

Perceived Usefulness of the Collection of Subclinical and other Disease Entities Detected at Slaughter

Paul V. Shadbolt, William R. Mitchell, Donald J. Blackburn, Alan H. Meek and Robert M. Friendship

Agriculture Canada, Food Production and Inspection Branch, Veterinary Inspection Directorate, 4900 Yonge Street, Suite 1210, Willowdale, Ontario M2N 6G7 (Shadbolt), Department of Veterinary Microbiology and Immunology (Mitchell, Meek), Department of Clinical Studies (Friendship), Ontario Veterinary College and Department of Rural Extension Studies (Blackburn), University of Guelph, Guelph, Ontario N1G 2W1

Abstract

Based on a survey of 1820 Ontario pork producers and 16 veterinary members of the Ontario Swine Practitioners Association, condemnation/demerit data, while viewed as potentially valuable, are seldom, if ever, utilized in the provision of herd health programs. We found, however, that: 1) 89.4 percent (SD 1.04 percent) of producers and all veterinarians would use the disease information made available by a computerized system that would collect and report on subclinical and other disease entities detected during the slaughter of hogs; 2) lesion diagnosis should be as detailed as possible and report on severity of disease; and 3) with the exception of those producers who ship larger numbers of hogs to market for which reports were wanted for each kill, monthly reports would be adequate.

Written comments by producers expressed concerns about confidentiality of individual herd data, costs for the information/service, and veterinary expertise in the interpretation of findings.

Key words: Swine, slaughter, preventive medicine.

Résumé

Perception de l'utilité des renseignements recueillis sur les maladies porcines, subcliniques ou autres, lors de l'abattage

À la suite d'une enquête menée auprès de 1820 producteurs de porcs de l'Ontario et de 16 vétérinaires, membres de l'association des praticiens du porc de cette province, les auteurs ont constaté qu'on utilise peu ou pas du tout les données relatives à la condamnation et au démerite, dans l'élaboration des programmes de santé, même si on les considère comme potentiellement valables. Ils réalisèrent aussi que: 1) 89,4% des producteurs et tous les praticiens impliqués utiliseraient l'information relative aux maladies, si on la leur rendait disponible par un système d'informatique qui enregistrerait et rapporterait toutes les maladies, y compris les subcliniques, détectées à l'abattage des porcs; 2) le diagnostic lésionnel devrait être aussi détaillé que possible et tenir compte de la gravité des maladies; 3) à l'exception des producteurs qui font abattre un nombre particulièrement élevé de porcs et demandent un rapport après l'abattage de chaque lot, un rapport mensuel suffirait.

Les commentaires écrits des producteurs exprimaient de l'inquiétude relativement au caractère confidentiel des informations sur chacun des troupeaux, au coût d'un tel service informatisé et à l'expertise des praticiens dans l'interprétation des informations précitées.

Mots clés: porcs, abattage, médecine préventive.

Can Vet J 1987; 28: 439-445

Introduction

Successful programs for the utilization of postmortem data collected from hogs at slaughter, to improve disease control measures and management practices used in pork production, have been developed in Denmark (1-4), Northern Ireland (5), the Netherlands (6), New Zealand (7), Norway (8), and Sweden (9, 10). Within the Danish National Pig Health Scheme, postmortem disease data are analyzed by computer, and the owners of identified problem herds are sent an offer of assistance. This program has helped to establish many specific-pathogen-free herds and identify production problems within other herds (3, 11).

The purpose of this part of our project was to determine whether or not information coming from a computerized system, that would collect and report on subclinical and other disease entities detected during the slaughter of hogs, would be perceived as useful by producers and veterinarians involved in the production of pork in Ontario. The specific objectives were:

- 1) To determine from pork producers and from veterinarians who specialize in swine practice the perceived usefulness of disease information derived from such a system;
- 2) To determine characteristics of swine producers, veterinarians, and/or their operations/practices, which might explain differences in their views about such a system, should differences be found to exist;
- 3) To determine the information considered to be essential by respondents, and the frequency with which it should be reported for the system to meet the needs of producers/veterinarians; and
- 4) To determine the value to producers and veterinarians of slaughterhouse

data, as presently reported, as a source of farming information.

Materials and Methods

To meet the stated objectives, a survey of hog producers and veterinarians was carried out by mail questionnaires and telephone interviews during March and April, 1985.

Survey Populations

A questionnaire was developed and, in cooperation with the Ontario Pork Producers Marketing Board (OPPMB), was distributed to 1820 of 16,716 pork producers using a nonproportional, stratified, random sampling scheme. Stratification was based on the number of hogs sent to slaughter annually as we felt that this may influence the perceived usefulness of disease data coming from slaughter. Published figures for the number of hogs shipped to market annually (12) were used to divide producers into three groups (strata) as follows: group 1, those shipping fewer than 750 hogs annually; group 2, those shipping between 750 and 1500 hogs annually; and group 3, those shipping more than 1500 hogs annually. Because of the large number of producers in group 3, it was not practical to sample equivalent proportions from each group (i.e. nonproportional).

A second questionnaire was developed and distributed to a simple random sample of sixteen of thirty-four veterinary members of the Ontario Swine Practitioners Association (OSPA). The OSPA was selected because swine practitioners are not separately identified in the listings of veterinarians of the Ontario Veterinary Association.

To determine possible differences between respondent and nonrespondent producers, a simple random sample of twenty-five nonrespondent producers was selected for telephone interviews.

Survey Materials and Procedures

A package containing: a covering letter to explain the project; a questionnaire; and a stamped, return-addressed envelope, was mailed to each individual selected for the survey. The proposed system was explained in the covering letter as: "... a computerized system that will collect data on swine diseases at the time of slaughter. Computer analysis of this data will provide producers with feedback information about disease problems

in their herds . . . fashioned after the successful Danish system which arose from a co-operative effort between pork producers, their organizations, and government agencies. With the aid of this system, the Danes have established approximately 1400 specific-pathogen-free (SPF) herds and discovered a new disease syndrome involving the kidney."

Questions for which there were structured responses were designed: a) to permit characterization of the swine operation or veterinary practice and their operators; b) to determine the importance of various sources of farming information as it pertains to disease; and c) to determine the needs and perceived value of the disease information to be collected at slaughter. Categorical variables relating strictly to producers were: type of swine operation (breeder, farrow-to-finish, weaner, feeder); and education level (ranging from elementary to university degree). Only one variable, type of practice (porcine, exclusively large, predominantly large, 50% large, small) was specific to veterinarians. Categorical variables common to both questionnaires and that could be answered by all those sampled were: importance of various sources (listed under results) of farming information (very important, important, slightly important, not important); discussion of slaughter data presently collected with veterinarian (never, seldom, occasionally, frequently); reason for never discussing slaughter data (not relevant, never thought much about them, not reliable, veterinarian does not think they are reliable, not presented by client for discussion, other); and future discussion of slaughter data reporting subclinical and other disease entities (yes, no).

Only those who indicated that they would use the new data were asked to answer questions regarding the needs of the information to be reported. These were: reporting detail for the diseases of pneumonia, arthritis, liver disease, disease of small/large intestine, kidney disease, and other (specify) (warning: herd incidence of disease-x exceeds national average, disease-x is present in the herd at a rate of, disease-x is mild/moderate/severe at rates of, lesions are consistent with a specific form of disease-x); frequency of reporting (each kill, monthly, quarterly, semi-annually, annually); and access to herd/summary

data (you alone, you and your veterinarian/client, all producers, all veterinarians, OPPMB, Canadian Meat Council (CMC), veterinary colleges, government agencies).

Continuous variables could be answered by all those sampled. To facilitate cross-tabulations, continuous variables pertaining to producers were combined into categories as follows: number of sows in herd (<40, 40-69, 70-99, 100-149, 150-199, 200-249, >249); number of feeder pigs in herd (<125, 125-249, 250-374, 375-499, 500-749, 750-999, 1000-1249, >1249); person-years involved in operation (1, 2, 3, 4, 5, 6-10, 11-15, >15); number of other farming enterprises on farm (1, 2, >2); number of memberships to farming associations/groups (1, 2, >2); number of hogs sent to slaughter per year (<750, 750-1500, >1500); age (<25, 25-34, 35-44, 45-54, 55-64, >64); number of seminars attended (1, 2, >2); number of years farming (<5, 5-9, 10-14, 15-19, 20-24, 25-29, 30-34, >34); and hours/week or days/year of off-farm employment for producer/for spouse (full time, part time, seasonal, occasional).

Continuous variables relating to veterinarians were structured in such a way that each pertained to a particular category of interest. These were: number of clients running breeder, farrow-to-finish, weaner, feeder, or backyard operations; number of farms with sow size of <50, 50-100, 100-250, 250-500, >500; and number of farms with feeder size of <50, 50-100, 100-500, 500-1000, >1000. Only one continuous variable relating to veterinarians, number of memberships to veterinary associations/groups, had to be combined into categories for cross-tabulations.

Answers to structured questions were analyzed using the SPSS_x statistical programs (13). Determinations of the frequency distribution of variables were carried out. Because the sample sizes taken from strata 2 and 3 exceeded 10% of their actual populations, the calculated standard errors of the mean for frequencies of variables related to these two groups were adjusted by finite population correction factors of 0.735 and 0.714, respectively. Cross-tabulations were used to determine possible relationships between pairs of variables, with and without controlling for other variables. To determine which variables were highly correlated and to study

the extent of divergence between groups that indicated they would or would not use the new data, discriminant analyses were done. These were carried out in a stepwise fashion on all variables and on selected variables (14-16).

In addition to answering structured questions, respondents were encouraged to make written comments. These were recorded verbatim and were subjectively evaluated.

Student's t-test (17) was used to compare responses of producers to variables common to the mail survey and telephone interviews.

Results

Survey of Pork Producers

After adjusting for thirty-five returns from producers no longer in pork production and for nine post office returns, the answers from 1222 (or 68.8% of eligible respondents) completed questionnaires were entered into the database.

It was determined that, regardless of strata, ninety-one percent of respondent producers reported that they would use disease data generated by the proposed system. When adjusted for actual population sizes of the strata, this percentage drops slightly to eighty-nine percent.

Five variables relating to characteristics of producers or their operations were found by chi-square analysis to be significantly associated with a producer indicating that the new disease information generated by the proposed system would be used (Table I). However, because these were found not to be significant when other variables in the study were controlled for or during discriminant analysis, it must be concluded that these variables are not predictive.

The survey indicated that producers, especially those who run breeder and weaner operations, wish to have information concerning the pneumonias, arthritides, and intestinal lesions. Further, there was a demand for more detailed disease information from producers shipping more hogs to market and/or having acquired higher levels of education. Also, a need for information about "other" diseases (Table II) was identified.

While fifty percent of pork producers indicated that monthly reports of hogkill data would be sufficient to monitor their herds, the following

TABLE I
Associations of the Producer-related Variable, "Intends to Use the New Data", with Other Producer-related Variables

Variable	Significance of chi-square
Type of swine operation	<0.01
Number of feeder hogs	NS
Number of hogs shipped to market	NS
Person-years involved in operation	NS
Number of other farming enterprises undertaken	<0.01
Present discussion of condemnations/demerits	<0.0001
Age	NS
Number of years farming	NS
Extent of off-farm employment	NS
Extent of off-farm employment (spouse)	<0.05
Education level obtained	<0.0001
Number of seminars taken	NS

NS = not significant at 5% significance level

TABLE II
"Other" Diseases Identified for Reporting Purposes by Producers and Veterinarians

Disease/Condition	Frequency of response by producers		Frequency of response by veterinarians	
	Count	% ^a	Count	% ^b
Rhinitis	146	14.1	5	33.3
Worms	61	5.9		
Skin	59	5.7		
Heart	26	2.5		
Pale soft exudative pork/ porcine stress syndrome			1	6.7
Ulcers			1	6.7
Ovarian activity			1	6.7
Reproductive abnormalities			1	6.7

^aOf 1038 producers

^bOf 15 veterinarians

trends were found to be significant (chi-square). As producer age increased, up to age fifty-four, the percentage desiring monthly reports also increased (42.9 to 53.6%). After the age of fifty-four, percentages dropped (to 33.3%). Producers aged sixty-five years or older indicated a preference for semiannual and annual reports. Requests for reports after each kill were inversely related to the age of respondents (35.7 to 16.7%), but were directly related to the number of hogs shipped (18.5 to 26.2%). All producers reported that data on each herd should be received by the herd's owner. Sixty-three percent (62.8%) indicated that the data should also be made available to the producer's veterinarian. Only a few of the producer group recommended that specific herd data be made available to other groups/organizations (i.e. veterinary colleges (19.9%), OPPMB (15.1%), and government and CMC (less than 10%)).

Most pork producers agreed that

producers (81.9%) and veterinarians (60.1%) should receive data summarized from all producers' herds. Amongst the named agencies/associations to receive group summary data were veterinary colleges (46.0%) and OPPMB (41.0%), government (23.6%) and CMC (23.0%).

The survey indicated that most (56.3%) producers never discuss slaughterhouse findings with a veterinarian. For those who indicated they did (43.7%), discussions seldom (almost never) took place (59.0%) or only took place occasionally (but not regularly) (46.6%). For those producers who do not discuss slaughter data with their veterinarian, the reasons reported for not doing so were: 1) had not thought much about them (46.2%); 2) did not find them relevant to their herd health program (21.0%); and 3) did not believe them to be reliable (4.2%). "Other" reasons accounted for the remainder. These were: "do not have many prob-

lems" (13.2%); "do not use veterinary services on a regular basis, if at all" (7.6%); "not enough information given" (2.3%); "not available" (2.1%); and "not understandable as written due to phrasing used and/or legibility" (less than 1%). Producers most frequently indicated that their own experience and farm records were the most important sources of farming information. The most important off-farm source of farming information was reported as being farm papers and magazines. Then, in descending order, came: veterinarians, Ontario Ministry of Agriculture and Food (OMAF) publications, agricultural representatives and swine specialists, slaughterhouse reports, agribusiness salespeople, neighbors, and farming groups and associations.

The educational levels of producers appears to influence their selection of sources of information. As the level of education increased, a slight, but significant, decrease in the importance of personal experiences and those of neighbors was noted. Concurrently, more importance was put on farm records, OMAF publications, and advice from agricultural representatives and swine specialists. Those producers with junior high, high school, vocational and community college education more frequently reported that disease data associated with slaughter were important and useful to them. Those producers who run weaner and purebred breeder operations also reported slaughterhouse data as being more important.

Twenty-one of the twenty-five non-respondents contacted by telephone participated in the follow-up survey. Results for comparable variables from mail and phone surveys of producers are shown in Table III. There were no significant differences in results between these two groups as determined by t-test.

Survey of Veterinarians

Of the sixteen questionnaires mailed, fifteen were returned (94%) and entered into the database.

All veterinary swine practitioners surveyed indicated that they saw the information to be generated by the proposed system as useful. Therefore, no characteristics could be derived from the survey that would help in predicting data use by veterinarians.

Veterinarians indicated that, for the disease states named, diagnoses should

be as detailed as possible and report on the severity of disease. In particular, data on the pneumonias, arthritides, and intestinal lesions were identified as being important.

Eight of fourteen (57.1%) veterinarians reported that monthly reports would be their choice. Quarterly reports were the second most frequently (28.6%) preferred.

All fifteen veterinarians surveyed indicated that data on the specific herd should be made available to the specific pork producer. Fourteen (93.3%) identified the receipt of these data by the producer's chosen veterinarian as a need. Fewer than five veterinarians indicated that veterinary colleges (26.0%), government (20.0%), OPPMB (13.3%) and CMC (<10%) should receive reports.

All veterinarians indicated that summaries on grouped data should be made available to all producers and veterinarians. Among the agencies and associations to receive summaries, smaller proportions suggested veterinary colleges (80.0%), OPPMB (73.3%), government (40.0%), and CMC (46.7%).

The survey revealed that three (20%) veterinarians never discuss slaughter data with their clients. The reasons given were: "do not specify findings other than what is lost", and "data are not presented by the client for discussion".

After their own experience, the ranking of the various sources of farming information by veterinarians was seen to be stepped. The ranking of sources within the highest ranking step was, in descending order: veterinary textbooks and journals; associations, cooperatives and groups, and farm records; farm papers and magazines; agricultural representatives and swine specialists, and Ontario Veterinary College (OVC); and OMAF publications and bulletins. Within the second step, agricultural colleges in Ontario were ranked as more important than agribusiness salespeople. Slaughterhouse data had a mean ranking value of half that of the second step.

Written Comments

The written comments reflected the general agreement of respondents to the principle of extending present slaughterhouse reports to include information on subclinical and other disease entities. Amongst producers who wrote comments (12.8%), concerns

were expressed about: confidentiality of individual herd data (5.1%); costs to the producer for the information (12.9%); and ability of veterinarians to solve herd health problems (6.5%).

Discussion

From the agreement of results for comparable variables between mail and phone surveys of producers (Table III), it is concluded that there was no difference between respondent and non-respondent producers and that results of the questionnaire mailed to producers could be extrapolated to all Ontario hog producers.

The finding that eighty-nine percent of producers are likely to use disease information generated by the proposed system is supported by a 1981 survey, conducted by the Saskatchewan Pork Production Committee, in which herd health programs were ranked among the ten leading areas of concern (18). In contrast, the initial experiences of Denmark's National Pig Herd Health Scheme were that only fifty percent of producers, all of whom were identified as having problem herds, accepted the offer for a veterinary swine specialist to visit their farm. The remainder did not accept for a variety of reasons, such as: "action already taken", and "going out of business" (2). In a survey of owners of 114 cow-calf herds in Saskatchewan, it was found that fifty-three (46.5%) producers were not interested in herd health programs, mainly because they "had no trouble and, hence, saw no need" (19). While feedback of slaughterhouse data cannot be equated to herd health programs, these examples certainly suggest that at least one-half of pork producers would be interested in such feedback.

The finding that all of the sampled veterinarians of the OASP would use the new data is inconsistent with the conclusion made by veterinarians of the Pig Veterinary Society, in 1980, who felt that the recording of disease, per se, was of limited value and that what was needed was a record of production that would identify individual or groups of animals that were lagging behind, presumably from disease, for more detailed examination (20). Further, many veterinarians do not participate in health management programs for various reasons (19). It

TABLE III
Comparison of Responses Common to Mail Survey and Telephone Interviews

Response Category		Phone		Mail	
Variable	Subcategory	Value	Count	Value	Count
1. Type of operation	breeder	5%	1	3%	37
	farrow-finish	76%	16	66%	798
	weaner	—	—	1%	14
	feeder	19%	4	29%	361
2. Hogs shipped	mean	1088		1217	
3. Presently discuss slaughter data with veterinarian	never	86%	18	56%	681
	seldom	14%	3	26%	314
	occasional	—	—	16%	194
	frequent	—	—	2%	23
	median	never		never	
4. Intends to use new data	no	14%	3	11%	107
	yes	86%	18	89%	1089
5. Reporting frequency	mean	monthly		monthly	
6. Age	mean	43		42	
7. Years farming	mean		18	15	
8. Education	presecondary	33%	7	37%	444
	secondary	52%	11	41%	496
	postsecondary	14%	3	22%	263

would appear, then, that the veterinarians sampled suffer from group, or membership, bias. They, that is members of the OASP, may be more interested in health management programs and aids to such programs, like meat inspection data, than veterinarians at large.

For both groups it is very likely that bias was introduced from wording of the covering letter (21, 22, 23). The description of the computerized data collection system did more than just describe what the system could do. It also indicated that it had been patterned after "a successful system" and pointed out a number of positive accomplishments achieved by users of similar systems. While these additional comments may very well have biased the respondents attitudes towards the value of slaughterhouse data, the rates of responses between respondents and nonrespondents, the latter of which were not reminded of the covering letter (Table III), were found not to be significantly different.

The finding that no variable(s) could be used to predict whether or not a respondent producer would use the disease information coming from the proposed system is not unexpected considering there was only nine percent of respondents with which to make this determination.

"Other" diseases identified for reporting purposes by producers reflect a concern about production-related diseases similar to those listed in the

1979 and 1984 surveys of the American Association of Swine Practitioners (AASP) (24), and, more recently, in 1985, with a survey of veterinarians about swine dysentery in which practitioners were asked what they thought would be the major swine diseases over the next five years (Shultz RA, personal communication 1985). These results are also in keeping with the needs expressed by respondent veterinarians.

A large proportion of producers (50.3%) and veterinarians (57.1%) indicated that monthly reports would be suitable. Results indicate that for large herds, this may not be frequent enough, and for small herds it may be too frequent. Michigan State University's Farm Animal Health and Resource Management Program (FAHRMX) offers its reports weekly or upon request to participating dairy herds (25, 26). Within the Danish National Pig Herd Health Scheme, condemnation/demerit data are reported back to the producer for each kill, as is presently done in the Canadian federal meat inspection system, with visits to farms and disease reports being made only when their central computer identifies a problem herd (1, 2, 4, 12, 13). Hilley *et al* suggest that the time and frequency of reporting will depend on the particular disease of interest (27). As examples, they indicate that to monitor rhinitis or pneumonia would involve semi-annual checks, whereas

to monitor both rhinitis and pneumonia would require quarterly reports.

Recommendations made by producers that the distribution of specific herd data be limited, and that summary data be given a more general distribution, are consistent with provisions made in Canada's Access to Information and Privacy Acts. These Acts provide for the confidentiality of individual and commercial data (28, 29). Producer recommendations are also consistent with conclusions made by a symposium on animal disease reporting, held in Toronto, Canada, in 1981 (30). There, a mixed body of government, university, and industry people agreed that data should be confidential and accessible only to those accredited groups which provided the information or had *bona fide* reasons (e.g. legislature).

There was only one area of the questionnaires where results could be directly compared with findings from other studies. Table IV lists the average of results of the present study and those of three other surveys (31, 32, 33) on the ranking of the value of various sources of farming information amongst producers. Calculated average values are based on the present study's coding system. There was strong agreement between all four studies for "farm papers/magazines" and "agricultural representatives and salespeople". The ranking value for OMAF publications was not consistent across the studies. The value obtained within the present study, however, does lie within the indicated range of values. The ranking for "neighbors" is considerably lower than that of the extension paper (32).

The discrepancy between the mean value for the importance of neighbors as a source of farming information between the present study and the extension paper may be due to ambiguity within the present study in the way the term was used. Perhaps the use of the phrase, "other hog producers", would have been better. The fact that some respondents specified "other farmers" under the "other (specify)" category is a good indication that ambiguity was involved. Overall, though, results amongst the four studies are consistent which is important in verifying the validity of the data as a whole.

The finding that the importance of slaughterhouse data is presently ranked by producers at a level close to that

for the importance of OMAF publications is not consistent with the finding, in a later question, that fewer than half (45.7%) of producers discuss condemnation/demerit data with their veterinarians and, at best, that these discussions take place infrequently. This lack of agreement could be apparent rather than real. For instance, while 90% of livestock producers in a 1983 survey, conducted in Minnesota to assess attitudes and knowledge of drug residues, indicated that they would consult a veterinarian, only 63% reported that they would consult their veterinarian first (34). From that same study, it was estimated that at least half of the livestock and poultry going to market have never been under routine veterinary care. It is also possible, and more likely, that the disagreement is real and due to bias introduced by the intent of the questionnaire as stated in the covering letter, which was: "... to determine the interest in a computerized system that will collect data on swine diseases at the time of slaughter. . .".

The low value ratings of present condemnation/demerit data by veterinarians is consistent with statements made concerning the number of producers who do discuss slaughterhouse data with their veterinarian, and the lack of sufficient detail in slaughterhouse reports.

From this discussion, the following recommendations are made:

1. that another survey of Ontario pork producers be conducted with the purpose of determining how much they are willing to pay for dis-

ease information coming from slaughter. Such a survey should validate findings of this study;

2. that a monthly summary of specific herd data, with appropriate adjustments for season and slaughterhouse, be forwarded to the specific producer. Provisions for such reports to be forwarded after each kill or directly to a veterinarian of the producer's choice might also be made available. The producer may then determine the extent of any further distribution of this information;
3. that monthly summaries of Ontario data be distributed to participating groups, and, in accordance with the Freedom of Information Act, be available to industry-associated businesses (e.g. pharmaceutical companies), veterinary colleges, and others with *bona fide* reasons;
4. that lesion recording be as detailed as possible and report on the severity of lesions found. Considering present procedures and technology and expressed needs of producers and veterinarians, lesion recording at the viscera inspection station should, initially, concentrate on lung and liver. As diseases from intestinal parasites can be diagnosed on the farm using fecal (stool) samples and as opening the intestinal tract increases the likelihood of contamination of edible portions, it cannot be recommended that these be recorded on the killfloor. Atrophic rhinitis lesions that do not result in gross distortion of the snout are, at pres-

ent, not practical to collect on a routine basis; however, they should be considered for future collection; and

5. that a study of the present system for collecting and disseminating slaughterhouse data be made. If it is not practical to extend it for the collection of nondemeritable disease and productivity data, then a suitable system of handling the data be designed and costed.

Acknowledgments

We wish to thank Robert Sinclair, Ken McKenzie, and Glen Agnew of the Ontario Pork Producers' Marketing Board for their provision of information and for their assistance regarding the mailing of questionnaires and letters.

Financial support, educational leave, and additional support required by Paul Shadbolt to pursue studies at the University of Guelph were provided by the Meat Hygiene Division, Food Production and Inspection Branch, Agriculture Canada.

References

1. PETERSEN BK. Ante and post mortem inspection in Danish slaughterhouses, especially related to pigs. In: Proceedings of the International Symposium on Meat and Poultry Inspection in a Dynamic World. Ernst Sillem Conference Centre, Den Helder, Netherlands, May, 1985.
2. PETERSEN BK. Nationwide computer-based abattoir surveillance and follow-up at the herd level. In: Proceedings of the International Symposium on Meat and Poultry Inspection in a Dynamic World. Ernst Sillem Conference Centre, Den Helder, Netherlands, May, 1985.
3. WILLEBERG P, AALEND O, RIEMANN H. Herd health monitoring by means of slaughter inspection data. In: Proceedings of the International Pig Veterinary Society Congress, Copenhagen, Denmark, June 30, July 1-3, 1980: 358.
4. WILLEBERG P, GERBOLA MA, KIRKEGAARD PETERSEN B, ANDERSEN JB. The Danish pig health scheme: Nationwide computer-based abattoir surveillance and follow-up at the herd level. *Prev Vet Med* 1984/85; 3: 79-91.
5. COLLINS JD. Abattoir data retrieval. *Irish Vet J* 1980; 34: 63-65.
6. VAN DER VALK PC, BUURMAN J, VANDENBOOREN JCM, VERNOOY JCM, WIERDA A. Automated herd health and production control programs for swine farms. In: Proceedings of the International Pig Veterinary Society Congress. Ghent, Belgium, Aug. 27-31, 1984: 342.
7. CHRISTIANSEN KH, HELLSTROM JS. The collection of data from New Zealand abattoirs and slaughterhouses. In: Geering WA, ed. Proceedings of the Second International Symposium on Veterinary Epi-

TABLE IV
Mean Scores from Farm Readership Surveys

Information Source	Ontario Farm ^a 1980				
	All pork producers	Major pork producers	Extension ^b 1982	OMAF ^c 1985	Present Study
Farm papers/magazines	2.3	2.3	2.2	2.3	2.2
OMAF publications	1.4	1.3	2.1	1.6	1.9
Agr. reps. and salespeople	1.5	1.7	1.6	1.6	1.6
Neighbors	n/a	n/a	2.2	n/a	1.4

n/a = not appropriate
Scoring used — 3 = very important
2 = moderately important
1 = important
0 = not important

Revised from:

^aOntario Farm Readership Survey (31).

^bHow Extension Stacks Up As An Information Source For Farmers (32).

^cReadership Survey of OMAF News and Other Media (33).

- demology and Economics, Canberra, Australia, May 7-11, 1979. Canberra, Australia: Australian Government Publishing Service, 1980: 168-176.
8. FLESJA KI, ULVESAETER HO. Pathological lesions in swine at slaughter. I. Baconers. *Acta Vet Scand* 1979; 20: 498-514.
 9. BACKSTROM L. Disease registrations on pigs at slaughter as a method of preventive and therapeutic veterinary medicine in swine production. In: *Proceedings of the International Pig Veterinary Society Congress*. Ames, Iowa, June 22-24, 1976: paper no. 12.
 10. HASSLER L. Some health problems in fattening herds in Sweden. In: *Proceedings of the International Pig Veterinary Society Congress*. Ghent, Belgium, Aug. 27-31, 1984: 365.
 11. WILLEBERG P. Epidemiological applications of Danish swine slaughter inspection data. In: Geering WA, ed. *Proceedings of the Second International Symposium on Veterinary Epidemiology and Economics*, Canberra, Australia, May 7-11, 1979. Canberra, Australia: Australian Government Publishing Service, 1980: 161-167.
 12. ONTARIO PORK PRODUCERS' MARKETING BOARD. Ontario Pork: Report to the Forty-third Annual Meeting of the Ontario Pork Producers' Marketing Board and the Ontario Hog Producers' Association. Toronto Hilton Harbour Castle, Toronto, Ontario, Canada, March 13-14, 1984: Section 8.
 13. SPSS INC. SPSS_x user's guide. Toronto, Canada: McGraw-Hill Book Company, 1983.
 14. CACOULLOS T, ed. *Discriminant analysis and applications*. New York: Academic Press, 1973.
 15. HAND DJ. *Discrimination and classification*. Toronto, Canada: John Wiley & Sons, 1981.
 16. REYNOLD HT. *The analysis of cross-classification*. New York: The Free Press, A Division of Macmillan Pub. Co. Ltd., 1977.
 17. STEEL RGD, TORRIE JH. *Principles and procedures of statistics, a biometrical approach*. 2nd ed. Toronto, Canada: McGraw-Hill Book Company, 1980.
 18. MAGWOOD SE. Preventive veterinary medicine in Canada: Study of results of survey. *Can Vet J* 1983; 24: 178-186.
 19. CHURCH TL. An analysis of production, disease and veterinary usage in selected beef cow herds in Saskatchewan. M.Sc. Thesis, University of Saskatchewan, 1978.
 20. DAVIES G. Aids to pig health and production recording. In: *The Pig Veterinary Society Proceedings*, vol. 6. Cambridge, Great Britain: Burlington Press (Cambridge) Ltd., 1980: 21-22.
 21. BACKSTROM CH, HURSH-CESAR G. *Survey research*. 2nd ed. Toronto, Canada: John Wiley & Sons, 1981.
 22. ERDOS PL. *Professional mail surveys*. Toronto, Canada: McGraw-Hill Book Company, 1970.
 23. WALTNER-TOEWS D. Questionnaire design and administration. In: *Proceedings of the Third International Symposium on Veterinary Epidemiology and Economics*, Arlington, Virginia, Sept. 6-10, 1982. Edwardsville, Kansas: Veterinary Medical Publ. Co., 1983: 31-35.
 24. SCHULTZ RA, HALL RE. A 1984 swine health survey conducted by the American Association of Swine Practitioners (AASP). In: *United States Animal Health Association Meeting*. Fort Worth, Texas, Oct. 21-26, 1984. Richmond, Virginia: Carter Printing Co., 1984.
 25. BARTLETT PC, KANEENE J, GIBSON CD, ERICKSON R, MATHER EC. Development of a computerized dairy management and disease surveillance system: FAHRMX. In: *Symposium on Computer Applications in Veterinary Medicine*. Mississippi State University, Starkville, Mississippi, Oct. 13-15, 1982: 21-29.
 26. MATHER E, McPHERSON M, HARSH S, MARTIN F, NOTT S, KANEENE J. Food animal health resource management system (FAHRMX) — an overview. In: *Proceedings of the Third International Symposium on Veterinary Epidemiology and Economics*. Arlington, Virginia, Sept. 6-10, 1982. Edwardsville, Kansas: Veterinary Medical Publ. Co., 1983: 15-22.
 27. HILLEY H, STRAW B, SCHWOCHERT M. How to conduct a high speed slaughter check. In: *Proceedings of the Annual Meeting of the American Association of Swine Practitioners*. Des Moines, Iowa, April 18-20, 1982: 219-230.
 28. COMMUNICATIONS DIVISION. Access to Information Act. Ottawa, Canada: Treasury Board of Canada, 1985.
 29. COMMUNICATIONS DIVISION. Privacy Act. Ottawa, Canada: Treasury Board of Canada, 1985.
 30. LEBER C. Minutes: Symposium on animal disease reporting. Held in Toronto, Ontario, Canada, October 6-7, 1981.
 31. BLACKBURN DJ. Ontario farm readership survey. Guelph, Canada: School of Agricultural Economics and Extension Education, Ontario Agricultural College, University of Guelph, 1980. (Research Report AEEE/81/1).
 32. BLACKBURN DJ. How extension stacks up as an information source for farmers. *Proceedings of the Annual Conference of the Canadian Society of Extension at the University of British Columbia*, Vancouver, B.C., 1982.
 33. BLACKBURN DJ. Readership survey of OMAF news and other media. Guelph, Canada: School of Agricultural Economics and Extension Education, University of Guelph, 1985. (Research Report AEEE/85/1/1985).
 34. LEMAN AD, PULLEN MM. The clinician's impact on meat safety. In: *Proceedings of Sessions on Safe Meat and Poultry from Farm to Table and the National Animal Disease Surveillance Program*, presented at the 121st Annual Meeting of the Am Vet Med Assoc, New Orleans, Louisiana, July 18-19, 1984, *J Vet Med Educ* 1985; 11: 97-98.

Index of Advertisers Index des annonceurs

Agriculture Canada	391
Hill's Pet Products	396-97
Kodak Canada	449
Langford Labs	394
MSD Agvet	IFC
Ralston Purina	IBC
Schering Canada	OBC
Squibb Canada	392
Vetrepharm	448