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RESOURCES, COMMUNITY,
AND ECONOMIC DEVELOPMENT
DIVISION

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The Honorable George E. Brown, Jr.
Chairman, Subcommittee on Department
Operations, Research and Foreign Agriculture
Committee on Agriculture
House of Representatives

The Honorable Tom Harkin
Chairman, Subcommittee on Livestock,
Dairy and Poultry
Committee on Agriculture
House of Representatives

The Honorable Jim Olin
House of Representatives



Subject: Information on Indemnity Payments in USDA's Avian
Influenza Eradication Program (GAO/RCED-85-36)

In your April 20, 1984, letter, you asked that we review the methodology the U.S. Department of Agriculture (USDA) used in calculating indemnity rates for destruction of poultry flocks under the avian influenza eradication program. You asked that we advise you of any inequities that might have occurred as a result of the Department's indemnification procedures. As agreed with Representative Olin's office, this report provides information on the Department's procedures for setting the indemnity rates, its reasons for changing the procedures, an outside agricultural economist's views on the Department's procedures, and our comparison of the indemnity rates for egg-producing hens (layers) and chickens and turkeys raised for slaughter (broilers and nonbreeder turkeys).

We found that USDA originally established per-bird indemnity rates for all types of poultry to compensate producers for production costs incurred at the time their flocks were destroyed. However, as a result of comments from the Pennsylvania layer industry, USDA increased the per-bird indemnity rates to reflect increases in production costs for all poultry other than layers. Because layers (unlike broilers and turkeys) generate revenue continuously and could not be replaced immediately, USDA decided to change per-bird indemnity rates for layers. The revised layer

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rates were designed to compensate producers for the value of their birds based on an estimate of net revenues expected during the 26 weeks following their destruction. The 26-week period was selected because it was the minimum time needed to get a replacement layer flock into full egg production (where current income exceeds current expenses). Our analysis of the expected net revenue for each group indicated that broiler and turkey producers were indemnified at least as well as layer producers even though a different basis was used for setting the per-bird indemnity rates. (See enc. 1.)

AVIAN INFLUENZA AND USDA'S
ERADICATION PROGRAM

Avian influenza is a highly communicable viral disease that affects poultry but not humans. The disease can cause a high mortality rate or virtual cessation of egg production. The disease is spread readily through feed, equipment, and humans contaminated by direct contact with infected birds or their secretions.

The influenza outbreak was first diagnosed in Lancaster County, Pennsylvania, in April 1983, but serious losses of poultry did not begin until late October. On November 9, 1983, USDA declared an "extraordinary emergency" in Pennsylvania. This action allowed USDA to direct and fully fund a program to contain and eradicate the disease by quarantining affected areas and destroying infected and exposed flocks. The declaration also permitted USDA to indemnify owners of destroyed flocks.

USDA soon extended the eradication program to New Jersey, issuing a separate extraordinary emergency declaration on November 23, 1983. Eradication efforts in Virginia began in late January 1984, after USDA superseded the Pennsylvania and New Jersey declarations with a general declaration applicable to any area.

USDA's Animal and Plant Health Inspection Service (APHIS) administers the eradication program. Teams of federal and state personnel kill affected birds humanely with carbon dioxide and bury them in sanitary landfills. Eggs, products, and other related articles likely to be a means of spreading the disease also are destroyed. Premises must then be disinfected under the supervision of federal or state officials and undergo a minimum waiting period of 30 days before being declared safe for repopulation.

USDA has financed all eradication program activities, except cleaning and disinfecting premises. These costs have been borne by property owners. USDA's approved budget for the avian influenza eradication program is \$66.7 million. Total obligations as of August 1, 1984, were \$57.7 million (\$41.1 million in indemnities and \$16.6 million in support costs). As of that date, no new cases of the disease had been found since June 30, 1984, and

USDA had destroyed all affected flocks. USDA expects to complete the program by the end of 1984.

USDA'S AUTHORITY TO SET
INDEMNITY RATES

Federal law (21 U.S.C. 134a) authorizes the Secretary of Agriculture to seize, quarantine, and dispose of animals, products, and other articles affected with or exposed to communicable livestock and poultry diseases when the Secretary determines that such diseases constitute an extraordinary emergency. In such instances, the Secretary must compensate the owners for the destroyed property. The law further requires that the compensation ". . . be based upon the fair market value as determined by the Secretary . . . at the time of the destruction." Thus, while the law calls for compensation at "fair market value," it allows USDA flexibility in deciding exactly how to calculate that value.

The courts recognized USDA's discretion to determine fair market value in a case arising from USDA's program to eradicate a 1972 outbreak of exotic Newcastle's disease in southern California's poultry layer industry.¹ A January 1982 court decision denied the plaintiff's claim that USDA inadequately compensated him for his destroyed birds. In so ruling, the court held that the Secretary's determination of fair market value would be upheld and deemed proper unless it is found to be arbitrary, capricious, an abuse of discretion, or a violation of the statutory standard.

OBJECTIVES, SCOPE, AND METHODOLOGY

As agreed with Representative Olin's office, our objectives were to provide the following information regarding USDA's avian influenza indemnities: (1) USDA's basis for the indemnity rates, (2) whether USDA used consistent methods for rates applicable to different types of birds, (3) whether the respective industries value birds on the same basis as the indemnities, (4) an outside expert's opinion on the appropriateness of USDA's computation methods, and (5) examples showing what selected broiler and turkey rates would have been had they been computed on the same basis as the layer rates.

We performed our work from May to July 1984 at USDA headquarters offices in Washington, D.C., and Hyattsville, Maryland. We interviewed the principal officials responsible for administering the eradication program and for determining the indemnity rates. These included the Deputy Assistant Secretary for Marketing and Inspection Services, APHIS' Deputy Administrator for

¹Julius Goldman's Egg City v. United States, 556 F. 2d 1096 (Ct. Cl. 1977), aff'd., 697 F. 2d 1051 (1983).

Veterinary Services, APHIS' Assistant Deputy Administrator for Animal Health Programs, and the USDA Economic Research Service's (ERS') economist who actually computed the rates. We reviewed, but did not verify the accuracy of, data on which the economist based his computations. We also reviewed applicable laws and implementing USDA regulations, a court decision dealing with a similar USDA indemnity program, and applicable congressional hearings. We made our review in accordance with generally accepted government auditing standards.

We obtained the views of an outside expert regarding USDA's indemnity computation methods. We selected Dr. Lee Schrader, Department of Agricultural Economics, Purdue University, because according to agricultural experts we contacted, Dr. Schrader is one of only a few persons in the country outside USDA and the industry who specializes in poultry economics. We also obtained information regarding the economic practices of the Virginia broiler and turkey industries from the National Broiler Council in Washington, D.C., and Dr. John Wolford, Chairman, Department of Poultry Science, Virginia Polytechnic Institute.

Enclosure I is a detailed explanation of the methods we used to compare the relative degree of indemnification given layer, broiler, and turkey owners. It identifies certain assumptions we made to compensate for data that were not available and to simplify our computations. Both Dr. Schrader and ERS' economist reviewed our analysis and agreed that it is a reasonable basis for measuring the relative degree of compensation afforded the three groups.

USDA PROCEDURES FOR COMPUTING THE INDEMNITY RATES

According to the Deputy Assistant Secretary for Marketing and Inspection Services, an important consideration in establishing the per-bird indemnity rates was to avoid compensating for lost profits, which USDA believed was a mistake made when establishing the 1972 Newcastle's disease indemnity rates. As explained by APHIS' Deputy Administrator, Veterinary Services, indemnifying for lost profits creates a financial incentive for bird owners to not report suspected cases promptly. This is because during a severe outbreak of a disease such as avian influenza, producers know that prices will rise due to decreased supplies. Thus, producers may delay reporting suspected outbreaks of the disease because they anticipate that future price increases will be reflected in higher indemnity rates. Such delays jeopardize the eradication program's basic objective, which is to quickly contain and eliminate the disease. Thus, USDA's overriding objective with the avian influenza indemnities was to prevent financial incentives that may cause bird owners to delay in reporting suspected cases. This concern influenced USDA to initially establish per-bird indemnity

rates to compensate producers of all types of poultry for their costs of production incurred at the time their flocks were destroyed.

Other policy considerations also influenced USDA's decision to base the original indemnity rates on production costs. The Assistant Secretary for Marketing and Inspection Services testified on January 26, 1984, before the Senate Appropriations Subcommittee on Agriculture, Rural Development and Related Agencies, that the decision was made because of budgetary constraints (i.e., to hold down the program's costs). APHIS program officials told us that difficulties in accurately gauging market value also was a factor. They noted that actual markets and prices in the poultry industry, unlike those in the livestock industry, exist at only two or three distinct points in a bird's lifecycle, depending on the type of bird. The market value for birds is difficult to determine between these points--a problem avoided by basing indemnities on production costs.

The original rates were standard dollar amounts per bird, which varied according to the bird's type and age. In setting the rates, APHIS officials and a USDA Economic Research Service economist familiar with the poultry industry agreed on specific elements to be used in computing allowable production costs. The ERS economist computed the per-bird payments based on actual cost data. ERS routinely collects and publishes some of these data, while the economist derived others from industries' records and researchers' estimates. The elements used to calculate production costs generally included the chick (or turkey poul), feed, veterinary or medical expenses, litter, utilities, fuel, housing, labor, and interest.

The result was separate indemnity rate schedules for various types of chickens, turkeys, and eggs. The schedules provided per-bird payments based on weeks of age so that field personnel could readily compute a flock owner's total indemnity payment.

According to APHIS' Deputy Administrator, Veterinary Services, this procedure was discussed with Pennsylvania poultry industry representatives, who agreed at the time that it was acceptable.

The Deputy Assistant Secretary for Marketing and Inspection Services told us that the Secretary of Agriculture decided to increase the original indemnity rates in response to congressional and industry concerns. She said that the Pennsylvania layer industry strongly encouraged its congressional delegation and USDA to increase the indemnity for layers but that the broiler and turkey industries did not.

According to the Deputy Assistant Secretary, the layer industry first asked USDA for a 120-percent increase; however, USDA offered a 16-percent increase (based on increased production costs since the original rates), which the Pennsylvania congressional delegation rejected, prompting increased congressional interest in higher rates. Under instructions to raise the rates to the extent justifiable, the ERS economist used a new procedure to compute the revised layer rates that were announced April 3, 1984. The revised broiler and turkey rates announced that same day, however, remained based on production costs but were raised to reflect cost increases that occurred since the original rates were established. The revised rates resulted in a 33-percent increase for layers, a 4.9-percent increase for turkeys, and a 3-percent increase for broilers.

The revised layer rates equalled the discounted expected net revenues that the birds would have generated during the 26 weeks following their destruction. To arrive at these figures, the ERS economist, aided by a computer model that simulates the productivity of a layer flock, multiplied the future egg production of various-aged birds by the prices that would have been expected in the absence of the disease. Expected production costs (primarily feed) were subtracted from these revenues to determine expected net revenues. USDA then calculated the indemnity rates by discounting these expected net revenues to the point in time that the birds were destroyed. This procedure was similar to a method for valuing the birds suggested to USDA by the Pennsylvania layer industry--the primary difference being that the industry suggested using actual egg prices, which had been inflated by the reduced production stemming from the eradication program.

USDA'S REASONS FOR CHANGING THE INDEMNITY COMPUTATION PROCEDURES

USDA stated that the discounted expected net revenue procedure is appropriate for determining the layer indemnity rates but not the turkey and broiler rates. USDA's primary reason for this position was that layer owners could not get immediate replacement birds, whereas turkey and broiler owners could.

As the ERS economist explained to us, layer flock owners normally replace hens that have completed their laying cycle

("spent hens") with "started pullets,"² which they purchase from others who raise the pullets from day-old chicks. However, because pullet growers normally require layer owners to contract and pay for their pullets before growers start to raise them, no extra (uncommitted) pullets normally are available. Thus, layer owners were unable to immediately replace entire flocks destroyed unexpectedly because of avian influenza. To repopulate, layer flock owners either had to contract for the raising of replacement pullets or grow their own from day-old chicks. In either case, an owner theoretically needs at least 26 weeks after his flock has been destroyed to obtain commercially productive replacements and begin earning revenue from egg sales. Such was not the case with turkey and broiler owners, who could get replacement poults and chicks immediately and theoretically could begin raising them for slaughter right away.³

USDA also reasoned that producing layers earn income continuously, whereas broilers and turkeys do not. The latter earn income only when sold for their meat (at about 7 weeks for broilers and 20 weeks for turkeys). As the ERS economist explained, USDA's objective was to return all owners to a position where they could start earning income--the same position as when their flocks were destroyed. According to the economist, reimbursing for the costs of raising a flock to the time of destruction accomplishes this objective for broiler and turkey owners but not for layer owners. In their case, the method for determining the value of the birds should be based on an estimate of the net revenues expected during the 26 weeks following destruction. The economist and other USDA officials pointed out that even with the indemnities, all affected owners are losing money because of the disease.

In further justifying the different indemnity computation procedures, the ERS economist told us that the procedures were

²"Started pullets" are young hens, about 20 weeks old, that are just beginning to enter their first egg-laying cycle. They lay for 52 weeks unless they are force molted. Force molting (loss of feathers and rejuvenation of the laying system) is induced by withholding food and water. The force-molting process takes 8-10 weeks. After the process, another laying cycle begins. Birds being kept for a second laying cycle are usually force molted (when about 64 weeks old) to ensure that all birds in a group begin and end the molt at the same time.

³USDA's indemnity rates were not intended to provide compensation for actual downtime due to eradication program requirements--i.e., the time required for cleaning the premises and the subsequent waiting period required before repopulation.

consistent with methods the industries use to value birds for their own purposes. As noted previously, USDA computed the revised layer rate using a methodology similar to the Pennsylvania layer industry's valuation method. The National Broiler Council and a Virginia Polytechnic Institute expert on the economics of Virginia's poultry industry told us that the broiler and turkey industries use production costs to value birds for bookkeeping purposes but not for determining value for marketing purposes. These industries, like any other, seek a return over and above costs when marketing their products.

APHIS officials, including the Deputy Administrators for Management and for Veterinary Services, said that the indemnities should be judged on the basis of equity rather than the methods by which they were computed. In this regard, they told us that USDA had received virtually no complaints about the indemnity rates from the broiler or turkey industries and that neither had asked USDA to increase the rates. According to the officials, this indicated that the industries considered the rates to be fair and equitable. They also said that indemnities for broilers and turkeys could exceed market value if computed using a method comparable to that used for layers.

AN OUTSIDE AGRICULTURAL ECONOMIST'S VIEW OF USDA'S PROCEDURES

We consulted Dr. Lee Schrader, Department of Agricultural Economics, Purdue University, to obtain his informal views on USDA's procedures for computing the layer, broiler, and turkey indemnity rates. Dr. Schrader said that indemnities paid in animal disease control programs such as the avian influenza program should compensate affected parties to some degree for revenue lost because of disruptions to their normal business. Accordingly, he said that USDA used an acceptable method to compute the revised layer rates, and that USDA should have considered using a similar basis for computing the broiler and turkey rates.

OUR COMPARISON OF INDEMNITY RATES

To determine if layer owners were compensated to a greater degree than were broiler and turkey owners, we compared the percentages of expected value⁴ that each group recouped from indemnities. We found that layer owners received a smaller percentage of expected value than did either broiler or turkey owners. We estimated that layer flock owners recouped between 75 percent and 80 percent of expected value. We estimated that broiler owners

⁴The discounted net revenues that an owner expected to receive from raising a bird (i.e., its value to the owner) in the absence of avian influenza. (Enc. I explains our analysis in detail.)

received between 110 percent and 164 percent of expected value (depending on the age of their birds when destroyed), while turkey owners received at least 126 percent. Even allowing for possible imprecision in our estimates, we believe that it is highly unlikely that layer owners were treated more favorably than broiler or turkey owners.

It should be noted that the percentages of expected values captured by the indemnities are presented for comparison purposes only. By using them in this manner, we in no way mean to imply that our method would be a more appropriate way to determine indemnity rates, or that expected values would be a more appropriate basis for compensation.


Our expected values (see enc. I) are, however, the best estimates possible (given the limitations of available data) of what broiler and turkey indemnity rates would have been had USDA computed them on a basis comparable to that underlying the revised layer rates--information which Representative Olin asked us to provide. The fact that these values are consistently well below the actual indemnity rates indicates that, in all likelihood, broiler and turkey owners would not have fared any better (perhaps worse) under the revised layer methodology.

AGENCY COMMENTS

The Deputy Assistant Secretary for Marketing and Inspection Services and other USDA officials said that our draft report was an accurate and well-balanced description of how and why USDA established indemnity rates for the avian influenza eradication program. The officials suggested several minor wording changes for accuracy which we incorporated into this final report.

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As arranged with Representative Olin's office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 5 days from its issue date. At that time we will send copies of the report to the Director, Office of Management and Budget; the Secretary of Agriculture; and other interested parties. We also will make copies available to others upon request.


J. Dexter Peach
Director

Enclosure

COMPARATIVE ANALYSIS OF LAYER, BROILER, AND
TURKEY INDEMNITY RATES UNDER USDA'S AVIAN INFLUENZA
ERADICATION PROGRAM

Our analysis compares the indemnities paid to owners of layer flocks destroyed because of avian influenza with the indemnities paid to owners of broiler and turkey flocks. The common basis of comparison is the expected value of the birds to their owners at the time of destruction.¹ The percentage of this value that is recovered by indemnities is our measure of relative treatment. This enclosure describes our derivation of

- the percentage of expected value recovered by the indemnities paid to layer owners,
- the expected value of broilers and turkeys that were depopulated, and
- the percentages of these broiler and turkey values that were recovered by indemnities.

LAYERS

The indemnities that USDA paid to layer flock owners equalled the discounted expected net revenues that the birds would have generated during the 26 weeks following their destruction. USDA multiplied the egg production of various-aged birds by the egg prices that were expected in the absence of avian influenza. Expected production costs (primarily feed) were subtracted from these revenues to get expected net revenues. Indemnities were then calculated by discounting these expected net revenues to the point in time that the birds were destroyed.

The indemnities paid were less than the expected value of the depopulated layer flock because some birds had more than 26 weeks of productive life left when they were destroyed. The greater the remaining productive life, the lower the percentage of expected value that was recovered by indemnities. The total productive life of a layer can vary from 52 to 79 weeks because some owners force molt birds and keep them for a second laying

¹By "expected value" we mean the discounted net revenues that a bird owner expected to receive from raising a bird (for either egg production or meat value). These expected net revenues are based on the egg prices, meat prices, and production costs that bird owners expected to prevail before avian influenza's effects became known.

cycle, while others replace their birds after a single laying cycle. To estimate the percentage of expected value captured by indemnities, we had to estimate the proportions of a representative layer flock comprising the following three groups:

1. Birds that would never have been molted.
2. Birds that would have been molted but were not old enough when they were destroyed.
3. Birds that had already been molted.

At any point in time, about 27 percent of all layers are either in, or have been through, the force molting process.² We therefore concluded that group 3 listed above comprised 27 percent of our representative flock. To calculate the percentages comprised by groups 1 and 2, we needed to know what percentage of these birds were destined for force molting. This is calculated from the following expression.³

$$A = \frac{B (PMT + OV)}{MT - B (MT - OV)} \times 100$$

where: A is the percentage of premolt birds that are destined for molting.

B is the percentage of the flock that is either in, or has been through, the molting process.

PMT "pre-molt time" is the number of weeks of productivity before a layer is put into force molting.

MT "molt time" is the 8-week molting process plus the number of weeks in the second laying cycle.

OV "overlap" is the number of weeks between the age when some birds are put into molt and the age when nonmolted birds are culled.

We know from USDA that current income exceeds current expenses for layers at age 26 weeks. Birds that are not molted are kept

²Derived from USDA estimates.

³This calculation, as well as some that follow, assumes a uniform distribution of birds across all ages, up to an age of 79 weeks.

for one 52-week laying cycle and are then sold at week 77. Birds that are force molted are put into molt at age 64 weeks and are kept for another 40 weeks. Consequently, PMT equals 39 weeks (the time from week 26 to week 64); MT equals 40, and OV equals 13 (the time from week 64 to 77). We stated above that B equals .27. So,

$$A = \frac{.27 (39 + 13)}{40 - .27 (40 - 13)} \times 100 = 43$$

That is, 43 percent of the nonmolted birds are destined for force molting (and therefore 57 percent are not). We use this calculated percentage and the following formulas to derive the percentages of the flock represented by groups 1 and 2.

1. Birds that would never have been molted:

$$\begin{aligned} \text{percentage} &= \frac{(1-A)(\text{PMT}+\text{OV})}{\text{PMT} + \text{OV} + A(\text{MT}-\text{OV})} \times 100 \\ &= \frac{(1-.43)(39+13)}{39+13+.43(40-13)} \times 100 \end{aligned}$$

percentage of the flock = 47

2. Birds that would have been molted but were not old enough when they were destroyed

$$\begin{aligned} \text{percentage} &= \frac{A \times \text{PMT}}{\text{PMT}+\text{OV}+A(\text{MT}-\text{OV})} \times 100 \\ &= \frac{.43 \times 39}{39+13+.43(40-13)} \times 100 \end{aligned}$$

percentage of the flock = 26

Given these percentages of an aggregate flock comprising all three groups, we estimated the percentage of each group's expected value that is recovered by the indemnity payments. Our reasoning is most easily demonstrated by the first group--birds that are never molted. These birds have a maximum of 52 weeks of productive life. They are indemnified for 26 of these weeks, or their remaining productive life, whichever is shorter. Consequently, the older half of this group receives full expected

value since they have 26 or fewer weeks of expected productivity left at the time of destruction. Birds in the younger half of this group (ages 26 through 51 weeks) receive different proportions of their full expected values. Birds that are 26 weeks old when destroyed receive half of their expected value (they have 52 productive weeks left), while 51-week-old birds receive almost full expected value. To calculate the percentage of expected value received by all of these younger birds, we used the average expected remaining productive life of these birds, which is 39.5 weeks. Since they are indemnified for 26 weeks, these younger birds receive, on average, 66 percent of their expected value. Since the older half of birds in the "never molt" group receive full expected value, while those in the younger half receive 66 percent of expected value, the group as a whole receives 83 percent of its expected value.

The percentages of expected value captured by indemnities for the other two groups are calculated in a similar manner. Birds that would have been molted but were too young had remaining productive lives ranging from 40 to 79 weeks. So, the average remaining productive life of these birds was 59.5 weeks. Consequently, they received 44 percent of expected value. Birds that had already been molted ranged in age from 64 to 104 weeks. Sixty-five percent of these birds (those 79 weeks old and above) had up to 26 productive weeks left at the time of destruction. They received full expected value. The remaining 35 percent of these birds had an average expected remaining productive life of 33.5 weeks; therefore, they received 78 percent of expected value. As a group, birds that had already been molted received 92 percent of their expected value.

With this information, we estimated the proportion of the representative layer flock's expected value that was recovered by indemnity payments. To obtain this estimate, we took the weighted average of the percentages of expected value received by each group in the flock.

(1) Groups	(2) Percentage of the flock	(3) Percentage of expected value received	(4) Weighted average (2) x (3)
Never molt	47	83	39
Would have been molted	26	44	11
Already molted	27	92	25
Total	100	-	75

The actual percentage of expected value recovered by indemnities is somewhat higher than this 75 percent because of three simplifying assumptions we made. First, we ignored the effects of discounting in our estimates. This causes us to underestimate the percentage of expected value recovered by indemnities paid for birds with more than 26 weeks of productive life left. The net revenues generated by the extra weeks should be discounted to obtain their true expected value, but our procedure does not account for this. Second, we did not account for the fact that some birds die of natural causes every week. Since the flock would actually have decreased from its size at destruction, expected net revenues after destruction actually would have been proportionately smaller. By not accounting for this fact, we again underestimate the percentage of expected value captured by indemnities. Third, we ignored the fact that layers' productivity declines with age. Because of this declining productivity, USDA's methodology indemnifies birds for the most productive weeks of their remaining lives. The percentage of their total remaining productive lives that is thus indemnified is higher than our estimates indicate. We ignored the fact that productivity during the uncompensated weeks would have been lower than during the weeks for which indemnification was paid. We concluded that the indemnities paid for destroyed layer flocks captured 75 to 80 percent of birds' expected value to their owners.⁴

⁴Our results are based on the assumption that the model and data that USDA used to calculate layers' indemnities were accurate. That is, we assume USDA correctly estimated the discounted expected net revenues that the destroyed layers would have generated during the 26 weeks following destruction.

BROILERS AND TURKEYS

The method necessary to determine the relative degree to which broiler and turkey owners were compensated by indemnity payments was less complex. Given USDA's indemnity schedules for birds of different ages at the time of destruction, we estimated the corresponding expected values of these birds to their owners. We then calculated the percentages of these expected values that were recovered by the indemnity payments and compared them with the above estimate we derived for layer flocks.

The expected value of a broiler or turkey to its owner equals the discounted net revenue that the bird is expected to generate. This, in turn, equals the difference between the bird's expected market price and the expected incremental costs to the owner of getting the bird to market (with both price and costs being discounted to the time of destruction). The expected value to the owner increases as a bird gets older, since the time until it is sold decreases, as do the remaining costs of getting it to market. We used data routinely compiled by USDA to calculate expected revenues and incremental costs for both broilers and turkeys of different ages. These data and our computations are detailed on the following pages.⁵

⁵These data are for birds that are processed and sold whole. Over half of the birds that were destroyed would have undergone further processing (e.g., sold as cut-up pieces). The bird owners would have received higher prices for these birds and also would have incurred additional costs. Since no data are available on these prices and costs, we had to assume that our estimated expected value for a whole bird approximated that of a processed bird. This assumption is reasonable since market forces should equalize rates of return in the whole-bird and processed-bird markets.

Broilers - mixed sexes

Age (weeks)	Live weight ^a (lbs)	Weight to gain ^b (lbs)	Feed conversion ^c	Feed to date (lbs)	Feed costs to date ^d (\$)	Remaining feed costs (\$)	Remaining production costs ^e (\$)
1	.377	3.722	1.066	.402	.043	.887	1.073
2	.753	3.346	1.411	1.062	.115	.815	.982
3	1.192	2.907	1.626	1.938	.209	.721	.866
4	1.705	2.394	1.723	2.938	.317	.613	.733
5	2.489	1.610	1.842	4.585	.495	.435	.516
6	3.305	.794	1.960	6.478	.700	.230	.270
7	4.099	0.0	2.100	8.608	.930	0.0	0.0

^aThese weights are calculated from USDA data, adjusted to reflect a final weight of 4.1 pounds.

^bFor any week, this is the difference between the weight at that week and the final weight at 7 weeks.

^cThis is calculated as:

$$\text{feed conversion rate for given week} \times \frac{2.1}{\text{feed conversion rate for week \#7}}$$

where:

- feed conversion rates are from USDA.
- 2.1 is the conversion rate assumed by USDA in calculating indemnity payments.

^dThis is calculated as:

$$\text{"feed to date"} \times \$.108$$

where: \$.108 per pound is the feed cost assumed by USDA in calculating indemnity payments.

^eFor any week, this is calculated as:

$$\text{"remaining feed costs"} + (\$.05 \times \text{"weight to gain"})$$

This adjustment to remaining production costs was suggested by USDA to account for remaining production costs in addition to feed.

Turkeys - male

Age (weeks)	Live weight ^a (lbs)	Weight to gain ^b (lbs)	Feed conversion ^c	Feed to date (lbs)	Feed costs to date ^d (\$)	Remaining feed costs (\$)	Remaining production costs ^e (\$)
2	.588	24.412	1.221	.718	.080	8.143	9.608
4	1.765	23.235	1.424	2.513	.280	7.943	9.337
6	3.922	21.078	1.628	6.385	.712	7.511	8.776
8	6.667	18.333	1.729	11.527	1.285	6.938	8.038
10	9.804	15.196	1.831	17.951	2.002	6.221	7.133
12	12.843	12.157	2.034	26.123	2.913	5.310	6.039
14	15.882	9.118	2.340	37.164	4.144	4.079	4.626
16	18.824	6.176	2.441	45.949	5.123	3.100	3.471
18	21.961	3.039	2.747	60.327	6.726	1.497	1.679
20	25.00	0.0	2.950	73.750	8.223	0.0	0.0

^aThese weights are calculated from USDA data, adjusted to reflect a final weight of 25 pounds.

^bFor any week, this is the difference between the weight at that week and the final weight at 20 weeks.

^cThis is calculated as:

$$\text{feed conversion rate for given week} \times \frac{2.95}{\text{feed conversion rate for week \#20}}$$

where:

- feed conversion rates are from USDA.
- 2.95 is the conversion rate assumed by USDA in calculating indemnity payments.

^dThis is calculated as:

"feed to date" x \$.1115

where: \$.1115 per pound is the feed cost assumed by USDA in calculating indemnity payments.

^eFor any week, this is calculated as:

"remaining feed costs" + (\$.06 x "weight to gain")

This adjustment to remaining production costs was suggested by USDA to account for remaining production costs in addition to feed.

Estimating the expected value of broilers and turkeys requires that we know expected prices and processing costs. The above estimated remaining production costs are the expenditures that bird owners expected to incur in raising birds from any given age to maturity. Processing costs are the expense of transforming a live bird into a salable whole carcass. The expected value of a bird of any age to its owner is the difference between these production and processing costs on the one hand and the expected price for the whole bird carcass on the other. We used the following estimates of processing costs and prices to calculate the expected values of broilers and turkeys.

Broilers

Processing costs for a 4.1-pound live bird were \$0.3738 (USDA estimate). The expected price was derived from USDA price forecasts for the fourth quarter of 1983 (when broiler destruction was greatest). We used the midpoint of the forecast price range and added 1.5 cents per pound to reflect higher than national average prices received by Virginia owners.⁶ This yielded an expected price of \$0.545 per pound, or \$1.63 for a 2.99 pound carcass.⁷

Turkeys

Using the same data sources and price adjustment yielded \$3.22 as our estimate of processing costs for a 25-pound live male turkey and \$12.40 as the expected price for a 20-pound carcass (\$0.62 per pound).⁸

The following tables present our estimated expected values for broilers and turkeys of various selected ages at the time of

⁶This adjustment was suggested by USDA. The price forecasts were from USDA, ERS, Livestock and Poultry: Outlook and Situation Report, Dec. 1983, table 1, p. 2.

⁷We used USDA's rate of 0.7315 to convert from live bird to "dressed" (carcass) weight.

⁸We used USDA's suggested conversion rate of 0.80. We also added 1.5 cents per pound since our calculations are for male birds, while the original price series was for females. USDA suggested we use this differential.

destruction. All prices and costs are discounted back to reflect the passage of time between the age when destroyed and the age at maturity.⁹

Broilers

Age at destruction (weeks)	Discounted			Expected value (\$)
	Price (\$)	Processing costs (\$)	Remaining production costs (\$)	
2	1.611	.3695	.9764	.2651
4	1.619	.3712	.7305	.5173
6	1.626	.3729	.2697	.9834
7	1.630	.3738	0.0	1.2562

Turkeys

Age at destruction (weeks)	Discounted			Expected value ^a (\$)
	Price (\$)	Processing costs (\$)	Remaining production costs (\$)	
4	11.9437	3.1015	9.1652	-.323
12	12.1718	3.1608	5.9834	3.0276
18	12.3430	3.2052	1.6751	7.4627
20	12.4000	3.2200	0.0	9.1800

^aThese values are somewhat understated. At the time of greatest turkey destruction (Jan. through Mar. 1984), turkey owners were growing birds primarily for further processing, rather than for the whole-bird market. They were using high-energy feed to produce heavier birds. Since processing costs are unaffected by this and feed costs are only slightly higher, this strategy increases the per-bird value of turkeys. The increase, which we could not quantify, is probably small, but it could change our estimated expected value for 4-week old turkeys from negative to positive.

⁹We used a discount rate of 12 percent, the same rate USDA used in estimating the value of layers' forgone productivity.

Our final task was to compare these estimated expected values with the indemnities actually paid to owners for destroyed birds. As shown in the following tables, the indemnity payments for broilers and turkeys were consistently higher than our estimated expected values. Because we estimated the indemnities paid to layer owners at 75 percent to 80 percent of expected value and allowing for some imprecision in our estimates, it appears unlikely that broiler and turkey owners were treated unfairly relative to layer owners.

Broilers

Age at destruction (weeks)	Expected value (\$)	Indemnity (\$)	Indemnity as percentage of expected value
2	.2651	.4354	164
4	.5173	.7112	137
6	.9834	1.1736	119
7	1.2562	1.3825	110

Turkeys

Age at destruction (weeks)	Expected value (\$)	Indemnity (\$)	Indemnity as percentage of expected value
4	-.323	2.92	-
12	3.0276	5.93	196
18	7.4627	10.08	135
20	9.1800	11.61	126