

## ATROPHIC RHINITIS : A PROTOTYPE COMPUTERISED HERD MONITORING SYSTEM

J.T. Done\*,

Central Veterinary Laboratory, Weybridge, KT15 3NB, England

W.M. Miller and J. Oldham

Pigtales Ltd., Great Hatfield, North Humberside, HU11 4UR, England

**THE PERCEIVED PROBLEM** Atrophic rhinitis (AR) is a chronic disease of insidious onset which, in its fully developed form, can cripple a pig enterprise. Consequently all large herds, and especially breeding herds, need to have contingency plans for dealing with it; i.e. they must know in advance what they will do, or not do, in particular circumstances. AR is not a simple aetiologically-specific, all-or-nothing condition; so, herds will need monitoring systems that can quantify the disease and its effects as well as detect its presence. Ideally an AR monitoring system for herd use should provide an ongoing picture of the situation in the herd related to its own past and/or required performance; and it should give advance warning of potential problems and clear indications when to take, and to cease, action. It should be based on variables directly relevant to AR and its effects, preferably those that can be determined easily, objectively and quantitatively. It should record data and changes in the situation in a valid, easily understood and preferably graphic form. Above all, it should cost less to operate than its value to the herd. Unfortunately this is easier to say than to do. Even when data are collected they are often not analysed effectively; and, all too often, the mathematical and clerical drudgery involved result in their not being analysed at all. Obviously there is a need for a system for storing, retrieving and manipulating data quickly, cheaply and effectively; and it should be capable of presenting the results clearly, preferably in graphic form, with virtually no mathematical input from the operator.

**THE PROPOSED SOLUTION** To this end we have developed a prototype computerised Atrophic Rhinitis Monitoring System (ARMS), utilising available hardware of modest computational capacity but with an emphasis on graphical presentation. The system is compatible with systems already in use for production monitoring in British pig herds; and it can be used either for ongoing monitoring of a herd or for retrospective investigation. No on-farm computer facilities are required. Any single variable or a combination of clinical and pathological variables may be used. Parameters used include: - sneezes per unit time; the frequency and/or extent of brachygnathia superior; the clinical incidence of facial distortion; the prevalence and severity of snout lesions at slaughter, expressed in terms of either snout grade or morphometric index (Done et al, 1982).

**THE PROTOTYPE SYSTEM** The ARMS software has been written in BASIC to run on a Tektronix 4051/52 with at least 32K of memory (RAM). The data and programs are stored as cartridge tapes and up to eleven sets of data (e.g. separate herds) can be stored on each DATA tape. The output can be displayed on the screen or drawn on a plotter. The system is 'menu-driven'; to run a program, the user merely follows instructions appearing on the screen. The menu reads as follows:

```

ENTER and CHECK ..... Press 1
READ and LIST ..... Press 2
DRAW a SCATTER-GRAPH ... Press 3
DRAW a HISTOGRAM ..... Press 4
DRAW a CUSUM ..... Press 5

```

Each individual program has its own sub-menu showing the details of its operation, viz:-  
*Enter and check.* This program allows the user to write data to a DATA tape entering it one week at a time. Missing data is allowed for; and each entry is checked for range and for data type.  
*Read and list.* This program allows the data to be read from a DATA tape and loaded into temporary tape file on the PROGRAM tape. It also allows the data

to be listed at a printer, if required.

*Draw a scatter-graph.* All variables can be drawn in the form of a scatter-graph, which usefully demonstrates the variability of the data, and the effect of outliers on the mean. It also helps to identify the extent of background variations, and the turning points; i.e. when the problem started to get worse or better and when it reached its peak.

*Draw a histogram.* All data over any time period, can be used to draw a histogram showing the distribution, mean and standard deviation.

*Draw a CUSUM.* A particularly useful technique in interpreting AR data is to construct a cumulative sum (CUSUM) diagram. It can be used for any of the variables. It has the great advantage of removing many of the problems of short-term variation, and it allows examination of a distribution-free measure of trend. It gives a good indication of the onset and disappearance of problems, though it should be interpreted cautiously if an incomplete outbreak is being analysed (i.e. one in which the peak has yet to be reached or which has yet to die away). In each run, the expected (target) value per week can be changed, as can the ratio of horizontal to vertical axes.

**DISCUSSION** The prototype ARMS represents a practical harnessing of newer technology to a situation where tedium probably constitutes an even more formidable obstacle than mathematics to the useful application of data-handling techniques already available but rarely used in veterinary practice. It enables data to be stored, recalled, manipulated and displayed in useful form with ease and accuracy; and this in circumstances where the time-cost of professional labour could be prohibitive. It is not, of course, necessary to have an on-farm computer; and indeed a bureau-based system could have considerable advantages to both the farmer and his veterinary adviser. Though the prototype ARMS has been designed to accommodate a fairly wide range of variables/parameters, others could be substituted or added, if needed, in subsequent versions. Any herd owner seriously concerned with the economic effects of atrophic rhinitis on his herd would want a monitoring system to take account of production parameters (e.g. daily live weight gain, feed conversion efficiency) as well as clinical and pathological variables. The availability of a technique, however, is not an indication for its unquestioned application; and the value of such a monitoring system to him is perhaps the most important thing for the pig farmer to monitor.

**CONCLUSIONS** The ARMS prototype gives people who may not have had previous 'hands-on' experience of micro computers, a chance to undertake a useful job which will produce interesting, attractive and valuable output for all concerned, especially the data gatherers. In the short term it helps users make better-informed practical decisions on disease control; and the data that is accumulated on the tapes will form the basis for important long-term analyses and future projections.

## REFERENCES

- DONE, J.T. (1975) Infectious atrophic rhinitis: rational control at herd level. *The Veterinary Annual* 15, 105-110.
- DONE, J.T. (1979) Herd monitoring for control of porcine atrophic rhinitis. *The Veterinary Annual* 19, 83-88.
- DONE, J.T., UPCOTT, D.H. and LUND, L.J. (1982) Atrophic rhinitis; snout morphometry for quantitative assessment of turbinate atrophy. *Proc. VIIIth IPVS Congress, Mexico City 1982* Paper No. 264.