Determining Poultry Indemnity Values: Examples and Lessons Learned from Poultry Disease Outbreaks in Canada and the United States

By

Stephen L. Ott
Agricultural Economist and Emergency Management Compensation Specialist
Centers for Epidemiology and Animal Health
USDA:APHIS:VS
Natural Resources Research Center, Bldg. B, 2E5
2150 Centre Avenue
Fort Collins, CO 80526-8117
Email: Stephen.L.Ott@aphis.usda.gov

and

Kirsti Bergmeier
Agricultural Economist
Disaster Assessment / Analysis Section
Agriculture and Agri-food Canada
Rm 206, Bld 75, 960 Carling Avenue
Ottawa, ON K1A 0C6
Email:bergmeierk@agr.gc.ca

Paper prepared for presentation at the Canadian Agricultural Economics Association Annual Meeting, San Francisco, CA, July 6-8, 2005

Any opinions and conclusions are those of the authors and do not necessarily reflect the views of the Agriculture and Agr-food Canada nor the U.S. Department of Agriculture. The findings and conclusion in this report have not been formally disseminated by USDA:APHIS:Veterinary Services and should not be construed to represent any agency determination or policy.

Abstract:
Avian influenza disease outbreaks in both Canada and the United States resulted in the depopulation of several million birds. Both countries have laws and regulations stating that owners will receive indemnity from the government to compensate for assets taken or destroyed. Government economists from both countries were charged with the task of determining value upon which indemnity was based. This paper explores the process used to determine value in an industry where market prices are not always observable.

Key Words: avian influenza, compensation, indemnity, poultry evaluation

Determining Poultry Indemnity Values: Examples and Lessons Learned from Poultry Disease Outbreaks in Canada and the United States

Introduction

In the United States and Canada, whenever the federal government orders the destruction of animals for the public good, the federal government through laws and regulation is required to compensate the owner at the fair market value of the animal taken[1]. However, the laws and regulations don't state how the fair market value is to be arrived at; therefore, it has been left up to government economists to determine these values. In the past, many of the animals ordered destroyed were either cattle or swine and as these animals were sold in public markets, a federal official could simply check with local livestock auctions to determine what similar quality animals were being sold for. Today livestock markets are becoming fewer with many animals going from birth to slaughter without ever having to pass through a public market system. Consequently, sometimes the first price observed is the carcass's wholesale price and this is especially true in the highly integrated North American poultry industry. Due to Avian Influenza outbreaks in Canada and in the United States and the subsequent depopulations of poultry flocks, economists from both federal governments were called upon to provide valuation for depopulated birds upon which the indemnity payments could be based. The first step to valuing a depopulated bird is to look for known market values for live birds. If this value cannot be found, the carcass value can be used minus processing costs to determine the live bird value. It is only in the absence of a market price that economists must

[1] In the United States the *Animal Health Protection Act* (Subtitle E of the *Farm Security and Rural Investment Act* of 2002) and Code of Federal Regulations, Title 9, Parts 50 – 55, deal with compensation associated with ordered destruction of animals by the federal government. In Canada it is the *Health of Animals Act* that governs federal compensation of owners for their animals ordered destroyed.

extrapolate a value that can either be based upon an Income Appraisal Approach or a Costs of Production Approach. Either method, if using the same data should give the same end value for a live bird. The purpose of this paper is to explain how an appraised fair market value can be determined theoretically in the absence of market prices and how economic theory was turned into practice within poultry disease outbreaks in the United States and Canada.

Determining Fair Market Value When Market Prices Are Unavailable

There are two basic types of commercial birds that must be evaluated during any avian disease outbreak: meat birds and breeder birds (including table egg layers). Each can be evaluated using one of two economically accepted methods, the Income Appraisal Approach or the Cost-of-Production Approach. A key to determining the market value with either method is the calculation of input costs and one way to calculate these costs is through an enterprise budget.

An enterprise budget can be created to calculate the costs for a fixed period of time i.e. one year or for some types of poultry, one production cycle. The first step in developing an enterprise budget is to determine the unit of analysis; often a single animal, a breeding set or if the animals are small, a group of animals. The second step is to determine those costs directly connected with the unit of analysis. The cost of variable inputs such as feed, fuel, and hired labor can be expressed as the purchase price (dollars) per animal unit. Fixed cash inputs such as insurance and taxes are expressed as the actual cost divided by the total animal unit(s) while costs for fixed assets i.e. land, buildings, and machinery, first have their costs annualized and then divided by the number of

animals units. Fixed costs are annualized either through depreciation or annual capital recovery charges (ACRC) (Boehlje and Eidman, p 143). ACRC is usually preferred to normal depreciation as ACRC includes a charge for the opportunity costs associated with the funds that are tied up in the asset. Finally, the enterprise budget needs to account for the opportunity costs associated with any capital invested, unpaid labor and management services provided by owner or other non-arms length family members. The capital invested should include all of the monies spent on variable and fixed cash inputs plus the value of any fixed assets[2]. For unpaid labor and management a wage rate should be charged that is equivalent to what the owner/manager could earn in other similar business activities.

The Cost-of-Production Approach for asset valuation is an extension of enterprise budgeting. It assumes that in the long-run, producers will not produce an item unless they can recover all costs associated with its production. Thus, the value of an item is, at a minimum, equal to all costs associated with its production. Such an evaluation system can be attractive for agricultural commodities where large supplies of the commodity in the market place can result in time periods where a commodity's price is less than its production costs.

For meat birds, the Cost-of-Production Approach represents a viable valuation option. After a bird is hatched, it is fed and housed and as it ages it increases in value until it reaches its maximum value at slaughter, age six or seven weeks. Since with each day of life, costs are incurred, daily variable input costs and daily allocated fixed costs can be used to determine the animals' value on a daily basis. A simpler approach is to

[2] If the ACRC method is used to cost fixed assets, then opportunity interest charges do not have to be added as ACRC already includes opportunity cost of the capital invested.

take the total costs at slaughter and the cost of a day old chick and assume a linear relationship between the two for determining a daily value.

For breeder birds (and table egg layers) using the Cost-of-Production Approach to value a bird is only appropriate up to the beginning of lay. Like meat birds, breeder birds increase in value from a day old chick to the beginning of lay, approximately 26 weeks of age; therefore costs associated with raising the birds to beginning of lay are reflective of their value. However, once egg production starts there is a divergence between costs and value. The value of a breeder bird is a direct function of the number of fertilized eggs expected to be laid and thus expected meat bird production. Once fertilized egg production starts the value of breeder birds begin to decline until salvage (spent) value is reached, approximately 40 weeks after egg production starts. Over this time period, costs are continuing to occur so the total cost of production is greatest at the end of lay. Consequently, with the Cost-of-Production Approach for breeder birds, only costs up to start of lay are used. Similar to meat birds, the daily or weekly value of breeder birds can be assumed to be a linear increase in value from the cost of day-old chicks to total costs at beginning of lay. Once egg laying starts, value depreciates linearly from beginning of lay to spent hen value at end of lay.

During periods of profitability, commodities will be worth more than their cost of production and producers will want government appraised fair market values to reflect this. Therefore, another way to determine fair market value is through the Income Approach. Basically, the Income Approach starts with the known market price of an item in a specific form and then subtracts production costs between the marketable form and the form desired for valuation or during an outbreak the form being destroyed. A key

assumption to the Income Approach is that the market price is greater than production costs; if not then an asset could have a negative worth.

The Income Approach is especially appropriate for assets which have future income potential, such as breeder birds and milk cows. In these situations the value of the asset is equal to its income stream minus the costs associated with producing the income stream[3]. While such a method may seem simple, in reality it can become quite complex. Using meat birds as an example, the bird's income stream is the price received by the processing plant for the carcass. Plant processing costs are then subtracted to obtain the live bird value, with adjustments being made for condemned/rejected birds. Production costs associated with raising the bird are subtracted to produce day-old chick value, with adjustments being made for mortality losses. Subtracting hatchery costs, with adjustments for hatchability rates, results in a value for a fertilized egg. The value of a fertilized egg can be used to determine the income stream for breeding birds.

Further complicating the valuation process using the Income Approach is the allocation of net revenue (gross revenue minus total costs). The net revenue associated with producing chicken products should be allocated among the different production and processing phases. This can be done by either using an allocation percentage provided by the poultry company or an allocation based upon a percentage of total cost that each production/processing phase represents. Allocating all net revenue to a single production/processing phase would generate a valuation that would represent an upper bound of the worth of the assets in that particular phase.

[3] If the income stream is expected to last several years, incomes and costs occurring more than a year away can be discounted into current dollars and such an approach is then called capital budgeting.

Valuation of immature breeding stock differs between the Income Approach and the Cost-of-Production Approach. With the Cost-of-Production Approach immature breeding stock have a very low value since they have few input costs. In contrast, the Income Approach calculates an income stream at beginning of reproduction (beginning of lay) and then subtracts the production costs associated with raising the breeding animal to the reproduction phase. Assuming positive net revenues, the Income Approach will result in a higher valuation for a day old animal than the Cost-of-Production Approach.

Avian Influenza Outbreak in Virginia, USA:

In the spring of 2002 low pathogenic Avian Influenza (LPAI) was discovered in the Shenandoah Valley of western Virginia, a major production region for both chickens and turkeys. The state of Virginia requested the assistance of the USDA in eradicating the disease from all infected poultry operations in the valley. In the end, 3.7 million birds were depopulated with an additional 976,000 sent to controlled slaughter. Almost two-thirds of the birds eliminated were meat turkeys and almost one-sixth were chicken broilers. More importantly, over a half million broiler breeders and over one hundred thousand turkey breeders were among the depopulated birds. Due to the highly integrated nature of the U.S. poultry industry, political influence and differing opinions on the valuation methods used for compensation, a number of compensation issues arose during this outbreak.

The poultry industry in the United States is a highly integrated industry with most companies owning the birds from hatching to harvest and much of the physical assets as well. Sometimes, however, poultry companies will contract individuals to supply

housing and labor to raise their birds. These individuals are known as contract growers. One issue arose when the U.S. Secretary of Agriculture announced that total compensation was to be limited to fifty (50) percent of the bird's market value, but that contract growers were to be made whole, i.e. receive compensation equal to what they would have earned if their poultry houses had not been depopulated. Since, not all poultry companies use contract growers an equity issue arose over the treatment of grower compensation. To be equitable to both types of poultry companies, it was decided that total compensation for a flock would be independent of the ownership of the house in which the flock resided. Poultry company compensation for a flock would equal total appraised value multiplied by the 50 percent compensation rate minus any contract grower compensation paid. Thus, poultry companies that didn't use contract growers received all the compensation paid out for the flock.

The process of determining depopulated bird values began with a meeting between the affected companies and the USDA. In the initial phase of determining the value of the birds, USDA personnel had to familiarize themselves with poultry production processes and bird valuation methods used by poultry companies. Poultry companies value their birds at a book value, i.e. capitalization cost minus depreciation, which is equivalent to the Cost-of-Production Approach. However, poultry companies expressed a desire to receive fair market value which they perceived to be greater than their book value. Therefore, the Income Approach was used to determine bird appraisal value.

Poultry companies provided USDA personnel with detailed information on bird production and processing costs. Gross revenue was based upon a published price series for poultry meat and average processed bird weight. Subtraction of bird production and

processing costs from gross revenue yielded net revenue per bird. A question arose on how should this net revenue be allocated among the various production/processing phases? An allocation of 100 percent to birds would result in a high maximum bird valuation, while a zero allocation to birds would result in a valuation equal to production costs. USDA personnel decided to have all of the net revenue allocated to the live birds, to help compensate for expected processing plant downtime and lost profits associated with the depopulation. For birds younger than slaughter age, all the way to day-old chicks, value was prorated by linearly subtracting input costs, mainly feed. Housing and labor costs (grower pay) were not considered in the calculation of input costs to ensure that recently placed chicks would have a minimum compensation value that was greater than the compensation that contract growers would receive. This was done in response to the Secretary of Agriculture announcement that capped total compensation to 50 percent of value, but contract growers were to receive compensation equal to 100 percent of normal pay from the companies. From day-old chick value, hatchery costs were subtracted to determine the value of a fertilized egg.

The value of a breeder bird is equal to its net value of its expected fertilized egg production plus its spent hen value. Net value of expected fertilized egg production was determined by multiplying the expected number of fertilized eggs by the appraised value per egg plus minus appropriate egg production costs. Once again housing and labor were excluded from production costs to represent potential grower pay. Maximum or peak value of breeding birds occurs on the first day of lay. With each egg the breeder bird produces, its value declines until it reaches its salvage (spent) value. Costs for raising a young breeder bird, except for housing and labor, were subtracted from maximum

appraisal value breeder birds to determine their day-old appraisal value. A linear (weekly) rate of increase was assumed from the day-old value to maximum value at the beginning of lay and then a linear (weekly) decline to salvage value at the end of lay was also assumed. Since broilers breeder companies calculate their costs on a per hen basis; the rooster has no separate value but is compensated through the value of the hen or as a breeding set. Thus, total compensation for a broiler breeder house was determined by multiplying total number of hens by the breeder bird compensation rate. To adjust for seasonal price and costs variations available data sources from the 12 month period of March, 2001 to February, 2002 was used in the calculations.

Turkey egg production differs from broiler egg production in that artificial insemination is used with toms (male turkeys) being raised in separate facilities where their semen is collected and transported to the hens. Up until recently, the two affected turkey companies had been purchasing semen; the past known purchase price of semen was used to determine the compensation value for the toms. The same evaluation method used for determining the value of the broiler breeder hen was used to determine the value for the toms. The gross revenue was calculated as the expected number of doses of semen produced multiplied by the semen purchase price per dose. Production costs were then subtracted from the gross revenue to determine the tom's net value at the beginning of collection. The spent birds' salvage value was then added to the net value to come up with a maximum compensation value for a tom.

US Outbreaks - Lessons Learned:

To USDA, poultry companies expressed misunderstanding about the compensation value presented to them for breeder birds. As mentioned earlier, companies value their birds at book value, capitalization cost minus depreciation, with the value of lost egg production being a separate loss. However, the Income Approach used by USDA economists to determine the breeder bird value incorporated the value of lost egg production. When USDA presented its breeder bird appraisal values, the companies still wanted to add the net value of lost egg production to determine the total cost of the outbreak. This represented a double accounting of outbreak costs. Even still, the poultry companies successfully lobbied the government for a higher compensation rate, from 50 percent to 75 percent of the appraised value. Such action called into question the wisdom of applying 100 percent of net revenue in the calculation of the breeder birds' value.

The appraisal value for a breeder bird is very sensitive to the percentage of net revenue allocated to bird value. For example, broiler breeders ranged in value from $8.19 with 0 percent net revenue allocated to them to a value of $28.88 with 100 percent net revenue allocation. For turkeys, the swing in value was even greater, $36.10 at 0 percent net revenue allocation to $174.83 at 100 percent net revenue allocation. With appraisal value being so sensitive to allocation of net revenues, the allocation of net revenue was later investigated. One way to allocate net revenue among the various production and processing phases is by their relative contribution of total costs. While investing net revenue allocation options it was realized that the Cost-of-Production Approach that incorporates net revenue will generate the same appraisal value as the Income Approach.

That the two approaches lead to the same value when net revenue is properly allocated is demonstrated using numbers presented in Tables 1 and 2. Table 1 has simulated broiler production and processing costs, loosely based on values obtained during the Virginia LPAI outbreak. At the bottom of Table 1 is an allocation of net revenue to the different production/processing phases based on their approximate relative contribution to total costs.

Table 2 shows the calculation of appraisal value for both the Cost-of-Production and Income Approaches. The Cost-of-Production starts with the breeder bird and works forward through the production process. Net revenue allocated to breeder birds is added to their capitalized cost to produce the appraisal value of $10.992 per bird. The next step is to determine the appraisal value of a fertilized egg. Total value of fertilized eggs equal the appraisal value of breeder birds plus production costs during lay minus spent hen value. This resulting egg production cost is then divided by the expected number of fertilized eggs to be laid to obtain a cost per fertilized egg, $0.125. This fertilized egg cost is divided by hatch rate to determine egg cost per chick placed. Added to this egg cost is hatchery costs, chick transportation costs and net revenue allocated to hatchery production with the resulting sum being the appraised value of a day-old chick, $0.238. The day-old chick cost is then divided by broiler bird survival rate resulting in the chick cost per harvested broiler. To this chick cost broiler grow-out costs and net revenue allocated to broiler grow-out is added to generate the appraisal value of a broiler bird ready for harvest, $1.756.

The Income Approach starts with wholesale value of a processed bird and works backwards to the value of breeder bird. Plant processing costs and net revenue allocated

to plant processing are subtracted from the value of a processed bird to give the value of a broiler ready for harvest, $1.756. Broiler grow-out and allocated net revenue are subtracted and this difference is divided by broiler survival rate with the result being the appraisal value of a day-old chick, $0.238. From day-old chick value, costs associated with chick transportation and hatchery costs are subtracted along with hatchery allocated net revenue to obtain the value of a fertilized egg. The value of a fertilized egg is multiplied by the hatch rate and expected number of eggs to be laid which equals the gross value of a breeder bird. To the gross value of a breeder bird egg production costs are subtracted and spent hen value is added, with the net being the appraised value of a breeder bird, $10.992.

Since the value for broiler breeders was determined before turkey breeders, the same spreadsheet format used for broiler breeders was used for female turkey breeders. However, with broiler breeders the costs associated with roosters were not calculated separately but were expressed on a per hen basis or as breeding sets. With turkey breeders, hens and toms are raised separately therefore the value of a breeder hen and a breeder tom had to be calculated separately. Since it takes both a male and a female to produce a fertilized egg, the value of the fertilized eggs produced should be evenly divided between male and female breeders. For turkey female breeders this 50 percent reduction in the value of eggs produced would have reduced the female breeder bird appraised value from $174.83 to $75.42 assuming 100 percent net revenue allocation to birds and from $36.10 to $6.06 with 0 percent net revenue allocation. Using this same method of evaluation based upon fertilized eggs instead of semen, toms would be evaluated by taking one-half of the value of the fertilized eggs a hen produces and then

multiply it by the number of hens a tom can service, on average one tom can service five hens. From a tom's gross revenue, production costs would then be subtracted to determine the tom's net indemnity value. If cost information on toms is not available, then the indemnity value of hens could be multiplied by the ratio of hens a tom services to determine the tom's appraised value.

As mentioned previously, the Secretary of Agriculture declared that contract growers would be made whole, i.e. receive indemnity equal to what they would have received if their bird houses had not been depopulated or be compensated for their lost revenue due to depopulation. Since "made whole" included the whole production cycle and not just accrued earnings at time of depopulation, the subtraction of the full grower pay would result in companies receiving less than full value for their birds. Therefore, housing costs and labor costs representing contract grower pay were not subtracted as costs in determining appraisal value. However, not subtracting any housing or labor costs resulted in an over valuation of the birds. Housing and labor costs should have been prorated for the time the birds were in the barn and the prorated amount then should have been subtracted as a cost, i.e. for a meat bird subtract all housing and labor costs for birds ready for harvest and subtract no housing and labor costs for day-old chicks.

A more straight forward way to compensate contract growers is to have them receive the same percentage compensation that the poultry companies receive. Then the indemnity value of the bird would contain the value owed to contract growers. However, contact growers might be fearful that they will not receive the compensation due them in a depopulation situation if their lost revenues are not made a specific part of the compensation plan. Determining grower pay independent of the companies could prove

to be very difficult as not all contract growers operate under the same contract. It is interesting to note that in the Virginia LPAI outbreak individual contract growers deferred to company records for the number of birds in their houses and past flock earnings, upon which their compensation payments from the government was determined. Thus, it should be reasonable to pay the companies all of the indemnity and then have the companies in turn pay their contract grower for the portion of grower pay that is owed for services rendered. To assist in this effort, the Animal and Plant Health Inspection Service could have the companies sign a statement with each indemnity claim stating that the companies will pay the contract grower what is owed, making sure that the contract growers also receive a copy of the statements.

High Pathogenic Avian Influenza Outbreak in British Columbia, Canada:

In February, 2004 a high pathogenic Avian Influenza (HPAI) outbreak occurred in the Fraser Valley of southern British Columbia. Under the authority of the Canadian Food Inspection Agency's (CFIA) *Health of Animals Act (HAA*), approximately sixteen (16M) million chickens and turkeys and nine hundred (900) thousand specialty birds, were ordered depopulated in order to control and eradiate the disease. The federal compensation packages under the HAA became a very important tool in the depopulation effort.

The Canadian poultry market is different from that in the United States as Canada is not as highly integrated, rarely has contract growers and producers raise their birds independently from the processors and hatcheries. Producers purchase day-old broiler chicks, from the hatcheries at a known market price, and raise them in their facilities until

slaughter age. The broiler birds are then collected and sent to the processor where the producer receives a payment based upon the live bird weight (kilograms) and a set marketing board price per kilogram[4]. There is an additional market for spent breeder birds. In Canada, chicken, turkey and eggs are all supply managed commodities; the marketing boards played a key role in both the depopulation and clean up efforts as well as in determining the appropriate indemnity payments owed to producers for their depopulated birds.

The primary issues that arose from the British Columbia outbreak were differences in valuation methods used by the CFIA and a private consulting firm hired to determine the impact of the outbreak, that HAA did not have specific maximum values for most specialty breeds, and the lack of timely and readily available published or multiple source input cost data. For some specialty birds the sole source data was from individual producer records.

The poultry industry, with the support of the Federal government, hired an independent consulting firm to make an estimation of the financial impact to primary and secondary industries due to the disease outbreak. Included in the report was a schedule of fair market values or appraisal values for the poultry and eggs that were used to determine the total financial impact to the primary producers affected by the disease outbreak and subsequent depopulation. The consultant's preliminary report[5] used three valuation methods; the Income Approach, the Market Approach or Direct Comparison Approach, and the Cost Approach. Since Canada has a supply managed poultry system the consultant argued that "regardless of the approach used in valuation… in a suppy

[4] The price per kilogram is usually ascertained through negotiations and contracts between the poultry marketing board and the processing companies.
[5] Compensation Value: As Outlined in the Health of Animals Act, April 30, 2004.

managed poultry system, once an individual owns the productive asset (bird), they also own the right to the value that the asset creates over its life cycle. Due to restricted supplies, in the event that the production cycle is interrupted there is no re-entry until the beginning of the next cycle. As a result, a seller would not willingly sell a given flock at any point in the cycle (starting in week one) for less than the net value that it would accrue over its full life cycle." This created a compensation value that included future loss of income from the depopulated birds due to lifecycle interruption. The consultant argued that because the depopulation was forced by the government and that there was not a willing seller involved in the sale of the bird, a producer would want to recapture the forgone income in the sale price of the bird, thus this forgone revenue must be included in the replacement value of the bird. The forgone income stream can be included in the valuation of a bird if all future forgone costs are also included yet the consultant argued that in the short run, fixed capital costs are not relevant to a short term production cycle therefore they decided to excluded fixed costs in their valuation calculations

The Federal government determined the value of breeder birds and laying hens by using the Income Approach[6]. It was determined that the gross revenue created by a laying hen and a breeding set[7] is the number of egg it produces over its lifespan multiplied by the value of each egg.[8] The wholesale price of table eggs was applied to a laying hen and the wholesale price for fertilized eggs, as paid by a hatchery, was applied to the breeding set. Added to the egg revenue was the spent (carcass) value of the bird at

[6] The costs for a breeding bird must include the male birds input for fertilization. This is not required for table egg layers since the eggs are produced without fertilization therefore no male input is required.
[7] 1 rooster can service 5 females which are considered a "breeding set" for calculation purposes.
[8] Roosters were not calculated separately in this case unless a producer had a barn of spiking roosters.

the end of its lifetime. The hens' value was calculated on a breeding set basis therefore the variable and fixed input costs had to include the costs of both the females and the male bird that created the revenue stream. The male birds' costs were calculated on a one male to five female ratio, so that the males' costs were divided evenly over all five of the females it was expected to cover. All of the input costs are subtracted from a hen's gross revenue to calculate the profit or the return to owner labor and management, per hen. The maximum value for the bird was determined to be the point at which the hen first starts to lay, usually around 22 weeks of age.

Two similar methods could be used to calculate the value of the breeder birds at difference ages. The first method adds the weekly profit of the bird to the day-old chick value until the maximum value is reached at 22 weeks and then reverses the process by subtracting weekly profit earned until the bird reaches it spent value. The second method simplifies the process by assuming linear weekly increase from day-old value to maximum value and then a linear weekly decrease to spent value, essentially a triangle. The difference between using these two methods are minor as both are anchored by the same values for day-old birds, birds at beginning of lay (maximum value) and spent birds and thus the simpler triangle/straight line valuation method was used.

CFIA's valuation of birds by age differed than the values proposed by the consultant, especially for sexually immature breeder birds. The consultant wanted to value such young birds very close to their maximum value at beginning of lay. If producers had been compensated at this higher rate proposed by the consultant, then they would have been made better off then if the outbreak had never occurred. This over compensation

would have then create an unfair advantage for the injured producer when compared to a producer that was not directly affected by the disease and never had to be depopulated.

The use of Spiking roosters created a sub set of animals that needed to be valued separately from a rooster in a breeding set. A spiking rooster is a sexually mature rooster who is placed into a flock during specific times over the flocks' lifespan. The spiking rooster is rotated into the flock during a time of decreasing fertility rates. Since roosters are territorial, the new rooster increases the productivity of the existing flocks' roosters as well as having the spiking rooster also being able to cover the hens. After a few weeks either the spiking rooster or an existing flock rooster is then removed to be placed into a new flock with the rotation continuing. This helps to keep the fertility rates more or less constant over the entire lifecycle of the flock. Since there were a few producers who raised spiking roosters specifically to increase the fertility in their flocks, compensation rates for these males had to be calculated outside of the breeding set ratio. Spiking rooster values were determine using the same triangle / linear method of breeder birds as day-old chick value, maximum value, and spent bird value are based upon known market prices.

A large variety of specialty birds are raised in the Fraser Valley including Squab, Blue Leg Chicken, Pheasant, Quail, Tinamou, Silkies, Ostrich, Emu, Ducks and Geese. Due to the nature of these species these markets have taken a long time to develop and therefore the majority of breeding and hatching is done by each specific producer with very little market trading of breeding animals. The meat birds were valued based upon their known carcass value or live value minus the processing costs. The breeder birds were valued similarly to the breeding chickens and turkeys except the value of these birds

are much greater than is allowed under the *Health of Animals Act*. This meant that the majority of breeder specialty birds were not able to be compensated for at their full market value, but were capped at the maximum value allowed under the Act. (Figure 1)

Canada - Lessons Learned:

Having any consulting firm involved in compensation calculations can increase the complications associated with the compensation evaluation process. It could be said that instead of helping governmental economists determine the value of the depopulated birds quickly, the report generated by the consultant actually created an additional burden on the government as it had to use valuable time and resources to refute the values that were generated by the consultant in their report. This divergence of opinions and published results is very common whenever values are estimated for commodities. Since there is no one method of determining these values and not every business has the same input costs, discrepancies will always emerge especially in a time of crisis. Unfortunately, the report created by the consultant raised the expectation of what producers felt they should receive as government compensation. While government economists were able to partially reduce the consultants' appraisal values to be more in line with the estimated market values, they were not always successful. Some values were increase to obtain middle ground, e.g. day-old replacement chicks were valued using the consultant's income approach which excluded fixed costs (Figure 1). During any stressful or catastrophic event where a persons business and/or livelihood are at stake, the government can be seen as both helping and hindering a situation. Therefore, diplomacy, good science, and business rules are required to make sure that no producer is unduly harmed or made better off due to the government's response to an event.

In Canada, the CFIA is expected to review the maximum compensation values, as set out in the *Health of Animals Act*, due to complaints that for specialty birds, the values were too low, some breeds are not listed under the act and had to be valued as commercial poultry. Re-evaluating these values is not an easy task as many specialty bird breeding sets currently have a high value due to lack of availability. As more producers enter the specialty bird industry, especially as primary breeders, the value of breeding sets will rise and then fall until stabilizing at a long-term equilibrium level. In the meantime, producers are seeking a compensation value that reflects the current over inflated market price. For example, the current value for a breeding pair of Squab (Pidgeon) is $150/pair[9]. This is a high value when compared to the earning potential of the Squab offspring as the number of meat birds that can be produced from a breeding pair, a more long-term equilibrium price would be $50 per pair.

While working with industry on compensation rates for depopulated poultry breeder birds, the use a straight line evaluation method based upon the maximums under the *Health of Animals Ac* was strongly considered as a rapid method of paying breeding bird producers, due to lack of know market values. If the straight line method, using maximum values, was used for compensation calculations due to political pressure and expedience, in many cases producers would have been overcompensated for their birds.[10]

For specialty birds, the compensation maximums under the act were not high enough to fully capture the full value of the breeder specialty birds (Figure 3). In some cases, the commercial production of a new species of specialty birds was started after the *Health of*

[9] Unlike poultry, Squabs breed as a pair, 1 male to 1 female ratio.

[10] Figure 2 shows the straight line evaluation method of the *Health of Animals Act* maximum value compared to estimated compensation values developed by the Government of Canada.

Animals Act was created, therefore some species of specialty birds are not individually listed and had to be included and capped under the poultry category e.g. Taiwanese blue leg chickens. In other cases, the maximum values were much lower than the actual value of the breeder birds, in part due to the genetic value of the specialty breeding bird i.e. ducks and geese. Another issue with specialty bird compensation or any specialty animal compensation is that producers, who enter these industries during an industry growth period, may pay inflated prices for their initial breeding animals and once the market stabilizes, the animals will no longer hold the same high value.

Many argue that the *Health of Animals Act* was not created to fully compensate producers for the full value of their birds but to offer enough compensation to reward producers for reporting diseases. In either case the maximum values need to be fairly set so that they compensate all producers equally. Compensating a chicken producer for full market value of the bird destroyed if it is less than allowable maximum while only compensating the specialty bird producer up to the maximum if the bird's value is greater, for the same disease outbreak is an unfair practice and creates an unfair economic advantage. Under the *Health of Animals Act,* a review of the regulations is required every five years to ensure that the maximum values are compared and adjusted to remain in line with the parameters of the act and the known market values; the act is currently up for review in 2005.

Summary

Cost-of-Production Approach and Income Approach are two viable methods for estimating the fair market value of a bird or an animal that does not have observable market prices. When net revenues are allocated among the various production phases,

both methods should generate the same appraisal values. The key to using either method is to obtain accurate revenue and costs estimates as slight changes in either can greatly influence the final appraisal value. On the cost side, it is important to include all fixed costs and depreciation charges. Excluding fixed costs in the Income Approach results in an appraisal value that represents a maximum price that would be sustainable only in the short-run and thus not representative of a true long-run sustainable market value. In addition, the allocation of net revenue is also important; allocation of all net revenue to the birds ignores the opportunity cost associated with the capital that is invested in the production assets, overstating the birds' value. Finally, when estimating total losses it is important not to mix the methodologies that are used when valuing the assets. Using one method to calculate the loss in value of a set of assets and then dividing the assets into separate but equal values can result in a double accounting of the losses if the revenue and costs are not split proportionally between the two assets. In the Canadian experience, the consultant's valuation of roosters and breeding hens created a double counting for the rooster.

References

Boehlje, M. D. and V. R. Eidman. 1984. *Farm Management*. John Wiley & Sons, New York.

Canadian Health of Animals Act [SC 1990, C.21], Compensation for Destroyed Animals Regulations, SOR/2000-233

Public Law 107-171. Farm Security and Rural Investment Act of 2002, Title X, Subtitle E, Animal Health Protection Act. http://frwebgate.access.gpo.gov/cgibin/useftp.cgi?IPaddress=162.140.64.21&filename=publ171.pdf&directory=/diskc/wais/data/107_cong_public_laws.

U.S. Code of Federal Regulations. Title 9 Animal and Animal Health Products. Chapter 1 – Animal and Plant Health Inspection Service, Department of Agriculture. Part 53 Foot-and-mouth disease, pleuropneumonia, rinderpest, and certain other communicable diseases of livestock and poultry. www.access.gpo.gov/nara/cfr/cfr-table-search.html#page1.

553

Table 1. Simulated Broiler Production Costs and Revenue[1,2].		
Row	Item	
1	Eggs per breeder bird	145
2	Breeder bird capitalization cost ($/bird)	$7.50
3	Breeder bird production cost during lay ($/bird)	$8.00
4	Spent hen value ($/bird)	$0.80
5	Production cost per egg ($/egg) [(2+3-4)/1]	$0.1014
6	Hatch rate	83%
7	Chicks hatched [1 x 6]	120.35
8	Hatchery costs ($/chick)	$0.0482
9	Egg cost per chick hatched ($/chick) [(5/6) + 8]	$0.1703
10	Chick transportation cost ($/chick)	$0.01
11	Total cost of day old chick ($/chick) [9+10]	$0.1803
12	Chick survival rate	95%
13	Chick cost per processed broiler ($/broiler) [11/12]	$0.190
14	Feed cost per pound of gain ($/lb)	$0.155
15	Contract grower payment per pound of gain ($/lb)	$0.050
16	Other broiler costs per pound of gain ($/lb)	$0.020
17	Total grow-out costs per pound of gain ($/lb) [14+15+16]	$0.225
18	Broiler live weight at processing (lbs)	5.33
19	Total grow-out costs per processed broiler ($/broiler) [17 x 18]	$1.199
20	Total broiler cost at processing ($/broiler) [13+19]	$1.389
21	Broiler carcass weight (lbs)	4.00
22	Broiler cost carcass basis ($/lb) [20 / 21]	$0.347
23	Broiler processing cost ($/lb)	$0.250
24	Total broiler cost ($/lb) [22+23]	$0.597
25	Broiler processing cost ($/bird) [21 x 23]	$1.000
26	Total broiler cost ($/bird) [20+25]	$2.389
27	Broiler wholesale price ($/lb)	$0.750
28	Broiler wholesale value ($/bird) [21 x 27]	$3.000
29	Broiler net revenue ($/bird) [28-26]	$0.611
30	Percent net revenue allocated to processing plant	40%
31	Percent net revenue allocated to broiler grow-out	50%
32	Percent net revenue allocated to hatchery	5%
33	Percent net revenue allocated to fertilized egg production	5%
34	Net revenue allocated to processing plant ($/broiler) [29 x 30]	$0.244
35	Net revenue allocated to broiler grow-out ($/broiler) [29 x 31]	$0.305
36	Net revenue allocated to hatchery ($/chick) [29 x 32 x 12]	$0.029
37	Net revenue allocated to fertilized egg production ($/egg laid) [29 x 33 x 12 x 6]	$0.024

[1]Numbers in brackets, [], refers to how the item was calculated.
[2] Rounded values are shown, but calculations were done using a spreadsheet without rounding.

Table 2. Cost-of-Production and Income Approaches to Determining Appraisal Value of Broilers and Broiler Breeders[1,2].

Cost-of-Production Approach		Income Approach	
Broiler Breeders	Example	Broilers (meat birds)	Example
expected eggs laid	145	wholesale bird value	$3.000
x breeder bird net revenue	$0.024	- plant processing cost	$1.000
= profit per breeder bird	$3.492	- processing plant net revenue	$0.244
+ breeder capitalization cost	$7.500	= appraisal value of broilers	$1.756
= appraised value of breeders	$10.992		
		Day Old Chicks	
Day Old Chicks		appraisal value of broilers	$1.756
appraisal value of breeders	$10.992	- broiler grow-out costs	$1.199
+ production costs during lay	$8.000	- broiler grow-out net revenue	$0.305
- spent hen value	$0.800	= value to chicks	$0.251
= total cost per breeder	$18.192	x broiler survival rate	95%
/ eggs laid	145	= value day-old chick	$0.238
= production cost per egg	$0.125		
/ hatch rate	83%	Broiler Breeders	
= egg cost per chick placed	$0.151	value day-old chick	$0.238
+ hatchery cost per chick	$0.048	- chick transportation cost	$0.010
+ hatchery net revenue	$0.029	- hatchery cost	$0.048
= chick cost at hatchery	$0.228	- hatchery net revenue	$0.029
+ chick transportation cost	$0.010	= value of fertilized egg	$0.151
= cost per chick placed	$0.238	x hatch rate	83%
		= value of a laid egg	$0.125
Broilers (meat birds)		x expected eggs laid	145
Cost per chick placed	$0.238	= gross value of eggs per hen	$18.192
/ broiler survival rate	95%	- production cost of eggs	$8.000
= chick cost per broiler	$0.251	= net value of eggs laid	$10.192
+ broiler grow-out cost	$1.199	+ spent hen value	$0.80
+ broiler grow-out net revenue	$0.305	= appraised value of breeders	$10.992
= appraised value of broilers	$1.756		

[1]Based on values from Table 1.
[2]Rounded values are shown, but calculations were done using a spreadsheet without rounding.

Figure 1:

The consultant's model put all of the revenue for the bird upfront. Thus, a day-old chick with a known market value of $4.52, a value also used by the consultant to calculate input costs, was valued at $23.98, an overvaluation of $19.46. Since the average lifecycle of breeder broiler is 60 weeks; costs are usually weighted towards the beginning of the cycle while the income is generated towards the middle and end of the production cycle but the consultant calculations did not include any time value discounts for invested money. The lack of time value discount gave an additional $1.05 value to a day old chick, which for an average producer with 10,000 birds equals over $10,500 in additional compensation. The consultant's model also had the birds lifecycle as 57 weeks versus the average lifecycle of 72 weeks.

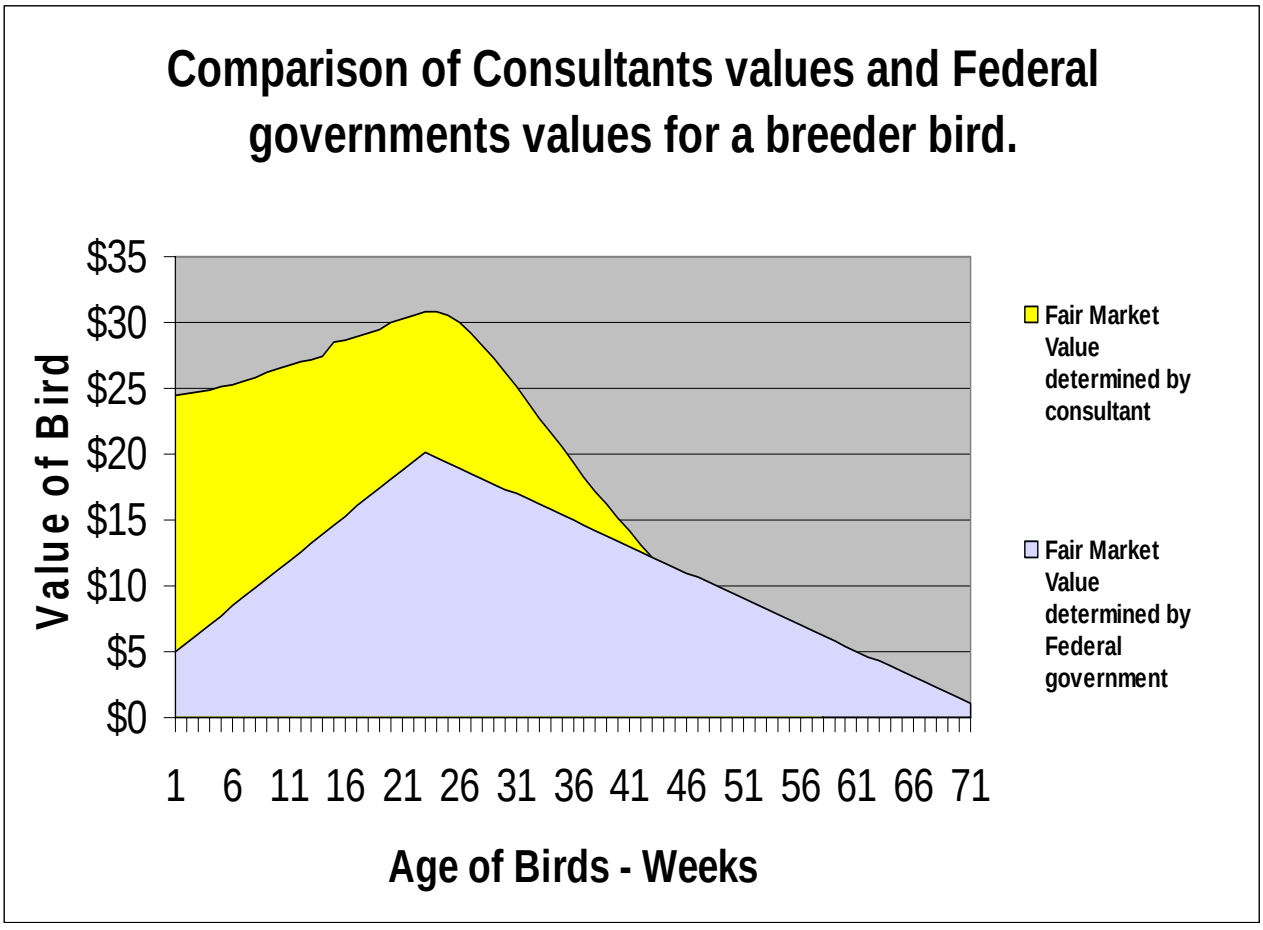

Figure 2:

It was recommended that the *Health of Animals Act* maximum value be used to value a bird, in a straight line method (day-old, to peak at 22 weeks, to cull) to determine the birds value instead of using input costs or income stream. When compared to an estimated value created by the Government of Canada, the straight line evaluation method using the maximums under the Act, would have created an overcompensation of the bird's actual fair market value.

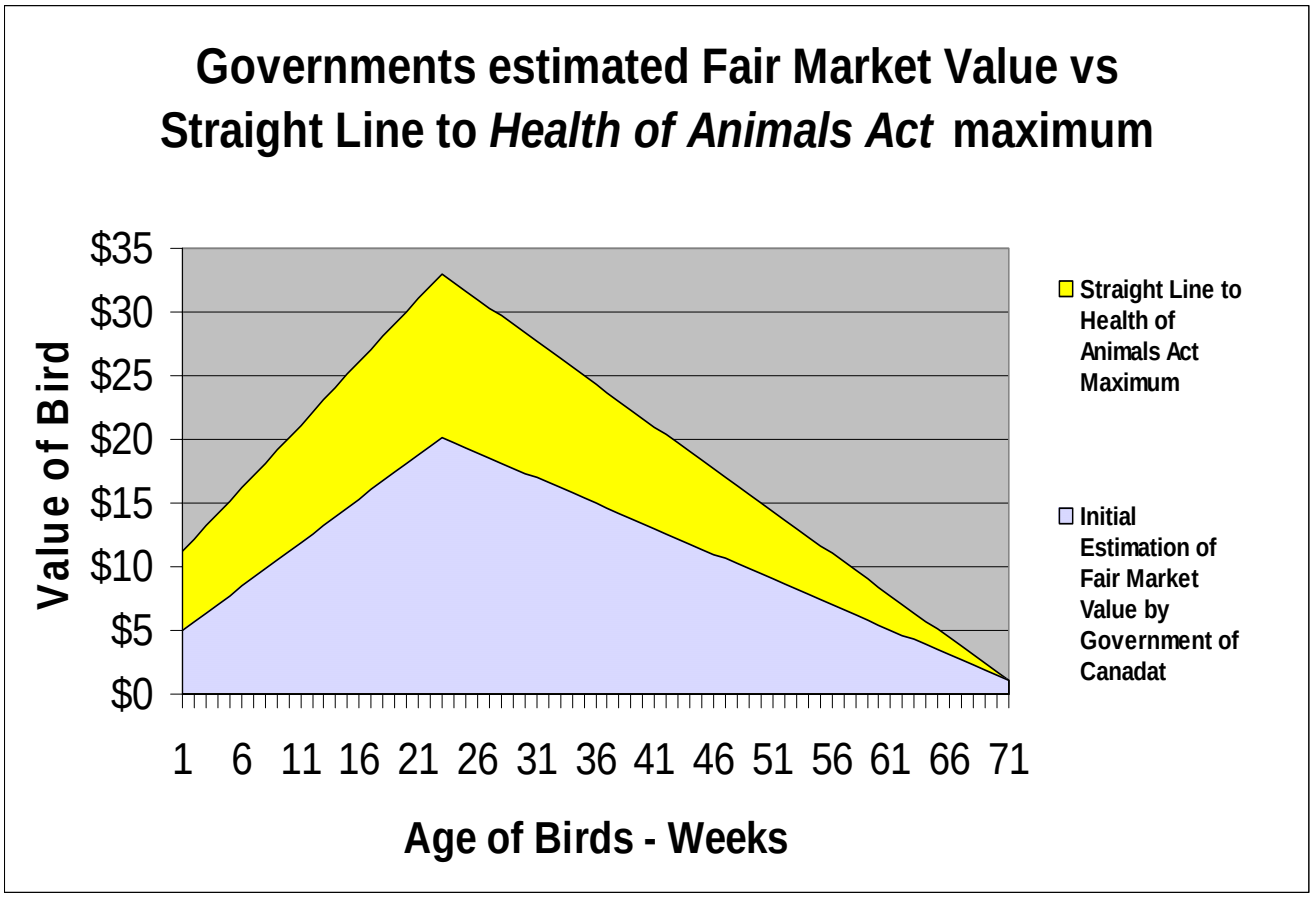

Figure 3:

Comparison of the actual calculated Fair Market Value (FMV) for a breeder duck (hen) and the compensation value of the same bird once it has reached its maximum replacement value under the *Health of Animals Act* (HAA). The figure shows that the producer loses a large portion of the specialty bird's value due to the restrictions of the maximum value payable under the act. These regulations may be reviewed in light of the recent Avian Influenza outbreak.