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The animal health foresight project

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Summary

The Animal Health Foresight Project was co-sponsored by the Canadian Food Inspection Agency (CFIA) and the United States Department of Agriculture (USDA). This study is the most recent of a series of four international workshops of the International Working Group on Animal Disposal Alternatives (IWADA), created to determine alternative options for effective disease control without mass animal destruction. The study employed foresight technology to stimulate new thinking using the future perspective tools of challenge questions and scenario development. A total of 43 Canadian and American participants from industry, academia, the public and government made their contributions over the duration of four meetings. The group developed and analysed eight pictures of possible futures. Ten conclusions were formulated. Fundamental to these conclusions was the recognition of a need for a conceptual change to the management of animal health, a new paradigm. This paradigm was a policy change to the management of risks rather than disease elimination, a change in the roles for the establishment of policy and a convergence of animal health and public health. The new paradigm was incorporated into a hierarchy of decision-making options, out of which five principles for alternatives to mass animal destruction were identified.

Keywords

Alternatives to animal disposal, Animal disease control, Foresight technology, International working group, Mass animal destruction, New paradigm, Stamping out.

Il progetto "previsione in salute animale"

Riassunto

Il progetto "previsione in salute animale" è stato co-sponsorizzato dalla "Canadian Food Inspection Agency" (CFIA) e dall' "United States Department of Agriculture" (USDA). Questo studio è il più recente di una serie di quattro workshop internazionali dell' International Working Group sulle altrenative alla distruzione delgi animali- International Working Group on Animal Disposal Alternatives (IWADA), creato per definire le opzioni altrenative per un efficace controllo delle malattie senza l'utilizzo della distruzione in massa degli animali. Lo studio ha utilizzato la tecnologia previsionistica per stimolare l'uso di un nuovo modo di pensare usando strumenti in grado di predire nuove richieste di sfide e nuovi scenari. Un totale di 43 partecipanti tra canadesi ed americani provenienti dall' industria, dal mondo accademico, dal settore pubblico hanno fornito il loro contributo per tutta la durata dei quattro meeting. Il gruppo ha sviluppato ed analizzato otto possibili scenari futuri. Sono state formulate dieci conclusioni. È stata fondamentale, al fine di stilare queste conclusioni, l'identificazione del bisogno di cambiamento nella gestione della salute animale, una nuova concezione. Questa nuova concezione è stata meglio definita in un cambiamento politico nella gestione del rischio piuttosto che nella eliminazione della malattia, in un cambiamento dei ruoli nella definizione della politica e nella convergenza di salute animale e salute pubblica. Questo nuovo concetto è stato incorporato in una gerachia di opzioni decisionali; tra queste sono stati identificati cinque principi di lotta alle malattie alternativi alle distruzioni di massa degli animali.

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Parole chiave
Alternative alla distruzione degli animali, Controllo della malattia animale, Distruzione in massa di animali, International working group, Nuovo concetto, *Stamping out*, Tecnologia previsionistica.

Introduction

In a global environment of escalating change in many aspects of society, agriculture, disease, environment and trade, the approach of choice for animal disease control and eradication has been the implementation of a stamping-out policy. This approach has received global acceptance by the veterinary authorities of most countries. According to the World Organisation for Animal Health (OIE: Office International des Épizooties), a stamping-out policy means: 'carrying out under the authority of the Veterinary Administration on confirmation of a disease, the killing of the animals which are affected and those suspected of being affected in the herd and, where appropriate, those in other herds which have been exposed to infection by direct animal to animal contact, or by indirect contact of a kind likely to cause transmission of the causal pathogen. All susceptible animals, vaccinated or unvaccinated, on an infected premises should be killed and their carcasses destroyed by burning or burial, or by any other method which will eliminate the spread of infection through carcasses or products of the animals killed' (9).

However, this often leads to the destruction of animals for animal welfare reasons rather than for disease control reasons because of an inability to move animals according to the normal production sequence (1, 3). As a result of this approach, millions of animals are slaughtered and destroyed and their value lost to society.

Although effective and in some circumstances essential, this stamping-out approach is increasingly causing concerns to a society which questions the excessive waste of animal products, the distasteful visual images, the negative environmental and animal welfare outcomes, and the devastating economic impact on agricultural industries, as well as on national economies (3, 6, 7, 8).

Concurrently, we are in a new era of previously unidentified emerging, infectious diseases as well as re-emerging known diseases. These are often zoonotic in nature and driven by unprecedented social, ecological and globalisation changes (2). In these instances, the rapid detection and response to emerging diseases is critical (6).

As a result, veterinary authorities are faced with a dilemma in which three simultaneous pressures need to be addressed. There is the need for a rapid response to contain and eliminate disease spread, the increasing occurrence of animal and zoonotic diseases and the growing negative response of society to mass animal destruction. In some areas, the success of the approach could be compromised by this negative social response, leading to a lack of cooperation with veterinary authorities.

In an attempt to provide some guidance to decision-makers in facing their dilemma, an international working group felt it was necessary to challenge the current strategy and search for alternative thinking which would yield an expanded choice of options for animal disposal. To accomplish this goal, foresight technology was chosen to stimulate innovative thinking using the future vantage point of the year 2020. From the pictures of possible futures generated in the study, it was possible to develop conclusions which alter the perspective for decision-making in animal disease control.

Method

The Animal Health Foresight Project was the most recent in a series of four international workshops seeking alternative approaches to mass animal destruction and disposal. It was initiated to stimulate novel thinking through the use of foresight methods and broaden or change the scope of the current paradigm for animal disease control.

The study was co-sponsored by the Canadian Food Inspection Agency (CFIA) and the United States Department of Agriculture (USDA). Through four working sessions, a

total of 43 participants contributed their knowledge, experience and opinions. These participants were selected from multiple sectors of industry, research, society and the veterinary profession (8).

In this foresight study, two tools were employed to create a future orientation for the mind set of the participants, namely: challenge questions and scenario development.

There were three challenge questions in each of the four categories as follows:

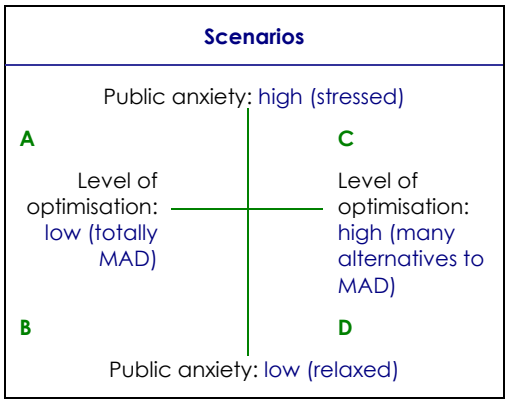
- information management and skills
- trade and economics
- policy and regulation
- advances in science and communications.

These were all considered from the future perspective of the year 2020 (4). It was necessary for participants to suspend their mental connection with the current environment and imagine what possible and plausible futures, both positive and negative, could exist. Only by considering what range of possible futures could occur, is it possible to evaluate what decisions, events, or occurrences could have lead to these futures. These evaluations then led to the formulation of conclusions as to what was required to adapt to an eventuality, should it come to pass.

In preparation for the development of future scenarios, a review of the current environment to determine the most significant drivers of change was conducted. A list of 19 change drivers was identified (4). A ranking of these drivers, based on their degree of uncertainty and their potential impact led to the identification of two critical drivers for axial scenario development, namely: the level of animal optimisation and the level of public anxiety. Animal optimisation reflects the degree to which animals and animal products are effectively utilised with minimal mass animal destruction, while public anxiety reflects the comfort level of society with the actions being taken (8). These two drivers were used as opposing axes in a relationship diagram creating the possibility of four different scenarios (8) as shown in Figure 1.

Results

The pictures of the future, produced by the challenge questions and scenarios, are described as if they exist and are consequently referred to in the present tense.



MAD mass animal destruction

Figure 1
Identification of possible future scenarios

Challenge questions

The participant responses lead to a possible picture of the future, in the year 2020, for each of the four categories of challenge questions.

Knowledge, information management and skills

In the area of knowledge, information management and skills, several key elements were identified. These included a linkage of all components of the information system, the availability of new technologies and a recommendation that risk-based decisions extend beyond disease control.

In this future picture, there is a more holistic approach to risk, whereby economics, social and political considerations are incorporated into an integrated approach to public health and animal health issues.

Also in this picture, national and global high-speed communication tools are available both as voice and visual data. There is an improved capacity to receive information as well as a refined ability to communicate effectively. The understanding of science by the public has been enhanced through the development and teaching of effective risk communication skills.

The flow of data begins on farms with the use of biosensors that allow early diagnostics on a syndromic basis, which is linked to a central organisation. The data also include identification of animals and premises, as well as animal movement and contacts. These data are verified and analysed to become information. Information from various sources is combined to formulate knowledge which is the basis for decision-making. This information flow is depicted in Figure 2.

Figure 2
Model information flow

This information flow is extended beyond a regional or national basis to achieve maximum effectiveness as a 'global knowledge web'. This web refers to the sum total of knowledge resources (data and analytical software), that support animal health and public health decisions and policy. The global knowledge web is represented in Figure 3.

Incentives, transparency and trust were important elements in generating confidence in this global information flow, in the eyes of the public, producers and government.

Trade and economics

In the future picture for trade and economics, the focus for agricultural production is one of global, multi-national food animal production. The type of agricultural production is differentiated and selected to serve either regional or international markets. In addition, developing economies are forcing a change in the pattern of production, trade and consumer demands.

Two possibilities are envisaged. The first possibility leads to countries forming larger blocks for trade agreements to achieve increased influence, but which also produces increased tensions. This is not considered likely. The second possibility shows multi-national corporations, not governments, leading implementation of standards. This follows a philosophy of 'one world, one food supply' in response to consumer demands. Governments continue to set minimum standards, but corporations, for business reasons, implement higher standards.

Consumer expectations for food safety, animal welfare and reduced animal protein waste lead to an orientation shift from disease elimination to the management of risks.

Policy and regulations

In the future picture involving policy and regulations, an anticipated global climate change forces a consolidation of food production into more suitable geographic locations, as driven by economics. However, greater attention to biosecurity is required because of the attendant increased risk and impact of adverse events.

The compartmentalisation concept is used increasingly to minimise disease spread and the need for mass animal destruction ('compartmentalisation' refers to a separation

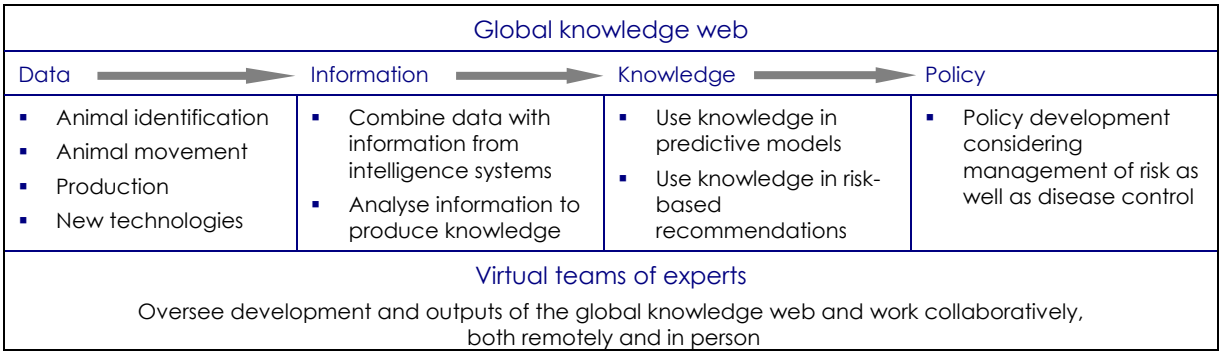


Figure 3
Global knowledge web

of animal subpopulations based on disease status, by a biosecurity management system for international trade purposes [9]). Regionalisation and zoning are refined from the level of country or region, to small zone or even herd level. Furthermore, the focus turns to strategic vaccination, immune modulation and the use of antivirals, rather than relying on removal of the infected animal host.

There is a complete re-evaluation of the concept of country-wide disease freedom, which is considered to be an impractical goal. Risks are now evaluated from a more holistic point of view and include such elements as the viability of rural communities, environment, tourism, employment that supports agriculture and animal welfare.

Animal health and public health goals and policies have moved to become more unified. Industry has moved to a higher standard of self-regulation to enhance its image in the opinion of the public. In a parallel move, the role of government has shifted to one of facilitation with both animal health and public health officials becoming active communicators.

The public has acquired greater science and risk literacy, achieved through targeted education policies in the education system and through skilful public communication.

Science and communication

The future picture of science and communication displays significant technological discoveries in disease prevention, detection, management and control. This is particularly evident in the areas of biocontainment, rapid diagnostic procedures and devices, vaccines and immune modulators, methods for deployment of immune enhancers and the use of nanotechnology in the development of biosensors.

There are genetic technological breakthroughs for both hosts and pathogens in the modification of the virulence of pathogens, approaches to therapy, altered delivery mechanisms for vaccines and treatments, mobile diagnostic devices and host genetic resistance.

An overall philosophy of 'see-through science' is adopted to create transparency and to demystify science in the view of the public, using innovative communication tools. An enhanced understanding of human behaviour relative to communication was necessary to achieve this clear communication. For example, a 'low tech – high touch' approach for active engagement of all stakeholders before, during, and after a crisis event, is employed. Because of this, such events are viewed as shared responsibilities with a shared resolution of the event, rather than as adversarial conflicts.

Through extensive, careful communication, the public focus has been transferred from one with emphasis on disease freedom or risk elimination, to the management of preventable risks for mutual societal advantage. Decision support tools also contribute to this improved communication.

Scenarios

The creation of scenarios was the second tool of the foresight project used in this study. The two drivers of change, the level of animal optimisation and the level of public anxiety that were selected as axes for scenario development are shown in Figure 1.

Scenario 'A'

Scenario 'A', with high public anxiety and a low level of animal optimisation, is regarded as the 'failure scenario' and is considered to be non-sustainable. It is marked by repeated mass animal depopulations and a lack of technological innovation.

In this picture, the government moves into a reactive response mode leading to unstable animal health and public health infrastructures. The focus shifts to short term fixes with blame placed on specific individuals. The government approach is one of secrecy with a lack of transparency because of the fear of political damage arising from disclosure of events. There is a lack of leadership and a tendency to shirk responsibility. The atmosphere is one of constant crisis management which the public perceives as chaos.

Industry remains in a damage control mode. There is no incentive for pursuing good practices. The media emphasises bad news. In its defensive posture, the government adopts a public relations communication model of 'spin over science', thereby further eroding credibility.

Funds are directed to industry bailout payments, leading to inadequate funding for research on alternatives to mass animal destruction and a lack of innovation.

The public sees finger-pointing, blame shifted, excuses and reactive chaos, instead of leadership. It has a low level of trust in the effectiveness of government, in the integrity of industry and in the system as a whole.

Scenario 'B'

In Scenario 'B', the public is in a relaxed state of mind, reflecting low anxiety; however the level of animal optimisation and innovation is also low.

The direction of government in this future picture is driven by pressure from urban demographics and public opinion polls. In effect, leadership is not shown, only response. The approach shifts to one of zero risk with frequent application of the precautionary principle. A major gap exists in communication and cooperation between government and industry, because all response is to the general public.

Industry is forced to make fundamental changes because of the restrictive nature of the multitude of government-imposed regulations. The situation is no longer economically viable for industry and multi-national corporations move their major vertical production systems abroad, seeking more economically favourable climates in developing countries.

In this atmosphere, the urban media incites the public to demand that government assume a role of 'defender of society'. As the government responds with increasing regulation, the media no longer considers the issue as an important media story.

The reactions of the government relieve public anxiety. The attitude is one of a 'nanny society' with a perception that the government is in control. It assumes a paternalistic stance and the public is comfortable with the assurance given.

Scenario 'C'

In the future picture of Scenario 'C', considerable progress is made in technological development and implementation resulting in the availability of multiple alternatives to mass animal destruction. However, the public is not engaged in the process and this is reflected by their high anxiety.

Government and industry together, make decisions based on economic factors, but disregard social factors. As the new technologies are effective, the emphasis is on 'super-capitalism'. However the public is not involved in the decision-making. The public relations and marketing approach adopted to counter this deficiency selectively presents partial evidence to substantiate the desired outcome. This is not effective and produces an increasingly negative influence on public trust.

The government believes that the media is deliberately fanning the flames of public fear. The deteriorating relationship between government and industry versus the media is non-productive for supporting the overall well-being of society.

As a result, there is an increasing misunderstanding by the public. This lack of understanding fosters a massive disconnect between the promotion of science, and the public's acceptance of science. Science is not believed. The public has no trust in either the food system or the government. It feels a loss of control with the perception that it is being forced to accept undetermined risks.

Scenario 'D'

The final future picture as represented by Scenario 'D', is regarded as the 'optimal scenario'. There is a high level of animal optimisation resulting from successful investment in technology development which yields multiple alternatives to mass animal destruction. Skilful communication and public involvement lead to a low level of public anxiety.

The role of government is as a catalyst, facilitating the adoption of beneficial technology by industry. It audits the

appropriateness of changes relative to minimal international standards. There is a policy of transparency and a good infrastructure for rapid crisis management. This has been achieved through carefully considered and focused research investments, such as the development of biosensors for vital information generation and a global knowledge web to support rapid and effective risk management decisions. In addition, the government realises the critical importance of the link between public health and animal health which leads to an envisioned optimisation of food production and to an enhanced level of health and well-being for society as a whole. As a further measure, the government broadens its perspective and allocates greater emphasis to the global public good by addressing global hunger through minimising the waste associated with mass animal destruction.

Industry reduces the risk and impact of disease through enhanced risk management. This approach is extended globally to achieve international collaboration and cooperation. Industry also strategically capitalises on the benefits of new technologies as they become available. The industry, public and government are now all involved in decision-making, with industry and the public initiating changes while government facilitates the transparency, mechanisms of decision-making and compatibility with international standards for disease control and food production. Significant research investments by both industry and government lead to a better understanding of the fundamental concepts of risk communication. This understanding also benefits from integrating knowledge from such disciplines as behavioural science, neuroscience and social science. The result is very effective, clear and convincing communication with the public.

After endorsing the success of the system for society, the media turns their attention to other crises. However, when significant changes occur, the media are brought into the process as a full stakeholder and as an expert in social communication and interpretation.

Satisfied with the transparency, the engagement and the clear, honest communication, the public displays a low level of anxiety with the system as it is operating, and a high level of trust with the directions and decisions taken.

Discussion

The foresight process used in this study drew on the collective thinking and opinions of the widely diverse group of expert participants. They produced and analysed a series of eight pictures of possible and plausible futures for animal health with an emphasis on alternatives to mass animal destruction, as described. While these pictures represent both positive and negative futures, which may or may not come to pass, the real value of the study rests with the conclusions that can be derived from considering these pictures.

The purpose is not to predict what the future will be 'but rather, it is to make strategic decisions that will be sound for all plausible futures. No matter what future takes place, you are much more likely to be ready for it and influential in it, if you have thought seriously about scenarios' (5).

The areas of importance identified in this study (8), include major policy change, stakeholder roles in setting policies, the relationship between animal health and public health, development of improved communication skills, management of information and the relationship with multi-national corporations.

Throughout all of these was a need for a change in thinking. This change has been incorporated into a new conceptual pathway, a new paradigm. This paradigm identifies the need to contain animal disease, but also to promote alternative responses to animal disease, such that the use of animals in the food animal system is maximised, while the requirement for mass animal destruction is minimised.

The vision of the new paradigm, that is, what the paradigm seeks to achieve, is 'animal health optimisation'.

Animal health optimisation is an inclusive term reflecting the positive contribution of food animal production to societal well-being, which has been brought about by:

- securing a high quality food supply
- enhancing public well-being through zoonotic disease control
- achieving a vibrant economic environment for industry
- capitalising on research and technological achievements to aid disease control
- reflecting animal stewardship through responsible animal welfare and a high standard of animal health.

The new paradigm is composed of three fundamental elements, as presented below.

The new paradigm

Management of risks

A major policy change to the management of risks, rather than seeking disease elimination should be undertaken. A holistic view of risk should be taken when assessing the true extent of risk, which would include other components of society, such as tourism, trucking, agricultural communities, animal welfare and the psychological impact on producers. A management of risk approach could be described as 'management for advantage'.

Change in the roles, responsibilities and accountabilities of the stakeholders involved

A change in the roles, responsibilities and accountabilities of the stakeholders involved in the establishment of policy for the food production system should take place. Policies should be established with the full participation of industry, the public and governments. Industry should assume a greater role in self-regulation and should initiate change, while government should play a catalyst and facilitation role, as well as auditing implementation against international standards. The process must be transparent to all stakeholders, including the public and the media. Responsibility and accountability must be shared by all stakeholders.

Relationship of animal health and public health

The relationship of animal health and public health must progress toward convergence, particularly in the area of zoonotic and newly emerging diseases, as a critical link to societal well-being. The current structures of animal health and public health are separate and must be suitably adjusted to accommodate this convergence.

Decision-making options

The Animal Health Foresight Project was an extension of the work of the International Working Group on Animal Disposal Alternatives (IWADA). In seeking alternative options to the slaughter of large numbers of animals for disease control, the study concluded that a new paradigm for animal health optimisation was a desirable alternative to mass animal destruction. The new paradigm fits into the hierarchy of decision-making options which was cumulatively created throughout the whole IWADA process. This is shown in Figure 4.

Five principles for alternatives to mass animal destruction flow from this hierarchy of decision-making options.

Anticipation

Anticipation is intelligence capability with analysis and interpretation. It provides the greatest return of investment. Anticipated disease allows resources to be focused and the risk mitigated with minimal impact and limited slaughter of animals. Effective anticipation depends on rapid information availability, analysis and international collaboration.

Prevention

Prevention is the principle of reducing the susceptibility of the host and blocking pathogen amplification. Tools include genetically derived vaccines, novel and easy-to-use delivery systems, generic immune enhancement systems and host selection or modification for genetic resistance to disease.

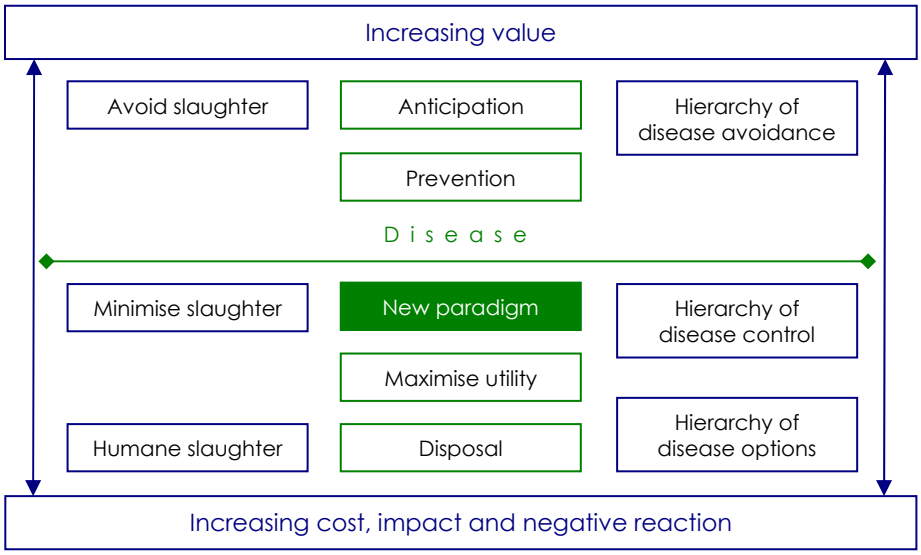


Figure 4
Hierarchy of decision-making options

Containment

The containment principle is to rapidly confine a disease occurrence to a restricted focus and smother pathogen spread. This is dependent on early detection of disease through such tools as:

- remotely read biosensors produced through nanotechnology
- on-site diagnostics produced through genomics, proteomics and multiple nucleic acid identification devices
- rapid, real-time information flow and analysis with links to a global knowledge web.

Disease can be confined by employing a technologically advanced, focused form of animal production through strategic agricultural planning. Containment can focus on pathogen elimination rather than host elimination, using antiviral drug therapy, antiviral misting and specific purpose vaccination or immune enhancement on a herd or individual basis. In addition, physical or engineered biocontainment can be modified to the pen, barn or farm level. Finally, rapid and extremely focused animal destruction, if strategically applied, could avoid mass animal destruction through limited slaughter.

Strategy change

Ultimately, strategy change is the most effective alternative to mass animal destruction on the broadest possible scale. This is a conceptual change to the management of risk instead of elimination of disease. It means abandoning the war-like perception of attacking disease and instead seeking animal health optimisation through management for advantage. This would yield an enhanced, humane and rational use of animals that are the source of the food animal system.

Communication

Communication is the fifth principle. To achieve alternatives to mass animal destruction requires broad acceptance. Essential to acceptance is communication and understanding. Intrinsic to achieving this is the skill in communication to effectively project clarity, truth and comprehension. Priority must be placed on acquiring these necessary capabilities.

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