ever. Foliage sprays of this material were effective there in treating iron deficiencies of gardenia, privet, photinia, hibiscus, bougainvillea and holly.

On the west coast a large paper concern has been experimenting with an antichlorosis product, presumably an iron chelate, on iron-deficient crops of pears, peaches, and prunes. The product is derived from paper mill waste materials. Spray applications have given very good results with no cases of leaf injury reported. Company officials say the new product will be available for limited commercial use during the 1956 growing season at prices substantially lower than those for products now being marketed.

In spite of initial difficulties and disappointments with chelate trials in alkaline soils, a number of compounds have been developed which give good results; chief among these are the iron complexes of HEEDTA. The success of these products seems to be assured by results of this year's growing season. One company official returning from a cross country junket reports increasing enthusiasm for chelate application west of the Mississippi river. Alkaline soils require a bigger dose but with any price decline at all bigger sales in these areas can be expected.

Future Prospects Bright

No one is predicting an immediate demand for chelates on field crops, but research now under way in several areas is examining this possibility. At the National Agricultural College in Pennsylvania and at the University of Nebraska, in particular, studies of this type are being made. Almost every state experiment station is studying one or more aspects of the application of chelates in agriculture.

Iron deficiencies in soils are widespread and herein lies the biggest market for chelates. Chelates can be formed with other metals but work best when supplying iron. The nature of synthetic chelating agents is such that they preferentially complex iron over other common metals. This is a stumbling block in using these compounds to correct deficiencies of other metals. On the other hand, promising preliminary results have already been obtained with zinc and manganese chelates.

In the long run, the package chelate business sold to the "little operators" and home growers may prove most profitable to suppliers. Already several companies are furnishing iron chelates in one pound packages. One company sales manager estimates 100,000 pounds will be sold in packages next year.

Full grown Hereford steer raised on stilbestrol ponders food he will never eat, because of increased weight gain and feed efficiency induced by the hormone

Hormone Feeding of Livestock

Definite advantages are derived from stilbestrol feeding, but additional studies are needed to eliminate confusion in some areas

OVER 5 MILLION stilbestrol-fed cattle were slaughtered through last month, according to an estimate of Eli Lilly & Co. A further indication of stilbestrol popularity is that Lilly, until this summer the sole manufacturer of the hormone, sells to 655 feed mixers in 42 states (recently, Charles Pfizer & Co. has marketed its brand of stilbestrol). The reason for stilbestrol's wide appeal: Feeding of 10 milligrams a day of the synthetic estrogen boosts gains in fattening steers to an average of 3.5 pounds a day, and results in an average improvement in feed efficiency of 16%. Economic calculations, based on growth and feed efficiency data from trials performed at many universities and by the two stilbestrol producers, show an average increased return per head of $10.

These advantages are agreed upon almost unanimously, but thereafter, as is true of most relatively new fields, the situation is in a confused state. A summary of the effects of stilbestrol shows that DES increases weight gain and improves feed efficiency, but does not increase fat deposition or improve carcass quality. Unknown and answerable only with time and further research are: the future of carcass grades and quality, shrinkage in live animals as well as carcasses, incidence of side effects, acceptability of meat and by-products, and the market price of live animals.

Pros and Cons

Much of current research is directed toward determining effects of DES supplement feeding on carcass grade and quality. As an example of the disagreement on this point, one study describes the results of feeding DES, dienestrol, and hexestrol to 10 steers for 123 days at a level of 10 milligrams per steer daily. According to this study, the best carcasses were those of steers which received no hormonal substances. On the other hand, another group of experimenters reported in a summary of six experiments that cattle carcass evaluations have been fully as good where diethylstilbestrol has been included in the feed as they were where carcasses were produced without the hormone addition.

Additional controversy exists about shrinking and dressing out of cattle. However, only a minimum of data is available on these points. Until more experimental work is completed, and as more stilbestrol fed cattle come to market discussion of these facets remains mostly speculative.

At times, some side effects have occurred, and the problem is being studied in two ways—when and what kind of side effects result from stilbestrol feeding, and the importance of these effects. Side effects observed include slight mammary development, changes in the loin and tailhead (of concern to feeders because they affect appearance of the animal), and recognizable increases in teat length, probably the most common side effect. Again, incidence of side effects varies. Some investigators have observed none or one of these, usually an increase in teat length; others have encountered each of them at one time or other. Incidence also varies within experimental herds, as well as among herds. A possible partial explanation for the variability in animal response may be due to the estrogenic activity of natural feedstuff, particularly legume pastures, silage, and hay.

Acceptability

Available data shows no hormone carryover into tissues of the animals. No threat of hormone ingestion by humans exists. The FDA has ruled that cattle should be taken off stilbestrol feeding 48 hours before slaughter, further obviating any possibility of potential carryover.

As to the market price of live DES fed animals, there is no set rule. Normally,

according to the American Meat Institute, cattle are bought for whatever they are worth, and hormone supplementation is not considered. There have been isolated instances where a buyer, at his own discretion, will adjust his price if he knows or suspects the cattle are hormone fed. Depending on the day's market, he may use DES as a convenient excuse for his actions. To ensure quality animals, DES manufacturers recommend feeding cattle to grade and not to weight.

Feeder Instruction Program

An educational program is being followed by the stilbestrol producers and feed mixers, since benefits derived from DES feeding are dependent on adherence to instructions. Through their own publications and also via agricultural experimental stations, producers are keeping feeders up to date on developments as they occur. Proper use of the hormone is impressed upon feeders, and instructions are specific enough to leave very little room for misinterpretation. Amount of mix, how often, and when to start and finish DES feeding periods is spelled out.

Experimental stations at many universities are actively engaged in research and field trials involving stilbestrol, as well as other hormones. Through their bulletins, the feeder obtains an objective view of developments.

What's Next?

The latest development in stilbestrol feeding is a stilbestrol-terramycin mix marketed this summer by Charles Pfizer & Co. Terramycin is added to the stilbestrol premix at a level of approximately eight times that of the estrogen, giving the equivalent of 75 milligrams of antibiotic per head per day. Terramycin-DES combinations, according to Pfizer, give additional improvement in feed efficiency and rate of gain, but there is also some limited data indicating this may not be the case.

Animals other than cattle have been treated with stilbestrol—chiefly lambs and swine. Methods of administration include pellet implantation and oral feeding, but data is insufficient to warrant any conclusions. An extensive report on effects of stilbestrol feeding of lambs is being prepared, and will be made public next month.

Other hormones tested on a limited scale include testosterone, progesterone, anterior pituitary growth hormone, and estradiol. Hexestrol and dienestrol have been investigated concurrently with stilbestrol, and results are somewhat similar with these estrogenic materials as with DES. Data on the others is either meager or inconclusive, and opinions are varied.

Oriental Crops

Newcomers to U. S., lychee and dasheen. One high on popularity poll, the the other remains a replacement

OFTEN ADVERTISED as Florida's latest fruit sensation, lychee has been one of the Orient's favorites for centuries. Still unfamiliar to many Americans, lychee's popularity in the U.S. is growing fast. Harvest this year is expected to hit an all-time high of 25,000 to 35,000 pounds (in 1954, harvest was 7500 pounds and in 1953, 9000 pounds).

A good source of ascorbic acid and phosphorus, fresh lychee is structurally similar to a peach, about the size of an English walnut. The inedible pit is surrounded by white-to-pink edible flesh (grape-like texture), enclosed in an inedible skin that can be peeled with the fingers.

Lychee trees first came to Florida about 1870, but remained a horticultural curiosity until 14 years ago when Lycheeland at Laurel became the parent grove of Florida's presently estimated 15,000 trees. Since World War II, orchards of lychee trees have been planted in a 200-mile belt across central Florida.

Trees mature in 20 to 25 years, thrive best where winters are brief, frost is slight, and summers are hot, long, and humid. Winter temperatures must drop below 40° F. for trees to go into dormancy (or trees will not produce) but not below 32° F. (or wood will be killed). Little is known about tree's plant food requirements, but evidence of minor element deficiencies, in limestone soils, has been corrected by nutritional sprays of copper, zinc, and manganese. In Hawaii, sodium naphthalene acetate has been used in attempts to induce dormancy, and the Florida Subtropical Experiment Station has conducted similar tests but has made no recommendations as yet.

One large grower says he suspects that profits from a mature lychee grove will never fall much below $1000 an acre. An acre of mature trees will produce up to 10,000 pounds of fruit at a cost of about $500. This agrees with the estimate of a large nursery, which assumes a maintenance cost of four times that of a citrus grove and includes picking, packing, packaging materials, and transportation costs. This is a conservative estimate, the nursery explains, because it is based on a wholesale price of only 30 cents a pound and discounts the fact that maintenance is probably only twice that of a citrus grove.

Before the war large amounts of dried lychee fruit were imported from China and sold as "lychee nuts." Florida's entire output is sold fresh, and the small amount of dried lychee available in the U.S. is either smuggled in from Communist China or imported into California from India.

In 1952, Florida growers organized the Florida Lychee Growers Association. They market their entire output through the Florida Citrus Exchange at a premium wholesale price of $1.00 a pound, f.o.b. local airports, a price they expect to keep despite the 1955 bumper crop. Lychees (shelf life is seven to 20 days) are shipped in 10-pounds lugs by air freight to markets all over the U.S. Lychees can be quick frozen without processing.

In sharp contrast, the dasheen, another Oriental crop, has fared badly at the hands of Americans. They generally refuse to accept this tuber as an alternate for potatoes. Markets are, therefore, almost entirely limited domestically to Orientals and West Indians. Meanwhile, imports have continued to come in large amounts, despite ban on trading with Red China, from other countries.

Not only do dasheens resemble the potato in taste and nutritional qualities, but their cultivation is much like that of the potato. They require the same soil preparation and are covered at the same depth. Harvesting is costlier however, because hand labor is required to separate, clean, and sort them. The tall-growing tropical plant produces about 250 bushels of corns and tubers an acre, but marketable portion seldom exceeds 100 to 150 bushels.

Dasheens, eaten in the Orient much as Westerners eat potatoes, have never become popular in U. S.