

# Food for thought for Food animal veterinarians

## Medical epistemology for food animal veterinarians

Our expectations for answers and mediums of communications are rapidly changing. We are living in an era of instant communication and information. Telephones, radios, fax machines, televisions, computers, the Internet, and e-mail provide information from many sources, including experts from universities, other professionals, technical service representatives, veterinarians in private practice, sales representatives, newsletters, professional and lay journals, trade associations, and political organizations. Cellular telephones provide communication anywhere, anytime. These instantaneous methods by which we do business and obtain information are affecting our perceptions about knowledge. Use of these technologic advancements may reinforce impatience, when patience is necessary to gain knowledge.

Information sources promise to inform, educate, persuade, entertain, and dismay their audiences. Information may be logical, sensible, humorous, scientific, and understandable, or it could be emotionally provocative, poorly written, nonscientific, inaccurate, and, in many cases, propaganda. Information sources have raised expectations in the minds of people—we expect immediate answers, instant

diagnoses, and rapid access to treatment intervention. Information may be illusory and affect people's perceptions. Additionally, there are others who may be impatient with scientific methods or the expense of pursuing a diagnosis. Unrealistic expectations could lead to disaster.

Many clients only call their veterinarian for advice or to share information after there has been a catastrophic event affecting their animals. Perhaps these clients believe the cause of disease can be established by weighing a number of opinions. Given the reluctance of some producers to embrace scientific methods, would it be easier for professionals that are instantly available via computer or telephone to gain an advantage for use of procedures or treatments that are supported only by anecdotal evidence? Livestock producers might turn to nonprofessional sources to seek explanation for their problems in animal health and productivity. Additional restrictions on the use of drugs or extreme regulatory measures could drive livestock producers to look for answers outside of the veterinary medical field. How can we convince livestock producers to work more closely with veterinarians to avoid unnecessary losses? Is it possible to frame the procedures of diagnostic and scientific methods in a sensible format for easier understanding? If we frame veterinary diagnostic methods in terms of medical epistemology, we may succeed in demonstrating the ways in which we gain knowledge. The task is not easy, but there is no substi-

tute for knowledge. It should be strongly emphasized that information is not knowledge.

Epistemology means a study of the nature and grounds of knowledge especially with reference to its limits and validity. Medical epistemology specifically embodies the nature of scientific knowledge as it relates to diagnosis, prognosis, and treatment. Epistemology frames the scientific methods used in medicine and allows for a better explanation of how we gain the knowledge needed to practice veterinary medicine. By gaining insight in ways knowledge is acquired, food animal veterinarians could provide the livestock industry with a systematic method of improvement that has long-term benefits. The use of scientific methods by veterinarians can be invaluable.

Although not taught in veterinary schools as a separate discipline, epistemology is a branch of philosophy that asks 3 fundamental questions:

- What is the nature of knowledge?
- What are the methods of inquiry (sources) for gaining knowledge?
- How do we validate our knowledge?

To answer these questions, it is important to appreciate the difficulty that arises from differences philosophers have about the meaning of the nature of knowledge. Numerous classifications have been created to categorize various points of view over the years, including realism, idealism, naturalism, subjectiv-

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ism, Pyrrhonism, utilitarianism, existentialism, and materialism. Without criticizing or defending these points of view, shouldn't we ask, "Where does science fit?"

Medical scientists most likely view the world materialistically or pragmatically. Pragmatists believe in a material world in which reality is independent of our mind, yet we may never have full understanding of the material world because of subjective interpretations. Each person's experiences differs from that of all other people. Our knowledge of the world comes from experience; thus, we theorize about observed phenomena on the basis of our interpretation of our life's experience.

For our interest in medical epistemology, let us focus on the subjectivity and objectivity of our perceived experiential world. As veterinary practitioners, we depend a great deal on subjective findings during a physical examination, which may provide great knowledge about a disease process. When listening to the primary problem or medical history, the information is of a subjective nature. We should remember that our subjective personal feelings and sensations may exist only in our mind. Distinguishing between things that we perceive as real and things that are real requires discipline and, perhaps, collaboration from colleagues and associates.

There are barriers to subjective knowledge. Staged events for motion pictures and magicians are illusions that are convincingly realistic, yet we know they are not real. Hallucinations, dreams, visions, and some illnesses are real only in the mind of the afflicted person. Faulty recollection may frequently mislead people. People unschooled in scientific methods may be inclined to believe imaginary phenomena. Testimonial support for nonscientifically tested treatments are subjective and may be incorrect. However, subjective belief can be useful. Placebos can be effective when treating psy-

chosomatic illness, and the placebo effect has been documented in veterinary medicine from studies that required owners or veterinarians to evaluate outcomes for treatment of animals. There is value in the use of placebos when treating subjectively inflicted disease. However, beyond the placebo effect, veterinarians must know that our subjective interpretation could affect our ability to make a diagnosis or a rational choice of medical treatment. In my view, we should be aware of the pitfalls and the possible advantages of subjectivity in veterinary practice. However, as veterinary medical scientists, we should attempt to corroborate subjective findings with objective criteria whenever possible. Our aim is to provide knowledge, not just information.

Trained in science, veterinarians recognize the importance of objectivity. Veterinarians have the potential to contribute a great deal of knowledge by looking for ways to objectify our observations. The objectivity we seek for interpreting clinical signs, reading instruments, collecting specimens, analyzing laboratory findings, or scrutinizing medical records is acknowledged to be difficult and may be prone to criticism. Our position should be to understand the nature of observed variation and strive to improve objective observation and measurement. In the context of medical epistemology, we attain knowledge through experiential subjective and objective methods that, by their very nature, have a degree of uncertainty. This simple fact challenges us to continue to improve our methods of evaluation.

The second question addresses the 4 primary methods of inquiry (sources) for gaining knowledge. These sources of knowledge are authority, sense perception, reason, and intuition. We have greatly expanded the ability of these sources to provide knowledge.

In veterinary medical sci-

ence, we recognize outstanding *authorities* in a given field of endeavor. Some experts have a commanding presence, particularly when introduced to an audience. Frequently, we refer to an expert as an absolute authority on a given subject. An expert, in turn, may refer to others as authorities who may well have been their mentors or colleagues. Years of experience in their discipline honing the methods of inquiry as sources of personal knowledge build an expert's esteem. Expert opinions are often a summation of subjective and objective reasoned thought that may well embody a lifelong search for answers.

*Sense perception* provides a basis for gaining knowledge. We use smell, taste, sight, touch, and hearing to learn about things around us. We may smell the odor of a cow with acetonemia (ketosis) or use eyesight to interpret a color change on a reagent test strip. We palpate to detect pregnancy and can accurately diagnose it. Many of us can feel the heat of a febrile animal, although we use a thermometer to objectively measure body temperature. We listen through a stethoscope to hear otherwise inaudible lung sounds or to diagnose a displaced abomasum. Personally, when a label on a container was illegible, I have used the sense of taste to distinguish between mineral oil or propylene glycol that should be administered to a cow. Furthermore, scientific advances have greatly expanded our sense perceptions. Laboratory equipment such as centrifuges, microscopes, spectrophotometers, and tissue stains have improved our ability to see additional pathologic lesions. Computed tomography, magnetic resonance imaging, radiography, and ultrasonography have given us great advantages for diagnosing anatomic and functional abnormalities. Often, these devices confirm what we already know, or they provide a better explanation of a problem or phenomena.

*Reason* provides yet another method by which we gain knowledge. Logic and mathematics are products of reason. Computational knowledge of mathematics and statistics are examples of knowledge gained by reason. Erroneous results are often caused by poorly collected data. The value of well-designed scientific studies and conscientious efforts to collect accurate data are invaluable to a reasoned explanation of the results. Inductive and deductive methods of reason are certain to enhance veterinary practitioners' command of scientific methods.

Lastly, *intuition* is knowledge that comes to a person without conscious recollection or reason. Recent research indicates that intuitions are based on experiences of people with great sensitivity. A person's experience is a repository of memories and impressions. These fragments of experience, when properly stimulated, mold thought or judgment. In those cases, a person may know something, but cannot say where the knowledge came from. Sometimes this is referred to as a hunch or instinct. Perhaps livestock producers who solicit opinions without demanding verification by other diagnostic tests have a great deal of confidence

in a practitioner's intuition; however, intuition is risky.

Finally, how do we validate our knowledge? There are several ways, although truth is not a principle to be accepted or cast aside at will. Critical-thinking methods, mathematics, and tests of truth enhance our search for validity. One test of truth is correspondence theory, which stipulates that there must be agreeable statement of fact with an actual fact. For example, if an animal has stopped breathing and does not have a heart beat, we can declare that the animal has died. A second test of truth is coherence theory, which is a test of consistency. For instance, a comparative trial including controls could be conducted on cattle in a feedlot to determine whether the performance of an implant is consistent with label claims. Lastly, a test of utility is a pragmatic concept. Does it work? Are the results satisfactory? Is your experience consistent with the results?

Scientific investigations have clarified and built a large knowledge base and raised new questions about the world we live in. Millions of people have contributed to this knowledge. Each day, scientists experientially gain new insight in their chosen field of study. This trend will continue. However, for a large number of

people, the methods of science are as mysterious as magicians who pull rabbits out of a hat. Unless we are able to communicate the hard work, perseverance, and effort necessary to logically understand our world, distinguish information from knowledge, appreciate the strengths and weakness of subjective assessments, acknowledge sources of knowledge, and seek the truth, many people will not share this point of view. Perhaps, administrators and educators within our veterinary schools could incorporate these concepts into their curricula so as to reinforce the educational process for gaining knowledge. Compared with the highly technical training to which veterinary students are traditionally exposed for gaining information, understanding epistemology promises to educate veterinarians in methods for gaining knowledge. The applicability of the concepts extend beyond veterinary medicine. Knowledge will make better leaders and managers and enhance our ability to improve the performance and profitability of our livestock producers. We have a responsibility to ourselves, our livestock producers, and our fellow citizens to pursue further study of how we gain knowledge. What are we waiting for?