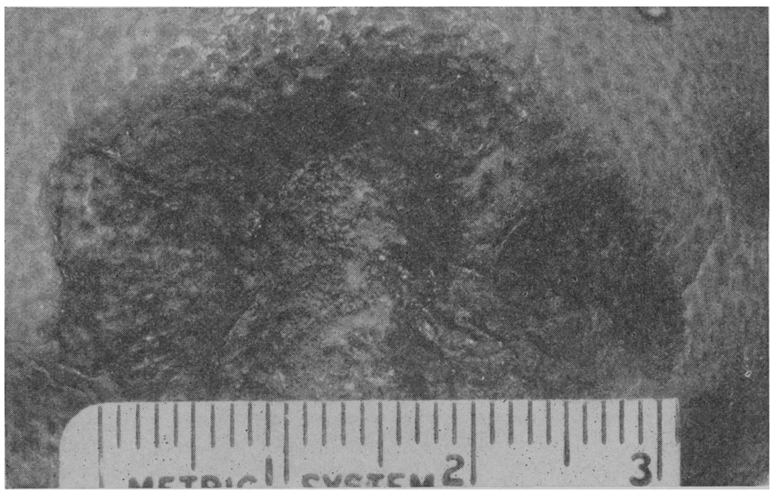
Rind Spot And Drop Of Valencia Oranges Investigated In Effort To Determine Cause And Cure

L. J. Klotz, W. S. Stewart and R. J. Bumgardner

A breakdown of the rind and the accompanying drop of Valencia orange fruit caused severe loss in some groves in Orange County again this summer.

The spots were sunken and of various sizes ranging from a mere speck to an inch or more across. They were most abundant on the shoulder portion of the stem half.



Rind spot of Valencia orange showing fruiting bodies of fungus.

Similar losses were experienced during the summers of 1926, 1931, and 1934. A slight amount of the breakdown may occur in late pickings almost every season.

An extensive orchard survey of the trouble was made this summer during the last half of July, all of August and the first half of September. Seven hundred and ninety-five trees and 45,000 fruit were examined.

In classifying the types of injury on the dropped fruit, it was found that 15% was caused by the pink scavenger worm and other worms. The injury from this cause may be very slight but supplies excellent paths of infection by the tear-staining and fruit-rotting fungus, **Colletotrichum gloeosporioides.**

Injury from the Tortrix worm, while it occurs in early July or before, which is previous to the time of greatest drop, very probably plays a part in the drop later in the season.

Thirty per cent of the fallen fruit had rind spots which include the typical Valencia rind spot, shoulder spot, and breakdown around stem.

Twenty-four per cent showed splits and soft decays; 7% had mechanical injuries or were pulled from the tree in various orchard operations.

There were 24% from all other causes, but mainly from the trouble called "dry stem."

The heaviest period of dropping was the week beginning August 11 when an average of 48 dropped fruits was found per tree.

The week beginning July 28 averaged 24.6 fruits per tree; the week of August 18, 27.35 fruits per tree; the week of August 25, 22.36 fruits per tree; and the week of September 2, 14.7 per tree.

The periods of greatest drop corresponded to those of the highest temperature which reached 103° F. There were two weeks when the temperature was 90° F., or above. In Orange County from July 24 to August 12, 1947, the temperature reached 90° F or above every day.

Causes Considered

In a consideration of the causes of Valencia rind spot, it is assumed that some weakness of the rind in the absence of visible injury apparently precedes the actual breakdown and spotting.

Similar effects sometimes follow mechanical injury such as those from insects, wind, thorn pricks, etc. The lesions in the advanced stage resemble one form of water spot on the stem half of navel oranges.

In the absence of mechanical injury, the first noticeable symptoms are the collapse and sinking of small areas in the rind without a discoloration. Sometimes it appears to start by the collapse of one oil gland. These are closely followed by a darkening of the individual oil glands to various shades of brown; then occurs a collapse of the adjoining tissues until larger areas are affected. As in one type of water spotting apparently the rind oil escapes internally and injures the cells adjacent to the oil glands.

Where the surface is noticeably broken by some external agency, the typical rind oil spot—oleocellosis—may precede the breakdown. As the lesions age they darken through the various shades of brown until they are a deep chestnut brown.

The anthracnose fungus—**Colletotrichum gloeosporioides**—and Alternaria fungus—**A citri**—may become established in these areas causing them to darken and enlarge further, and even develop into a decay of the fruit. Such lesions may also be vantage points for the entrance of blue and green molds.

The spots are usually confined to the button half of the fruit, being most abundant on the shoulder and around the button. This region is apparently the more permeable, weaker portion of the rind although an abrasion any place on the rind may result in a typical spotting.

Weather Factors

Hot weather, rains, and high humidity may be important factors in the development of rind spot of the stem-end half.

The severe breakdown in 1934, the first year in which we made accurate observations, followed the period of high temperature in July and August. The most seriously affected groves in Orange County were those that experienced the high temperature of 103° F and high humidity of 70% on July 27, and a light rain in the early morning of July 28.

It is also possible that coastal fogs may be an important factor.

Laboratory Experiment

Susceptible Valencia oranges collected in Orange County were atomized with a fine spray of distilled water and placed in a moist chamber at 98° F. After 48 hours, the typical breakdown was noticeable on areas of the rind that were previously apparently unaffected, and old lesions were enlarged by this treatment.

This laboratory experiment was repeated this summer using temperatures of 100° F to 105° F., and a relative humidity of 95%.

Typical spots were developed after a period of one week. Spraying with eight parts per million—.0008%—of 2,4-D to check the drop had no influence on the development of spotting under these conditions.

Whether this plant growth regulator will have any effect on the incidence of spotting of susceptible fruit under field conditions has not been determined. It does have a pronounced affect in decreasing the tendency to dropping. Preliminary experiments also indicate that trees sprayed with the chemical have fewer dry fruit stems.

Fruits that had some slight evidences of incipient spotting developed definite spots after the washing operations of the packing house, suggesting a relationship to water spot and water rot.

Fumigation and ethylening also seemed to aggravate the condition.

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Liquid Manure—Pumps, Tanks And Application Method

(Continued from page 1)

manure usually are made on dairy farms and most authorities recommend not less than 100 cubic feet of tank capacity per cow and prefer 150 cubic feet.

Proponents of smaller storage tanks prefer to empty them often and pump the liquid manure into the irrigation system or directly onto the land. These systems may be automatic, with the pump controlled by a float valve.

Storage tanks are six to eight feet deep and have no recommended lateral dimensions. The bottom of the tank should slope towards the outlet. In a tank in which all solids are collected, the slope should be as much as one foot per 10 feet in length. Larger tanks, collecting liquids mainly, may have a slope of only one foot in fifty feet, but will likely require agitation before pumping to facilitate complete removal of solids. All tanks should be covered for sanitation and for safety.

A sump should be provided at the outlet of the tank to facilitate complete cleaning. The sidewalls and floors of a concrete tank should be not less than six inches thick. They should be reinforced with wire or metal rods, especially at the corners.

Application Method

One method of spreading liquid manure is by tank wagon. From the storage tank the material is transferred to a water tight wooden box tank wagon, either by pump or by gravity.

A controlled outlet at the rear of the sloping wagon tank permits the liquid manure to flow onto a splash plate which spreads it about the width of the wagon as the wagon is driven through the field.

Throughout the irrigated area of California the method commonly used is to pump the liquid manure into the irrigation system for distribution.

Usually the manure is admitted into a stand pipe and the flow directed through the pipelines or ditches from there, using the irrigation water as a carrying agent.

Liquid manure may be pumped directly to the land without extra water but the solids are likely to settle out in the pipeline, requiring subsequent flushing. Also, it is difficult to get even distribution of the manure over the soil without plenty of water.

A sprinkler system should never be used to distribute liquid manure with the sprinkler heads in place. By removing the sprinkler heads the system may be used, provided the pipes are flushed thoroughly immediately after use.

Liquid manure is highly corrosive on wrought iron pipe, necessitating thorough flushing immediately after use. Low spots in pipe lines clog easily as will pipe with an irregular interior.

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Further suggestions for the installation and operation of the liquid-manure system are given in the California Agricultural Extension Service illustrated Circular No. 140, now available without cost by request addressed to the College of Agriculture, University of California, Berkeley 4, California.

Carotene Recommended As The Coloring Agent For Production Of Standardized Butter Yellow

G. A. Richardson and M. Louisa Long

The natural color in butter is mainly carotene which has great nutritional significance and from which Vitamin A is derived.

The concentration of carotene in milk and cream, apart from breed characteristics, depends upon the amount of carotene in the feed of the cow. The seasonal variations in the carotene content of feed causes butter to range in natural color from a pale yellow to a deep "summer yellow."

The buttermaker usually attempts to standarize his product to a shade with good eye appeal by adding harmless vegetable or synthetic dyes. These attempts have been only partially successful due to inefficiency, negligence, not recognizing the importance of color, or which is more likely, to the use of unsatisfactory methods of standardizing.

Butter never has been regulated as to Vitamin A content but nutritionists and food technologists have long advocated the use of the nutritionally significant carotene instead of the usual butter colors. The suggestion went unheeded because of the lack of a supply of suitable carotene and of the high cost. Today, refined carotene concentrates are available at prices that compare favorably with those of the commonly used butter colors.

In some sections of the country, improvement of winter feed has produced less seasonal variation in the carotene contents of the milk resulting in a more uniform year round butter color.

Carotene For Color

The introduction of carotene as a butter color presents problems.

Carotene concentrates must be protected from heat and light or the carotene will be destroyed and acquire an unpleasant odor and flavor.

In trade channels and in household refrigerators, provision should be made against over-long storage or unnecessary exposure to light.

Experiments show that commercial concentrates differ among manufacturers' brands as to concentration and stability of the carotene.

Storage trials with laboratory and commercial butters showed that at low temperature the added carotene was not definitely detrimental to the keeping quality of the butter.

When carotene is used as a butter color very attractive shades are obtainable.

The use of carotene, in amounts at least sufficient to minimize the seasonal fluctuation in the natural color of butter, should be considered by the buttermaker.

How To Obtain Desired Color

Here is a simple method whereby the creamery technician or the cream tester can determine the natural color of the cream to be churned and calculate quite accurately, the amount of added color needed to give a predetermined shade to the butter. Carotene concentrate or artificial coloring may be used.

The method requires only a few minutes and consists of churning about nine grams of cream in a Babcock test bottle at a temperature of 30°C—87°F—extracting the fat with definite volume of benzine and determining the color with a colorimeter or by comparing it with a set of permanent inorganic color standards using a simple comparator.

Color standards may be prepared at low cost in most any chemical laboratory, including that of the local high school.

By making use of this method it should be possible to effect economies in the use of color and supply the consumer with butter of a uniform shade to meet the market demands.

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Supplemental Feeds For Range Sheep Compared As To Protein, Digestible Nutrients And Price

R. F. Miller

Sheepmen are faced with the problem of feeding high priced supplements this winter.

Ewes that are bred to lamb in November and December should be in good condition and should be on good feed at this time of year. Formerly lambs were not dropped until December and January but now it is common to find sheepmen in the Sacramento and San Joaquin valleys lambing during November. These early lambs get a good start in life before the colder weather arrives and in general are more profitable than the later lambs.

In many sections of the San Joaquin Valley ewes are lambed on alfalfa pasture and this, of course, is ideal. If green alfalfa is not available a good substitute would be irrigated pasture, preferably a mixture of ladino clover, birds-foot trefoil, and some of the grasses, preferably ryegrass. The sheepman, however, cannot be too "choosey," he will be glad to get any kind of green pasture.

Name of Feed	Total Crude Protein, Per Cent	Total Digestible Nutrients in 100 lbs.	Comparative Price when alfalfa hay is $30 per ton
Alfalfa hay leafy No. 2	16.0	51.0	$30.00
Wild oat hay	6.6	48.7	28.65
Corn Eastern No. 2	9.4	80.0	47.06
Whole barley	8.7	78.0	45.88
Cottonseed cake 43% protein	43.2	75.5	44.61*
Bean screenings (10% dirt)	20.4	60.7	36.10*
Cane molasses	2.8	56.6	33.30
Irish potatoes	1.1	17.3	10.18
Dried figs	1.7	65.8	38.70

**The figures for cottonseed cake and bean screenings do not give a fair expression of relative values since these feeds are very high in protein and protein is the most valuable nutrient in feeds as a whole.*

Later in the season it becomes necessary to feed some of the supplements in addition to whatever natural range feed is available. It is true the sheepman always hopes for early rains to start the green feed.

Alfalfa Hay at Top of List

Of the supplements alfalfa hay stands at the top of the list. Due to a large production this summer the price has been $25.00 to $27.00 per ton and most sheepmen, no doubt, have laid in a good supply for the winter. Volunteer grain hay with considerable bur clover is also satisfactory. The most common concentrate feeds are shelled corn, cottonseed cake, whole oats, whole barley and bean screenings. Dried figs, and possibly some other inferior dried fruits, may be available. Cull potatoes were available last year at a low price through the Government surplus program.

Composition and Relative Value of Common Feeds

The comparative price is based on the total digestible nutrients for 100 pounds of feed and assuming an average price of $30.00 per ton for alfalfa hay.

With shelled corn quoted at the present time at $95.00 per ton, barley at $80.00 per ton and cottonseed cake at $90.00 per ton it is easy to see from the above table that alfalfa hay is by far the cheapest supplement and fortunately it is one of the best feeds for bred ewes and ewes with lambs.

Shelled corn or cottonseed cake may be more convenient to feed as troughs are not necessary. With hay at one-third the price sheepmen should construct suitable hay racks and make other necessary provisions to feed mainly alfalfa hay this winter.

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