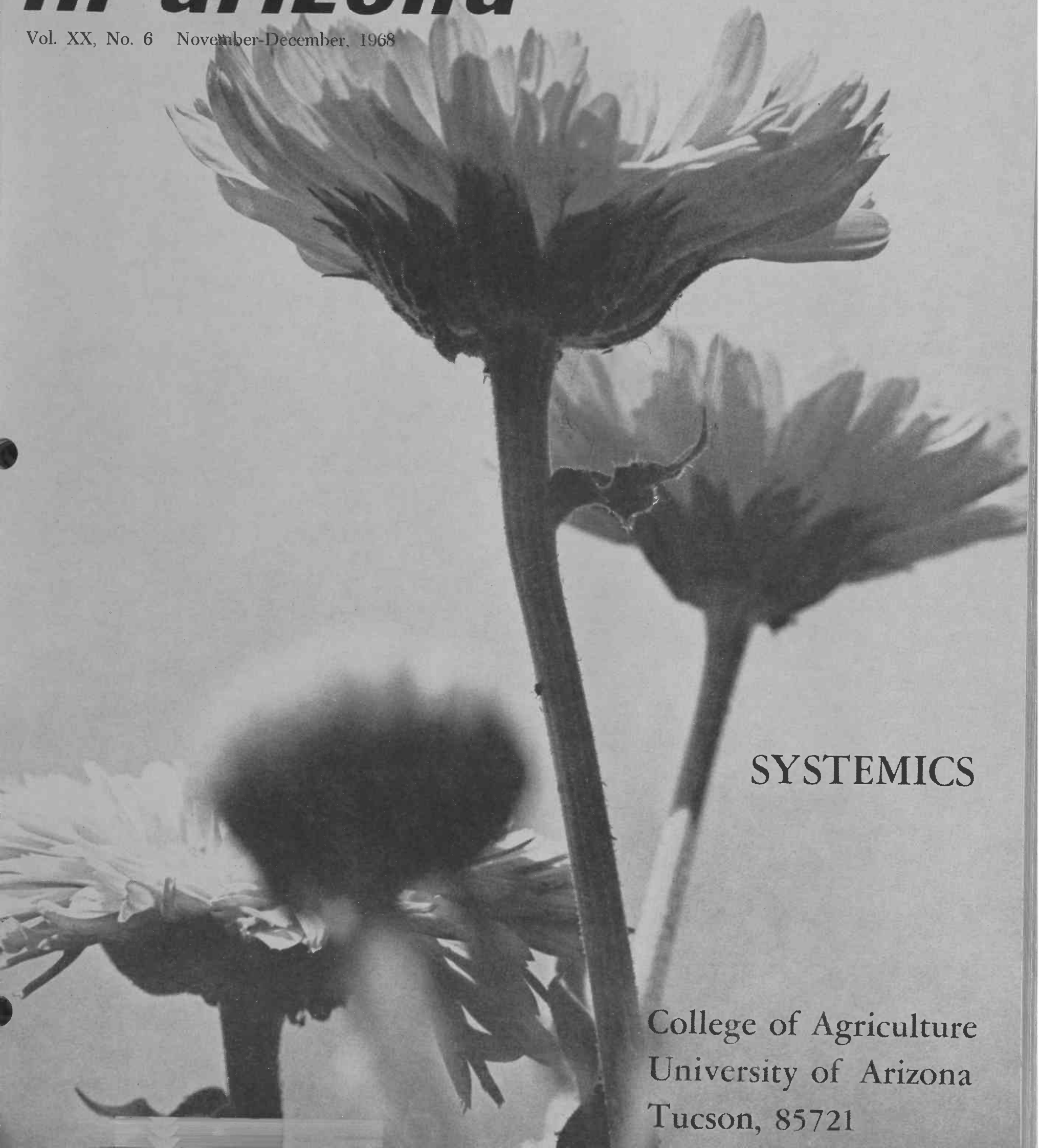
Progressive
agriculture in arizona

Vol. XX, No. 6 November-December, 1968



SYSTEMICS

College of Agriculture
University of Arizona
Tucson, 85721

High School Graduates Find . . .

Opportunties in Agriculture

While it is true that we need fewer and fewer people to grow our highly nutritious food for America, it is not true that agriculture has all the people it needs.

There are many sources which report that only one-half to three-fourths of the farm reared boys now growing-up on their home farms and ranches will be needed as replacements of present farm and ranch operators.

And, some of the critics of Agriculture say: "why educate more boys in agriculture?"

The answer is that the allied industries, businesses, including agricultural services have jobs each year that go begging for lack of agriculturally trained individuals. And, usually that training requires an agricultural degree from one of the better Colleges of Agriculture.

When properly trained you still will be a part of the way of life you so much love — agriculture.

While fewer and more efficient farmers and ranchers are feeding America, industry and business are eager for technically trained young men who have graduated from such Land Grant Colleges of Agriculture such as the one we have at the University of Arizona.

It is known, particularly, for it excellence of educational training which is worthy of note because it has been one of the world's faster growing agricultural colleges.

Dr. Darrel S. Metcalfe, director of Resident Instruction, points out a ten-year growth in enrollment of 100 per cent.

Such growth can only come about after your graduates have made a name for themselves in the industrial, business and service world.

When these graduates achieve success and build for themselves excellent reputations, then other U of graduates are sought by employers to duplicate this fine performance.

College graduates, of course, get the best jobs — jobs with top pay and interesting incentives with which to grow and progress.

For he who graduates from a Land Grant College of Agriculture is opening the door to a wide range of diverse and interesting occupations.

Each boy who graduates from a high school can, through interest, curiosity and ambition, open that door to his own unlimited and successful future.

I invite you to contact Dr. Metcalfe in person or by letter. He can help you become acquainted with the wide range of choices you have in agriculture. And, he can help you prepare for entrance into our College of Agriculture.

Harold E. Myers

Harold E. Myers, Dean
College of Agriculture
School of Home Economi

In this Issue . . .

Progressive Agriculture in Arizona
November-December, 1968, Vol. XX, No. 6

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Experimental Management Procedures for Chronic Pain

*by V. A. Christopherson**

Pain in one form or another and in some degree is one of the universal experiences of mankind. Much of the pain human beings experience can be quickly alleviated by bringing appropriate medical influence to bear on the underlying pathology thought to be responsible for the pain symptoms. When the pathology cannot be influenced significantly, medical management may bring about symptomatic relief through palliative medication or surgery. A number of conditions, however, appear to be associated with long term continuous or intermittent pain symptoms having little prospect of permanent remission. A number of forms of arthritis are productive of such symptoms — symptoms characterized as chronic pain.

There is much evidence that individuals differ noticeably in their reactions to pain thought to be of comparable intensity. This in turn suggests a significant learning component associated with pain response. Pain response has been found to vary with nationality, race, religion, age and other factors. Among Polar Eskimos, for example, the appropriate response to pain is reported to be laughter. Papago Indians apparently interpret the significance of pain in their lives in such a way as to make their responses seem stoical by middle-class caucasian standards. These well-known facts suggest the feasibility of a learning approach to the management of chronic pain. In other words, the variation in pain response [illegible] to learning — granting the possibility of other response determinants such as genotypic influences — indicates that individuals suffering from chronic pain might learn to live with it productively through the utilization of appropriate techniques.

One of the promising approaches to a learning-type model in pain management is the operant condition technique. Considerable success has been achieved with this procedure at the College of Medicine Pain Clinic, University of Washington in Seattle. Very simply stated, through selective reinforcement of predetermined behavior patterns the individual learns to function in a productive fashion without the aid of palliative medication or treatment. Application of this model yields a set of strategies and premises different from those derived from the medical model.

Operant conditioning is a technique which assumes a functional relationship between behavior and its consequences. Desirable behavior is rewarded immediately by positive reinforces, i.e., c o n s e q u e n c e s that strengthen behavior. Undesirable behavior, on the other hand, is followed by negative reinforcers or undesirable consequences. Under these conditions the undesirable behavior is likely to decrease and the desirable behavior to increase. It should be noted that what may constitute a positive reinforcer for one person may not be so for another. The three conditions necessary for the application of the operant procedure are, first to identify the behavior to be produced, increased or maintained and also that to be decreased or extinguished; second, to determine the kind of reinforcers to be used; third, to develop sufficient control over the therapeutic environment to be able to regulate the consequences (the occurrence and non-occurrence of reinforcers) of the behavior to be influenced. This control generally must be extended to the environment outside the hospital, for unless the procedure enjoys the active participation of the individual's family the gains made in the hospital may diminish or extinguish upon the patient's discharge.

Inasmuch as medication under usual conditions is given following the patient's request or expression of discomfort, the first step in the operant procedure following the orientation of patient and family, is to shift medical prescriptions from a pain contingency to a time contingency. This means that medication is administered according to a time schedule rather than according to the patient's requests or complaints. Next the analgesic components of the prescription are put in a masking substance which permits variation in dosage without the patient's knowledge. Finally, the time interval is extended until the amount of medication received is minimal or inconsequential.

One of the most effective positive reinforcers is social attention on the part of the staff — the nurse, the physician, the physical therapist and so forth — all participants in the therapeutic regimen. The staff are instructed to be alert and responsive to

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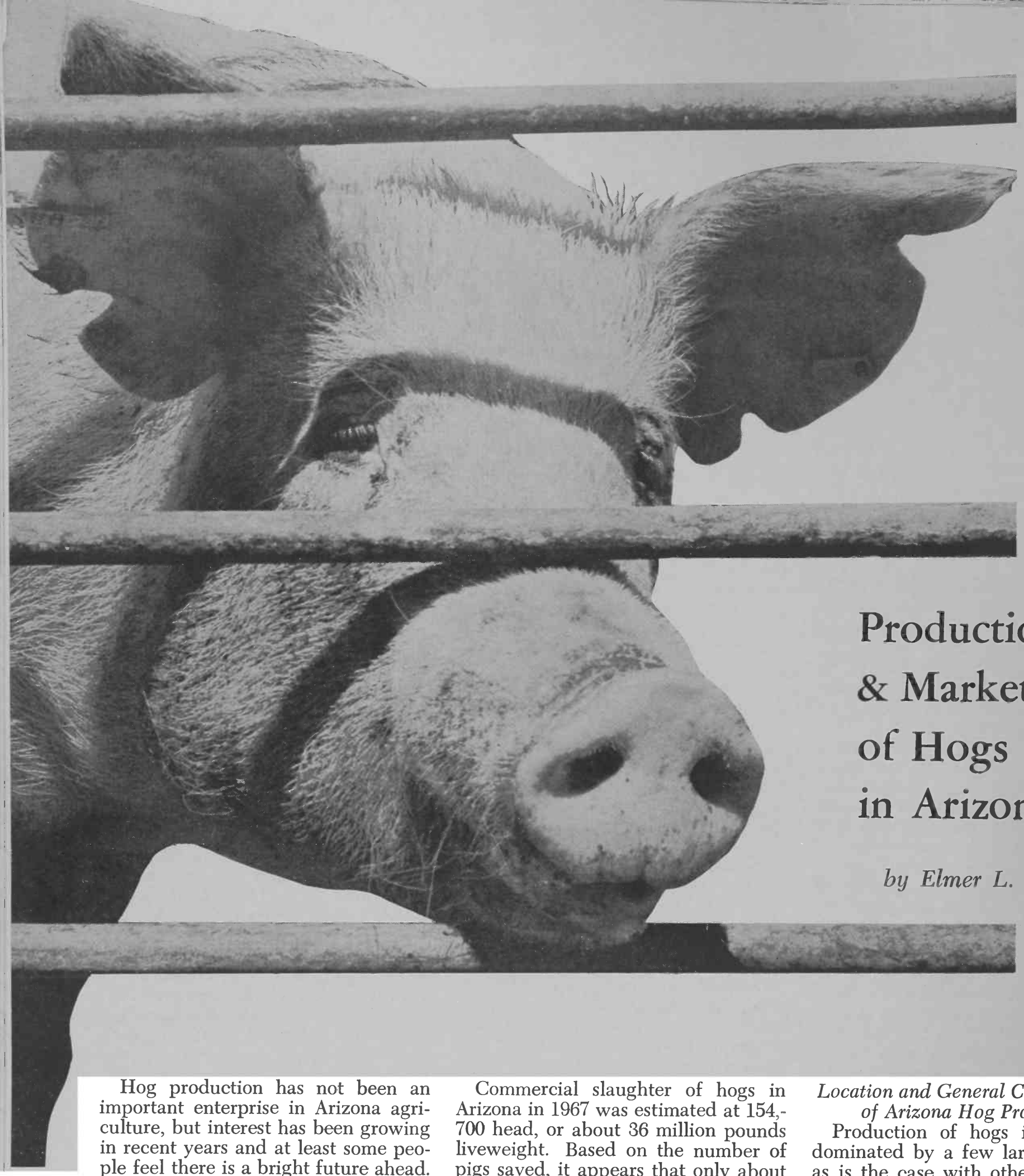
**Professor of Home Economics.*



Production & Marketing of Hogs in Arizona

*by Elmer L. Menzie**

Hog production has not been an important enterprise in Arizona agriculture, but interest has been growing in recent years and at least some people feel there is a bright future ahead. The inventory of 54,000 head on June 1, 1968, was the largest recorded number since 1944 when there were 68,000 head. While relatively small, the inventory has doubled since 1965 and indications are that expansion is continuing at a fairly fast rate. Pigs saved in the spring crop for 1968 were nearly 30 percent greater than for the same period in 1967.

Commercial slaughter of hogs in Arizona in 1967 was estimated at 154,700 head, or about 36 million pounds liveweight. Based on the number of pigs saved, it appears that only about one-third of the commercial slaughter is produced locally. The bulk of the remainder is imported from the Midwest. Assuming consumption of pork in Arizona to be about the same as the national average (63.9 pounds per capita in 1967), it therefore appears that local hog production supplies less than 10 percent of the needs.

* *Professor of Agricultural Economics.*

Location and General Characteristics of Arizona Hog Production

Production of hogs in Arizona is dominated by a few large producers, as is the case with other agricultural enterprises. It is also fairly well localized in about five counties, with three supplying the largest numbers. In 1967, Pima County was estimated to produce nearly 30 percent of the State's total. Most of these came from three or four lots. Nearly one-half of the pigs produced in the State are from the Safford area. Maricopa, Pinal, and Cochise Counties produce most of the remainder.

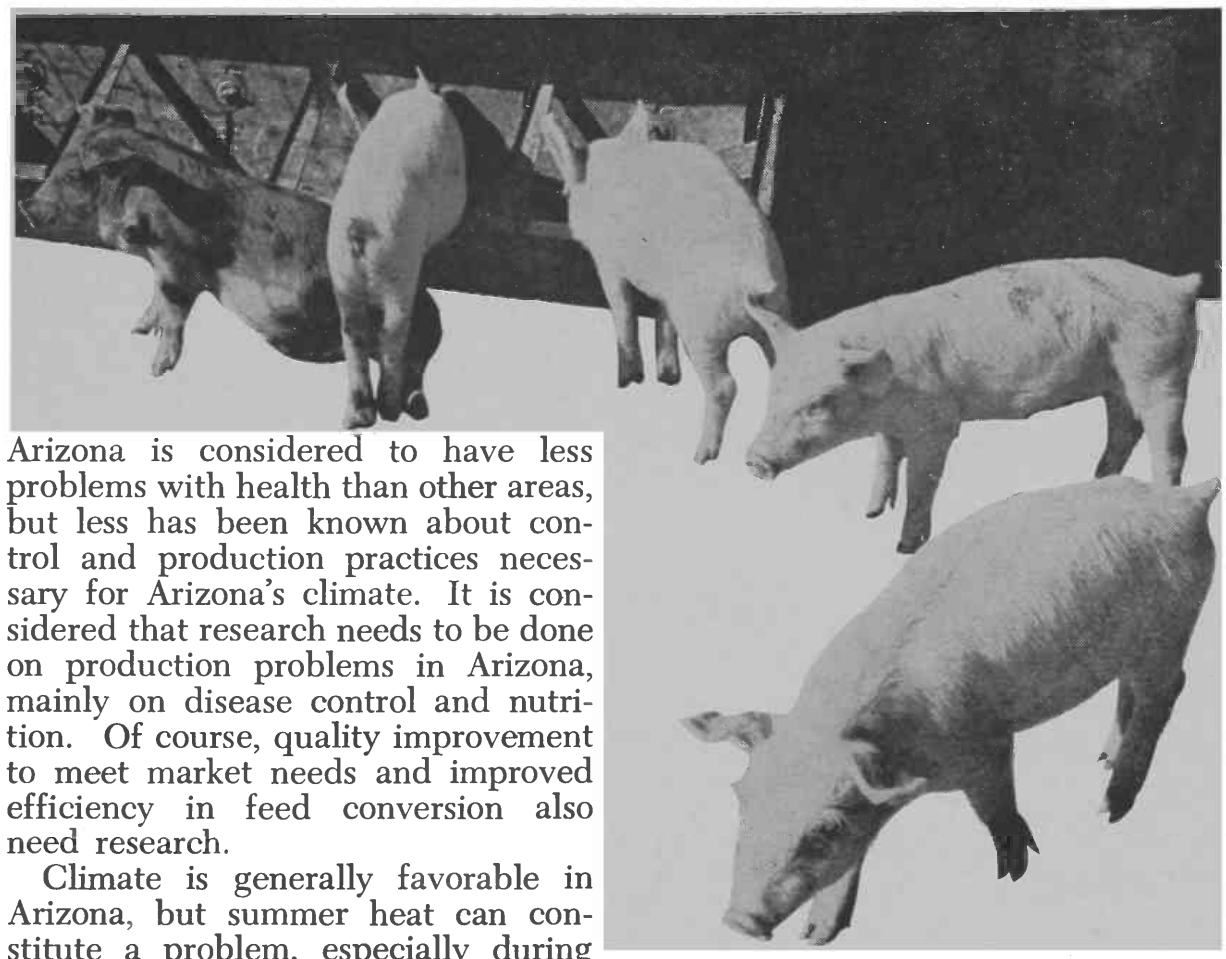
The largest proportion of the hogs produced are from 200- to 300-sow establishments, with 3,000 to 5,000 hogs per year. Some are specialty operations and some are established in conjunction with other farm production. Most feed a grain concentrate ration, although a few smaller operators use garbage.

Relative to most other types of agricultural production, it is fairly easy to move in and out of the swine business. Estimates of costs vary with the type of structures used, but indications are that buildings for a well-established 100-sow unit would cost $35,000 to $40,000. This is considered about a one-man operation. Of course, with less sophisticated structures these costs may be reduced.

It is general practice to have two litters per sow per year. Pigs saved per litter have been increasing and averaged 8.1 in 1967. With the favorable climatic conditions in Arizona, it is possible to control production and to market a relatively even number of hogs per month. This permits better use of labor and plant capacity.

Production Problems

Disease is considered to be the most serious problem for hog producers. In order to keep disease under control, good management practices are necessary. This, apparently, has been a significant factor in limiting the expansion of the industry in the past.



Arizona is considered to have less problems with health than other areas, but less has been known about control and production practices necessary for Arizona's climate. It is considered that research needs to be done on production problems in Arizona, mainly on disease control and nutrition. Of course, quality improvement to meet market needs and improved efficiency in feed conversion also need research.

Climate is generally favorable in Arizona, but summer heat can constitute a problem, especially during farrowing. There is need for more information on methods and costs of cooling, such as by sprinklers or evaporative coolers. In addition, research is needed on types of structures best suited to the area.

Marketing

Since Arizona production is only a small fraction of consumption, considerable expansion could occur to meet local needs if costs remain competitive with other areas. In addition, there is a large market available in California.

Most of Arizona's production is marketed to one packing plant in Phoenix. Some smaller plants slaughter as well, but numbers are not large. Because of their location advantage in terms of the Arizona market, producers receive a price differential over Midwest market prices.

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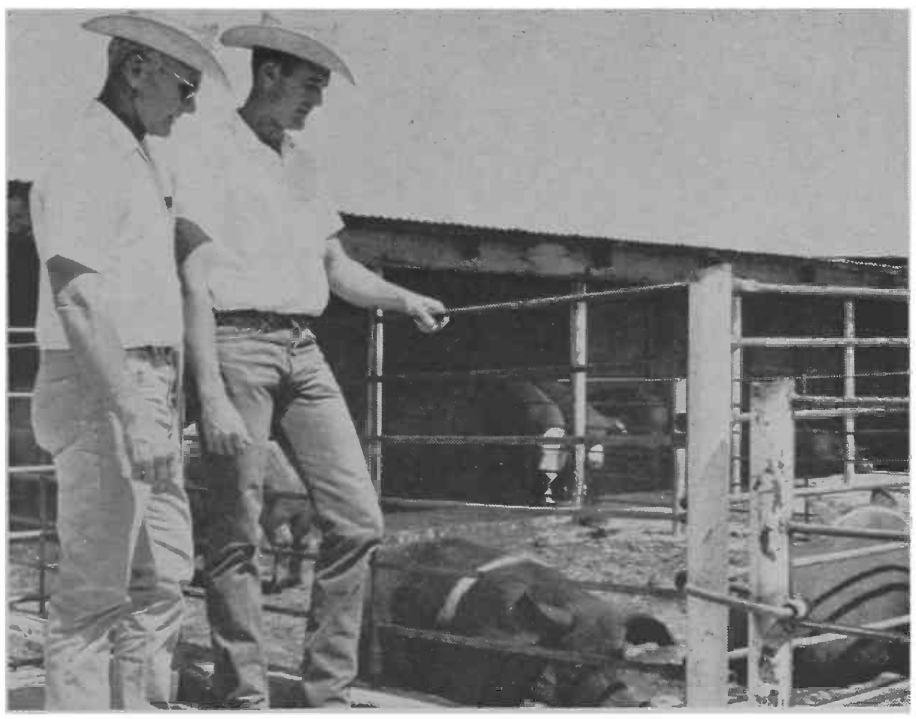


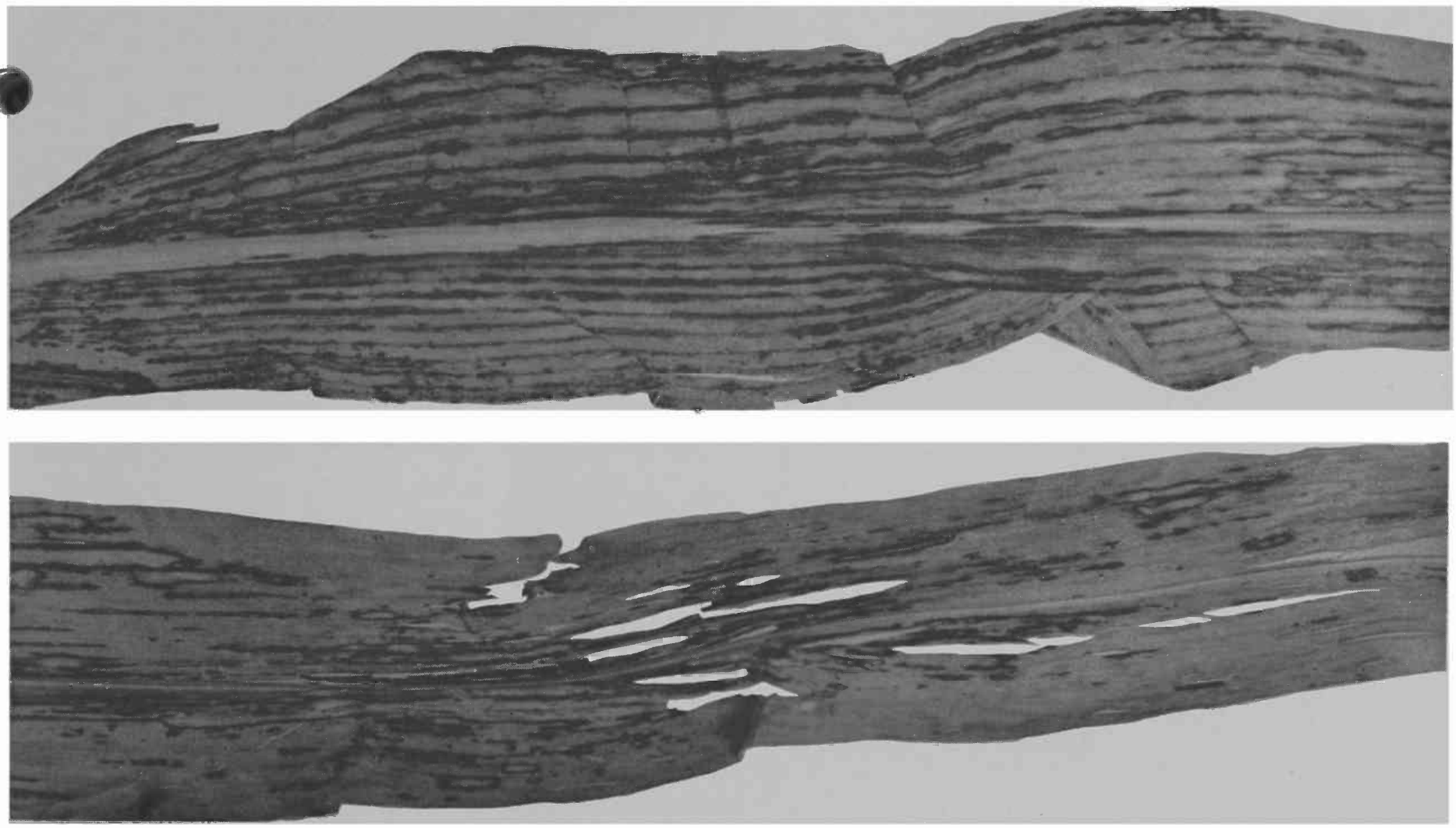
At the Arizona Milling Company Buckeye Swine farm Herold V. Loughead, Extension Area Livestock Specialist for feedlots and swine, left, and Gary Gruel, farm manager discuss possible ways of improving production. Gruel's management has the swine operation farrowing about 80 litters per month giving an average of 10.51 live births per litter. This farm is 10 miles west of Goodyear on the Yuma road.

Elmer Menzie, author of this article, left, and James F. Armstrong, Agricultural Agent for Pima county, work together in obtaining information needed for the survey. They are looking over the swine production operation of Silverbell Farms in the northern end of Avra Valley which is under the management of Evans Thornton. This operation started with 70 and has climbed to 230 sows. Thornton will level off production at 300 sows within the year.

Newly Identified Sorghum Disease is . . .

Widespread in Arizona

*by R. B. Hine, M. R. Nelson, R. E. Dennis and D. L. Johnson**



A serious disease of sorghum, only recently identified in Arizona, is now found widespread in the state. It is caused by a virus known as Maize Dwarf Mosaic virus.

It was first observed in Cochise county by Carmy Page, Cochise County Agricultural Agent in Charge; Warren Plants, Asgrow Seed Co.; and Gene Anderson, Chevron Chemical Company.

Identification of the virus was made by transmission studies in the greenhouse and in cooperation with plant pathologists at the University of California, Kansas State University and Texas A and M University.

The virus undoubtedly occurred in Arizona prior to 1968 but had gone unrecognized in sorghum probably because of the low incidence in the field and the similarity of symptoms with known bacterial diseases of sorghum.

At left typical early disease symptoms caused by Maize Dwarf Mosaic virus in leaves of sorghum, left, and johnsongrass, right. Note the lighter color mottling between the veins of the leaves. On the [illegible] these appear as lighter green against [illegible] darker typical leaf color.

Rapid spread and destructive nature of plant disease is dramatically illustrated by the Maize Dwarf Mosaic virus 1968 outbreak in Arizona. It parallels a similar outbreak in Ohio in 1962. This disease was first described in Ohio in 1962 when it caused some losses in corn. From a few diseased plants along the Ohio river, the Maize Dwarf Mosaic virus

** Extension Plant Pathologist, Professor of Plant Pathology, Extension Agronomist and Extension Assistant in Plant Pathology, respectively. The Authors wish to thank D. H. Hall, University of California; L. K. Edmunds, Kansas State University; R. W. Toler, Texas A & M University for help in virus identification and hybrid reaction. Also they thank James F. Armstrong, Pima county Agricultural Agent; Charles R. Farr, Maricopa county Agricultural Agent; Donald R. Howell, Yuma county Agricultural Agent; James W. Little, Pinal county Agricultural Agent; Carmy G. Page, Cochise county Agricultural Agent in Charge; and John L. Sears, Graham county Agricultural Agent in Charge for helping to make the county surveys; and to L. M. Stockton, Northup-King and Company for opportunities in evaluating hybrid sorghum field plots in Cochise and Maricopa counties.*

*** Trade names used in this publication are for identification only and do not imply endorsement of products named or criticism of similar products not mentioned.*

Red-streaking symptoms of Maize Dwarf Mosaic virus in older leaves of sorghum are shown above. The black areas appear red in the diseased plant.

spread to 15,000 acres of corn in 1963 and was responsible for a 5 million bushel loss of corn in 1964.

Since the original discovery in 1962, it has spread rapidly across the U.S. and is now known to occur in major corn and sorghum producing states. The disease was identified in Texas for the first time in 1966. It reached epidemic proportions in 1967 in grain and forage sorghum particularly in the Texas high plains and Gulf Coast areas. In New Mexico it was first found in 1967 when two to three thousand acres of sorghum and broomcorn were severely damaged in the Tucumcari area.

A brief description of the disease follows:

Symptoms

Symptoms of Maize Dwarf Mosaic depend upon a number of factors. These include genetic makeup of the host plant, stage of growth at time of infection, and environmental con-

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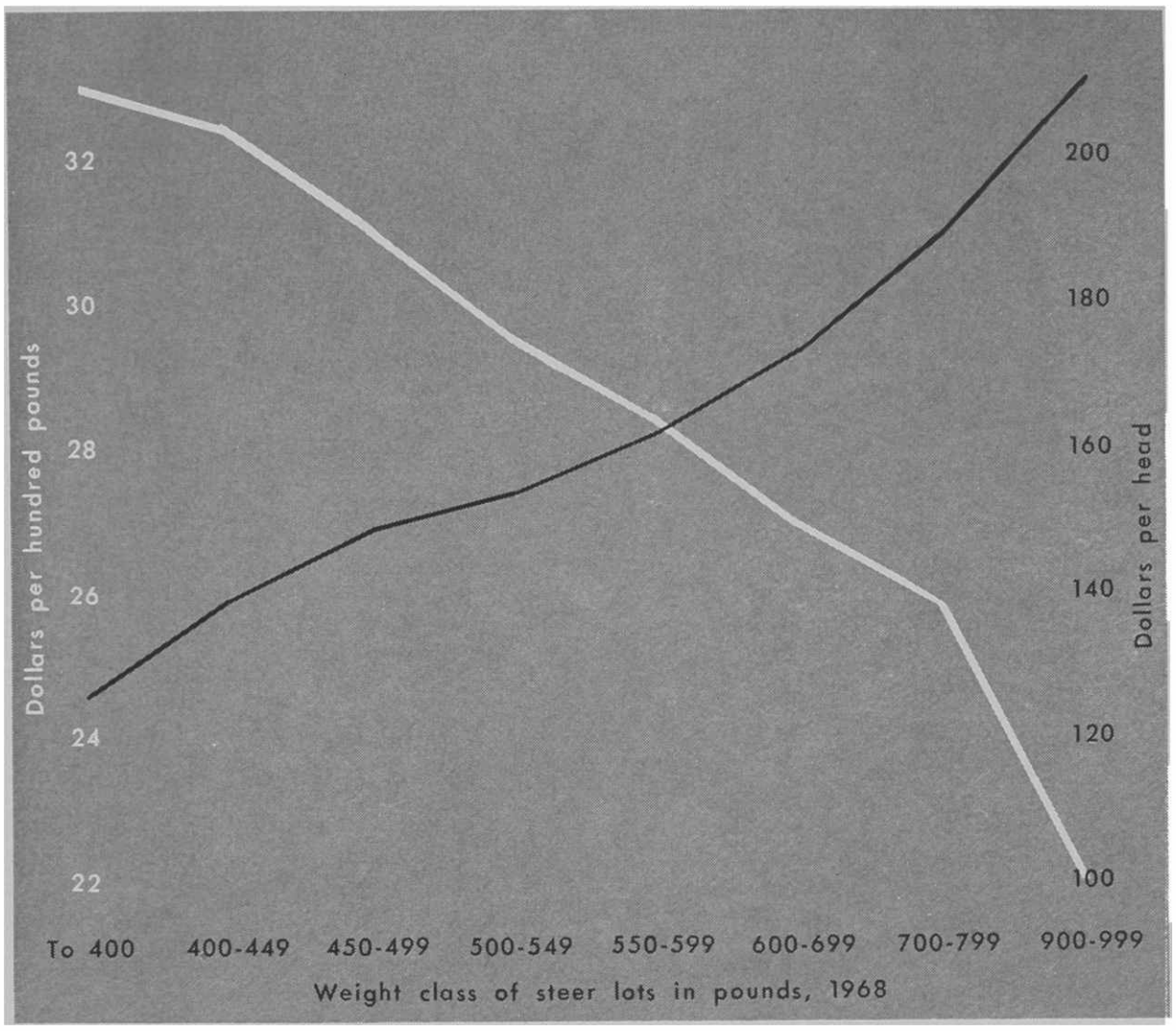


The above chart shows that price per pound declines as weight of steer increases. But, dollars per head increases as weight increases. Thus, it takes pounds as well as price to make gross dollars. On the other hand, cost of growing heavier steers must be taken into account to determine the most profitable weight.

It Takes Price and Pounds To Make Dollars

*by Robert G. Gray and C. Curtis Cable**

After three years of growth, and the experiences gained in the development process, Gila County Cattle Auction's participating ranchers have asked that their program be studied.

As they say, "we know we are doing better," but we want to know "are we doing the best we can to make every possible dollar from our auction?"

It must be emphasized that the auctions are not a one-way street in favor of sellers, only; buyers have benefited as well. And, participating ranchers are interested in improving the auction to benefit themselves as well as buyers — keeping it a two-way street.

The association's files contain numerous letters and comments from buyers expressing their satisfaction with the auction and encouraging continuation of this method of selling.

Having the cattle concentrated at one location substantially reduces buyer costs.

Also, having the cattle separated into fairly uniform lots makes it easier for buyers to fill their particular needs for cattle. The evidence is clear that the auction is advantageous to both ranchers and buyers.

And, yet, ranchers are not willing to rest on their laurels. It is for this reason the authors have been analyzing the records of the auctions. As a result a publication has been produced and is available from Pat Gray, Gila County Extension Service, P. O. Box 7, Globe, Arizona 85501.

Highlights of the report are presented in this brief article. The report may help pinpoint certain things that ranchers, as individuals or as a group, can do to realize optimum benefits from the annual cattle sale.

The number of ranchers increased from eleven to thirty in the three year period. They consigned 1,515 head of cattle the first year and 3,599 head in the third year. During the first year 62 per cent of the steers weighed less than 500 pounds; the third year, 43 per cent weighed less than 500 pounds.

Many reasons could be accountable for the heavier cattle in 1968. Data to measure the effects of any one cause are not available from the records of the auction. It is suggested that ranchers carefully study the various means for profitably increasing the selling weights of their cattle. As will be shown, it takes both pounds as well as price to make dollars!

* *Agricultural Agent in Charge for Gila County Extension Service, and Agricultural Marketing Specialist with the Cooperative Extension Service, respectively.*

Prices per Hundredweight

As is true in most cattle markets, there was an inverse relationship between the price received and the weight of the cattle — prices decline as weights increase.

For example: the average price for 1968 steers weighing less than 400 pounds was $33.03 per cwt., but only $25.88 per cwt. for steers weighing 700 to 799 pounds.

Prices for heifers averaged about three to five cents per pound less than for steers of comparable weights in each of the three auctions.

Are these differences in prices which are due almost entirely to sex justified on the basis of differences in finishing cost and packing house value?

Although an analysis of average prices is indicative of the prices being received by ranchers as a group, it does not reflect the whole story on prices received for each lot consigned by any individual. For example: why did one lot of 1968 steers weighing 450-499 pounds sell for $26.80 per cwt., while another lot in the same weight group sold for $32.60 per cwt?

This difference of $5.80 per cwt. may be entirely justified. But, the important thing is to determine —

Why there was this difference, and if the seller of the lot bringing $26.80, or the association, could have done something to entice buyers to bid a higher price.

Was the size of lot, the quality, breed or some other cause responsible for this wide range in prices?

The same question could be raised relative to the similar range in prices received for lots of 1968 heifers in the same weight group.

Dollars Received per Head

Although prices per pound declined as weight of cattle increased, dollars received per head increased as weights of cattle increased. And, when the sale is over, it is dollars that the rancher carries to the bank that counts, not prices per pound. Thus the statement made earlier — It takes both price plus pounds to make dollars — should be remembered by every rancher. And, the fact that pounds is equally important as price in making dollars becomes very obvious from "dollar-per-head" comparisons.

An example: 1968 steers weighing 450-499 pounds and selling at an average price of 31.04 cents per pound returned $148.63 per head; those weighing 400-449 pounds and selling at an average price of 32.46 cents per pound returned only $139.02 per head.

The lower price, higher weight steers returned $9.61 more per head to the rancher than the higher price, lower weight steers. Or, stated differently, the "sacrifice" of 1.42 cents per pound in selling price was more than offset by selling roughly 50 more pounds per head; that is, offset to the tune of $9.61 more dollars per head.

The simple formula — price times pounds equals dollars — could well be the slogan of each rancher. Alternatives for making both pounds and price larger should be considered.

Total pounds sold and price per pound as determined by quality are affected by production management decisions. However, when considering alternatives for making price and pounds larger, the costs involved must be carefully weighed. Some "improvements" may cost more dollars than they make!

When all of these considerations are taken into account then, and only then, will the rancher tend to realize the "most dollars possible" from his annual calf crop.

Consider Marketing Costs

Yardage, auctioneer fees, advertising, reserve fund, inspection fees, hay and feeding, and trucking are additional costs. Most of these charges are made on a per head basis, thus on a per-pound basis they decline as weight of animal increases.

Few, if any, of these costs are incurred when cattle are sold at the ranch by private treaty. But, the private treaty buyer considers his personal expenses and cattle hauling costs in determining his offer price. Most ranchers selling at private treaty pay these costs, indirectly of course, by taking a price which is less than the going market price.

Shrink is another expense which should also be evaluated for both methods of selling — private treaty or auction — before making a final decision as to which method is best in terms of net dollars.

Therefore the rancher must compare the net price received at the auction with the estimated or expected price he would have received at private treaty. This comparison will provide a rough measure as to which method of selling is most profitable.

Handling and Selling Practices

Participating ranchers repeatedly stress that long-run success and survival of an auction is dependent upon a marketing organization which is beneficial to both buyers and sellers.

For this reason Gila County ranchers established rules and operating procedures to govern the conduct of their auction.

Some of the more important ones are:

The association enters into contract with each individual rancher giving guarantee of cattle delivery to auction pens, costs to be deducted by the association and other sale terms.

Conduct auction on two consecutive days as one large sale — first day for steers, second day for heifers.

Begin sale with lightest-weight steer lot, followed by successively heavier lots up to the largest. This applies to heifer sale on second day, as well. Highest price cattle are therefore offered first to set general price level.

Weigh each lot immediately before entering sale ring.

Sort cattle into fairly uniform lots with respect to weight and grade.

Unmerchantable cattle should not be consigned to the sale. Do not overfill cattle at ranch.

Deliver cattle at least two days prior to sale.

Feeding and watering at pens should be timed to guard against over-and under-filled conditions at sale time.

Loading and unloading cattle should be done during daylight hours for more efficient sorting and handling at pens.

Penning instructions to yardmaster should accompany each load.

The association must have accurate and timely clerking for the sale.

A cross-check of all pertinent sales data is an absolute necessity to assure accuracy and equitable treatment to all sellers and buyers.

Buyer satisfaction should be the goal of every auction in order to repeatedly maintain and attract adequate buying power to the sale.

Workshop for . . .

Head Start Cooks

*by Joyce M. Huggins**

Twenty-four women employed as cooks in full-year Head Start Child Development Centers from Arizona and Nevada spent two days as students at the University of Arizona in April, 1968. They worked with a team of nutrition specialists in the Food Labratory, School of Home Economics.

The Workshop developed as a result of needs observed over the past year and frequent requests made to the Regional Training Officer that specialized training was highly desirable for these important staff members.

In early January the planning commitee began to shape the program. Individuals from seven different state, county and city organizations participated in the program planning. They were Mary Adele Wood, Professor, Division of Food and Nutrition, University of Arizona; Iris Crump, Nutritionist, Children's Evaluation Center, Pima County Health Department; June Gibbs, Nutritionist, Cooperative Extension Service, University of Arizona; Hazelle Junker, Consulting Nutritionist, Maternal and Child Health State Department of Health; Jackie Sutherland, Nutritionist, Pima County Health Department; Mary Rey, Nutrition Director, Child Development Centers, OEO, Tucson.

The importance of nutrition programs in Head Start has been well documented in numerous publications. Among these are quotes from the Program Director, Dr. Julius B. Richmond, in the Rainbow Series No. 3 *Nutrition*, "Studies indicate that poor nutrition during early childhood has an affect not only on physical growth but on the mental functioning of the child." Head Start staff have the responsibility of establishing not only sound nutritional practices by providing food to the children; but also educating families in the selection and preparation of good food at home.

How does a mother who is employed to cook for approximately 50 children and 8 to 10 adults, transfer her knowledge of cooking in her own home to the problems in her new job? What are the new tasks involved in learning to plan menus and to cook for groups of young children when all previous experience is with older children or with adults? These were some of the common problems brought to the Workshop.

Dr. Ruth Hall, Director of the School of Home Economics, welcomed the women and expressed the school's interest in relating to community needs. Miss Mary Adele Wood served as Chairman and master-minded the coordination necessary for extensive food preparation and serving of a model meal. Miss June Gibbs presented numerous charts to help cooks visualize the components of good nutrition. Utilizing models she gave each of the women an opportunity to select foods for a breakfast, lunch and two snacks.

Charles Martin, University Extension Specialist in Human Relations and Child Development, set the stage when he described the transfer from home to school for both children and their parents. With humor and group participation he emphasized the importance of food in achieving good human relations.

Hazelle Junker utilized colored slides and a tape to dramatize characteristics and needs of the child who is 3, 4, and 5 years of age in the day care center.

Iris Crump emphasized the value of planning to achieve an orderly, pleasant mealtime and one that will be relaxed and social for both children and adults. Such a meal must

* *Assistant Professor of Home Economics.*

At the workshop Alice Jackson of the Head Start program in Douglas is about to pour the ingredients from the measuring cup to the sauce pan as Ann Adamin of National Asthmatic Foundation, Tucson, looks on.

be developed on the basis of knowing what to expect, what is important and what procedures work best. Cooks can benefit when they know what previous experiences leaders in the field have recommended. Because each center is different from every other center, the staff responsible in each program will be required to make numerous decisions to suit their needs, and enable goals for the nutrition program to be achieved.

The film "Little World" was mentioned as one source for viewing children in a day care center who have successful experiences with food. The film is available for loan at the State Department of Public Health, Visual Aids Department and at the University of Arizona, Audio-Visual Department.

Women in the workshop worked with partners to plan, cook, and then evaluate recipes used in planning menus to serve in their centers. The results of their work were served to guests. There was a spirit of enthusiasm and dedicated interest among participants. Some of the statements made were the best descriptions of what problems they experience and in which areas help is needed.

"The discussion about equipment cooks should have available has helped me to understand that some of my problems are because of things I need. Better equipment would help reduce our work load and make it easier to get meals ready. One problem is our dishwashing equipment. Another problem is the food storage. I learned a great many better ways to plan the meals and how to get more variety into the menus, especially through using surplus foods."

"The most important thing was that the cook is part of the team. I can't wait to begin talking with my director and the teachers and see how I can help them with better ideas for improving our snacks."

"I have learned better ways to serve food to the children. I think we can improve our meals a great deal with some of the ideas we discussed during this workshop. It was also good to hear how other people have problems and how they do things."

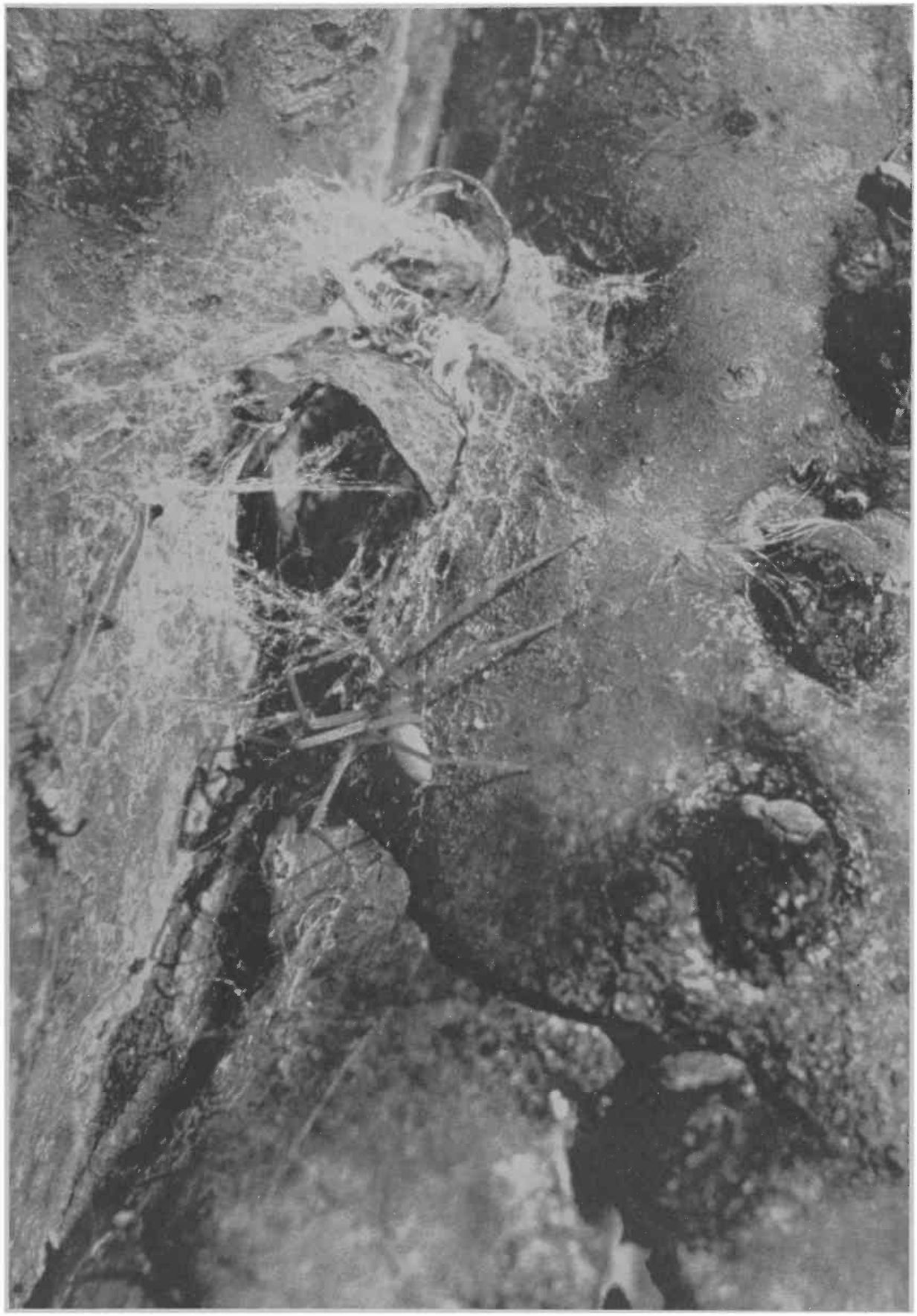
"It was a new idea to me to hear about how children need to be quiet before they get served their meal. I think our teachers will go for that idea because it looks as though it would really help make the meal a more relaxed time."

"It was good to hear that cooks are important people. I think I would like to be present during the staff meeting and have a part in the planning, especially when food problems are discussed. I know I can help with better snack ideas. I think we could do a lot more to help the parents know what we are doing to help their children with good food."

"I hope there will be another workshop to help us because I know when we go back there will be some new problems we didn't get to talk about this time."

From left are Iris Crump, nutritionist, Children's Evaluation Center, Pima County Health Department, Tucson; Hazelle Junker, consulting nutritionist, Maternal and Child Health, State Department of Health, Phoenix; and Jackie Sutherland, nutritionist, Pima County Health Department, Tucson. All participated in the Workshop for Cooks of the Office of Economic Opportunity Child Development Centers from Arizona and Nevada which was held on the University of Arizona campus School of Home Economics.

Mastering the third unit of the program for Head Start Cooks are from left Romona Bernal and Juanita Cons, Sacred Heart Child Development Center in Phoenix.



This male Arizona brown spider was found on its silken shelter on the underside of a fallen saguaro cactus.

The Arizona Brown Spider

*by Floyd G. Werner**

Since the announcement of the discovery that the bite of the brown recluse spider, *Loxosceles reclusa* Gertsch and Mulaik, causes persistent ulceration and other symptoms in man (Atkins *et al.* 1957), that spider has received a considerable amount of study and publicity. Two groups of workers have described its life cycle in some detail (Hite *et al.* 1966, and Horner and Stewart 1967). The symptoms of the bite in man have been described by Dillaha *et al.* (1964). There is apparently little or no pain felt at the time of the bite, but pain and local swelling are experienced in from two to eight hours. A blister forms at the bite, this becoming a center of swelling and reddening. Later symptoms include long lasting ulceration of the wound and a variety of general reactions including fever and nausea. Dillaha *et al.* (1964) state that two deaths had been reported in small children up to that date.

The brown recluse spider does not range into Arizona, but two closely related species have been reported from here. Dr. W. J. Gertsch (1958) has described all of the North American species of *Loxosceles* in detail. The two species found in Arizona are so similar to the brown recluse spider that distinguishing them from that specie

* *Professor, Department of Entomology.*

is a matter for a student of spiders. The most obvious features are small differences in proportions. Of the other species, *Loxosceles arizonica* Gertsch and Mulaik, quite abundant in southern Arizona. This is the spider we are calling the Arizona brown spider. Gertsch reports *Loxosceles unicolor* Keyserling from this area also. It seems to be much less abundant.

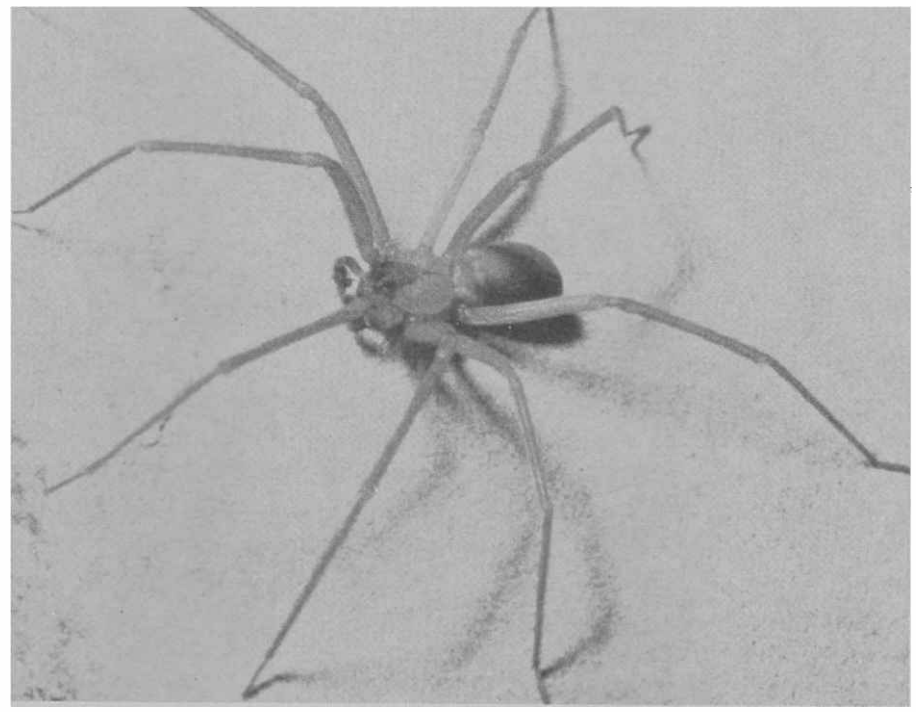
For all practical purposes the brown recluse spider and the two species known from Arizona can be grouped together for purposes of identification. The photographs show both sexes of the Arizona brown spider. The body of an adult spider is almost exactly one-third of an inch long. The legs, which are much longer in the male than in the female, bring the span up to an inch or more. The general color is from tan to brown, and there is a distinctive lyre-, or violin-shaped, darker marking on the front part of the body. The only spider found commonly in Arizona that is very much like *Loxosceles* is the giant crab spider, *Olios fasciculatus* Simon. This spider is of the same general shape, but it has heavier legs, a narrow dark streak down the middle of the front portion of the body, and it grows much larger. The body of a fully grown female measures as much as an inch long. Only the immature individuals are in the size range of *Loxosceles.* The feature that clinches the identification of *Loxosceles* is the presence of only three pairs of eyes across the front of the body. These show up well in the photograph of the male. The giant crab spider has four pairs of eyes across the front, and almost all other spiders have four pairs of eyes in one position or another. Unfortunately, the eyes are small enough that they are difficult to see without a hand lens. But they provide a sure basis for the identification of a spider that has bitten a person.

The normal habitat of the Arizona brown spider is under pieces of wood, dead cacti, and similar objects in the desert, but they do move into dark places in buildings in desert locations. In our experience they do not thrive in irrigated areas, but they might be brought into homes on firewood or pieces of cactus skeleton picked up on the desert. In their normal habitat they spin an almost formless web of very white silk (see photograph), on which they are usually found, at least in the daytime. They apparently forage out from their web at night in search of prey.

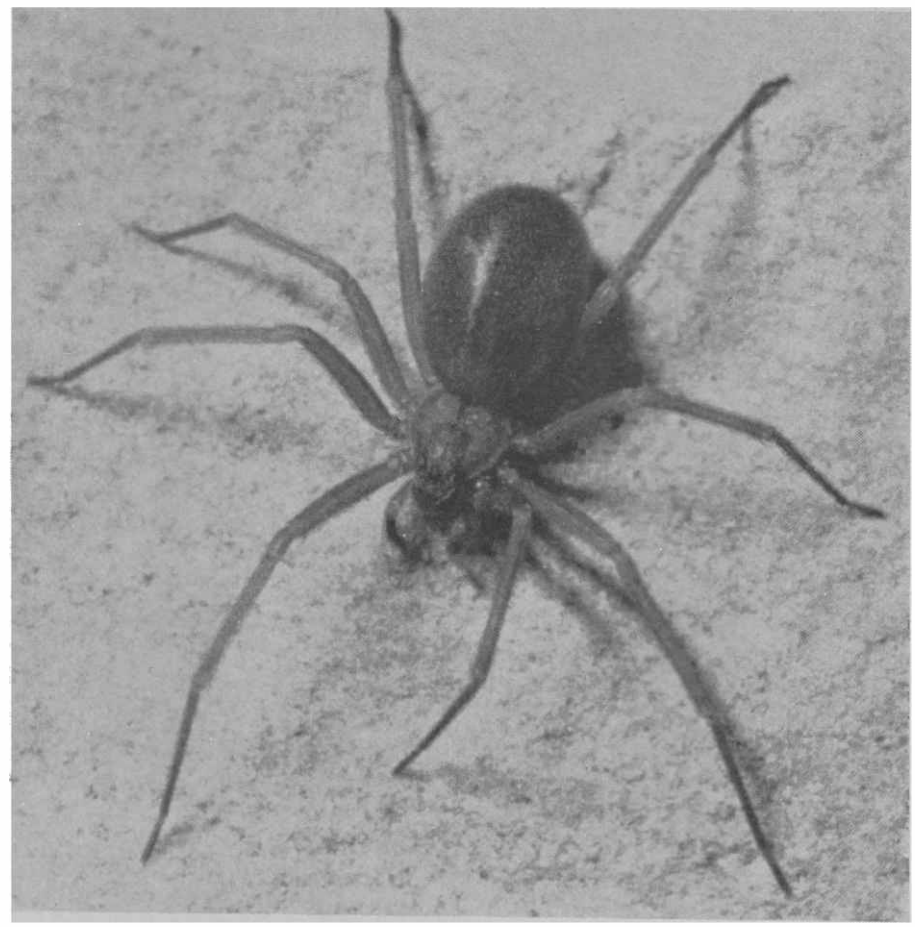
The brown recluse spider of the midwest and southeast is more often found in houses. It apparently is partial to darkened closets and corners for the construction of its web, and it leaves the web during the night in search of prey. Most of the recorded bites have been on an arm or leg of the victim, and have resulted from disturbance of the spider on a web it has built inside a garment or chance pressing of an individual that has found its way onto a bed in its search of insect prey at night. While we have no exact information on the way the Arizona brown spider behaves in houses, it is likely that it would have similar habits and could end up biting people under the same circumstances.

There is no reason for alarm at the presence of the Arizona brown spider in our area. Both it and the related species are native to Arizona, and they have undoubtedly been in contact with man here for a long time. But it would be only prudent to eliminate any household infestation, rather than take the risk of a bite. Preliminary studies by Hite *et al.* (1966) on control of the brown recluse spider indicate that most of the residual insecticides commonly used in houses should be effective, DDT being a notable exception. If a person suspects that he has been bitten by one of these spiders, it would be most helpful if he would undertake a careful search of the sleeping area and closets and capture any spiders he encounters.

The presence of an Arizona brown spider could help the physician in diagnosing and treating the suspected bite. The spiders probably remain in the same area for long periods, so a search could be productive weeks after a bite was received. Even the smashed remains of an Arizona brown spider are identifiable if the front part of the body and part of the eyes are present.



This is a male Arizona brown spider. Note the distinctive brown marking and three pairs of eyes on the front part of the body.



The female Arizona brown spider has a heavier abdomen and legs that are shorter than those of the male.

Arizona's Answer

to the Las Vegas wheel of fortune

*by John Wildermuth and Russell Gum**

Everyone taking part in a game of chance is faced with risk and uncertainty regarding the outcome. The experienced gambler gains an advantage through careful scrutiny of the odds and due consideration to the laws of probability. So it is with farming.

There are a number of factors, for example weather, insects, and disease, which cause agricultural prices, yields, and subsequently incomes to vary in a random or unpredictable fashion. The experienced Arizona farmer considers these factors as he compares alternative enterprises and farm plans. However, experience itself is often limited to a small number of alternatives. Further, it may be based on a biased sample of unusual years. Thus, the purpose of this article is to provide an objective basis for an evaluation of the relative "riskiness" of a broad range of Arizona field crops.

Measurement of Risk

Variability measures for 23 field crops have been derived from Arizona state price and yield historical data.[1] Assuming that future variability for these crops is closely related to past variability, these estimates will serve as realistic measures of relative "riskiness." It must be remembered that for certain farms or areas within the state, the absolute variability for any given crop may be higher or lower depending upon specific climatic, resource, and economic conditions. Thus, while on an individual crop basis these estimates are in general somewhat optimistic, they should be reliable for between-crop comparisons.

Price Variability

The variability coefficient shows in percentage terms the degree of random or unpredictable variability relative to the current level of the item in question. Accordingly, the mean prices (average over the last five years) and the corresponding variability coefficients are presented in Table 1. The "Bad Year" figures should be interpreted to mean that at least one year in ten (10 percent probability of occurrence) the price will be this low or lower.

It is not worthwhile to discuss the ranking in terms of each individual crop. This would only duplicate what is obvious in Table 1. At this stage it suffices to say that in general the truck crops display much more price variability than do the standard field

Table 1. Ranking of Arizona Crops by Price Variability Coefficients.

Rank	*Crop*	*Units*	*Mean* (*price*)	*Var. Coeff.*	*Bad Year* (*price*)
1	**Barley**	$/cwt.	2.51	3.3	2.41
2	**Oats**	$/cwt.	3.05	3.4	2.92
3	**Corn**	$/cwt.	2.79	5.5	2.60
4	**Wheat**	$/cwt.	2.94	5.7	2.72
5	**Alfalfa Hay**	$/ton	27.88	5.9	25.70
6	**Grain Hay**	$/ton	25.90	6.3	23.82
7	**Winter Broccoli**	$/cwt.	12.86	7.7	11.59
8	**Alfalfa Seed**	$/cwt.	29.70	8.2	26.58
9	**Grain Sorghum**	$/cwt.	2.16	8.4	1.93
10	**Upland Cotton**	$/lb.	29.85	9.5	26.23
11	**Long Staple Cotton**	$/lb.	50.18	9.7	43.95
12	**Winter Cauliflower**	$/cwt.	12.38	11.8	10.51
13	**Winter Cabbage**	$/cwt.	3.82	16.1	3.04
14	**Summer Cantaloupes**	$/cwt.	7.72	16.2	6.12
15	**Winter Lettuce**	$/cwt.	4.78	16.4	3.77
16	**Carrots**	$/cwt.	4.78	16.9	3.74
17	**Honeydew Melons**	$/cwt.	6.94	20.1	5.14
18	**Early Summer Watermelons**	$/cwt.	2.47	20.1	1.83
19	**Fall Lettuce**	$/cwt.	5.40	20.6	3.98
20	**Early Spring Cantaloupes**	$/cwt.	7.32	22.2	5.24
21	**Early Spring Lettuce**	$/cwt.	5.54	24.9	3.77
22	**Potatoes**	$/cwt.	3.09	29.9	1.90
23	**Onions**	$/cwt.	3.52	36.6	1.87

* *John Wildermuth and Russel Gum are assistant professors in the Department of Agricultural Economics, The University of Arizona, Tucson.*

[1] *The data are taken from Arizona Agricultural Statistics 1966, 1967, 1968. This yearly publication is compiled by the Arizona Crop and Livestock Reporting Service, U. S. Department of Agriculture, Statistical Reporting Service and published in cooperation with the Department of Agricultural Economics, The University of Arizona.*

crops. The true income-risk effect of this can only be determined with the addition of yield variabilities.

Yield Variability

The yield variability data are presented in Table 2. Here again there is no need to go into great detail in discussing the data. This information is presented to establish the nature and magnitude of the factors determining the all-important income variabilities.

It is worthy to note in passing that in general there is less variability associated with yields than there was with prices. The highest variability coefficient on yield is 27.4, while for price the highest was 36.6. Given the relative stability of Arizona's climate and the general nature of the prices of agricultural commodities, this is to be expected.

Gross Income Variability

It is now possible to combine the separate price and yield components and derive the gross income variabilities. This will enable us to evaluate the relative "riskiness" of the various crops.

The individual crop gross income variability data are presented in Table 3. The mean or expected gross income per acre, Column 1, is a simple product of the mean price and yield, Column 1 of Tables 1 and 2.

The "risk ranking" of the various crops is not at all surprising. However, the magnitudes of the income effects are. The application of the variability coefficients to the mean gross incomes at the pessimistic 10 percent probability level leaves a strong impression. For example, the "Bad Year" gross income on crop 23, onions, is $684 below the mean gross income per acre. This is truly a "risky" crop. At the same time it should be pointed out that the gross income from onions is the highest of the crops considered.

The selection of a cropping system involves much more than what has been presented here; e.g., costs, soil conditions, availability of water, etc. This discussion is not at all intended to imply that a "risky" crop is something to be avoided under all circumstances. Certainly those who are willing and able to accept the "risk" will reap the highest profits (assuming other things equal). For over time the good and bad years will cancel each other out; and in this the "long run," the mean income is applicable.

Certain individuals, however, may not be able to wait for the long run. As an example, a bad year on 100 acres of onions would undoubtedly place a capital-poor beginning farmer at or near bankruptcy. Under the assumption of a bad year price, $1.87, a 270-hundredweight yield would lead to our bad year gross income of $504.79 per acre. At a normal harvest cost of $1.60 per hundredweight, each hundredweight would recapture $.27 of the preharvest costs ($1.87-$1.60). Consequently, it would pay to harvest, but only $73 of the typical $160 per acre preharvest cost would be salvaged ($73 = $.27 x 270 hundredweight). The resultant loss would be $87 an acre or $8,700 on the 100 acres, and this includes no fixed costs such as land payments, depreciation, or supervisory labor.

It is hoped that the data presented herein will be useful for both the new and the experienced farmer in the process of making just such an evaluation.

Table 3. Ranking of Arizona Crops by Gross Income Variability Coefficients.[a]

Rank	*Crop*	*Mean $/Acre* (*gross income*)	*Var. Coeff.*	*Bad Year* (*gross income*)
1	**Barley**	81.00	4.1	76.69
2	**Corn**	43.79	4.2	41.42
3	**Grain Sorghum**	88.43	6.6	80.96
4	**Alfalfa Hay**	142.95	8.0	128.33
5	**Wheat**	77.10	8.8	68.37
6	**Grain Hay**	57.07	9.8	49.92
7	**Upland Cotton**	328.59	11.8	278.87
8	**Winter Broccoli**	854.40	13.7	704.34
9	**Oats**	47.29	14.6	38.43
10	**Summer Cantaloupes**	910.60	16.0	823.31
11	**Alfalfa Seed**	55.83	18.0	42.93
12	**Winter Lettuce**	793.70	20.3	587.59
13	**Fall Lettuce**	876.00	20.8	641.91
14	**Winter Cauliflower**	809.20	23.9	561.18
15	**Early Summer Watermelons**	403.35	24.7	275.64
16	**Long Staple Cotton**	300.91	25.6	202.34
17	**Carrots**	904.83	25.7	606.80
18	**Potatoes**	719.10	30.3	439.61
19	**Winter Cabbage**	687.40	31.1	413.26
20	**Early Spring Lettuce**	1,076.65	31.4	643.83
21	**Honeydew Melons**	848.50	32.8	492.10
22	**Early Spring Cantaloupes**	889.90	33.2	511.48
23	**Onions**	1,189.19	44.9	504.79

[a]*Dollars per acre basis.*

Table 2. Ranking of Arizona Crops by Yield Variability Coefficients.

Rank	*Crop*	*Units*	*Mean* (*yield*)	*Var. Coeff.*	*Bad Year* (*yield*)
1	**Alfalfa Hay**	tons	5.12	3.7	4.88
2	**Barley**	cwt.	32.26	4.0	30.61
3	**Grain Hay**	tons	2.20	4.3	2.07
4	**Grain Sorghum**	cwt.	40.82	5.5	37.93
5	**Upland Cotton**	lbs.	1,100.60	5.6	1,021.08
6	**Winter Lettuce**	cwt.	166.00	6.3	152.51
7	**Fall Lettuce**	cwt.	163.00	6.6	149.13
8	**Corn**	cwt.	15.68	6.7	14.32
9	**Wheat**	cwt.	26.28	7.4	23.77
10	**Potatoes**	cwt.	235.00	8.5	209.26
11	**Early Spring Lettuce**	cwt.	190.00	10.4	164.59
12	**Winter Broccoli**	cwt.	66.00	11.5	56.31
13	**Summer Cantaloupes**	cwt.	118.00	11.5	100.60
14	**Alfalfa Seed**	cwt.	188.00	13.4	155.72
15	**Early Summer Watermelons**	cwt.	162.00	13.7	137.47
16	**Onions**	cwt.	329.67	15.0	266.45
17	**Long Staple Cotton**	lbs.	598.60	15.6	479.12
18	**Oats**	cwt.	15.48	15.7	12.35
19	**Carrots**	cwt.	189.33	18.5	144.54
20	**Winter Cabbage**	cwt.	181.00	18.5	137.96
21	**Early Spring Cantaloupes**	cwt.	123.00	26.4	81.42
22	**Honeydew Melons**	cwt.	123.00	27.3	79.96
23	**Winter Cauliflower**	cwt.	65.40	27.4	42.45

Whetstone Wildfire

& Implications to Watershed Management

*by J. L. Thames & C. W. Doran**

Wildfire, before it was brought under control last June, burned nearly 18,000 acres of the 45,000 acre National Forest unit in the Whetstone Mountains.

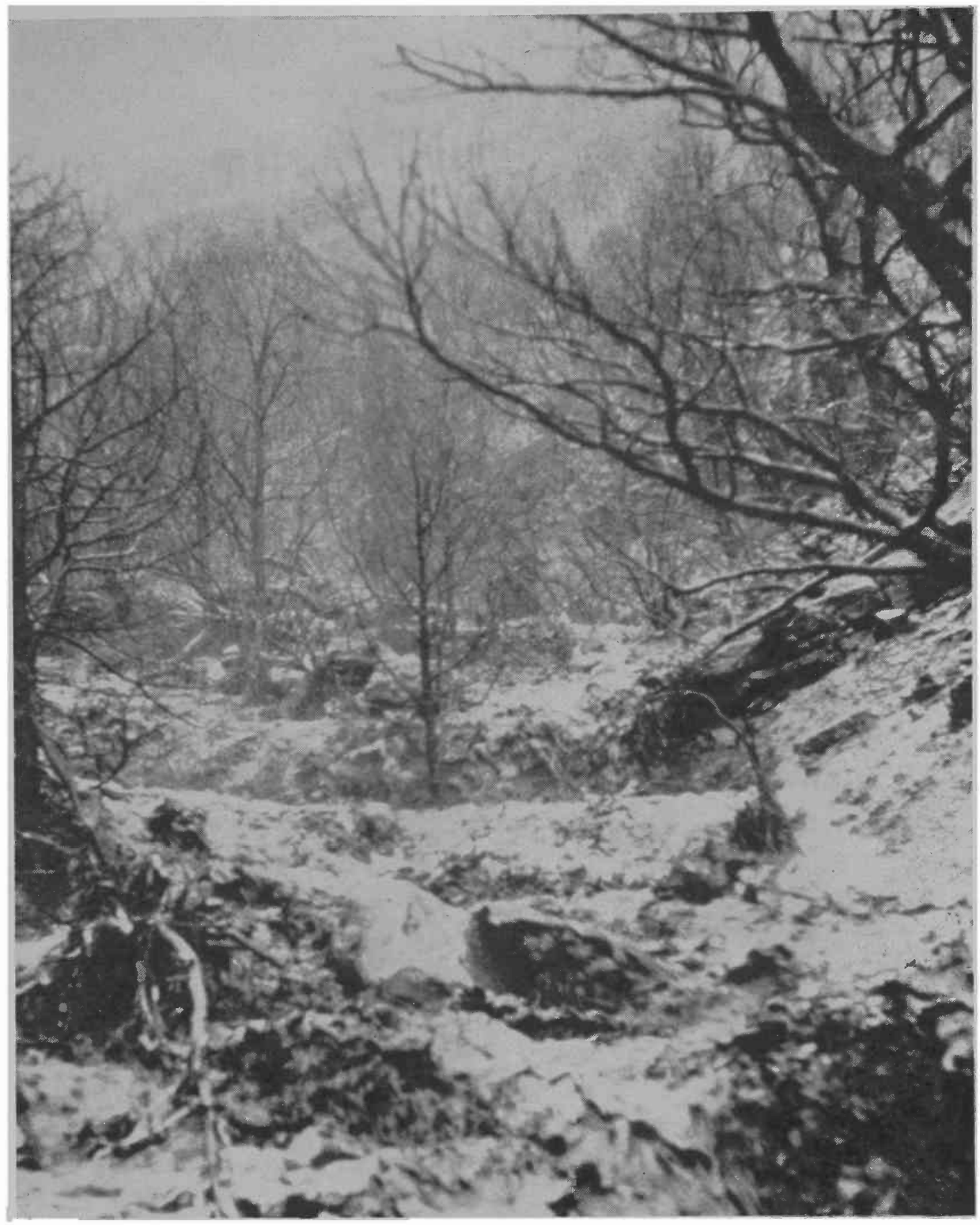
Day-after-day 110 degree temperatures, low humidity, high winds and updrafts, dense fuels and rough terrain made the fire suppression action very hazardous and difficult.

It was seriously suggested at the time that the fire be allowed to burn itself out, since much of the high elevation areas were inaccessible to cattle and since the lower elevation areas were typical southwestern brush infested range where forage has sometimes been improved by fire.

In August, the authors and Drs. Lehman and Zwolinski from the Watershed Management Department surveyed the burn. This is what they found: the highest elevations, where slopes are generally over 60 per cent and repose of the soils most delicate. were blackened and bare of any growing thing; a total absence of any humus or litter that might serve to protect the exposed mineral soil; two to four inches of top soil already removed by sheet erosion in many areas, and rills and gullies forming in others.

On some of the steeper slopes dry soil creep (soil moving downslope by its weight alone) was extensive. These were on former areas of dense live oak and mountain mahogany which

In the photo, left, a mud and rock slide is shown which cut a gully six to eight feet wide, three feet deep and a thousand feet long in less than 10 minutes during the rainstorm in which this photo was taken.



At right the picture which was taken during a rainstorm of only 0.8 inches shows water flow in stream bed at the rate of more than one thousand cubic feet per second.

burned hottest. It is also the primary range of the Whetstone deer herd.

One small creek in the area which flows most of the year with clear water and supplies several stock tanks was carrying a suspended sediment load greater than that of the traditionally muddy Mississippi. The stream bottom was coated with burned sediment in places to a depth of a foot or more. Roots were torn loose from the stream bank and it was calculated from high water marks that a storm of less than one inch discharged a torrent of water and sediment in excess of 750 cubic feet per second through the small stream channel.

The effects of the burn after reseeding as seen from the highway appear not to have been too harmful and fortunately the deer herd has been able to move into unburned areas of the mountain range and continue to thrive. However, soil losses from some of the high mountain watersheds are severe. These areas are not readily accessible, except to wildlife, and the steep slopes prevent effective reseeding.

Short term effects of the fire may not be felt because it was suppressed without loss of buildings or structures, except fences. Long term consequences, if the entire mountain had burned, could have been disastrous.

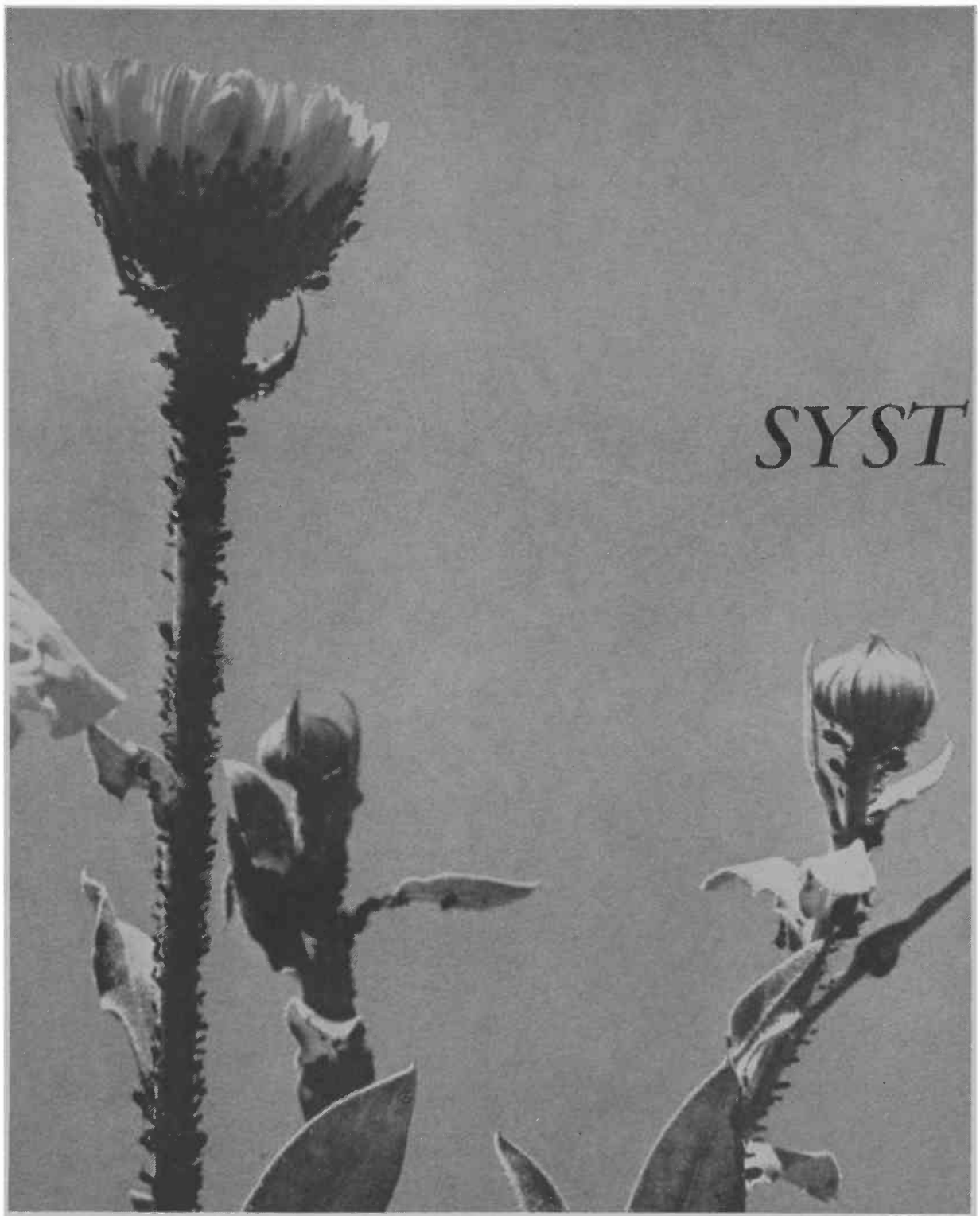
Total water yield, its timing and quality can be economically controlled on a watershed by proper management of the vegetation and soil. If the vegetation is destroyed and the soil is irrevocably lost, the price of flood and sedimentation control, in the form of engineering structures becomes exceedingly expensive. For example, had the fire been allowed to burn and if it were followed by a 10 year storm event then over 50 million cubic feet of water carrying thousands of tons of rocks and debris could have been uncontrollably debouched from the mountain canyons.

Although the University of Arizona and the U. S. Forest Service have long recognized that the use of controlled fire or prescribed burning has merit in certain areas to enhance Forest values, reduce fuels and improve forage for livestock and wildlife, they are quick to point out that *uncontrolled* wildlife is entirely different and often disastrous to natural beauty, animal habitat, and soil.

The suggestion that an uncontrolled wildfire of the Whetstone nature be allowed to burn is somewhat similar to suggesting that the fire department allow a neighborhood in our city to burn because its commercial value is low.

One of the most interesting attractions of the southwest is its isolated mountain ranges which offer humid oasis in an otherwise desert environment. The term "mountain islands" has been applied to these unique features of our landscape. Southern Arizona does not have such an abundance of water nor such low prospects for future population growth that we can afford the extravagance of allowing our mountain watersheds to be destroyed simply because their value for present commercial interests may not be high.

* *Associate Professor of Watershed Management and Forest Supervisor, Coronado National Forest, respectively.*



This photo was taken in one of the control clump-plantings of calendulas. Without any insecticide treatment it soon became heavily infested with aphids and remained so until mid-May when lady beetles destroyed aphids.

SYSTEMICS!

A lazy way to control aphids on calendulas

*by George Wene**

While as gardeners most of us enjoy the time we spend working in our gardens, we begrudge the time we spend in repeated, routine chores.

One such chore is the common practice of applying recommended sprays to control the aphids that infest our beds of calendulas.

And, if we miss a week or two — wow! — the aphid population soars to unbelievable numbers.

During the past calendula growing season some research was conducted by the author to find an insecticide which would give longer lasting control of the aphid on calendulas. Also, if one can be found with this characteristic, can it be used in such a manner as to eliminate the familiar leaf injury we have experienced with spray insecticides?

There were three systemic insecticides which were studied in controlled experiments with calendula flower beds on the U. S. Department of Agriculture Plant Materials center in Tucson. The three systemics were disulfoton (known commercially as Di-syston), dimethoate (Cygon), and oxydimetonmethyl (Meta-Systox-R).

Test plots show that all three eliminate the possibility of leaf injury. Also, each gave aphid control for prolong periods of time ranging from four to six weeks.

While this aphid is a cool weather insect, it may appear as early as mid-February. Once it is on the scene the insect will continue its injurying habits until mid-May. Usually by the middle of May the weather becomes hot. And, with warm weather lady beetles become active.

Lady beetles are predators. When they become active in warm weather they are able to destroy an aphid population in less than a week.

The experiments were conducted on a series of calendula clump plantings which were approximately two and one-half feet in diameter.

One pound of 10 per cent Di-syston granules were scattered on the surface of the soil around the test clumps of calendulas. Water was immedi-

* *Associate Entomologist.*

Success of systemic insecticides applied to the soil is shown here. Treated calendulas remained aphid free for the growing season until hot mid-May weather brought on the lady beetles which destroyed aphid population in less than a week. All three systemics tested gave results in three days.

ately applied. An equal number of test clumps were left untreated for comparison.

Later, as untreated clumps became infested liquid applications of other systemics were applied.

Two teaspoonsful of a two-pound Meta-Systox-R emulsion was added to one gallon of water. This mixture was poured on the soil surface, exercising care to prevent splashing the mixture onto the upper two-thirds of the plant.

The other liquid systemic was Cygon. Two teaspoonsful of a 2.67 pounds emulsion was added to a gallon of water and applied to the soil surface in the same manner as with Meta-Systox-R.

Calendula aphid infestations usually start on the under side of the flower, or flower bud. As population increases the aphids move down the flower stalk. When heavily infested, six inches or more of the terminal stalk will contain aphids.

All three systemic insecticides gave excellent aphid control within three days.

The data also show that all three insecticides gave season-long control.

Di-syston granules gave control for a two-month period. Plants treated with this systemic are shown in the photograph taken six weeks after treatment application.

Cygon and Meta-Systox-R drenches, which were applied later, were giving excellent control five weeks later when lady beetles destroyed the aphids.

Only two of the three test systemics are available commercially — Di-syston granules and Meta-Systox-R. Di-syston granules are sold as a three per cent formulation. Meta-Systox-R is purchasable as a five per cent liquid under various trade names. Both are available in many local stores and nurseries.

Cygon, on the other hand, is not currently available for this type of application.

Table 1. Effectiveness of systemic insecticides applied to the soil surface in controlling the aphid on calendula plantings.

Date Examined	Average number of aphids per three inch flower terminal			
	Untreated	Di-syston[1]	Cygon[2]	Meta-Systox-R[3]
3/13	17	28		
		Treatment Applied[4]		
3/16	21	5		
3/22	57	5		
4/ 5	58	3	82	35
			Treatments applied	
4/ 9		0	0	0
4/17	43	0	0	0
4/27	175	1	0	0
5/ 4	76[5]	0	0	0
5/11	50[5]	0	0	0

Lady beetles destroyed all aphids.

[1] Disulfoton is the generic name for Di-syston.
[2] Dimethoate is the generic name for Cygon.
[3] Oxydimetonmethyl is the generic name for Meta-Systox-R.
[4] Treatment applied immediately after insect counts were taken.
[5] Lady beetles were feeding.

Trade names used in this publication are for identification only and do not imply endorsement of products named or criticism of similar products not mentioned.

Cost-Return Comparisons for Finishing Yearling Steers

*by Russell Gum and John Wildermuth**

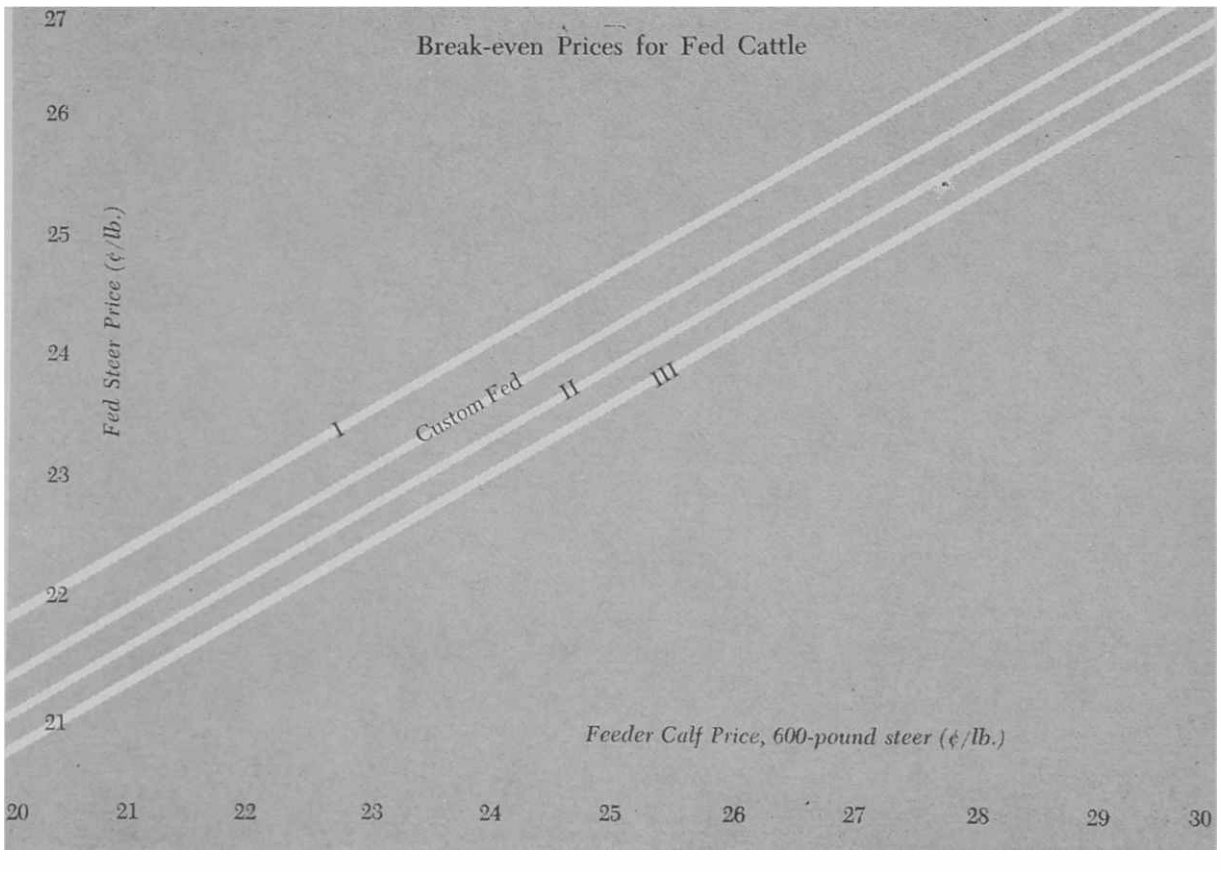
Profits from livestock feeding operations may be calculated as the difference between value added and the total cost of holding, feeding, and marketing the animals.

Under the above definition of profits, value added is the difference between returns from the sale of the finished animals and the total cost of the feeder stock.

The definition of costs and returns in the above manner emphasizes that profits in livestock feeding are very much dependent upon the relationship between feeder and fat cattle prices. Pursuant to the above, the purpose of this article is twofold: (1) to demonstrate the methodology of determining break-even fat cattle prices and (2) to provide cost data for the feeding of yearling steers in Arizona.

Table 1. Ration Used.

Percentage of Total Feed Fed	*Ingredient*	*Price Per Ton*
		(dollars)
21.4	**Alfalfa Hay**	30
63.2	**Milo**	44
4.5	**Cottonseed pellets**	81
.6	**Urea**	100
.5	**Salt**	28
.2	**Dicalcium phosphate**	100
.1	**Limestone**	15
5.0	**Trace minerals**	350
4.0	**Molasses**	36
	Fat	130
100.0		$46.49



Cost Data

The cost data presented herein are based on a specific feeding plan which can be considered typical for the feeding of yearling steers in Arizona. Under this plan the cattle are placed on feed at 600 pounds and fed for a period of 157 days. Typically, three different rations are utilized: A 55 percent concentrate ration is fed for 15 days; a 75 percent concentrate ration is fed for 56 days; and an 85 percent ration is fed for 86 days.

* *Russell Gum and John Wildermuth are assistant professors in the Department of Agricultural Economics, The University of Arizona, Tucson.*

The average concentrate level of the rations weighted by the number of days each is fed is 78.6 percent. Therefore, for costing purposes it is possible to assume, as we have in Table 1, that the steers are fed a continuous ration of 78.6 percent concentrate level. Valued at current average prices, this ration costs $46.49 per ton, Table 1.

Assuming an average rate of gain of 2.7 pounds per day, the 157-day feeding period results in a total gain of 425 pounds and a final weight of 1,025 pounds. Based on a 1 to 7.5 feed conversion ratio, 3,188 pounds of the average ration would be required during the total feeding period. The resulting feed cost on a per pound of gain basis is 17.44 cents (3,188 pounds of the ration times the $46.49 per ton cost all divided by the 425 pounds of gain).

The above feed costs have been incorporated into the budgets presented in Table 2. The total cost per pound of gain is presented in four operating situations: (1) feedlot capacity of less than 4,000 head, (2) feedlot capacity between 4,000 and 10,000 head, (3) feedlot capacity of 10,000 to 26,000 head, and (4) custom fed. All assumptions relating to these budgets are detailed in the footnotes to Table 2.

Table 2. Costs Per Pound of Gain — Yearling Steers.

Item	*Size Category*[a] *I*	*II*	*III*	*Custom Fed*
Depreciation	.96	.45	.33	
Taxes, interest, insurance	.86	.52	.34	
Total fixed costs	1.82	.97	.67	
Salaries and wages	1.73	1.30	1.10	
Utilities	.22	.19	.15	
Gas, oil, grease	.19	.11	.10	
Repairs	.41	.23	.27	
Vet. fees	.31	.15	.24	
Nutrition services	.00	.02	.06	
Legal and accounting	.02	.06	.03	
Trucking and freight	.06	.10	.01	
Promotion	.00	.01	.01	
Other costs	.10	.11	.07	
Death loss[b]	.49	.49	.49	.49
Interest on cattle in lot[c]	1.45	1.42	1.41	1.43
Feed costs[d]	17.44	17.44	17.44	21.26
Total variable costs	22.42	21.63	21.38	23.18
Total cost/lb. of gain	24.24	22.60	22.05	23.18

[a] *Size category I is less than* 4,000 *capacity; size category II is* 4,000 *to* 10,000 *capacity; size category III is* 10,000 *to* 26,000 *capacity. Custom fed cattle are fed in a* 10,000 *to* 26,000 *capacity lot with a charge of* $10 *per ton of feed fed.*

[b] *One percent death loss valued at* 26 *cents per pound for an* 800*-pound steer.*

[c] *Interest on feeders valued at* 26 *cents per pound plus interest on costs of gains. Interest is at* 7 *percent per year rate.*

[d] *Feed cost calculated assuming an average price of feed at* $46.49 *a ton and a* 1 *to* 7.5 *conversion ratio.*

Break-Even Price Comparisons

It is now possible to determine the exact price which must be received for the finished animals in order to equate total costs with total returns. In Table 3 these "break-even" prices are presented for each of the four operations budgeted in Table 2 and under a number of alternative feeder cattle prices.

At a feeder cattle price of 20 cents per pound, a Type I operation would break even if the finished cattle were sold at a price of 21.76 cents per pound. As a result of the cost advantage associated with the larger operations, their comparable break-even price is lower — 21.08 cents, 20.85 cents, and 21.33 cents respectively for situation II, III, and custom fed. The same interpretation applies to the data at all of the other assumed feeder cattle price levels (e.g., break-even prices at the 25 cents feeder price level are: Size I, 24.68 cents; Size II, 24.00 cents; Size III, 23.77 cents, and custom fed, 24.24 cents.

The break-even price information presented in Table 3 is also displayed graphically, Figure 1. Given the assumed holding, feeding, and marketing costs and the various feeder cattle prices, a price received for the finished animals anywhere above the relevant line in Figure 1 will lead to a net operating profit. Total profits would, of course, be found by multiplying the per unit profit (difference between the price received and the break-even price) times the number of units sold (pounds of live animals.)

Table 3. Break-Even Prices of Fed Cattle.

Feeder Cattle Price	*Category I*	*II*	*III*	*Custom Fed*
(¢/lb.)				
20	**21.76**	**21.08**	**20.85**	**21.33**
21	**22.34**	**21.66**	**21.44**	**21.90**
22	**22.93**	**22.25**	**22.02**	**22.49**
23	**23.51**	**22.83**	**22.61**	**23.07**
24	**24.10**	**23.42**	**23.19**	**23.66**
25	**24.68**	**24.00**	**23.77**	**24.24**
26	**25.27**	**24.59**	**24.36**	**24.83**
27	**25.85**	**25.17**	**24.95**	**25.41**
28	**26.44**	**25.76**	**25.53**	**25.99**
29	**27.02**	**26.34**	**26.12**	**26.58**
30	**27.61**	**26.93**	**26.70**	**27.17**

This analysis emphasizes the importance of outlook data pertaining to the price of fed cattle. Further, it provides a convenient means of estimating profits or potential profits given current feeder prices and expected fat cattle prices at the end of the feeding period. This information has been provided with the conviction that there is at least one Arizona cattleman who is failing to evaluate his potential profits in this or an analogous fashion.

New Sorghum Disease

(*From page 7*)

ditions. Symptoms are quite similar in sorghum, broomcorn and corn. In sorghum the first symptoms appear in young leaves as an indistinct light and dark green mottling between the leaf veins. This mottling or leaf mosaic is especially obvious in the young whorl leaves.

Mosaic symptoms may disappear during hot weather or as the plants approach maturity particularly in resistant hybrids. In certain susceptible varieties and hybrids, brilliant reddish-purple streaks and blotches begin to develop in older leaves. Cool temperatures are necessary for this symptom to develop. This "red-leaf" symptom has been much more common in the higher elevation, cooler-climate areas of Cochise county than in other locations in Arizona.

The shade of red is largely dependent on type of sorghum and ranges from bright red in many forage sorghums to tan.

Symptoms in mature plants may include malformed heads, reduction in head size, partial sterility, reddish discoloration of the head and overall plant stunting and yellowing. Susceptible plants infected early may not head. Plants infected late in the growing season, however, are not stunted and yields appear to be normal. Hybrids and lines with the red leaf symptom have the highest yield reduction.

Hosts of the Virus

Several grasses of economic importance including sorghum, broomcorn, corn (sweet, pop, dent), sudangrass and sorghum X sundangrass hybrids are susceptible to the disease. Studies indicate that small grains, including wheat, rye, barley and oats, are not susceptible. More than 20 sorghum species are known to be susceptible to the virus.

Although many grass weeds, including several species of *Bromus*, *Panicum* and *Echinochloa*, are hosts of the virus, the grass most important to disease development is johnsongrass (*Sorghum halepense*). Maize Dwarf Mosaic virus overwinters in the underground stems (rhizomes), and roots of johnsongrass. In most states where the disease has been studied, higher disease incidence occurs where johnsongrass is common. Johnsongrass collected from Cochise, Maricopa and Pima counties has been shown to be infected by transmission studies in the greenhouse.

Transmission of Disease

Several species of aphids, including *Rhopalosiphum maidis* or corn leaf aphid, *Acrythosiphon pisum* or pea aphid, *Myzus persicae* or green peach aphid, and *Aphis gossypii* or cotton aphid are known to be vectors of the virus.

Aphids may acquire the virus from diseased plants in single probe feedings and transmit the disease to healthy plants similarly. Thus, aphids feeding on emerging grasses in the spring, particularly johnsongrass, acquire the virus and act as vectors when subsequent feeding occurs on susceptible plants. Research reports from other states are contradictory concerning seed transmission of the virus. California studies indicate low transmission (0.4 per cent) in corn whereas studies in Missouri are negative. Other seed transmission studies in Ohio with corn and sorghum were also negative. The virus cannot survive in dried, dead plant tissue or for long periods in the aphid vector. A living, infected plant is necessary for virus survival.

Virus Occurance

Positive identification of the disease has been made in Cochise, Graham, Maricopa, Pima, Pinal, and Santa Cruz counties. The disease has not been found in surveys in Yuma county. No surveys have been made in the northern counties of Arizona as of this date. Highest disease incidence and loss occurred in Cochise county in several susceptible hybrids. The epidemic situation in Cochise county was triggered by unusually high aphid vector populations, prevalence of johnsongrass as a virus reservoir, favorable environment for disease development and large acreages planted to susceptible hybrids. Observations have been made in the field on the reactions of several hybrid sorghums to Maize Dwarf Mosaic virus. These observations were made at a number of locations in Cochise, Graham, Maricopa, Pima, Pinal and Santa Cruz counties. The reactions of the hybrids to Maize Dwarf Mosaic virus found in Arizona indicates that the virus has the same pathogenicity as that found in other states, and therefore is not a new strain. Striking differences in response to infection between susceptible and resistant hybrids were noted in the Kansas Settlement area of Cochise county where disease incidence and severity has been high.

In many fields with highly susceptible hybrids the disease incidence was more than 90 per cent and severe red-leaf streaking resulted in extensive leaf killing. Resistant hybrids growing in some cases, side-by-side with susceptible hybrids, developed little or no red-streaking and yields appeared to be normal.

Hybrids observed in Arizona that appear to have varying degrees of resistance to Maize Dwarf Mosaic virus include Northrup-King's NK210, NK210A, NK222, NK222A, NK222G, NK265, NK270, NK275, NK280, NK310, and NK310A; Amak's R10 and R12; Asgrow's Double TX, Rico, and Jumbo L; Dekalb's 61 and 63; Frontier's 400C; Pfister's PAG430 and PAG515; Excel's 505 and 707; and Pioneer's 846 and 820.**

Although the above observations were made in locations where disease incidence was high it should be emphasized that the list is incomplete, is based on field observations in limited areas and that resistance is relative and influenced by a large number of factors not all of which are completely understood. Greenhouse studies are presently underway to determine relative tolerance of the major Arizona sorghums to Maize Dwarf Mosaic virus.

Disease Control

The only practical method for control is the use of resistant hybrids as the elimination of johnsongrass, other perennial grass hosts, and aphid vectors does not seem feasible.

Sorghum is a major crop in Arizona with production centered in Cochise, Maricopa and Pinal counties. The virus is wide spread in these counties and is presently the most serious disease of this crop in the state. Prevalence of johnsongrass as a virus reservoir combined with an abundant population of insect vectors indicates that Maize Dwarf Mosaic virus has become an important factor in Arizona sorghum production.

Help Where it Counts

*by Clay Napier**

More than two hundred women took part in a series of nutrition classes conducted by the University of Arizona Cooperative Extension Service in the border city of Douglas.

The women pictured on this page were in the group.

The classes were conducted by Miss Frances Romanoski, Mrs. Mary Bostick and Miss June Gibbs, all with Extension.

They organized the program on a grass roots level and the women attending the sessions say they reaped tremendous benefits from learning how to get a good buy at the grocery store, how to prepare surplus commodity foods provided by welfare and how to set up a balanced diet to insure good health for their families.

The program was made possible by a matching grant from Title I, Higher Education Act of 1965. The U of A provided the matching funds.

Miss Romanoski served as coordinator of the program setting it in motion. Mrs. Bostick who speaks both English and Spanish did the bulk of the organizational work.

Miss June Gibbs, far left in top photo interviews a group of Douglas women concerning what they learned in the series of nutrition meetings. At left another Douglas lady shows the commodity foods with which nutritious meals are prepared. And below, Mrs. Mary Bostick, second from left, demonstrates meal preparation.

Chronic Pain

(*From page 3*)

increases in activity and productive behavior; conversely, they tend to ignore complaints of pain and discomfort.

Apparently this method, although somewhat oversimplified in this description, when applied consistently and knowledgeable by the entire therapeutic team and followed by appropriate continuation in the patient's normal or home environment has produced very promising results. Further details and/or reprints of articles dealing with the learning-type model in chronic pain management can be obtained by directing inquiries to Dr. Wilbert E. Fordyce, Pain Clinic, University of Washington, Seattle.

The fact that significant differences in pain responses and reactions have been described among Jews, Italians, Indians, Old American, and other ethnic groups would seem to indicate considerable promise for further research in the learning approach to pain management.

Dr. H. K. Beecher's observations concerning the significance of situational determinants — the influence of particular situations upon reaction to pain — are also relevant to the learning theory approach. Beecher compared soldiers in a combat zone hospital who had been seriously wounded with 150 male civilians who had undergone major surgery. The tissue damage in the two groups was comparable, but their responses were sharply different. According to Beecher the soldier interpreted his wound as a blessing. It enabled him to leave the battlefield with honor. It was his ticket out. The civilian on the other hand, perceived his "wound" as a calamity. It was painful and disabling. Only one-fifth of the postoperative patients refused medication for the relief of pain, whereas two-thirds of the soldiers refused medication. The meaning that pain has to the individual quite obviously affects his response to it. Equally obvious is the fact that the meaning, or the individual's perception of the significance of the pain, can be modified through appropriate experimental techniques.

Hog Production

(*From page 5*)

An Arizona Pig Marketing Association assists producers in marketing hogs and in buying certain types of supplies. The Association tries to develop an orderly flow of product to the packing plant by keeping track of numbers available for market each week. Currently there are 36 producer members estimated to produce about 80 percent of the State's hogs. The main marketing problems are to improve quality and to sell consumers on the value of locally produced pork.

Industry Profitable

While further study needs to be made to determine costs in relation to different systems of production and to varying feed prices, estimates are that hogs are being produced in Arizona at between $16 and $17 per hundredweight. From January 1965 through June 1968, monthly mean prices reported for hogs in Arizona fell below $17 in only three months. Average prices reported rose to $27.70 and the mean price for the entire period was $20.87. This would indicate that while prices fluctuated rather sharply during the past 3½ years, margins above costs have been good. This, plus the fact that producers are searching for profitable alternative uses for resources in agriculture, is helping to stimulate interest in the industry.