The economics of animal health in farmed livestock at the herd level

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Summary
Animal health economics is a relatively new discipline which makes use of concepts, procedures and data to support the decision-making process with the objective of optimising animal health management. As the economic impact of most diseases that afflict farmed livestock is typically greater at the sub-clinical rather than the clinical level, animal health management often involves decisions regarding expenditure on preventive measures as well as the treatment of obviously sick animals. Animal health programmes have been shown to provide a very high return on investment. This is because reduction of the impact of disease increases the efficiency of production, often without the need for additional inputs such as feed or labour. The analytical techniques described in this chapter are the simplest, most useful, and most commonly used by animal health economists. Most decisions in animal health economics at the farm level can be arrived at by using partial budgeting, decision tree analysis, or cost-benefit analysis techniques – either alone or in combination. Regardless of the technique chosen, the analysis is only as good as the quality of the data used.

Keywords

Introduction
Economics is concerned with making decisions. Economic decisions at the farm level are mainly focused on the allocation of resources such as land, labour, and capital among alternative uses. A fundamental characteristic of economic analyses is that the analysis is never entirely complete. Additional data can always be added to the information base being assembled to support the decision-making process. However, sooner or later, a decision must be made and a plan implemented. The purpose of economic decision-making, therefore, is not to 'be right' or to predict the future. Rather, the aim is to make the best decision given the available information. Because of the many subtle ways in which most diseases affect the productivity of farmed livestock, decisions concerning animal health are seldom made on an all-or-nothing basis. The animal health economist employs a limited number of analytical methods to assemble and analyse production and financial data to provide a framework for economic decision-making.

Cost of disease versus benefit of control
The inclination of individuals without training in animal health economics is often to attempt to estimate the 'cost of disease'. Statements such as 'bovine mastitis costs the nation $50 million per year' appear regularly in research proposals, newspapers and magazines. Such statements inevitably overstate the case because the figures are based on the following flawed assumptions that:
a) the disease could be instantly eradicated at zero cost
b) current prices received by farmers and paid by consumers would remain unaffected by the increase in production as a consequence of eradication of the disease.

Moreover, as the ramifications of disease control flow from the farm, through various food processing and retailing steps before eventually benefiting the consumer, an attempt to
calculate the 'cost' of a disease quickly becomes a complex and extensive exercise.

Alternatively, economic analysis techniques used by animal health economists are designed to estimate the benefits of disease control at the farm, regional, national, or international levels. In general, economic analyses performed from this perspective are simpler to construct and carry out. As disease eradication at the individual farm level is rarely a feasible option, economic analysis techniques can provide the decision maker with guidance to the cost-effectiveness of reducing disease prevalence to a manageable level. This introduces the concept of marginality. Where the cost of investing in further control measures exceeds the benefit of increased productivity, then to continue to spend money on the problem makes no sense. Furthermore, the rational decision maker should be concerned with alternative uses of available funds, such that the overall return on investment in the livestock production system is maximised, or at least consistent with the risks involved.

The importance of quality data

The most difficult aspect of economic decision-making is the acquisition and organisation of data in a format suitable for economic analysis. Once the relevant data have been assembled, the processes of formal analysis tend to be relatively straightforward. The quality of the data underlying health management decision-making at the herd level is a critical factor that impinges directly on the appropriateness of, and confidence in, the decisions made. Quality and completeness of financial accounting data is particularly important when estimating the potential benefits of competing interventions intended to protect against or reduce the impact of disease on the health and productivity of livestock populations.

Financial accounting data

Because of the widespread use of agreed and standardised methods of financial accounting, the process of gathering, the interpretation, and the use of financial data in decision-making in most sectors of the economy is a relatively straightforward process; agriculture, however, is the exception. Other industries have long ago adopted double-entry, accrual accounting methods, based on generally accepted accounting principles (GAAP). On the verge of the 21st Century, more than 90% of agricultural producers in the United States of America are still using cash-basis accounting. As the primary motivation of farmers for keeping financial records has typically been the legal requirement of income tax reporting, use of such records to support health management decisions can be dangerous and misleading. Financial records kept for tax reporting purposes which ignore the costs of carrying crop, feed, and growing livestock inventories tend to be biased towards making the business appear to show as little profit as possible. This is understandable, as the accountant is paid to find creative ways of minimising the income tax obligation of the business.

The remaining 10% of agricultural producers have more in common with the non-agricultural sector. Double-entry accrual accounting provides a system of managerial accounting that is useful in support of daily decision-making as well as more occasional exercises such as choosing between alternative approaches to controlling disease in livestock herds. By flowing expenses and revenues through defined cost and profit centres, managers have constant access to up-to-date information. On a daily basis, the manager is able to generate reports showing the cost of producing a kilogram of milk, the annual profit per animal place, or the cost or profit per head or per kilogram of pork sold. Additionally, managerial accounting also provides the information needed to comply with income tax reporting requirements.

Small farmers typically use cash-basis accounting, while larger producers have been the first to adopt managerial accounting practices. This tendency has been the source of some confusion regarding comparisons of the cost of production among various farm firms and production systems. For example, in managerial accounting, one can calculate three 'break-even' costs of producing a market weight pig. These are the production, operating, and total (net) break-even costs. Each of these break-even measures is clearly defined, and allows the analyst to isolate production efficiency from business efficiency and leverage (use of debt).

Managerial accounting also requires management to allocate assets and liabilities, which comprise the business entity, by commodity (e.g. pork, milk and corn), by location (e.g. farm 1, farm 2), or by group (e.g. freshly-calved cows, first-calf heifers, mid-lactation cows, dry cows). With this degree of organisation, the farm financial accounts can provide meaningful data on the production of each commodity, including the amounts and costs of inputs and the quantities and revenues received for marketed products.

Production records

A good financial management information system is often complemented by a good production records system maintained on a microcomputer. Production records are kept either on an individual animal basis (e.g. cows, sows), or on a group basis (e.g. growing pigs). One particular strength of computer-based production records systems is the ability of these systems to maintain accurate and complete lifetime histories and to generate a management list on a daily or weekly basis to identify animals requiring attention (a list of actions which need to be undertaken to ensure effective management). Once data have been maintained for one or two production cycles, the powerful analytic capability of the
microcomputer allows the manager to generate information on the physical productivity of the livestock herd. Comparison of physical productivity measures for groups of healthy and diseased animals can provide an indication of the loss of production efficiency attributable to disease, or conversely, the expected gains in production efficiency if the impact of disease could be minimised.

Monitoring and control

Animal health management is essentially a process of monitoring and control. Depending on the nature of the health issue under consideration, an operational, tactical, or strategic plan may be developed, implemented and monitored. An example of an operational (short-term) plan is dietary supplementation to prevent hypomagnesaemia in dairy cattle for the first month of the grazing season. A tactical (medium-term) plan might involve the use of diagnostic tests to identify dairy cattle carrying *Staphylococcus aureus* in their udders, followed by the segregation of these animals from the herd, or culling. Strategic (long-term) plans often involve the development of vaccination strategies and the quarantining and acclimatisation of purchased animals to protect the herd against infectious diseases.

Whatever the plan, a system of monitoring and control must be in place to inform management of the effectiveness of the programme. Complete and up-to-date production and financial records including the incidence of mortality, morbidity, treatments, vaccinations and related costs (i.e. costs related to treatments and vaccinations) can help managers to monitor health management plans, indicate the need for adjustments, and help monitor the effectiveness of adjustments made. Where significant differences between desired or expected physical production and budgeted financial performance begin to emerge, the monitoring system will alert the farmer to the situation, thus providing the opportunity to intervene before serious economic loss is incurred.

Time horizons and the time value of money

The time horizon is the period for which the economic analysis is undertaken. The longer the time horizon, the greater the number of factors that should be included in the analysis.

Once the time horizon exceeds one year, and especially where the time horizon includes multiple years, a consideration of the time value of money is appropriate. The time value of money is based on the notion that money received now is better than money received later. Firstly, while money already paid or received can be counted with certainty, the promise of money to be received in the future is a higher-risk prospect. Secondly, money received today has a greater value than an equal sum to be received in the future; if invested, a dollar can be expected to grow to a larger sum in the future. While a conservative investor might put the dollar in a risk-free investment such as a bank savings account, a less risk-averse individual may choose a higher-risk investment, such as a stock market mutual fund, in search of higher return on investment. Whatever the strategy, money received now has more value than money received in the future because of the existence of alternative opportunities for use.

The formula used to calculate the present value (PV) of a future sum (FS) is:

$$PV = \frac{FS}{(1 + r)^n}$$

Where:

- $r$ = periodic interest (discount) rate
- $n$ = number of periods.

For example, the present value of US$1,000 to be received two years hence, discounted at 7.5% is calculated as follows:

$$PV = \frac{US$1,000}{(1 + 0.075)^2} = US$873.44.$$
In a capitalist society, interest rates reflect the time value of money. In any economy, interest rates are determined by the supply and demand for money, plus a ‘risk premium’ usually assessed by the lender of the money. In general, a banker will be willing to lend at a lower interest rate to a farmer who has had a long association with the bank, and whose business has amassed a significant amount of equity over the years. Where a loan would result in a farm business having a high ratio of debt to equity, as in the case of a new business, the lender would probably charge a higher rate of interest, reflecting a higher-risk investment.

**Budgeting**

For most farm businesses the aim of the manager is to generate a profit. This may be achieved by reducing production costs to provide a strategic advantage, or by increasing the efficiency of production of livestock products (e.g. milk, meat or wool) by controlling the effects of disease on animal populations. Budgets provide a framework for measuring or estimating the profitability of a livestock production system, as well as a means for monitoring the effectiveness of a disease control strategy once the strategy has been implemented.

A sample budget in the form of a projected income statement for a pork production profit centre using a managerial accounting approach is illustrated in Table I. The information, including the breakdown per head sold, per hundredweight sold, and per breeding female place, provides an estimate of the overall profitability of the pork production enterprise. Profit is calculated as revenue minus expenses. Direct production expenses are allocated directly to the pork profit

| Cost of production: income statement and break-down of production costs (US$) |
|---------------------------------------------|-----------------|-----------------|-----------------|
| Pork profit centre income statement          | Total           | Per head sold   | Per cwt         | Per breeding female place | Percentage of gross revenue |
| Revenue                                      | 348,765         | 104.73          | 39.82           | 1,550.07               | 97.2                         |
| Standard finisher pig sales                  | 348,765         | 104.73          | 39.82           | 1,550.07               | 97.2                         |
| Sub-standard finisher pig sales              | 2,118           | 2.14            | 0.81            | 31.63                  | 2.0                          |
| Sub-standard nursery pig sales               | 2,541           | 0.76            | 0.29            | 11.29                  | 0.7                          |
| Sub-standard weaned pig sales                | 225             | 0.07            | 0.03            | 1.00                   | 0.1                          |
| Gross revenue                               | 356,549         | 107.70          | 40.95           | 1,594.00               | 100.0                        |
| Direct production expenses                  |                |                 |                 |                        |                             |
| Cull breeding livestock                      | (10,676)        | (3.21)          | (1.22)          | (47.45)                | -3.0                         |
| Purchased feed                              | 190,316         | 57.15           | 21.73           | 845.85                 | 53.1                         |
| Cost of goods sold                          | 179,640         | 53.95           | 20.51           | 798.40                 | 50.1                         |
| Animal health                               | 9,041           | 2.72            | 1.03            | 40.18                  | 2.5                          |
| Breeding                                    | 5,555           | 1.67            | 0.63            | 24.69                  | 1.5                          |
| Depreciation                                | 30,800          | 9.25            | 3.52            | 138.88                 | 8.6                          |
| Marketing                                   | 8,898           | 2.67            | 1.02            | 39.55                  | 2.5                          |
| Professional services                       | 2,638           | 0.79            | 0.30            | 11.72                  | 0.7                          |
| Rent                                        | 821             | 0.25            | 0.09            | 3.65                   | 0.2                          |
| Repairs                                     | 1,969           | 0.59            | 0.22            | 8.75                   | 0.5                          |
| Supplies                                    | 852             | 0.26            | 0.10            | 3.79                   | 0.2                          |
| Total direct production expenses            | 240,214         | 72.14           | 27.43           | 1,067.62               | 57.0                         |
| Support operations cost centres (SOCC)       |                |                 |                 |                        |                             |
| Equipment                                   | 3,744           | 1.12            | 0.43            | 16.64                  | 1.0                          |
| Labour                                      | 29,239          | 8.80            | 3.34            | 130.17                 | 8.2                          |
| Overhead                                    | 18,812          | 5.59            | 2.13            | 82.72                  | 5.2                          |
| Total SOCC                                  | 51,645          | 15.51           | 5.90            | 228.53                 | 14.4                         |
| Net income from production                  | 66,790          | 20.66           | 7.63            | 296.84                 | 18.6                         |
| General and administrative cost centre      | 13,701          | 4.11            | 1.56            | 60.88                  | 3.8                          |
| Net income from operations                  | 53,089          | 15.94           | 6.06            | 235.95                 | 14.8                         |
| Financial cost centre                       | 22,810          | 6.85            | 2.60            | 101.38                 | 6.4                          |
| Net income                                 | 33,279          | 9.09            | 3.46            | 134.57                 | 8.4                          |
| Break-even measures                         |                |                 |                 |                        |                             |
| Production break-even                       | 291,859         | 87.65           | 33.33           | 1,297.15               | 81.4                         |
| Operating break-even                        | 305,560         | 91.76           | 34.89           | 1,358.04               | 85.2                         |
| Total (net) break-even                      | 328,370         | 98.61           | 37.49           | 1,459.42               | 91.6                         |
centre by the accounting system. Direct expenses include purchased feed and livestock (cost of goods sold). Income received from the sale of cull breeding livestock is listed as a reduced expense rather than a revenue item. This is appropriate because cull breeding livestock is a by-product of the production system, as distinct from growing pigs raised with the intent of marketing as the primary, finished product.

Pork-related allocations from the equipment, labour, and overhead cost centres are added to the direct production expenses. Deduction of these expenses from gross revenue provides a value for the net income from production. Net income from operations and net income are then sequentially calculated by deducting the pork allocations of the general and administrative and financing cost centres, respectively. By using this approach, production, operating, and total (net) break-even figures for producing pork, on a per head sold, per hundredweight (live) sold, and per breeding female place can be calculated.

Generation of a full budget requires either a sophisticated financial accounting system, or detailed manual calculations. However, if constructed appropriately, a budget can be used effectively as part of ongoing monitoring to provide information on the profitability of the livestock production system.

Partial budgeting

Developing 'before' and 'after' budgets is one possible method of generating data to examine the feasibility of an intervention intended to improve animal health. However, at least in the first instance, the development of comprehensive budgets is not necessary to examine the feasibility of animal health-related questions. This is particularly true where the time horizon does not exceed one year, so that the time value of money may be ignored.

Partial budgeting is useful for the consideration of relatively small changes in the overall scale of the farm business. Examples include switching from natural service to artificial insemination in a breeding herd, vaccinating against infectious disease, reducing mortality rates, and improving feed conversion efficiency. Partial budgeting is so-called because only those revenues and expenses that are affected by the proposed intervention are considered. Partial budgets consider variable costs that tend to increase with increasing production, such as purchased feed, breeding expenses, animal health, marketing, and supplies. Fixed costs that are incurred whether output is produced or not, are not considered (e.g. rent, real estate taxes, general and administrative, and financing costs). Because of the focus on the changes in costs and revenues associated with adopting an alternative approach, a partial budget is a much more rapid and simple process than developing a comprehensive budget (1, 3, 11).

A typical approach is to compare the expected consequences of the proposed change with the baseline ('do nothing') alternative. The partial budget format uses the following four headings:

- additional income
- reduced expenses
- reduced income
- additional expenses.

For example, the owner of an 800 sow farrow-to-finish herd may be considering replacing conventional boar breeding (natural service) with artificial insemination (AI). In doing so, boar numbers would be reduced from 45 to 8, and an extra 33 sows could be kept in the spaces previously occupied by the surplus boars. A partial budget to consider the economic feasibility of the change might be structured as follows:

1) Additional income:
   - one-time sale of surplus boars
   - revenue from extra growing pigs produced by extra breeding females.

2) Reduced expenses:
   - savings in feed costs for surplus boars
   - reduced annual boar replacement cost.

3) Reduced income:
   - smaller litter sizes until AI technique is perfected.

4) Additional expenses:
   - investment in AI building and equipment
   - one-time purchase of extra breeding females
   - extra feed costs for extra breeding females
   - increased breeding female replacement costs
   - cost of extra facilities for extra growing pigs
   - extra feed costs for extra pigs marketed.

Net benefit = (1 + 2) - (3 + 4).

The attractions of partial budgeting are that the method is quicker than complete budgeting, and focuses attention on the issues that are of interest. The disadvantages of the technique are that no clear time horizon can be specified, and distinguishing between 'one-time' and recurrent costs can present difficulties. In addition, no consideration is given to the time value of money (discounting), and an item can easily be missed or double-counted by recording the same effect as both reduced income and increased expense items. Further, no comparison can be made with alternative investments (opportunity costs) and no consideration is given to the uncertainty of the outcome. Nevertheless, despite these drawbacks, partial budgeting is a useful tool for a first-cut or preliminary economic analysis. Should a project pass the first test of the partial budget, then the feasibility analysis should be continued using one or more of the techniques described below.
Decision tree analysis

In animal health, treatment outcomes and the economic consequences of these outcomes are often uncertain. Decision analysis offers a formal, structured approach to decision-making, taking into account elements of uncertainty. The analysis involves construction of a decision tree as a pictorial representation of the flow of events in a logical and time-ordered sequence. For example, an animal is diagnosed as diseased; if not treated, the probability of survival is estimated at 40%. Treatment is available at a cost of US$50 which raises the probability of survival to 80%. If the animal lives, the owner values the animal at US$300. If the animal dies, to dispose of the carcass will cost US$20. If the animal were to be culled immediately, the buyer would pay US$150, but if culled later, only US$100 would be received.

A decision tree describing this situation is illustrated in Figure 1. The first step in building a decision tree is to identify a mutually exclusive list of all possible courses of action to address the problem. In the case of a sick animal, the veterinarian may recommend the animal be treated, left untreated, immediately culled, or suggest that the producer ‘wait and see’ if the condition of the animal changes, thereby deferring the decision to a later time.

The first node of a decision tree is always a decision node, conventionally represented by a rectangular box. Separate branches (represented as lines) emanate to the right of the decision node, one for each possible decision under consideration. Each branch originating in a decision node leads to either a terminal node or a chance node. Chance nodes include information describing the probability of each possible outcome following a decision being taken. Probabilities at each chance node must sum to one (or 100%). For example, if the probability of an animal living if no treatment is given is 40%, then the associated probability of an untreated animal dying must be 60% (100% - 40%). The value (cost = - US$50) of treatment is indicated at the chance node following the branch showing the decision to treat. Terminal nodes, symbolised by triangles, appear at the tip of each branch. Numbers underneath each branch near terminal nodes indicate the value of each outcome. Values for ‘lives’ (US$300), ‘dies’ (- US$20), ‘cull now’ (US$150), and ‘cull later’ (US$100) outcomes are shown in Figure 1.

The choice of the preferred course of action is made through a process called folding back. This is performed by first multiplying the monetary values at each terminal node by the associated probability at the preceding chance node. The products of branches emanating from the same node are summed. This sum is called the expected value of the node. In complex decision trees, expected values are folded back to preceding chance nodes until a single expected value is obtained for each branch originating from the decision node at the source of the decision tree. In this example, the expected values (EV) are calculated as follows:

EV (treated and lives) = 0.8 x (300 - 50) = 200
EV (treated and dies) = 0.2 x (-20 - 50) = -14
EV (TREAT) = 186.

As the expected value of treating (US$186) is greater than that of not treating (US$108), culling now (US$150), or ‘wait and see’ (US$118.90), then treatment is the preferred course of action.

Decision analysis is explicit because the decision maker is forced to separate the problem into the component parts, without losing the overall context. The analytic approach forces the decision maker to explicitly consider the timing of choices that must be made and the data that must be acquired to make informal decisions. Uncertainties involved and the relative values of possible outcomes are also explicitly stated.

Decision analysis is quantitative because the decision maker is forced to use the language of probability. Probabilities are used to express the strength of belief than an animal will live or die, or whether a herd will experience a clinical outbreak of disease. Anecdotal estimates such as ‘very likely’ or ‘a good chance that...’ are replaced by numerical estimates of probabilities such as ‘80% chance of success’. This approach is particularly helpful in communicating the opinion of the veterinarian to the animal owner, who is usually the ultimate decision maker, acting under the influence of veterinary advice.

Finally, decision analysis is prescriptive. The decision maker is aided in deciding what should be done under a given set of circumstances. The decision is consistent with the problem, as the problem has been explicitly laid out in the decision tree. The uncertainties involved have been identified and quantified, and relative values placed upon possible outcomes. It is perfectly possible that the animal under consideration in this example will die following treatment. Regardless, the decision maker will have made the best decision given the available information (4, 5, 6, 7, 8, 9, 10).

Cost-benefit analysis

Cost-benefit analysis is useful in comparing alternative disease control programmes over an extended time horizon, typically five to twenty years. While the technique has typically been used to evaluate large-scale projects such as national disease eradication and control programmes, the technique could also be used for analysis of animal health decisions at the farm level. In fact, the approach is similar to that which a farm manager would use in capital budgeting to help decide whether to purchase or lease a major item of farm equipment.
Fig. 1
Example of a decision tree
Cost-benefit analysis involves the following four steps:
- specification of the flow of costs
- specification of the flow of returns
- choice of an appropriate discount rate
- specification of the decision criterion.

Decision criteria

**Net present value**

Net present value is the simple mathematical difference between the present value of the flow of future returns and the present value of the flow of costs. The value of the total programme is reduced to a single figure, discounted to current monetary values. The decision rule is as follows: if NPV is greater than zero, then the investment under consideration has a return greater than the opportunity cost of the money to be invested (discount rate).

**Benefit-cost ratio**

Benefit-cost ratio (BCR) is calculated by dividing the present value of the flow of returns by the present value of the flow of costs. The calculation yields a number representing the relative sizes of the benefits and costs. The weakness of the BCR is that it provides no indication of the scale of investment involved in the project, which may be an important consideration where available funds are limited. The decision rule is as follows: if BCR is greater than one, then NPV must be greater than zero.

**Internal rate of return**

Internal rate of return is calculated by finding the discount rate that equates the present value of future cash flows to the cost of the investment (that is, the interest rate that would yield an NPV of zero). The IRR is a useful figure, because the value can be compared directly with alternative uses of the funds (opportunity cost).

**Payback period**

Payback period (PBP) provides the answer to the question of how long it will take before the flow of returns from the programme have paid off the total investment. While the PBP approach appeals to risk averse decision makers, this is the least useful of the decision criteria. This is because the PBP is usually calculated using nominal dollars, thus ignoring the time value of money. More importantly, the flow of returns beyond the payback point is ignored. While calculation of the PBP can be helpful, the technique should be used in conjunction with other measures, rather than as the sole decision criteria.

An example analysis is shown in Table II. Supposing that an animal health management programme has been designed to reduce the prevalence of paratuberculosis in a cattle herd over a five-year planning horizon, the initial investment (in year zero) will be US$15,000, followed by US$10,000 in year one, and smaller amounts in years two, three, and four. The flow of benefits will commence with US$4,500 at the end of year one, with the bulk of the benefits accruing in years two, three, and four. A discount factor of 5% has been used in the calculations.

The PBP of this programme is four years (end of year three), by which time the total investment (US$32,500) will have been repaid by the flow of benefits, accounted in nominal dollars. The NPV of the project is US$8,759, calculated using the sum of discounted cash flows at the end of each year. (Note that by the end of the fifth year, a dollar is worth only US$0.784 in current terms.) The BCR is 1.28 (US$39,621/US$30,863). The IRR is 20.46%, which is the discount rate necessary to yield an NPV of zero for the project.

According to two of the decision rules (BCR > 1; NPV > 0), the project is economically feasible. However, before proceeding, the IRR (20.46%) should be compared with that of other approaches to this particular problem, and also with alternative uses of the funds that may yield a better return on

### Table II

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<th>Discount factor (0.05)</th>
<th>Costs</th>
<th>Benefits</th>
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investment for the same level of risk. In general, investment in reducing disease effects on the productivity of livestock populations yields a higher IRR than investment in other aspects of the farm business. This is because by improving the efficiency of production, the amount of output (e.g. kg of milk per cow per year) is increased for a relatively small change in the amount of inputs (extra forages and concentrate feeds) needed to affect the change.

Conclusion

Of all the techniques available for economic analysis, partial budgeting, decision analysis and CBA are the most useful and most widely applied to animal health decisions at the herd level (2). While none of the methods is computationally intensive, the utility of each approach is dependent upon the quality and completeness of available data. Each method described is suitable for use in an electronic spreadsheet model on a microcomputer, which provides the decision maker with the capability to perform sensitivity analysis by repeating calculations to test how the decision might change with different assumptions.

Économie de la santé des animaux domestiques au niveau du troupeau

W. Marsh

Résumé

L'économie de la santé animale est une discipline relativement nouvelle, dont les concepts, procédures et données sont utilisés pour fonder les décisions qui permettront d'optimiser la gestion zoosanitaire. L'impact économique de la plupart des maladies qui frappent les animaux domestiques étant d'ordinaire plus important lorsque l'infection est inapparente que lorsqu'elle s'exprime cliniquement, la gestion zoosanitaire affecte autant les dépenses faites au titre de la prévention de maladies que celles faites au titre du traitement d'animaux présentant des signes cliniques manifestes. La preuve est désormais faite que les programmes zoosanitaires offrent un excellent taux de rendement des investissements. En effet, en réduisant l'impact d'une maladie on accroît l'efficacité de la production, souvent sans apport supplémentaire en aliments ou en main-d'œuvre. Les techniques analytiques décrites par l'auteur sont les plus simples, les plus utiles et les plus couramment utilisées par les économistes de la santé animale. Plusieurs méthodes, utilisées séparément ou conjointement, permettent de prendre la plupart des décisions d'économie zoosanitaire au niveau de l'élevage : la budgétisation partielle, l'analyse des diagrammes de décision ou l'analyse coût-bénéfice. Quelle que soit la technique utilisée, la qualité de l'analyse dépend de celle des données utilisées.

Mots-clés
Economía de la sanidad animal a escala de la explotación
W. Marsh

Resumen
La economía de la sanidad animal constituye una disciplina relativamente nueva, que, mediante una serie de datos, conceptos y procedimientos de ayuda a la adopción de decisiones, persigue el objetivo de optimizar la gestión zoosanitaria. Dado que la mayoría de las enfermedades que afectan al ganado suelen acarrear mayores pérdidas económicas durante la fase subclínica que durante la fase clínica, la gestión zoosanitaria conlleva a menudo inversiones de orden preventivo, además de las medidas de tratamiento de los animales manifiestamente enfermos. Ha quedado demostrado que las inversiones en programas de sanidad animal ofrecen un elevado rendimiento, ya que reducen el impacto de la enfermedad y posibilitan con ello una mayor eficiencia de producción, sin necesidad por lo general de aportaciones suplementarias en forma de mano de obra o alimentos. Las técnicas analíticas aquí descritas son las más sencillas, útiles y de uso más generalizado entre los economistas que se dedican a la sanidad animal. A la mayoría de las decisiones de gestión zoosanitaria se puede llegar por aplicación, independiente o combinada, de técnicas de presupuestación parcial, árboles de decisiones o análisis de la relación costes/beneficio. Pero con independencia de la técnica utilizada, el análisis sólo será bueno en la medida en que lo sean los datos de partida.

Palabras clave

References