

## EPIDEMIOLOGICAL ANALYSIS AND ANIMAL-HEALTH VETERINARY ATTENTION

V. ASTUDILLO, A. ZOTTELE, F. DORA

*Pan American Foot-and-Mouth Disease Center (PAHO/WHO)*

P.O. Box 589, 20001-970 Rio de Janeiro, RJ, Brazil

**SUMMARY.** Veterinary epidemiology is conceived as a discipline whose purpose of study is an understanding of the problems of productive animal health, including its organizational basis and the processes of intervention. This discipline is an indispensable instrument in animal-health planning and in veterinary intervention. This paper defines the spaces and planes of epidemiological explanation that enable observers to assess the problems of animal health from the essential and general perspectives defined by the prevailing economic and social system, as well as from the specific character corresponding to the particular models of the transmissible diseases and of production. The problems of productive health and the conception of its strategies of transformation, require prospective analyses that lead to a configuration of the most probable of the scenarios wherein the process of change will be developed.

The profile of animal health presents different levels of development derived from the historical circumstances which, in distinct spaces and at distinct times, have conditioned livestock production (2). The problems related to the productive health of farm animals must be pondered in relation to the economic and social organization which, in each case, has achieved livestock production as the result of activities by which man has transformed the environment. Likewise, the socio-economic relationships generated in the production process within those societies should also be incorporated (1).

Those productive actions create, over time and space, scenarios characterized by the existence

of a variety of social actors and a dynamic process of exchanges and interrelationships that form a picture of economic, social, political and cultural conditions.

They are the conditions under which develop the productive-reproductive potentialities of animals, the commercial exchanges of this process' inputs and products. At the same time, they "determine" the epidemiological conditions for the generation and spreading of morbid situations that affect the production and trade of animals and their products.

From this approach, veterinary epidemiology considers the livestock industry's entire economic and social organization (structure and processes) as a source of explanation for the problems affecting productive health, that identifies and establishes the mechanisms responsible for morbid occurrences, for their endemic presence in certain

---

Reprint requests to:  
Pan American Foot-and-Mouth Disease Center (PAHO/WHO).

areas and their spreading toward others, for their nonoccurrence or occasional appearance in some regions and, finally, for making it possible to characterize the risk conditions of the different areas and subpopulations vis-à-vis a specific problem.

A dialectic relationship exists between productive health and disease, whereas they are two expressions of the same and sole reality: that of an animal population producing in the midst of an economic-social organization. Between both ends there exists a relationship of causal identity, since a possible bioproductive equation includes productive health as an initial whole represented by a physiological-economic possibility, and the disease, which is encompassed in that whole as a risk or economic and social probability.

Both situations share the same origin in the structure of production in which they occur. Therefore only the very society responsible for that production organization can "give or take" productive health to or from the animal population.

This veterinary epidemiological approach not only visualizes the explanation of the problems that affect productive health, but also weighs solutions considering that this production structure embraces the interests of diverse social actors that are affected in varying ways and degrees by the different problems. At the same time, the social actors possess power resources and materials whose utilization should be essential to yield feasibility and continuity for the solutions proposed. In this way, the broad approach of veterinary epidemiology enables it to metamorphose into an instrument of planning and management for veterinary attention in the productive health field.

This approach of epidemiology is of great use in any spatial dimension, whether national, regional or local. Nevertheless, its effectiveness, expressed as a response capability, is more objective at the local and regional levels. It is there that the problems occur, that the economic-productive structures exist, that the social actors are mobilized and alliances and consensuses forged among them. And it is there that the society's active participation in solving the problems affecting productive health can be materialized.

## SPACES OF EPIDEMIOLOGICAL ANALYSES

This concept incorporates the complex social processes that include the transformation of the State's role. Likewise, international trade exercises great influence, including the organization of subregional economic and trade-integration agreements. These have stimulated the Latin American countries to review the orientations of the agricultural and agroindustrial sector. The result increases the responsibility of assimilating this process of change and of raising the productive capability of our herds, including the protection and expansion of that productive capability.

The instruments available for analyzing the facts and forecasting expectations in the coming years disclose certain limitations. Such instruments are based on the idea that present and future facts and factors can be explained through the knowledge of the facts of the past. This is not always possible.

As has been mentioned, the phenomena of productive animal health are complex and characteristically transitory. Within the context of the livestock economy's permanent and structural processes, the conjunct factors have assumed a great importance in explaining situations. Each moment conditions a change in the relationships that define the following moment. The ensuing result is that the available explicative models are not entirely able to reflect such behavior.

It thus becomes necessary to "*view veterinary epidemiology*" as a *discipline of synthesis* that embraces the understanding of productive animal-health problems as a whole, in both their structure and their processes. As a discipline, it goes beyond the specific productive-health problems or beyond a disease, preferring to consider the society in relation to the livestock industry's productive organization as the source for explaining and solving the problems.

As an indispensable instrument for animal-health planning, and for strategically steering the veterinary attention processes, veterinary epidemiology enables one to anticipate the needs of attention, identify and determine the risk factors,

orient both the definitions of the priorities of attention and the utilization of available resources.

The organization, functioning and evolution of the veterinary attention mechanisms and actions take on a new dimension with the epidemiological approach that incorporates the context of reality, of major importance in understanding the productive animal-health phenomena. This makes it possible to develop a systemic and integral view of animal health and animal productivity, of their economic and social milieu, of the conditioning factors and of the activities developed.

A space thus opens to the need for new routes that enable the problematics of animal productivity and disease to be taken as an expression of the ecoproductive conditions dominant in different population-spaces and to understand the associations and connections between them and the more general processes of the economic and social organization.

The traditional conceptions held in the veterinary field about the problems of animal disturbance or productive health-disease are unable to explain their relationships. Thus it becomes necessary to open the field toward more integral methodological and conceptual approaches that have a greater capability to encompass the real complexity of the determinant processes to describe and explain the relationships between the society's more general processes (economic and social organization of animal production) and the productive health-disease profiles of the livestock-raising ecoproductive system and of the herds (2).

With respect to their description and explanation, the animal-health and productivity problems are not independent of the describer or explainer, nor of the standpoint adopted. Each social group with specific interests in the livestock economy and activity has its own way of "regarding and analyzing" a specific problem in this field and of "visualizing" its solution, considering their socioeconomic efficacy vis-à-vis their interests even though they may be technological or scientific projects. The way in which the specific phenomena are perceived in the economic sector conveys a mobilizing potential of the social (actors) forces (3,4).

The predominance of a way of thinking about this matter is not only a function of the greater abstract explanatory capability of some technical personnel. Given the explanation of the appearance of certain animal-health problems and of their solutions more than once in Latin America, there has been a confrontation of concepts, theories, methods and techniques, which has created an environment of conflicts and consensuses among the social actors.

The legitimacy of a way of thinking vis-à-vis a society, although it may be resolved for those who have the power to force their projects to dominate, is also a function of the potentiality to respond to animal-health problems from the viewpoint of other social actors and to demonstrate superiority on the technological and methodological planes, where other ways of thinking are concerned.

On the other hand, the legitimization of a body of thought requires that space be opened and forces accumulated, but fundamentally it requires a large-scale technological and methodological development. Which is to say, having the capability to assume all the preceding scientific and technical development, redefine it and lift it to a higher level of efficacy and efficiency, and including in that legitimacy the alternative views of the problem.

As underscored above, the accumulation of forces will be favored by the capability to forge a more advanced and integral thinking about the productive health-animal disease problems, not only because of the greater theoretical strength and coherence of such thinking, but rather because of a technical capability superior to that of the other interpretations, and a greater capability to respond to the animal productive-health problems. This applies especially in the aspects perceived as relevant by other social actors, above all those whose resources of power are necessary to render feasible the projects that we value as socially important.

The facts and occurrences that are identified and perceived as animal productive health-disease phenomena occur in different dimensions. On the one hand they may be singular variations, that is, among animals or among herds by individual attributes. This may occur in relation to the pres-

ence of foot-and-mouth disease in animals or herds, some vaccinated and other not vaccinated against the disease (table 1).

Another possible dimension is given by the particular variations, that is, among subpopulations or among different ecoproductive systems in a country, in the livestock industry of a large state or a livestock-raising microregion, at the same given moment (animal groupings that differ in the economic-social organization conditions of animal production). This may occur with respect to the endemic situation of an animal disease.

Perhaps bovine brucellosis is endemic in regions where the small proprietary family ecoproductive system predominates, or the disease may not exist in regions of intensive beef-raising ecoproductive systems or of entrepreneurial dairy farming.

Finally, there exists a possible final dimension that corresponds to the flows of facts concerning the overall or total animal population country, state or microregion.

The form in which an animal production health problem is defined delimits the explanatory space utilized. Thus when a problem is defined in a singular space its explicative potential is limited to what could be termed "*epidemiology of what*" (*disease or disturbance*). The usual form for defining the problems at this level is the frequency and gravity of a pathology or specific disturbance among animals or among herds.

The explanation of these facts is linked to specific forms of managing these animals in these herds, or the individual exposure to factors or processes, thus making up the so-called risk groups (2,3). The generic principles define

**Table 1. Spaces and Planes of Epidemiological Explanation**

SPACES	PLANES		
	ESSENCE	SOCIAL ACTORS	PHENOMENA
GENERAL	ECONOMIC & SOCIAL SYSTEM.	SOCIAL & ECONOMIC ORGANIZATIONS. POLICIES & STRATEGIES. CONSUMPTION	PRODUCTION OF GOODS & SERVICES. INCOME DISTRIBUTION.
PARTICULAR	LIVESTOCK PRODUCTION SYSTEM.	ECONOMIC AND SOCIAL ORGANIZATIONS OF THE LIVESTOCK SECTOR. POLICIES	ANIMAL-HEALTH PROFILE P: F(N,M,F) MAN, GENT NUT.
SINGULAR	EPIDEMIOLOGICAL MODEL. (ECOSYSTEM)	PUBLIC & PRIVATE BODIES. FMD PROGRAMS	OCCURRENCE OF FOCI. DAMAGE, COVERAGE.

epidemiology at this level are the laws of variation of agents, hosts and risks.

This space contains the major part of veterinary epidemiology's technical and methodological developments to study epidemics, to evaluate risk factors, to conduct epidemiological surveillance of some specific problems, and to evaluate technologies.

The potential of transformative sanitary actions on the problems is limited to the technological possibilities that have been developed within those limits. The types of actions that are derived from this form of definition and explanation of the animal health/productivity-disease problems are oriented toward the control of the physical and sanitary damages and specific risks. Consequently they employ the organization of a veterinary attention model with programs directed to specific pathologies, very often verticalist and centralising. Nevertheless, it is necessary that the technicians dominate the technical knowledge available at this level in order to reply to problems of animal productive health from the services and in conditions of limited power resources.

This is basic to earn legitimacy, to evidence the limitations of the approach and the need to redefine the problems in larger spaces.

The definition and explanation of the productive-health problems in *the particular space* would correspond to what could be called the "*epidemiology of whom*" (*ecoproductive systems*) wherein the problems are defined as variations in the productive health-disease profile at the level of livestock-raising ecoproductive systems.

In this case the explanation of animal-health problems focuses on the process of organization (structure and dynamics) of the animal-production conditions through the technical-material investment that creates them (productive capacity/animal health), of each animal ecoproductive system through different "moments" of the said process.

Approaching the problems of animal productive health at this level leads to a greater explicative potential in terms of animal productivity and disease. This results from the inclusion of

all the arsenal of aspects relative to the structure and dynamics of the production conditions of the animal population. Those are the conditions that determine the animal productive health-disease profile in each animal ecoproductive system.

The process of organization of the animal-production conditions in each productive ecosystem encompasses at least four basic moments:

(a) the populational-biological moment, associated with fecundity, gestation and precocity;

(b) the ecological moment, associated with pasturelands, animal density, exposure and disease epidemiological cycles, environmental sanitation and production conditions;

(c) the animal-management moment, associated with zootechnical movements, field rotation, sanitary protection measures, feeding, and

(d) the economic-productive moment, associated with the economic relationships of animal production, its insertion into the productive process, the relations with the inputs and products markets, animal trade and animal productivity.

The conception of moment involves a joint process that exceeds the notion of stage or phase and the view of structures of independent processes. Each moment conjoins the other moments and is affected by them. Upon scrutinizing a given moment we encounter all the moments.

Upon examining the explanation of the animal-health problems, at the particular space level, the intention is: to strengthen that explicative capability; to reduce the difficulties existing in many animal-health services with respect to defining the problems and assessing the actions in terms of productive animal health; to annex a more advanced socioeconomic thinking in the animal-health technical spaces, assuming the explicative potentiality of the biological, economic and social sciences based on the definition of animal productive health-disease problems and on the selection of actions that encourage greater effectiveness and efficiency.

The types of sanitary actions derived from the study of the particular space would tend to be organized on animal-health planes according to ecoproductive systems, including the flows of trade. This would open further possibilities for the decen-

tralization of veterinary attention and for the participation of the livestock-raisers and other social segments that cohabit with such systems, all seeking to improve animal health and animal productivity.

In summary, dealing with the problems at the level of *particular space* broadens the explicative and transformative potentials.

Finally, the productive health problems may be viewed as variations on the general space level, where they are identified at the level of a livestock population of a country, state or large region. This level of analysis enables the productive health-disease problems to be selected with economic models, historical changes of the political processes, and impact of large catastrophes.

So it follows that this is the level of the review of animal-health policies and plans. The problems appear as needs to decide, from among priorities of different animal population groups, livestock ecoproductive systems, or different plans, the proper way to insert the animal-health productivity profiles and the veterinary attention model with the economic, social, political and ecological-regional processes. The basic characteristics of the veterinary attention model are defined at this level.

It is important to draw attention to the nonexclusive character of the three spaces discussed (singular, particular, general). On the contrary, they should be considered as complementary. The general space includes the particular, which in turn includes the singular. It is implicit in the animal-health actions to respond in the singular space, even when the activity has conditions to identify and explain its problems at the general level.

As a final consideration, the treatment of the productive health problems, their identification and explanation for the drawing up of transformative strategies, should not be restricted to the situation observed nor to the extrapolation of series of historical data.

*Prospective analyses* must be carried out (infer prospectively) to provide the most probable of the scenarios wherein the process of change will be developed. In this way, one may evaluate the possible modifications that can occur in the different aspects under consideration (productive level, animal-health problems, risk factors, transformative strategies). This approach implies the development of a prospective veterinary epidemiology that enables students of the subject to develop future epidemiological scenarios having a multidimensional and historical conception ensuing from the economic, social and political productive scenarios.

## ACKNOWLEDGEMENTS

This paper is part of the Final Report by the FAO/PAHO/WHO Joint Regional Seminar on cost-benefit analysis and decision-making for directors of animal-health programs. The Seminar was held in Buenos Aires, Argentina, from September 29 to October 2, 1992. Publication in this issue of the *Bulletin* was kindly agreed to by the Food and Agriculture Organization of the United Nations.

## REFERENCES

1. ASTUDILLO, V. M., ZOTTELE, A. C., DORA, F. Desarrollo ganadero y salud animal en Latinoamérica. *Livestock development and animal health in Latin America. Bol. Centr. Panam. Fiebre Aftosa*, 57: 7-22, 1991.
2. ASTUDILLO, V. M., ROSENBERG, F. J., ZOTTELE, A., CASAS O., R. Considerações sobre a saúde animal na América Latina. *Hora Veterinaria*, 9 (54): 37-43, 1990.
3. MATUS, C. *Planificación de situaciones*. Fondo de Cultura Económica, 1980.
4. MATUS, C. *Política y plan*. 2. ed. Caracas, Venezuela, Ed. IVEPLAN, 1980.