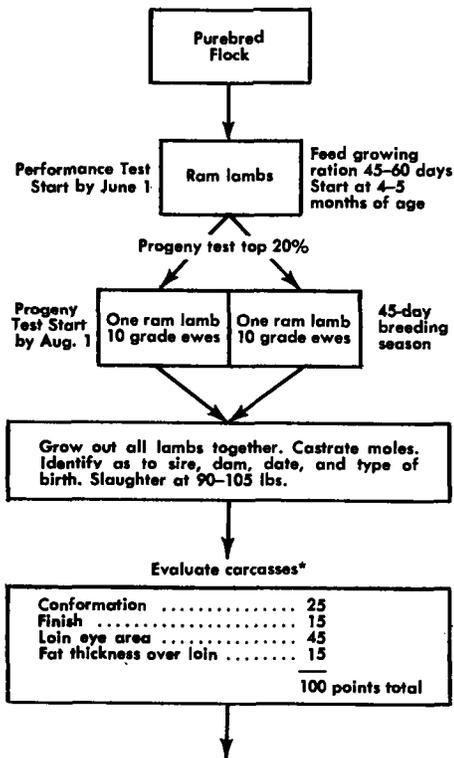


SELECTION OF RAMS ON PERFORMANCE AND PROGENY TEST



Select top ram from several such comparisons on progeny carcass score for use in purebred flock. Repeat annually.

- * Conformation: 25 points. Average of two independent scores.
- Cover: 15 points. Even and complete cover desired, without being excessive. Average of two independent scores.
- Loin Eye Area at 12th rib: 45 points. Measured by planimeter and adjusted to basis of 50 lb carcass wt. 3.0 sq. in. = 45 points. 1 point deducted for each .05 sq. in. below this.
- Fat Depth over loin eye at 12th rib: 15 points. Average of 3 measurements at 12th rib, in millimeters, adjusted to basis of 50 lb carcass wt. 5-6 mm. (1/8-1/4 inch) = 15 points. 1 point deducted for each mm. thickness above 6 mm., and 2 points for each mm. below this.

the carcass score thus obtained would be selected for use as flock sires among participating breeders' flocks. Benefits from using progeny-tested rams will only result to the extent that these rams are above the average of all rams tested. Hence at least the lowest 50 per cent, or preferably the lowest 75 per cent, on progeny carcass score should not be used in purebred flocks. On the other hand, the very best rams from within the selected group should receive heaviest use. Even though the freezing of semen and control of the heat cycle in sheep needs further research, artificial insemination using fresh semen could greatly extend the use of a superior sire. Breeders may ultimately use this procedure to make maximum use of particularly outstanding sires.

If the top performing rams, irrespective of the flock from which they come, are progeny tested, some breeders will have more rams in the progeny test than will others. Even with equal numbers tested from each breeder, some breeders will have more of the top rams on progeny carcass score. This situation would necessitate a definite agreement in advance for distribution of costs of the progeny test and use of the superior tested rams so that all participating breeders will benefit from the program. Sires and half brothers of top rams from the progeny test as well as the proven sires would form a highly desirable source of breeding stock.

Self-help program

Such a program would constitute an active self-help effort by the breeders themselves, subject to their own approval. The system is amenable to change as improved methods become available. It would offer California purebred breeders a chance to put the progeny test to work on a cooperative basis. It is probable that such programs will be set up in different places, and that breeders who are the first to take the step will reap greatest benefits.

The University of California can offer help through the Department of Animal Husbandry and the Extension Service in organizing such a program. If costs of the program as outlined above make it impossible for many breeders to participate, at least two alternatives are available: (1) the performance testing of ram lambs and progeny testing of top ram lambs on grade whiteface ewes at the breeder's ranch, and (2) performance testing ram lambs at home and putting out the top performers with commercial operators willing to cooperate by mating these rams separately to different ewe flocks, so that this will constitute a valid progeny test.

By comparison with the plan of testing all rams from all breeders at one location, these alternatives are less desirable because they allow careful comparison only of animals from within one breeder's flock. This means a slower rate of improvement. Secondly, at least three or four rams should be progeny tested to allow a greater chance of locating animals with superior progeny. However, even these alternatives offer a great improvement over present breeding efforts to increase carcass merit in sheep.

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Symptoms of severe copper deficiency were visually diagnosed in a 27-acre grapefruit orchard near Hemet, California, in February 1958, and again in a nearby orchard in 1962. Typical symptoms were dieback of young twigs, chlorosis of terminal leaves, and misshapen, rough fruit with brown necrotic spots on the outside and gum pockets in the albedo or white portion of the rind. Leaf samples from the orchard contained less than 0.75 ppm copper on a dry-weight basis, thus confirming copper deficiency. The annual application of a copper spray has corrected the severe symptoms of copper deficiency. A minor element study of southern California citrus orchards suggests that approximately 20 per cent of the orchards may possibly respond to a copper spray program.

Severe Copper

ALTHOUGH COPPER DEFICIENCY is not a new problem to the citrus industry of California, the diagnosis of a severe case of copper deficiency in a grapefruit orchard near Hemet, California, in 1958, and again in a nearby orchard in 1962, together with the analysis of trace-element survey data completed over the past 10 years, suggest that more attention should be given to the importance of including copper as a part of the trace-element spray program for citrus.

Leaf samples gathered in February

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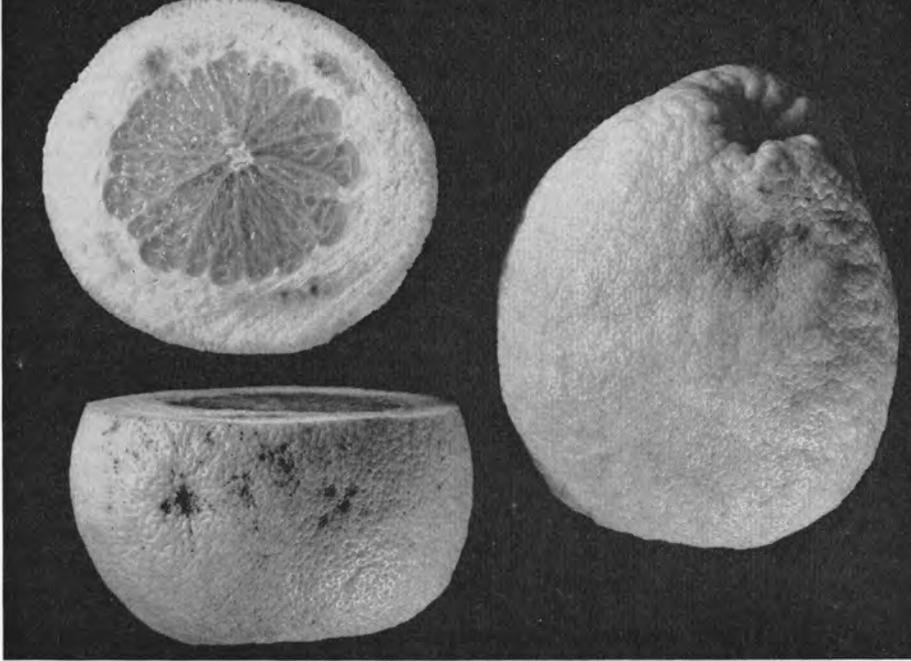
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Deficiency

IDENTIFIED IN SOUTHERN CALIFORNIA GRAPEFRUIT

G. R. BRADFORD · R. B. HARDING · M. P. MILLER

1958 from a 27-acre grapefruit orchard on Rough lemon rootstock growing in sandy loam soil near Hemet, California, showed a general unhealthy condition, which was at first attributed to low winter temperatures; however, more careful examination of the orchard revealed considerable twig dieback and chlorotic leaves on trees growing at higher locations in the orchard where temperatures were higher. Many of the leaves were irregular in contour and tended to "bow up" along the midrib. Most of the fruit throughout the orchard was misshapen and coarse in appearance. The peel was abnormally thick and pulpy. Brown blotches or necrotic spots were observed on the outside of the fruit and gum pockets or brown areas of discoloration were observed on the inside of the fruit. *The photo shows the typical appearance of the fruit. Gumming on twigs, a typical symptom of copper deficiency reported from other citrus-growing areas, was not identified. Identical symptoms were recently observed in another nearby grapefruit orchard.*

Since copper deficiency symptoms on citrus are not as specific as with zinc, iron, and manganese, visual diagnosis is somewhat unreliable and may be confused with the effects of fungus diseases, insects, nematodes, or other pests, as well as with

the effects of low temperatures or nutrient deficiency or excess. Analysis of foliage, however, will usually provide the critical information required for a sure diagnosis.

Leaf samples representative of the orchard were taken from behind the fruit during March 1958 and analyzed spectrochemically for trace-elements. The copper content of the dry leaves was extremely low—less than 0.75 ppm. The concentrations of other trace elements were normal. Lithium was present, but below the level where toxicity symptoms usually appear. The visual diagnosis together with leaf analysis provided evidence of copper deficiency. A copper spray containing 2 pounds of copper sulfate plus 2 pounds of hydrated lime per 100 gallons of water was applied immediately and annually thereafter. Symptoms of copper deficiency were corrected the first year and there was no recurrence of the problem.

Leaf samples were gathered during April 1962 from a nearby grapefruit orchard showing symptoms of severe copper deficiency, and also from navel orange trees growing in adjacent rows. These orange and grapefruit trees were on sour orange rootstock. Less than 0.75 ppm copper was found in the grapefruit leaves, and less than 2 ppm copper in the orange leaf sample. The orange trees were generally lacking in vigor, but did not

show symptoms of severe copper deficiency. This suggests grapefruit trees are better than orange trees as indicators.

Extensive experimental work with copper on citrus has been conducted in Florida, California, South Africa, and other citrus-producing areas of the world. W. Reuther and C. K. Labanauskas of the Department of Horticultural Science at Riverside recently surveyed the published literature dealing with copper nutrition. They concluded that 4- to 7-month-old citrus leaves having less than 4 ppm copper are deficient, leaves with 5 to 20 ppm copper are normal, and leaves with more than 20 ppm copper are likely to show symptoms of copper toxicity. They also point out that a moderate response in vigor and yield may be expected from applying copper even where there are no striking symptoms of copper deficiency other than lack of vigor, and that early stages of copper deficiency may show no symptoms except reduced growth.

In a special study of the trace-element content of the leaves sampled from 43 high-producing orange orchards during the period 1950-56, the average copper content of the samples was 5 ppm. Twenty-five of the samples contained less than 5 ppm, 10 samples contained less than 4 ppm, and 5 samples contained less than 3 ppm. *On the basis of the accepted 5- to 20-ppm normal concentration referred to earlier, approximately 25 per cent of the orchards studied have a low copper supply and may therefore respond to a copper spray treatment—even though many of the orchards are high producers.* A more recent trace-element analysis of leaf samples from 22 medium- to good-producing orchards, representative of southern California, showed that four orchards (or approximately 20 per cent) have a low copper supply and may therefore respond to a copper spray. No data are available from selected poor-producing orchards; however, it is likely that a comparatively greater per cent of these orchards may show a favorable response to a copper spray.

A current study of the trace-element content of citrus leaf samples compared to the sampling technique will provide more refined criteria for interpreting trace-element deficiencies and excesses.

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