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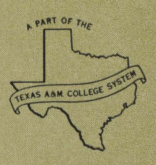
Effect of Early Vaccination For Fowl Pox on the Performance of Broilers



THE AGRICULTURAL AND MECHANICAL COLLEGE OF TEXAS
TEXAS AGRICULTURAL EXPERIMENT STATION
R. D. LEWIS, DIRECTOR, COLLEGE STATION, TEXAS

Summary

Vaccination of broilers at 2, 4 and 6 weeks of age for fowl pox using the wing-stab method had a small depressing effect on growth rate. Vaccination at 2 weeks of age depressed the 4-week-growth rate approximately 4.6 percent compared with the controls. Vaccination at 4 weeks decreased the 6-week-growth rate 3.2 percent compared with nonvaccinated birds, and vaccination at 6 weeks decreased body weight 2.8 percent compared with the nonvaccinated birds. By 9 weeks of age, the birds vaccinated at 2 and 4 weeks had almost recovered from the systemic effects of vaccination as measured by body weight.

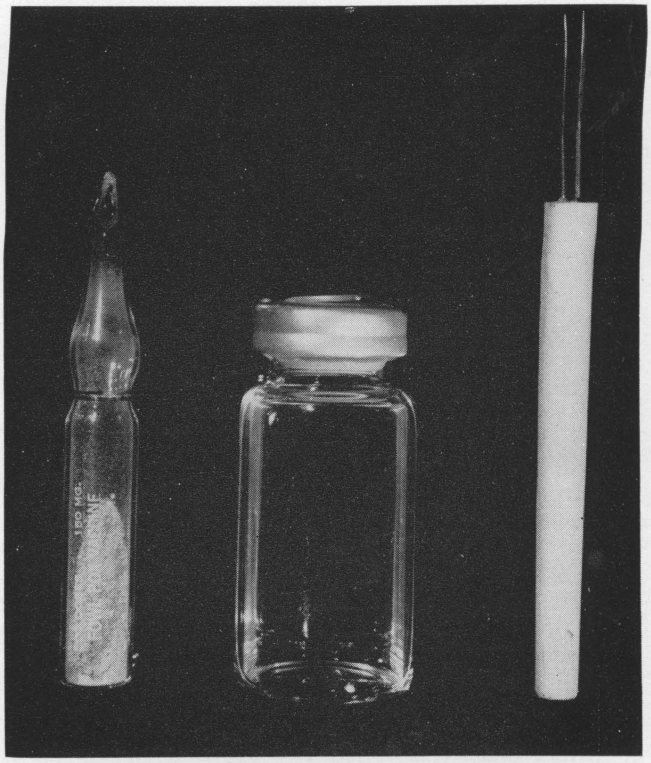
Market grade and feather score in the nonvaccinated birds were significantly better than the market grade and feather scores in the vaccinated lots. No differences in feed efficiency and livability were noted. Likewise, no relationship could be established between debeaking and vaccination for fowl pox.

Debeaking at 1 day of age or at 2 weeks of age did not depress performance in broilers.

Although there may be slight effects from early fowl pox vaccination of broilers, losses from a natural outbreak of fowl pox would probably more than offset any losses incurred as a result of vaccination. Under good management practices, the amount of depression from vaccination should be small and probably would approach significance only statistically.

Contents

Effect of Early Vaccination for Fowl Pox on the Performance of Broilers



The vaccination materials required for fowl pox vaccination. Vial on the left contains live fowl pox virus which is added to the diluent in the larger bottle just prior to use. The applicator contains two grooved needles. In vaccinating young chicks one needle is often removed. Birds should be free of coccidiosis and respiratory diseases before vaccinating for fowl pox.

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IN CERTAIN REGIONS outbreaks of fowl pox in broilers less than 8 weeks old have necessitated early vaccination to obtain protective immunity. Vaccination for fowl pox has been studied extensively; however, few reports are available on the amount of depression in performance, if any, one can expect from routine vaccination of commercial broiler chicks at different ages during their growing period. The economic importance of early vaccination is obvious and needs no discussion.

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Literature Review

Beaudette (1949) and Biester and Schwarte (1952) have reviewed most of the literature on the effects of early vaccination for fowl pox. In general, vaccination for fowl pox on 1-day-old chickens has been reported to depress growth and increase mortality, and has often failed to give lasting immunity. Severe systemic reactions have been observed in chicks vaccinated at different ages up to 1 month and older. Many of the vaccines used were not attenuated vaccines.

Systemic reaction followed fowl pox vaccination at the ages of 13, 28, 31 and 42 days, according to Lubbehusen and Beach (1937). Systemic reaction was slower and progressively less severe as the vaccination age increased.

TABLE 1. EXPERIMENTAL PATTERN

Pen number	Number birds	Treatment	
		Age when debeaked	Age when vaccinated
1	100	No	None
	100	Day old	None
2	100	No	6 weeks
	100	Day old	6 weeks
3	100	No	4 weeks
	100	Day old	4 weeks
4	100	No	2 weeks
	100	2 weeks	2 weeks
5	100	No	2 weeks
	100	Day old	2 weeks

Systemic reaction in the older groups was evidenced more by retardation of growth than by excessive mortality when the chicks were exposed to unfavorable conditions, such as coccidiosis.

In a recent study by Seeger and Price (1956) chicks were vaccinated at 1, 5, 10 and 15 days of age with fowl pox vaccine. Neither age at vaccination nor dilution of the vaccine had any significant effect on broiler performance. Likewise, no significant adverse effects resulted from multiple vaccination using Newcastle or infectious bronchitis in conjunction with fowl pox.

Edgar and Bond (1957) reported that a commercial fowl pox vaccine used on chicks from 1 to 8 weeks old caused a slight, but not significant, depression of growth. Less attenuated strains of pox virus caused a significant depression of growth in birds vaccinated at 2 weeks or older.

A study was initiated to compare early vaccination for fowl pox in conjunction with debeaking in commercial broiler type chicks.

TABLE 2. EFFECT OF EARLY FOWL POX VACCINATION AND DEBEAKING ON BROILER PERFORMANCE BY 2-WEEK PERIODS

Pen number	Period (weeks)	Mean weight (pounds)		Mortality (number)		Feed efficiency
		Debeaked	Nondebeaked	Debeaked	Nondebeaked	
1	2	0.338	0.343	1	0	1.38
	4	0.841	0.840	0	0	1.66
	6	1.570	1.540	0	0	1.91
2	2	0.330	0.348	5	2	1.28
	4	0.811	0.835	0	0	1.71
	6	1.530	1.540	2	0	1.90
3	2	0.340	0.330	5	4	1.32
	4	0.823	0.811	0	0	1.66
	6	1.510	1.480	0	0	1.93
4	2	0.326	0.332	5	2	1.36
	4	0.766	0.845	0	0	1.64
	6	1.430	1.520	0	0	1.90
5	2	0.337	0.330	2	2	1.38
	4	0.766	0.779	0	0	1.69
	6	1.450	1.500	0	0	1.84
All pens	2	0.336	0.335	18	10	1.34
	4	0.801	0.822	0	0	1.67
	6	1.500	1.520	2	0	1.90

Materials and Methods

One thousand, 1-day-old Cornish-type commercial broiler chicks were randomly divided into five lots of 200 birds each. Before placing the birds in brooder pens, each bird was vaccinated intraocularly with B_1 Newcastle vaccine. The brooding facilities consisted of a multiple unit, five-pen broiler house. Each pen in the brooder house was equipped with a natural gas Oakes brooder stove, two continuous flow water troughs and hand feeders. Before the chicks were placed in a pen, the house and equipment were thoroughly washed and allowed to dry. Three to 4 inches of peanut hulls were placed on the floor for litter. Ample feeder space was supplied and the birds received a high energy commercial broiler ration ad libitum.

The experimental design used in this study is presented in Table 1. One hundred chicks in pens 1, 2, 3 and 5 were block debeaked at 1 day of age. The remaining 100 chicks were not debeaked and were permitted to compete with those which had been debeaked. Half the chicks in pen 4 were debeaked at 2 weeks of age rather than 1 day of age.

The wing-stab method of vaccinating a chick for fowl pox. This chick was 2 weeks old when vaccinated in the wing by puncturing an area of the web from which the feathers had been removed. Normally vaccination of broilers against fowl pox is not recommended except in regions where experience shows that it is necessary to vaccinate. Birds should be checked 10 days after vaccination for a "take" or scabs. The "take" should be close to 100 percent if the vaccination procedure was properly performed.

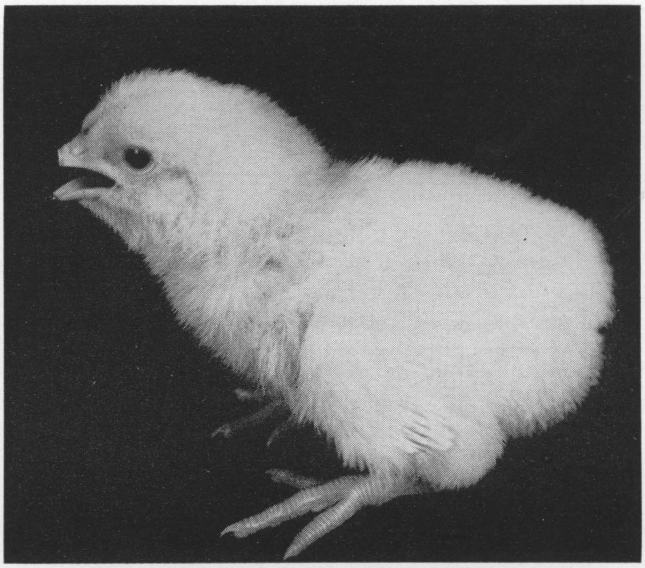
At 2 weeks of age, all chicks in pens 4 and 5 were vaccinated wing web with a reliable commercial type fowl pox vaccine. At 4 weeks of age all chicks in pen 3 were vaccinated with the same type of vaccine. At 6 weeks of age the chicks in pen 2 were vaccinated with fowl pox vaccine of the same lot used to vaccinate pens 3, 4 and 5. The chicks in pen 1 were used as the control lot.

When the chicks reached 2, 4 and 6 weeks of age, weight, feed consumption and mortality data were collected. At 9 weeks of age, individual bird records were taken. Data collected were 9-week weight, feather score, live market grade, feed efficiency and mortality. Birds were observed constantly for pox lesions about the head and for respiratory symptoms, particularly in those birds which had not been vaccinated for fowl pox.

Results and Discussion

An analysis of the data collected at 2 weeks of age showed no significant difference among pens in body weight and feed efficiency, Table 2. This was not surprising since the birds were treated alike and there were no major location effects. A higher mortality was observed in the debeaked chicks during the first 2 weeks of the brooding period. Statistical analysis using Chi Square indicated that this difference was not significant and was probably caused by sampling. The birds in pen 4 which were not debeaked until they were 2 weeks of age also had somewhat higher mortality than their counterparts. This also suggests that differences resulted from sampling.

At 2 weeks of age, pens 4 and 5 were vaccinated for fowl pox using the wing-stab method. Any systemic effects from this vaccination should have been detectable at 4 weeks of age when the birds were again weighed.



An example of block debeaking on a day-old chick as it was performed in this experiment. Part of the upper beak and part of the lower beak have been removed with a debeaking instrument.

Vaccination at 2 weeks of age generally reduced growth rate approximately 4.6 percent as measured by 4-week weight, but this difference was not statistically significant. The nondebeaked birds in pen 4 were among the heaviest lots at 4 weeks of age; however, this was not the case for the other three vaccinated lots in pens 4 and 5. Vaccination at 2 weeks of age appeared to have no effect on the livability of the birds nor on feed efficiency.

During this period no appreciable difference in body weight or livability was found when the mean of all debeaked birds was compared with the mean of the nondebeaked birds. Since both of the debeaked groups in pens 4 and 5 tended to have the smallest body weight at 4 weeks of age, the cumulative effect of debeaking and vaccination may have accounted for their low rank in

TABLE 3. THE EFFECT OF EARLY FOWL POX VACCINATION AND DEBEAKING ON THE PERFORMANCE OF 9-WEEK-OLD BROILERS[1]

Pen number	Debeaking treatment	Mean weight grams	Mean feather score	Mean market grade	Feed efficiency	Percent livability
1	Debeaked	1294	4.34	1.18		95.0
(No vaccination)	Nondebeaked	1283	4.37	1.22	2.19	98.0
2	Debeaked	1273	3.84	1.49		93.0
(Vaccinated 6 weeks)	Nondebeaked	1235	4.11	1.41	2.19	97.0
3	Debeaked	1254	4.22	1.35		95.0
(Vaccinated 4 weeks)	Nondebeaked	1277	3.87	1.52	2.18	96.0
4	Debeaked	1268	4.12	1.38		94.0
(Vaccinated 2 weeks)	Nondebeaked	1273	4.12	1.38	2.19	97.0
5	Debeaked	1321	4.05	1.45		97.0
(Vaccinated 2 weeks)	Nondebeaked	1335	4.17	1.40	2.06	97.0
All pens	Debeaked	1282	4.11	1.37		94.8
	Nondebeaked	1281	4.13	1.39		97.0

[1]Equal weight given sexes in arriving at means.

TABLE 4. EFFECT OF EARLY FOWL POX VACCINATION ON PERFORMANCE OF 9-WEEK-OLD BROILERS IRRESPECTIVE OF DEBEAKING[1]

Pen number	Time of vaccination	Mean weight grams	Mean feather score	Mean market grade	Feed efficiency	Percent livability
1	No vaccination	1289	4.36	1.19	2.19	96.5
2	6 weeks age	1253	4.02	1.45	2.19	95.0
3	4 weeks age	1264	4.07	1.43	2.18	95.5
4	2 weeks age	1270	4.12	1.37	2.19	95.5
5	2 weeks age	1328	4.03	1.38	2.06	97.0

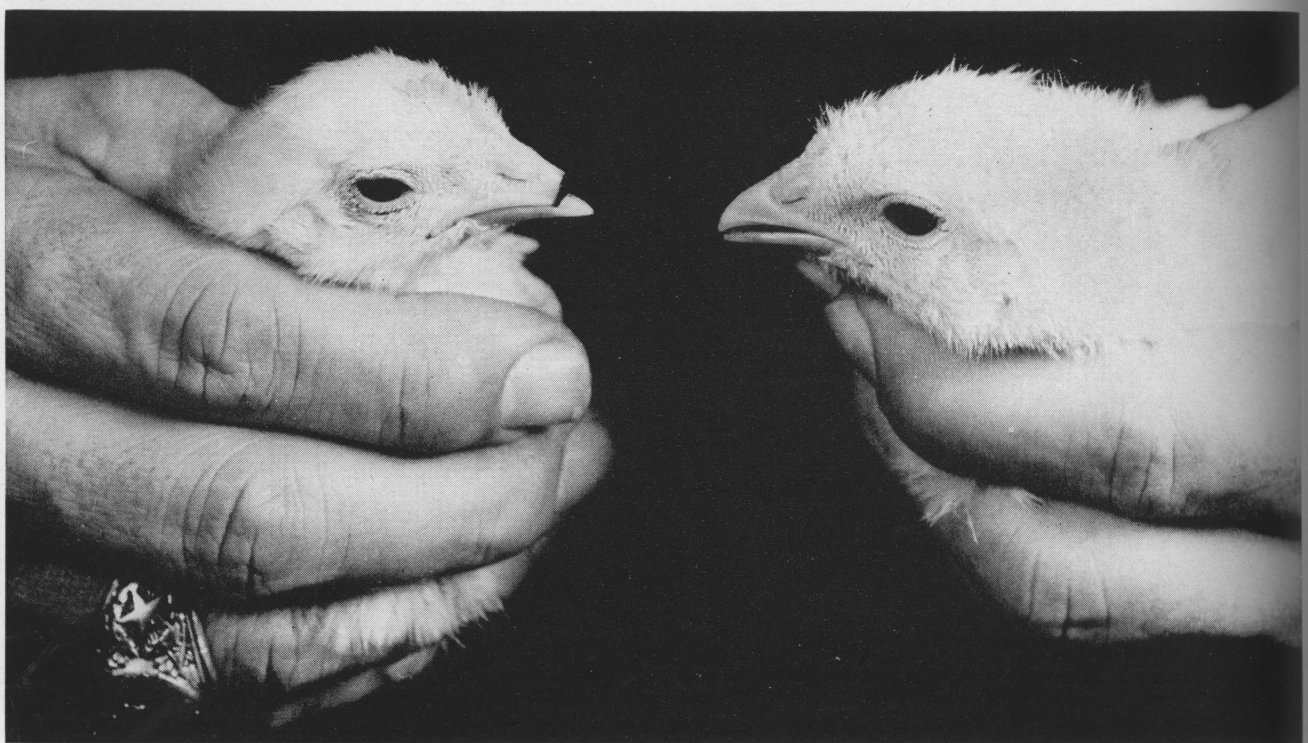
[1]Equal weight given sexes in arriving at means.

weight. If a least difference necessary for significance is computed, the mean difference between the debeaked and the nondebeaked groups in pen 4 is significant, but not the mean difference observed in pen 5.

At 4 weeks of age, all the birds in pen 3 were vaccinated for fowl pox. Systemic effects of the vaccination should have been apparent at 6 weeks of age at which time the next body weight measurements were taken. Table 2 indicates that weight at 6 weeks in pen 3 was reduced approximately 3.2 percent over the 6-week weight of the birds in pens 1 and 2 which had not yet been vaccinated for fowl pox. Birds in pens 4 and 5 were still some 4.5 percent smaller in body weight than the nonvaccinated groups. These differences were not significant statistically although the vaccinated birds were consistently smaller than the nonvaccinated birds. No significant differences in feed efficiency or in mortality were noted at 6 weeks of age. There was no significant difference between debeaked and nondebeaked lots of birds.

When the birds reached 6 weeks of age, the group in pen 2 was vaccinated for fowl pox. The 9-week performance data are presented in Tables 3 and 4. Statistical analyses of these data are presented in Table 5. No difference was noted in body weight, mean feather score or market grade between debeaked and nondebeaked birds, Table 3, but at 9 weeks of age the nondebeaked birds had 2.2 percent less mortality. This difference was not statistically significant. The data summarized according to vaccination time, pooling nondebeaked and debeaked birds, with equal weight given to sexes, shows that the birds vaccinated at 6 weeks of age were lighter in weight than any group in the brooder house, Table 4. If a least difference required for significance is calculated, birds in pen 2 differ significantly from the control birds in pen 1. This difference amounts to 2.8 percent in favor of the control birds. Pen 5 likewise differs significantly from the control; however, pens 3 and 4 did not. Pen 3, however, did approach significance at the 95 percent level of probability. There is an orderly regression in weight from pen 5 through pen 2 which logically could be correlated with vaccination times.

The control birds in pen 1 were significantly better feathered and had a significantly higher live market grade than the other groups. No real difference could be established between the groups of birds in pens 2, 3, 4 and 5 as far as



A comparison of a debeaked and nondebeaked 2-week-old chick. One-third to one-half of the upper beak of the chick on the left was removed with a debeaking instrument at 2 weeks of age.

feather score and live market grade were concerned. Feed efficiency and livability were uniform for all experimental groups.

At 9 weeks of age, a few of the birds in the control pen (pen 1) began to show symptoms of pox lesions about the head. No respiratory symptoms could be detected in these birds.

The significant sex-by-pen interaction for weight shown in Table 5 cannot be explained because females generally follow the same rankings as the males for the different experimental groups. Because of differences in numbers of birds in each sex, the analysis was made symmetrical by random removal of birds from each experimental group to avoid adjustment for disproportionate subclass numbers. The analysis also shows that there was no significant association between vaccination time and debeaking in the birds at 9 weeks of age.

Although differences appeared among the various experimental lots and some of them were significant when compared with least significant differences, on the whole they were too small to produce any major effect in the overall data analysis. Thus, vaccination at 2, 4 or 6 weeks of age in broilers receiving good management may have a slight depressing effect on performance. The depressing effect, however, should not be too severe. The small performance decreases probably would be much less than losses which would result from a natural outbreak of fowl pox in nonvaccinated broilers.

These data indicate that debeaking at 1 day or 2 weeks of age did not significantly alter weight, feather development, market grade, feed efficiency, or livability to 9 weeks of age.

TABLE 5. ANALYSIS OF THE VARIANCE OF 9-WEEK PERFORMANCE DATA

Sources of variation	Degrees of freedom	Mean squares		
		Weight	Feather score	Live market grade
Total	699[1]			
Between pens	4	129,129	1.838	.775
Between debeaked groups	1	661	.280	.010
Between sexes	1	17,139,568[2]	15.480[2]	.010
Pens X debeaked groups	4	18,574	2.227	.260
Pens X sexes	4	31,272[3]	.641	.510
Debeaked groups X sexes	1	2,549	.114	.200
Pens X debeaked groups X sexes	4	16,366	1.789	.515
Experimental error	680	12,623	1.388	.397

[1]A random sample of 140 birds per pen with equal numbers per debeaked group and sex was used in the statistical analysis.
[2]$P \leq .01$
[3]$P \leq .05$

Bibliography

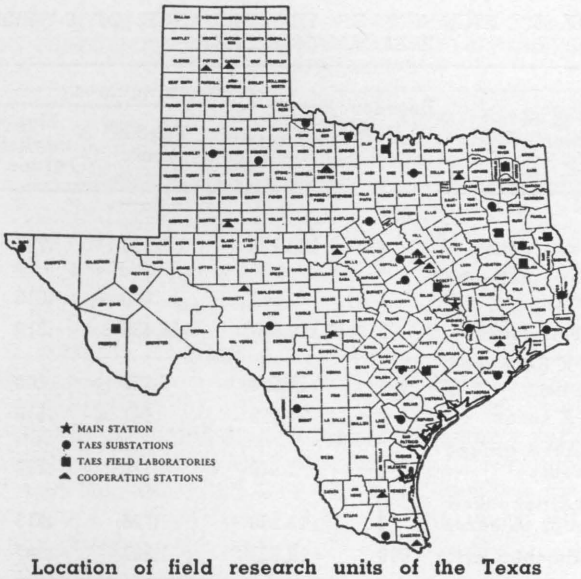
Beaudette, F. R., 1949. Twenty years of progress in immunization against virus diseases of birds. J. Am. Vet. Med. Assoc. 115: 232-244.

Biester, H. E. and L. H. Schwarte, 1952. Diseases of Poultry (Third Edition). The Iowa State College Press, Ames, Iowa. Ch. 25: 635-667.

Edgar, S. A. and D. S. Bond, 1957. Effect of fowl pox on growing chickens and duration of immunity. Poultry Science 36: 1115 (Abstract).

Lubbehusen, R. E. and J. R. Beach, 1937. Fowl pox vaccination of day old and older chicks. J. Am. Vet. Med. Assoc. 90: 430-446.

Seeger, K. C. and R. J. Price, 1956. Evaluation of immunity to fowl pox. 1. Immunization of young chicks with pigeon and fowl pox vaccines. Poultry Sci. 35: 372-379.



Location of field research units of the Texas Agricultural Experiment Station and cooperating agencies

State-wide Research

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The Texas Agricultural Experiment Station is the public agricultural research agency of the State of Texas, and is one of the parts of the A&M College of Texas.

ORGANIZATION

IN THE MAIN STATION, with headquarters at College Station, are 16 subject-matter departments, 2 service departments, 3 regulatory services and the administrative staff. Located out in the major agricultural areas of Texas are 21 substations and 9 field laboratories. In addition, there are 14 cooperating stations owned by other agencies. Cooperating agencies include the Texas Forest Service, Game and Fish Commission of Texas, Texas Prison System, U. S. Department of Agriculture, University of Texas, Texas Technological College, Texas College of Arts and Industries and the King Ranch. Some experiments are conducted on farms and ranches and in rural homes.

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Conservation and use of water
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Grain crops
Cotton and other fiber crops
Vegetable crops
Citrus and other subtropical fruits
Fruits and nuts
Oil seed crops
Ornamental plants
Brush and weeds
Insects
Plant diseases
Beef cattle
Dairy cattle
Sheep and goats
Swine
Chickens and turkeys
Animal diseases and parasites
Fish and game
Farm and ranch engineering
Farm and ranch business
Marketing agricultural products
Rural home economics
Rural agricultural economics

Two additional programs are maintenance and upkeep, and central services.

Research results are carried to Texas farmers, ranchmen and homemakers by county agents and specialists of the Texas Agricultural Extension Service

AGRICULTURAL RESEARCH seeks the WHATS, the WHYS, the WHENS, the WHERES and the HOWS of hundreds of problems which confront operators of farms and ranches, and the many industries depending on or serving agriculture. Workers of the Main Station and the field units of the Texas Agricultural Experiment Station seek diligently to find solutions to these problems.

Today's Research Is Tomorrow's Progress