

graduate

MISCELLANEOUS PUBLICATIONS SERIES NO. 493

THIRD VETERINARY POST-GRADUATE COURSE

THEME: "HERD HEALTH PROGRAMMING"

AUGUST 15-19, 1983

REPAHA, MON REPOS, GUYANA

SPONSORED JOINTLY BY PAN-AMERICAN HEALTH ORGANISATION / WORLD HEALTH ORGANISATION AND INTER-AMERICAN INSTITUTE FOR COOPERATION ON AGRICULTURE

IICA  
PM-493  
1983





**INTER-AMERICAN INSTITUTE FOR COOPERATION ON AGRICULTURE**

**P.O. BOX 10-1089, GEORGETOWN, GUYANA,**

THIRD VETERINARY POST-GRADUATE COURSE

THEME: "HERD HEALTH PROGRAMMING"

AUGUST 15-19, 1983

REPAHA, MON REPOS, GUYANA

SPONSORED JOINTLY BY PAN-AMERICAN HEALTH ORGANISATION / WORLD HEALTH ORGANISATION AND INTER-AMERICAN INSTITUTE FOR COOPERATION ON AGRICULTURE



This One



RRTL-R90-03GZ

Digitized by Google

SECTION OF THE  
FEDERAL BUREAU OF  
INVESTIGATION  
U. S. DEPARTMENT OF JUSTICE

7-10-58  
100-100000-1000

# C O N T E N T S

	<b>Page</b>
<b>INTRODUCTION</b> . . . . .	<b>1</b>
<b>PROGRAMME</b> . . . . .	<b>2</b>
<b>LIST OF PARTICIPANTS</b> . . . . .	<b>6</b>
<b>SUMMARY REPORT</b> . . . . .	<b>7</b>
<b>SEMINAR EVALUATION</b> . . . . .	<b>21</b>
<b>RESOLUTION</b> . . . . .	<b>23</b>
<b>ANNEX: Planned Animal Health and Production Programmes - Chapter One - General Principles</b>	

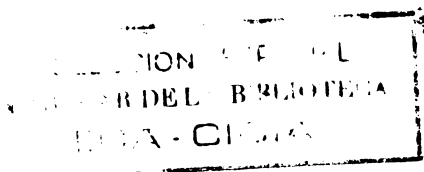
## I N T R O D U C T I O N

The Third Caribbean Veterinary Post-Graduate Course, theme: Herd Health Programming, was jointly sponsored by the Inter-American Institute for Cooperation on Agriculture and the Pan-American Health Organisation/World Health Organisation.

The objectives of this Course were:

- To maximise the use of Veterinary personnel by eliminating the "Fire Brigade" type of service now being practised and allowing Veterinarians more time to effectively plan proper preventative programmes.
- Development of Veterinarian/Farmer relationships which will lead to greater Community involvement and participation in the Animal Health/Veterinary Public Health Services.

The Course was held at REPAHA, Mon Repos, Guyana from August 15-19, 1974 and representatives from Antigua, Barbados, Guyana, Jamaica, Nevis, Suriname and Trinidad and Tobago attended. Also participating were representatives from the Inter-American Institute for Cooperation on Agriculture (IICA), PAHO/WHO and University of Saskatchewan.



PROGRAMME

MONDAY, AUGUST 15

08:30

REGISTRATION

OPENING CEREMONY

Chairman

Dr. C.L. Bent

Project Manager AMRO 6571

09:00

ADDRESS OF WELCOME

Mr. C. Schleyer  
Acting Country Representative  
PAHO/WHO

ADDRESS OF WELCOME

Dr. F.C. Alexander  
Interim Director  
IICA

ADDRESS & OPENING OF COURSE

Dr. P.L. McKenzie  
Deputy Chief Agricultural Officer  
Ministry of Agriculture

9.45

COFFEE BREAK

/...

## PAPERS AND DISCUSSIONS

MONDAY, AUGUST 15

SESSION 1MODERATOR: DR. C.L. BENTRAPPORTEUR: DR. J. LA ROSE

10:15

Ratification of Programme

Veterinary Public Health Implication  
Health ProgrammingPANEL: Dr. A. Vallenas

Dr. F. Mongul

12:00 LUNCH

13:30

Clinical Examination of the Individual Animal

Dr. O. Radostits

15:00 COFFEE BREAK

15:30

Discussion of Clinical Cases

Dr. P. Brightling

Dr. A. Kelly

TUESDAY, AUGUST 16

SESSION 2MODERATOR: DR. F.C. ALEXANDERRAPPORTEUR: DR. S. RAMUDIT

09:00

Examination of the Herd

Dr. A. Kelly

10:30 COFFEE BREAK

11:15

Discussion of Herd Cases

Dr. P. Brightling

12:30 LUNCH

14:00

Discussion of Herd Cases (cont'd)

Dr. E. Janzen

15:00 COFFEE BREAK

Discussion of Herd Cases (cont'd)

Dr. P. Brightling

Dr. A. Kelly

Dr. E. Janzen



15:15

Discussion of Herd Cases (cont'd)

Dr. O. Radostits

Dr. E. Janzen

Dr. A. Kelly

WEDNESDAY, AUGUST 17

FIELD TRIP: Visit to Moblissa Dairy Farm

THURSDAY, AUGUST 18

SESSION 3MODERATOR:

DR. S. SURUJBALLY

RAPPORTEUR:

Dr. L. APPLEWHAITE

09:00

Principles of Preventative Veterinary Medicine

Dr. O. Radostits

10:30

COFFEE BREAK

11:00

Principles of Preventative Veterinary Medicine

(cont'd)

Dr. O. Radostits

12:00

LUNCH

13:30

Principles of Preventative Veterinary Medicine

(cont'd)

Dr. O. Radostits

14:30

Herd Health Programming - Dairy

Dr. P. Brightling

15:00

COFFEE BREAK

15:15

Herd Health Programming - Dairy (cont'd)

Dr. P. Brightling

/...

SESSION 4

FRIDAY, AUGUST 19

CHAIRMAN:

DR. G. SWANSTON

RAPPORTEUR:

DR. R. BALKARAN

09:00

Beef Herd Health

Dr. E. Janzen

10:30

COFFEE BREAK

11:00

Beef Herd Health (cont'd)

Dr. E. Janzen

12:00

LUNCH

14:00

Swine Herd Health (i)

Dr. A. Kelly

15:00

Swine Herd Health (ii)

Dr. O. Radostits

16:00

CLOSING CEREMONY - DISTRIBUTION OF CERTIFICATES

LIST OF PARTICIPANTSA. GOVERNMENT REPRESENTATIVES

Antigua	Ministry of Agriculture → Dr. J. Matthew, VO
Barbados	Ministry of Agriculture - Dr. R. Maitland, VO
Guyana	<u>Ministry of Agriculture</u> Dr. P.L. McKenzie, Deputy CAO Dr. R.N.D. Raja, CVO Dr. K. Sealey, VO Dr. V. Rammarine, VO Dr. M. Clarke, VO Dr. D. Muller, VO Dr. L. Applewhaite, SVO Dr. R. Balkaran, VO Dr. H. Reid, SVO (Ag.) Dr. I. Craig-Clarke, VO Dr. D. Ruschit, VO Dr. J. La Rose, Ag. Principal/Co-Project Manager, REPAHA
	<u>Others</u> Dr. S. Surujbally, Manager, LIDCO Milk Plant Dr. S. Ramudit, Guyana Pharmaceutical Corporation Dr. T. Richmond, Manager, Guyana Marketing Corporation
Jamaica	Ministry of Agriculture - Dr. H. Edwards, VO
Nevis	Ministry of Agriculture - Dr. G. Swanston, VO
Suriname	Ministry of Agriculture - Dr. E. Hooghiemstra, SVO
Trinidad & Tobago	Ministry of Agriculture - Dr. H. Narinesingh, VO

B. INTER-AMERICAN INSTITUTE FOR COOPERATION ON AGRICULTURE (IICA)

Dr. F.C. Alexander, Interim Director & Animal Health Specialist, Antilles Zone

C. PAHO/WHO STAFF MEMBERS

Dr. A. Vallenás, Animal Health Adviser, CPC, Barbados

Dr. C.L. Bent, Project Manager, REPAHA, Guyana

Dr. F.E. Mongul, Lecturer/Co-ordinator, REPAHA, Guyana

D. CANADIAN WESTERN COLLEGE OF VETERINARY MEDICINE

Dr. O. Radostits, Professor & Head, Veterinary Internal Medicine

Dr. E. Janzen, Associate Professor, Department of Herd Medicine

Dr. A. Kelly, MVSc./Post-Graduate Student

Dr. P. Brightling, MVSc./Post-Graduate Student

SUMMARY REPORT

The first technical session of the Third Refresher Course for Caribbean Veterinarians commenced at 10:15 hrs.

The programme was rearranged slightly to accommodate Dr. Vallenias who unfortunately had to attend a meeting elsewhere. With this change the programme was quickly ratified.

Dr. Vallenias presented his paper on "Veterinary Public Health Implications of Herd Health Programming". His remarks were made against the PAHO/WHO background of "Health for all by the year 2000". This, he stressed, could only be ensured by animal products of a high quality coming from healthy animals. He outlined the general objectives of a Veterinary Public Health programme as follows:

- to decrease human morbidity and mortality from Zoonoses;
- to ameliorate human nutrition by ensuring the availability of animal protein;
- to prevent human injury and illness by protecting and ensuring to safety of food supplies of animal origin;
- to promote social and economic development by reducing losses due to important Zoonoses and foot and mouth disease.

Dr. Mongul presented an informal paper which stressed the Zoonoses and food hygiene aspect of Veterinary Public Health. He mentioned that there were some 150 known Zoonotic diseases and that quite a sizeable percentage of the people of Latin America and the Caribbean suffered from one or more of these diseases. Examples of such diseases included Brucellosis, Tuberculosis, Leptospirosis, Hydatidosis and Equine Encephalitis.

He stressed that against a background of shortages, both in quantity as well as quality, it was the vital role of the Veterinarians to ensure animal products of an acceptable standard reached the consumer. He further emphasized the notion that the Veterinarian should see himself/herself as an integral part in the chain of food production.

A lively discussion followed Dr. Mongul's presentation. During this period, in answer to questions raised, Dr. Vallenias outlined a monthly reporting system

which was recommended by a recently concluded Epidemiological Seminar held in Trinidad and Tobago. The Veterinarians were requested to play their part in making this reporting system meaningful.

The morning session was adjourned for lunch at 12:00 hrs.

At 13:30 hrs, the afternoon session started with Dr. Radostits's presentation concerning the Clinical Examination of the Individual Animal. Dr. Radostits suggested that Herd Health was knowledge required to go from one point to another and likened it to a bridge over a river going from uneconomic animal production and poor health to economic animal production and improved human health.

There were eight (8) pillars supporting this bridge and these were:

- 1) Individual animal examination
- 2) Herd medicine - dairy and beef herd production
- 3) Investigation of herd disease
- 4) Epidemiological factors affecting disease
- 5) Veterinary Public Health Zoonoses
- 6) Animal production (Genetics pool, nutrition)
- 7) Economics
- 8) Extension education.

The second session began with Dr. A. Kelly presenting a paper on Examination of the Herd. He said that this involved dealing with the animals or groups of animals in a herd in contrast with an individual. This type of examination was much more complicated, time-consuming, expensive and diagnosis less specific. Environmental problems were more common. The herd with say 15 animals having Brucellosis may not be necessarily termed - a Br. herd.

He advocated the 5 W's approach:

- What - One had to be quite sure what one was looking at or for
- When - Time
- Where - Place
- Who - Age - breed/type - sex - physiological status (Vaccination, nutritional status)
- Why - The reasons as to why it happened or had to happen. Try to look again at one's information.

Dr. P. Brightling - I.B.R. on a Dairy Herd - shed light on how the 5 W's were used to investigate an outbreak of I.B.R. in a herd of 84 animals comprising Cows and Calves, cows showing the Ocular forms and calves showing the respiratory form of the disease.

Dr. E. Janzen - Case Report - Feed lot of 1400 head in 14 pens - 95 yearlings arrived on farm and 61.0% of which died in 5 days from Bovine Respiratory Disease. The question posed was what was an economical mortality rate? Another was what was/were the cause(s) of death in order to quantify the failure of treatment. Whether the choice of drug was relevant/correct. Or it might have been a wrong diagnosis. These and the other questions led to healthy discussion which was indeed thought-provoking and fruitful.

Dr. O. Radostits - Case I Report on Rabies. A case of 4 sudden deaths in a herd of 5 pregnant cows and 6 pregnant heifers out of which 3 pregnant cows were sick and wandering aimlessly, showing inco-ordination, bellowing, inability to drink, slightly aggressive, anal tone decreased, drooling of saliva.

This sparked off a brain-teasing discussion which led to the diagnosis of Rabies.

Case II - Holstein herd of 48 Milking Cows + Calves + Yearlings + Bred Heifer + Dry Cows. Eight (8) milking cows were reported ill showing depression, anorexia, weakness and recumbency. Temperature 103-105 °F, pulse and respiration increased, ruminal stasis, fluid diarrhoea in 6 animals, rumen pH 3.5-4 animals were fed on brewers' grain, alfalfa hay and dairy concentrate.

Discussion led to the conclusion that lactic acid poisoning was the problem, brewers' yeast being the culprit.

Dr. Janzen presented a case which tentatively related to Monensin toxicity but which was never really confirmed.

Dr. Kelly closed the day's activities discussing bush fires in Australia and the consequent loss of livestock.

The third session began with Dr. O. Radostits presenting a paper on Principles of Preventative Veterinary Medicine. He said that Principles of Preventative Veterinary Medicine (PVM) could be implemented by the integration of animal health and animal production services.

In developed countries, meat and milk production was five to six times that of developing countries, this having occurred through research in genetics, nutrition, animal health, housing, etc., as well as through the education of farmers in scientific methods of farming through the Government extension services. This resulted in increased production per unit of time, labour, land and animal and this led to the development of livestock rearing on an intensive scale.

Intensive systems were established in the developed world by:

- 1) High capital investment in agriculture.
- 2) Cheap supplies of energy.
- 3) Adequate alternate opportunities for labour displaced through mechanization.
- 4) Well educated farming communities, supported by well organized extension services. (Increasing numbers of farmers now have 1st degrees in Agriculture).
- 5) Good market prices through demand by affluent communities.

However, in developing countries:

- 1) Capital was short (this being aggravated by foreign exchange problems).
- 2) Energy supplies were expensive and were not always available in sufficient quantities.
- 3) Few alternative opportunities for displaced labour existed.
- 4) Extension services were poor and additionally,
  - a) farmers were largely illiterate;
  - b) research was inadequate.
- 5) Processing units were undeveloped and poorly sited, and products were largely utilised by the urban elite.

Nevertheless, it was emphasized that livestock rearing in the tropics would be optimised only if there was an improvement on the national animal health services, together with a programme for breeding livestock for a tropical environment. Married into this would be research into the use of indigenous crops as a source of stockfeed. It was further stressed that this goal could only be achieved

if there was a general upgrading of education, research, marketing and extension services.

### Planned Animal Health and Production

A programme of planned animal health and production could best be implemented through the "team or inter-disciplinary approach", whereby farms are visited by a team comprising the Veterinarian, nutritionist, agronomist, etc. Then the Veterinarian and the animal scientist should co-ordinate services.

The objective of Preventative Veterinary Medicine (PVM) was to promote good herd health, whose objectives were:

- a) to optimise production in a given environment;
- b) to maximise returns;
- c) to look after animal welfare;
- d) to prevent zoonoses.

Methods by which these objectives could be achieved included the establishment of targets of performance, e.g. age at first calving (24 months), calving to first heat (60 days), calving to conception (85 days), etc. This would be implemented by measurement of the optimum level of performance, i.e. determining the best herd performance in a given environment with respect to the parameters of daily milk yield, number of pigs marketed per sow/year, etc.

The concept of integrated herd health had its origin in Canada, in the compulsory eradication of such zoonotic diseases as brucellosis and tuberculosis and was followed by simple herd health schemes in which vaccination was routinely performed for Black-leg disease and herds were screened for sub-clinical mastitis. However the recent introduction to North America of large animal clinics has tended to keep the Veterinarian off the farm thereby reducing the effectiveness of integrated animal health programmes. The role of the Veterinarian in such programmes should be that of a herd health consultant and not as a healer as he is generally perceived to be, an image which, to a large extent, is still promoted by Veterinary Schools.

Dr. Radostits went on to say that two of the mistakes made in the early herd health programmes were no provision for early weaning and lack of constant surveillance. Current health programmes, he added, can be strengthened by establishing



performance targets and adopting a "whole farm" approach in which nutrition, milk yield, mastitis incidence and calf mortality, etc. were monitored.

He defined some causes of economic loss in livestock as poor reproductive performance, high neonatal mortality and poor nutrition. Compilation of data on performance-related activities would allow quantification of losses with the eventual aim of minimising them. Such activities would include milk yield, calf birth weight, weaning weight, calving interval, etc.

With respect to the dairy unit at Moblissa, Dr. Radostits suggested that a herd health programme should incorporate:

- a) The establishment of objectives,
- b) Planning;
- c) Target-setting;
- d) Forecasting.

#### General Requirements for Herd Health Programmes

These were considered to be willingness of the farmers, enthusiasm of the Veterinarian and recording analysis and storing of information. In addition, the Veterinarian was expected to have a broad knowledge of the species, be convinced that herd health is effective, give herd health priority and report to farmers in a simple manner. In fact opening a file for each farm was recommended and taking 4-5 farmers on critical farm visits at regular intervals would do much to foster herd health programmes in the farming community.

Constraints to the proper functioning of herd health programme in the Caribbean in particular were considered by the delegates in order of priority, as follows:

- 1) Remuneration inadequate;
- 2) Small herds,
- 3) Education of farmers, livestock assistants, professionals;
- 4) Lack of incentives, marketing, etc.;
- 5) Farming as a secondary enterprise;
- 6) The political situation (regionalisation in Guyana),
- 7) Inadequate transport;
- 8) Veterinarian/Animal Scientist conflict.

Accordingly, the following recommendations were made for planned herd health in the Caribbean:

1. The team approach should be attempted and the farm should be visited by a Veterinarian, animal scientist, agronomist, etc., this being first tried on a model farm.
2. Demonstration farms should be set up. (Government livestock farms are to be used where possible.)
3. Farmer education should be improved.
4. All available resources are to be mobilized.
5. Veterinarians must orient towards animal health.
6. There must be a marked improvement in the extension services.
7. Inputs required for animal production should be facilitated.
8. Field days should be sponsored by, among others, Veterinarians.

Dr. Radostits concluded his presentation by recapping the requirements necessary for instituting a programme of planned herd health, for the purpose of improving the productivity of livestock in Guyana and the Caribbean. Little progress could be made in this direction if the extension services were not upgraded. Concomitant with this should be a change in attitude, by Veterinarians, towards herd health and maximum exploration of all available laboratory facilities. There was also a very pressing need for relevant research and the application of this research to everyday agriculture. Findings, as well, should be communicated to colleagues, livestock assistants and farmers through a newsletter or other related publication.

Dr. E. Janzen presented a paper on Beef Herd Health to begin the fourth session in which he discussed Beef Farms in Western Canada where there was a community pasture system or grazing association. Because of this type of grazing association, it was important to establish an identification system.

Different types of identification systems were discussed and presented. They were as follows:

1. Ink Marking.
2. Hot Branding - In this system symbol and numbers were not used due to the fact that after branding imprint of number and symbols **was** not legible.

3. Freeze Branding.
4. Brisket Tags.
5. Neck Chain with Tags.
6. Large Ear Tags - Apart from identity this method was used also for identifying certain diseases.
7. Electronic Transmitters.
8. Insecticide impregnated - Ear Tags - Preventing of external parasites also.

During the lecture, questions were raised on the use of Hot Branding and Plastic Ear Tags.

### Record Keeping

Several record sheets were presented, most of which could be referred to in a booklet - "Health and Production Handbook for the Beef Herd".

### Principles of Disease Surveillance System

1. Systematic Collection
2. Orderly Evaluation
3. Prompt Dissemination

### Methods of Systematic Collection

1. Quantitate the Diagnosis
2. Quantitate the Lesions
3. Quantitate the Lowered Productivity

### Information Necessary to quantify Productivity

1. Regular Inventories - Inventories should reflect different classes of Cattle.
2. Dam Identification
3. Dam History
4. Calf Identification
5. Sire Identification
6. Calf Performance

A Beef-Cow Record Sheet was shown and consisted of the following:

1. Herd Calving Summary

Description of the Sheet

Date Calving begins ...

Date Calving ends .....

2. Herd Breeding Record

3. Record of Reproductive Examinations

Under this:

a) Herd Culling Record of Females

b) Bull Culling Record

Reasons for Culling Beef Cows in the Fall

- i) Non-pregnancy
- ii) Severe and unresolving lameness
- iii) Udder breakdown
- iv) Small or no Calf Weaned
- v) Projected to Calf late
- vi) Cancer Eye or Actinomycosis (Lump Jaw)
- vii) Excessive Emaciation
- viii) Disposition

4. Calf Weaning Record and Weaning Weights.

5. Herd Disease Record

Description:

Date	Number and kind of animal disease	Disease suspect	Treatment

6. Summary Herd Health Losses.

/...

7. Year End Summary of PerformanceBeef Cow Calf Preventive Health ProgrammeComponents of Cow/Calf Herd Health

## A. General Herd Health

1. Herd Examination
2. Individual Diagnosis
3. Necropsy and Lab Diagnosis
4. Vaccination Programme - This was important initially and not static.
5. Parasite Control
6. Monitor "Round up" events
7. Federal Animal Health Regulations.

## B. Reproductive Herd Health

1. Limited Breeding Season - All herd bred in 45 days
2. Reproductive Examination.

## C. Nutrition

1. Cow Herd
2. At weaning of replacements of bulls - early weaning is advisable.

## D. Management

1. Animal Identification
2. Records
3. Calculation and Evaluation of Indices
4. Co-ordination.

## E. Client Education

1. Formal - This can be done through Extension medium.
2. Informal or individual.

Different Stages in the Preventive Health Management Programmes  
by Prof. Blood:

- Stage (1)
1. Build up of owner's file.
  2. Producer maintains minimal records - Periodic inventories.
  3. Management events selected as need arises.
  4. Disease Control initiated as threshold of concern.
  5. Culling based on many factors.
  6. Client Education.

- Stage (2)
1. Records based on individual record or daily event journals.
  2. Precise inventory figures.
  3. Sufficient information to calculate performance indices.
  4. Necessary management events based on predicted performance.
  5. Cattle are well managed, e.g. a) Cattle are Classified.  
b) Breeding Season Limited. c) Weaning Weight of Calves.
  6. Culling based on preventive medicine events.
  7. Client education is a special effort.

Intermediate level of Veterinary Involvement.

- Stage (3)
1. Records based on individuals.
  2. Information accessible by cow, calf, breed, sire, nutritional history - e.g. Paddock, creep fed.
  3. Increased number of performance indices can be calculated.
  4. Predicted performance based on:
    - a) Cyclicity as determined by palpation or blood progesterone.
    - b) Weight Changes.
  5. Culling based on recorded information.
  6. Specific management warts may be developed.
  7. Continuing education for owner is same.

Spreading Out Stress

There are four (4) critical areas under this:

1. Calving - identification - dehorning.
2. Spring round up - Castration
  - Immunisation
  - Clostridial Infection
  - Hemophilus
  - Other
3. Fall round up (three (3) weeks) prior to weaning.  
Growth implantation, branding, dehorning, fly control.

Classification of Bulls

This system is based on semen evaluation and a physical examination. The following example using the situation in Western Canada was given, which indicated that one out of every five (5) bulls was a boarder.

Classification	No. of Bulls	%
Satisfactory	8674	79.2
Questionable	1224	11.2
Unsatisfactory	1024	9.6

**Bull Evaluation was based on:**

1. Sex drive (Libido)
2. Mating ability
3. Semen production

Physical examination of the bull should include:

1. Feet
2. Rectal - accessory sex glands
3. Scrotum
  - Testicles (position and size)
  - Epididymis - (Palpate for head and tail)

4. Penis

Grading of bulls can be done on the basis of the size and shape of scrotum.

The scrotum must have a definite shape consisting of neck, body and base.

Based on the scrotal circumference, bulls are graded. The scrotal circumference can be measured using a tape measure such as the Colorado Tape, normal range of sizes 30-40 cm; greatest range 34-36 cm.

Scrotal circumference is breed-dependent, e.g.

A two(2) year old Hereford Bull should have a scrotal circumference of 34 cm.

It was noted, however, that in the measurement of scrotal circumference, certain problems may arise causing or giving wrong measurements, e.g. for Scrotal hyperplasia, etc.

Heritability of Scrotal Circumference is

0.67 in Holstein

0.68 in Beef Types

and it is related to early puberty in heifers.

**Semen Evaluation**

Assess density, but note that there may be differences in colour. There were two scoring systems by which evaluation of semen can be made, e.g. Old Semen Scoring System which involved wave motion, concentration, percentage of live sperm and morphology and the Revised System in which scoring was done as follows:

<u>Revised Scoring System</u>				
<u>Score</u>	<u>Scrotal Circ.</u>	<u>Morph.</u>	<u>Wave</u>	<u>Total</u>
VG	40	40	20	100
G	24	24	12	60
F	10	10	10	30
P	-	3	3	6

Relationship of Semen Quality to Conception Rate in Natural Mating

<u>Normal Sperm</u>	<u>Conception Rate</u>
76-95	57
60-75	59
40-60	40
40	30

This part of the session closed after lively discussions.

The post-lunch session was begun by Dr. Kelly and was concerned with Swine Herd Health.

He presented for discussion and possible diagnosis, case records indicating performance of seven pig herds.

Dr. O. Radostits concluded the day's session by relating his experiences with a farrow-finish operation involving a 6-acre farm which was converted originally from a fowl house. New feeder pens were built and each week 150 S.P.F. weaned pigs were purchased and eventually sold at 200 lbs. weight. There was an outbreak of Swine dysentery followed by Mulberry heart disease, the latter being controlled by addition of Selenium to the diet.

The old hen house was then converted into a 100-sow unit and gilts were brought in for stocking. These had an oestrous problem and later M.M.A. Syndrome.

From experiences with this herd he suggested that reproductive cycles must be synchronised into groups of animals and for best results average time between weaning and conception should be 20 days.

Problems encountered in reproduction performance were pubertal anoestrous and post-weaning anoestrous. Disease conditions included mange, roundworms, pneumonia, (Haemophilus) mulberry heart disease, M.M.A. Syndrome, exudative epididymitis,



splayed legs and swine dysentery.

He recommended that to farms of this nature, under a herd health programme, there should be a one-monthly visit when following checks should be made:

- a) Dry sows - checking on disease problems.
- b) Pregnancy diagnosis - 30 days using ultra-sonic preg tester.
- c) Farrowing barns - Neo-natal mortality; all in all out policy for bringing sows into farrowing crates 4-5 days before farrowing.

Amount of feed not changed until 3-4 days after farrowing.

Parturition could be induced with prostaglandins so that, for example, pigs treated on Monday would farrow on following Wednesday.

For new-born pigs, usual routine was clipping of teeth, iron injection after three days, tails clipped after colostrum feeding, and castration at two (2) weeks.

As was usual, there was a lengthy discussion in which different points of view were expressed.

There was a brief closing ceremony at the conclusion of this session, during which the visiting lecturers were thanked for their very excellent contribution to the course. The certificates were handed out to the participants by Professor O.M. Radostits.

/...

SEMINAR EVALUATION - THIRTEEN (13) PARTICIPANTS COMPLETED FORMS)1. Do you consider that the Seminar was useful to you?

Twelve (12) participants thought the course was very useful as it was very stimulating and definitely encouraged an integrated approach to Animal Health and Production. One (1) thought it was not really useful to him.

2. What aspect was suitable for your situation and how would you apply it in your own country?

It was a consensus of opinion that the general principles of preventative health programmes as they related to Herd Health Programming were applicable to the needs of the territories even though examples discussed were in the context of a temperate zone situation.

3. Was the type of presentation suitable? What type of presentation would you prefer?

Thirteen (13) thought the type of presentation was suitable. Some liked the type of "quiz" presentation while others thought that participation by more delegates was desirable.

With regard to the second question, inasmuch as most participants thought it would have been very difficult to improve on the type of presentation, a few would have liked to have had more field training.

4. What topics would you consider most important for future Seminars?

There was a plethora of suggestions to this query. They are listed below in apparent order of priority.

- |  |       |
|--|-------|
| 1. Reproductive diseases and reproduction  | (III) |
| 2. Diseases of Neo-natal animals   | (II)  |
| 3. Haemoprotezoal diseases of livestock  | (I)   |
| 4. Animal Nutrition - Pasture propagation and management   | (II)  |
| 5. Animal Genetics - Cross breeding for tropics  | (I)   |
| 6. Recent Advances in the Veterinary Field   | (I)   |
| 7. Discussions on control and prevention of disease formerly exotic but now present in Caribbean, e.g. African Swine Fever | (I)   |

8. More selective topics on New Techniques in Animal Production, Beef, Dairy and Sheep (I)
9. Reporting and surveillance of diseases especially those of Public Health significance (I)
10. Poultry and Small Ruminant Production (I)
11. Clinical and pathological examination of cases encountered in the Caribbean region with emphasis placed on normal values (I)
12. Preventative Veterinary Medicine

**COMMENTS:**

Even though there was no consensus, the first topic on the list had the most votes and may therefore be the basis of the theme for next year's Post-Graduate Course.

RESOLUTION

The Third Intra-Caribbean Veterinary Post-Graduate Course;

Considering that the most important need for humans is a dependable food supply;

Considering that efficient production of livestock which yield milk and meat is a major concern for Animal Health Specialists;

Considering that a planned health and production programme, i.e. herd health, is designed to maintain optimal animal health and achieve optimum production, and

Considering that herd health programme emphasises preventative veterinary medicine thus making more efficient use of Veterinary resources.

RESOLVES:

To recommend to the Governments of the respective territories the following guidelines as a strategy for planning the improvement of animal production and the development of Herd Health programmes.

- a) The promotion of extension services including establishment of model farms utilising a team approach.
- b) Orientation of Veterinarians towards herd health programming.
- c) Enunciation of a clear statement of official policy regarding animal production which would ensure facilitation of inputs for such production.
- d) Improvement of Veterinary diagnostic services, and increasing research facilities and funds for applied appropriate technology.
- e) Mobilisation of all available resources and personnel to improve animal production.
- f) Improvement of communication channels.
- g) Setting of targets of performance.
- h) Development of uniform recording and reporting systems.
- i) Co-ordination between Veterinarians and Agrologists in the preparation of a Regional Journal.

# A N N E X

## Planned Animal Health and Production Programmes

### Chapter One

#### General Principles

##### Introduction

The most important need of humans is a dependable food supply. The efficient production of livestock which yield meat and milk is a major concern for human society in general and in particular for sociologists, animal scientists and animal disease specialists. The veterinarian has always been concerned with the effects of health on the production of herds of animals.

In 1975, the Committee of Inquiry into the Veterinary Profession under the chairmanship of Sir Michael Swan examined the role of the veterinarian in the future. The Committee indicated that the profession will be increasingly concerned with preventive medicine on the farm including advice on husbandry and management for the purpose of maintaining and improving animal health and welfare, the productivity and profitability of the farm business and the hygiene of its products (22).

This book is about the role of the veterinarian in planned animal health and production in farm animals, particularly cattle, sheep and swine.

A planned animal health and production programme, commonly known as herd health, is a combination of regularly scheduled veterinary activities and good herd health management designed to maintain optimum animal health and achieve optimum production (1). Herd health programmes vary from simple ones in which the veterinarian visits the herd on a regular basis to examine animals and their performance and to make recommendations for the control of disease and improvement production, to intensive programmes in which the veterinarian along with the assistance of other animal specialists makes detailed recommendations about the daily management of the animal health production programme. This may include recommendations on nutrition, breed programmes, the purchase of breeding stock, the selling of animals ready for market, and advice on cash flow. Some veterinarians are now employed as resident herd managers and are responsible for ensuring maximum utilization of all available resources by co-ordinating the services and advice proved by all the agricultural advisers who are involved with the herd.

### Objectives

The primary objective in a herd health programme is to maintain animal health and production at the most efficient level which will provide maximum economic returns to the animal owner (11). The ever present goal is to control and manage animal health and production at a high level of efficiency and at the same time seek and introduce new techniques which will continue to improve efficiency (12).

Some equally important secondary objectives include the provision of comfortable animal housing commensurate with reasonable animal welfare, the minimization of pollution of the environment by animal wastes and the prevention of diseases transmissible from animals to man (the zoonoses).

### Targets of Performance

The objectives of herd health are achieved by application of the concept of targets of performance. A target of performance is the level of animal health and production which is considered to be optimum and will yield the best economic returns in investment. The targets of performance are determined from the performance which is occurring on a sample of farms which are considered to be representative of the economically conscious commercial farm population.

In a herd health programme, the actual performance of animal health and production is determined on a regular basis and compared with the targets of performance. The differences between the targets of performance and actual performance are the shortfalls. The reasons for failure to achieve the targets of performance are then identified, which is followed by recommendations for improvement, and performance is monitored continuously to assess the effectiveness of the action taken. The cycle is then repeated on a continuous basis.

### Historical Aspects of Preventive Veterinary Medicine

The historical development of preventive veterinary medicine can be divided into four phases of activity (Table 1).

In Phase 1 which began about 100 years ago, national and state governments were involved in the eradication of diseases such as brucellosis and tuberculosis in cattle which were transmissible to man. These diseases have already been

eradicated from some countries and real progress is being made toward eradication in others. Other countries have been involved in the control of contagious diseases such as foot and mouth disease, rinderpest and trypanosomiasis in order to reduce livestock losses which lead to widespread nutritional deficiencies among the human population. These national disease eradication programmes have been directed towards effective control in the animal population on a geographical area basis. As each area became free of the disease, only disease-free animals were allowed to enter. In this way the disease could theoretically be eradicated from the entire country. These programmes have been successful because the diagnostic tests were reliable, the testing was compulsory and the financial resources necessary to do the job were made available from the public treasury.

In Phase 2, beginning about 1940, meat, milk and fibre-producing animals (cattle, swine and sheep) became valuable when animal farms began to sell livestock and livestock products off the farm as a source of net income. Prior to this time, most practising veterinarians were involved in equine practice which consisted largely of seasonal routine work (43). With the decline of the horse as a source of power on the farm, the veterinarian turned his activity to cattle, swine and sheep practice. Between 1945 and 1965 there was an exceptionally large growth in rural large animal practice. This period coincided with a sharp increase in the standard of living in the developed countries which created an unprecedented demand for meat and milk. The law of supply and demand increased the price of meat to the consumer and in turn farm animals became valuable. When animals became ill it was economical to call the veterinarian to treat them on an individual basis. During this period modern veterinary education was also born and veterinary graduates possessed the knowledge and skills to treat a wide variety of animal diseases with remarkable success. Antibiotics and chemotherapeutics were also introduced during this period and veterinarians could treat a wide variety of the common infectious diseases such as pneumonia and enteritis with spectacular results. Veterinary graduates were taught how to do aseptic surgery, and the caesarean section in cattle, for example, became common surgical procedure in a veterinary practice. This created a tremendous demand for veterinarians and veterinary service. However, because of a shortage of veterinarians, those veterinarians who were in practice were very busy and spent most of their time treating individual sick animals. This activity resulted in the term "fire-engine practice". Because of a lack of time there was little effort made to control or prevent diseases on a herd basis. The emphasis was on the individual animal affected with clinical disease. Efforts to

Table 1: Historical Development of Preventive Veterinary Services

Principal Preoccupation	Principal Mode of Action	Principal Agent	Support Mechanism
<p>Phase 1</p> <p>Area problems. Protection of all herds by control of disease on area basis.</p>	<p>Government sponsored health programmes on area basis, e.g. brucellosis and tuberculous eradication programmes.</p>	<p>Government veterinary officer.</p>	<p>Trouble-shooter from government agency.</p>
<p>Phase 2</p> <p>Treatment of individual animals gives rise to enquiries about preventive programmes.</p>	<p>Incidental preventive programmes, e.g. mastitis control, fertility, maintenance, parasitic disease status.</p>	<p>Private practitioner.</p>	<p>Private, university or government consultant.</p>
<p>Phase 3</p> <p>Positive action via herd programmes to maintain health status, e.g. reproductive efficiency, quarter infection rate.</p>	<p>Packaged herd disease preventive programmes, planned actions at programmed visits.</p>	<p>Private practitioner (or government or employed veterinarian).</p>	<p>Consultants as above with specialties in individual diseases.</p>
<p>Phase 4</p> <p>Integration of health maintenance plans with production and management plans to give whole-farm best effect.</p>	<p>Positive action via herd programmes as above with control data handling for all participating herds. Data bank makes production planning and prediction possible.</p>	<p>Private practitioners (or employed veterinarian). May be in conjunction with husbandry adviser.</p>	<p>Disease consultants and husbandry advisers BUT Data lab most important to provide statistical and financial analysis.</p>



control or prevent disease consisted largely of large-scale testing programmes for diseases such as brucellosis and vaccination programmes. Veterinarians spent considerable time vaccinating pigs for hog cholera and cattle for brucellosis.

In Phase 3, beginning about 1965, veterinarians and farmers began to appreciate the value of taking positive action to maintain a high level of animal health and efficient production on a herd basis. Farmers, themselves, gradually learned how to recognize and treat the common diseases of farm animals. In the earliest stages of this phase, preventive medicine consisted of recommendations for the control or prevention of specific diseases. For example, an outbreak of blackleg in young cattle was followed by a recommendation to vaccinate all susceptible animals with a clostridial vaccine. This was later followed by the veterinarian making recommendations for control of specific diseases which were likely to occur in the herd. As veterinarians became more involved and familiar with the herd and the farmer on a regular basis, the presence of subclinical disease and inadequacies in management resulting in poor animal performance was recognized. Subclinical disease in its broadest sense was recognized as the major cause of economic loss in food-producing animal herds. Diseases such as infertility and subclinical mastitis in dairy cows, intestinal helminthiasis in sheep, as examples, responded dramatically and economically to strategic prophylactic procedures or changes in management.

The recognition that economic benefits could be derived by taking positive action against subclinical disease was then followed by the development of planned herd health programmes. Veterinarians began to make regularly scheduled visits to farms to examine the animal health and production status of the herd and to make recommendations for improvement. Herd health began to evolve. Between 1970 and 1980 there has been considerable activity in the development of herd health programmes for dairy cattle (20, 26, 27, 28), beef breeding herds, beef feedlots, swine herds and sheep flocks. Considerable progress has been made in dairy (29) and swine herd health (17, 30). Programmes for beef breeding herds and feedlots (18), and for sheep flocks (16) are in the developmental stages. Health management is now an important component of a modern equine practice (19).

During this phase, farmers and veterinarians recognized the value of keeping good records of animal health and production so that an objective analysis of health and production, including the costs of production, could be made.

The inclination to fill the programme with every known preventive measure, whether the disease was likely to occur or not, whether the particular technique was highly effective or not, and often with more than one technique to prevent one disease, was one of the false steps made in the early stages of this new expansion into herd and flock health programmes. Such programmes could, and often did, cost more than the wastage they set out to eliminate. Subsequently, the analysis of these programmes in terms of cost-effectiveness has put them on a sounder financial footing and made them more generally acceptable. Modern financially viable herd health programmes were the eventual outcome of this evolutionary process.

Phase 4 is in the developmental stages in the 1980's. In this phase, practising veterinarians will make regularly scheduled visits to the herd, examine animals and records for evidence of subclinical disease and collect and analyze data with the assistance of the computer. Both the farmer and veterinarian will agree on targets of performance for the herd. The veterinarian will regularly analyze the animal health and production data and compare the actual performance with the targets of performance and identify the reasons for failure to achieve the desired targets of performance. With the assistance of agricultural advisers (nutritionists, geneticists, engineers, economists), the veterinarian will make recommendations for improvement in animal health and production using the whole farm approach. The ideal objective is to maximize the utilization of the resources available on the farm.

It is now generally agreed that subclinical disease or production inefficiencies, many of which cause no recognizable clinical signs, are the most important contributors to reduced productivity. These production inefficiencies which result from factors that impair animal health can be eliminated in the foreseeable future if present knowledge is applied, if animal health delivery systems are improved, and new technology is developed through basic and applied research where suitable measures are not presently available. There are good prospects for major breakthroughs in animal health with the next decade which will have implications for animal production in the 21st century (2).

The development of a totally integrated animal health and management system is the most important need.

Epidemiological surveillance will become the "core" activity for public and private practice of preventive veterinary medicine (4).

### Factors Affecting the Development of Herd Health Programmes

Several factors have prevented the widespread adoption of herd health veterinary services by farmers and veterinarians.

Some farmers have not fully appreciated the existence of subclinical disease and the economic returns which are possible by accurately monitoring animal health and production and taking positive action to improve performance. Farmers have traditionally been willing to pay for emergency veterinary service on individual clinically-ill animals. However, they have been and many still are reluctant to pay for veterinary advice, when the results are not immediately obvious. Interviews with large-scale dairy operators have indicated that they perceive veterinarians as primary providers of clinical services only (5). Large dairies require an integrated approach to herd management but the operators do not look to veterinarians to provide this integrated approach, instead relying on feed representatives, nutritionists, accountants, and staff of dairy co-operatives. As veterinarians have little conflict of interest or vested interest in giving advice about nutrition, proper facility design, and other general management issues, this perception of the veterinarian as a clinician only deprives the dairy operator of an objective appraisal of herd health, management, and production. Changing this perception will require a restructuring of many veterinary medical school curricula, with an emphasis on courses in epidemiology, preventive medicine, herd management, nutrition, and similar courses. This has been a major stumbling block in the rate of development of herd health services. Much of the gain in preventive veterinary medicine in the recent past has been because of a change in the attitude of farmers towards a more financially conscious appraisal of their activities than they applied previously. Some of the change has been due to better education generally, but mostly it has been an appreciation of the need to maintain a sufficient margin between costs and income in order to enhance their standard of living or simply to service their very large financial commitments. Cost-effectiveness and benefit-cost analysis have become the important yardsticks rather than winning at cattle fairs and shows, or topping the prices at fat stock shows or wool sales. When this attitude to economic viability is transposed to health and productivity there is a tendency for technical services and advice to be used much more to the mutual advantage of the service and the farmer. The trend to greater use of advisory services has been followed by a significant improvement in the standards of animal management and

/...

farming generally. This trend has been assisted by the disappearance of many inefficient farms brought about by the cost-efficiency squeeze. In some areas the surviving farms absorb the others and farm size has increased. In general, the larger the farms, the more demand there is for advice on prevention of loss and encouragement for the development of planned health and production programmes.

The goals and values of farmers may also have been responsible for the slow growth of herd health (6). An analysis of the goals and values of British farmers reveals that the smaller farmers place more stress on intrinsic aspects of work, particularly independence. Farmers with larger businesses, however, are more economically motivated and are more likely to seek and consider consultancy advice about health and production management (21).

A major factor affecting the rate of development and the success of herd health programmes has been the lack of reliable animal health and production records which can be analyzed regularly. The success of a herd health programme depends upon the competence and enthusiasm of the veterinarian, the management expertise of the farmer and the ability of the programme to demonstrate progress through improved performance. Only the records can document improved cost-effective performance. When reliable records are lacking or cannot be easily analyzed, the veterinarian cannot demonstrate to the farmer that progress has been made. With no clear evidence of progress the farmer may become disinterested in the programme.

The economic value of the animal can influence the development of herd health. As the value increases, the need to insure against loss of the individual increases. As the value of food-producing animals continues to increase, the need for diagnosis and treatment of individual sick animals increases. At the other extreme when the economic value of animals is low, such as beef cattle and wool sheep, the treatment of individual animals is given low priority and there is a tendency for animal husbandry and management to be considered more important than specific health maintenance programmes. The emphasis is on nutrition and breeding practice. Disease control programmes such as those for internal parasites, blowfly infestation and footrot, are developed for application to all farms in the area rather than adapting them to suit the circumstances or resources of a particular farm. For these reasons planned animal health and production programmes for wool sheep, and to a lesser extent for range cattle, tend to be strong on

management and light on disease control, and therefore to be dominated by animal husbandry advisers rather than veterinarians. The reverse is true in dairy cattle herds, beef feedlots, beef breeding herds, swine herds and intensively-farmed fat lambs and fat sheep enterprises. Maximum veterinary intervention, and domination of the management of the farm by veterinary rather than nutritional or genetic advice is demanded by the high level of disease prevalence which is potentially possible in such units and the capital value of the individual animals. The risks of disease losses and the need for veterinary supervision are even greater in the large "factory" type farming units which are common in most developed countries (3).

Emergency veterinary medicine and the revenue from the sales of drugs and vaccines have occupied a large part of well established rural veterinary practices and in part has contributed to the slow growth of herd health in some areas. As long as veterinarians were making a good living from emergency veterinary medicine which is satisfying to the veterinarian and the farmer there has been little incentive to develop herd health programmes. Some veterinarians have also lacked the confidence necessary to provide a comprehensive animal health service which included investigations of the nutritional status of the herd, housing requirements, reproductive performance and other production-oriented aspects of the herds. However, there is ample evidence that veterinarians who give high priority to herd health will quickly develop a reputation as herd health specialists who can provide an integrated production-oriented preventive veterinary service. A busy veterinary practice can also schedule herd health work during those periods of the year when there is insufficient emergency work to financially support the practice staff. In this way the work can be balanced throughout the year.

Other factors which can affect planned herd health programmes include the availability of feed supplies, the market value of livestock, the prevalence of disease in the herd and the diagnostic laboratory services available to the veterinarian. Large fluctuations in the supply of feed can cause major disruptions in reproductive performance. A marked decline in the market price of livestock will force farmers to invest scarce resources elsewhere on the farm. A sudden unexpected epidemic of an infectious disease can cause large economic losses and the farmer may lose confidence in the veterinarian's ability to control disease.

### The Requirements of a Herd Health Programme

The three requirements for a successful herd health programme are:

- (1) a willing farmer;
- (2) an enthusiastic competent veterinarian; and
- (3) a records system and animal identification.

An even more fundamental requirement before a herd health programme is begun is the establishment or growth of a satisfactory farmer-veterinarian relationship. Through experience with the veterinarian the farmer must reach the point where he has confidence that the veterinarian can provide the service.

The Willing Farmer: The characteristics which identify farmers as being likely to be receptive to a herd health programme and which will set an example for the rest of the community include the following:

- Leaders in the community. These are the progressive farmers whose opinions are accepted by other farmers.
- Successful businessmen. Business acumen is a highly desirable characteristic especially if the farmer has a good farm. These farmers are aware of the principle of cost-effectiveness.
- Stable efficient farmers who have good judgement and who are recognized as "early innovators" in the community (Figure 1).
- Knowledgeable farmers. Those farmers who keep up-to-date with the farm literature and who are interested in learning more about the modern aspects of animal health and production.
- Farmers who have not overextended their limit of resources, financially and in terms of labour or land area, are most likely to be able to make changes in management and scale of operations.
- Farmers whose inclination is to avoid taking risks are natural enlistees in herd health programmes. There are significant differences between them and gamblers in farming performance (7).

To develop a situation in which farmers are committed to a herd health programme requires two stages. The first is to convince them to begin by:

- establishing a bond of confidence between the farmer and the veterinarian;
- and

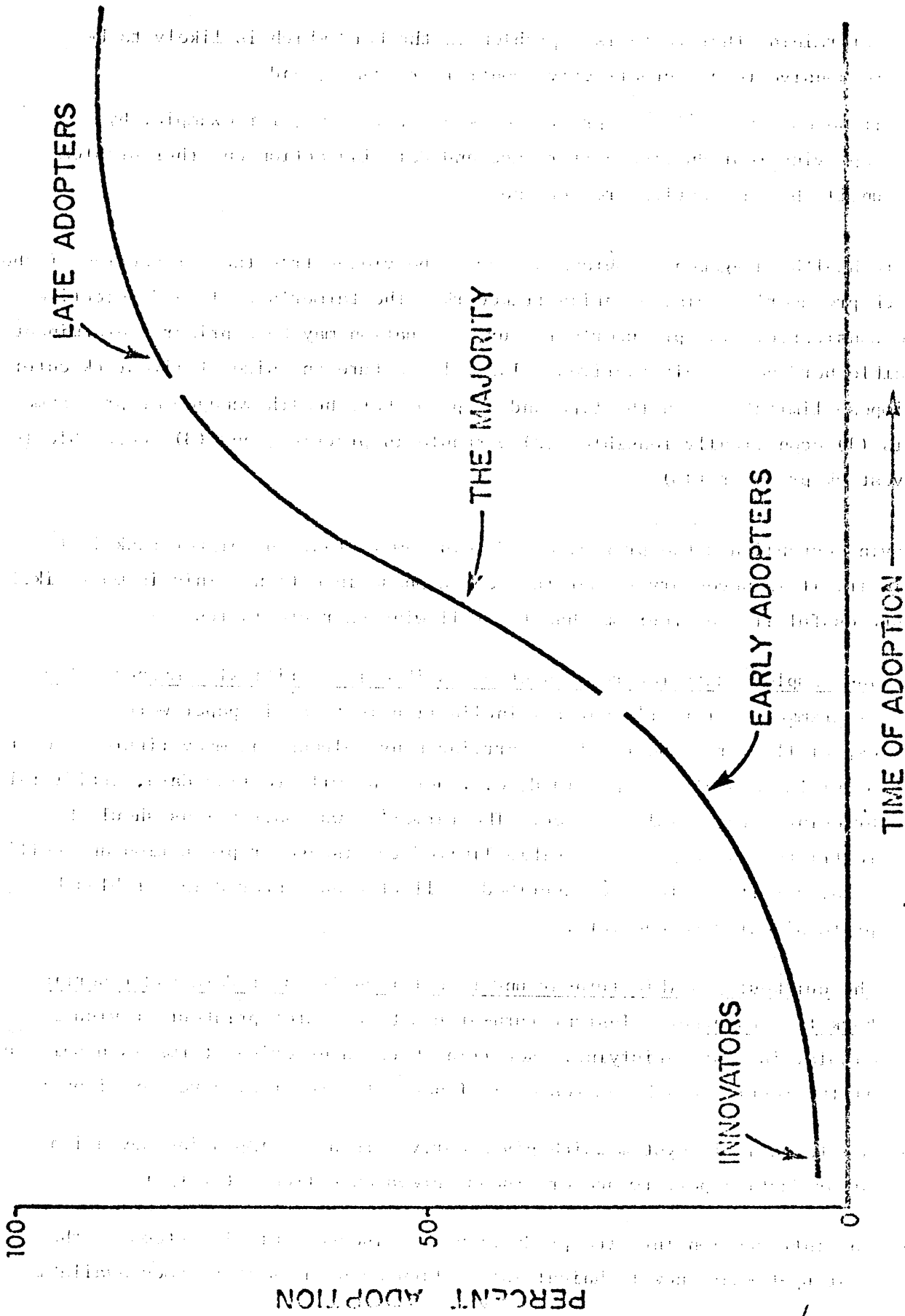


Figure 1- The community adoption curve

- determining that there is a problem in the herd which is likely to be responsive to a cost-effective control programme, and
- if necessary, begin the programme as a partial one, for example, by improving reproductive performance and delaying action on other problems until obvious results are obtained.

Herd health management programmes need to be viewed from the perspective of the livestock producer's decision-making framework. The farmer's goals and objectives must be considered. The producer's resource situation may be a primary determinant of feasible herd health alternatives. The role, nature and size of livestock enterprise impose limitations on the type and scope of herd health management programme which is (1) economically feasible, (2) workable in practice, and (3) acceptable to the livestock producer (13).

Having established the programme and being aware that the bigger task is to maintain it, it is necessary to set the second phase in motion. This is most likely to be successful if the programme has the following characteristics:

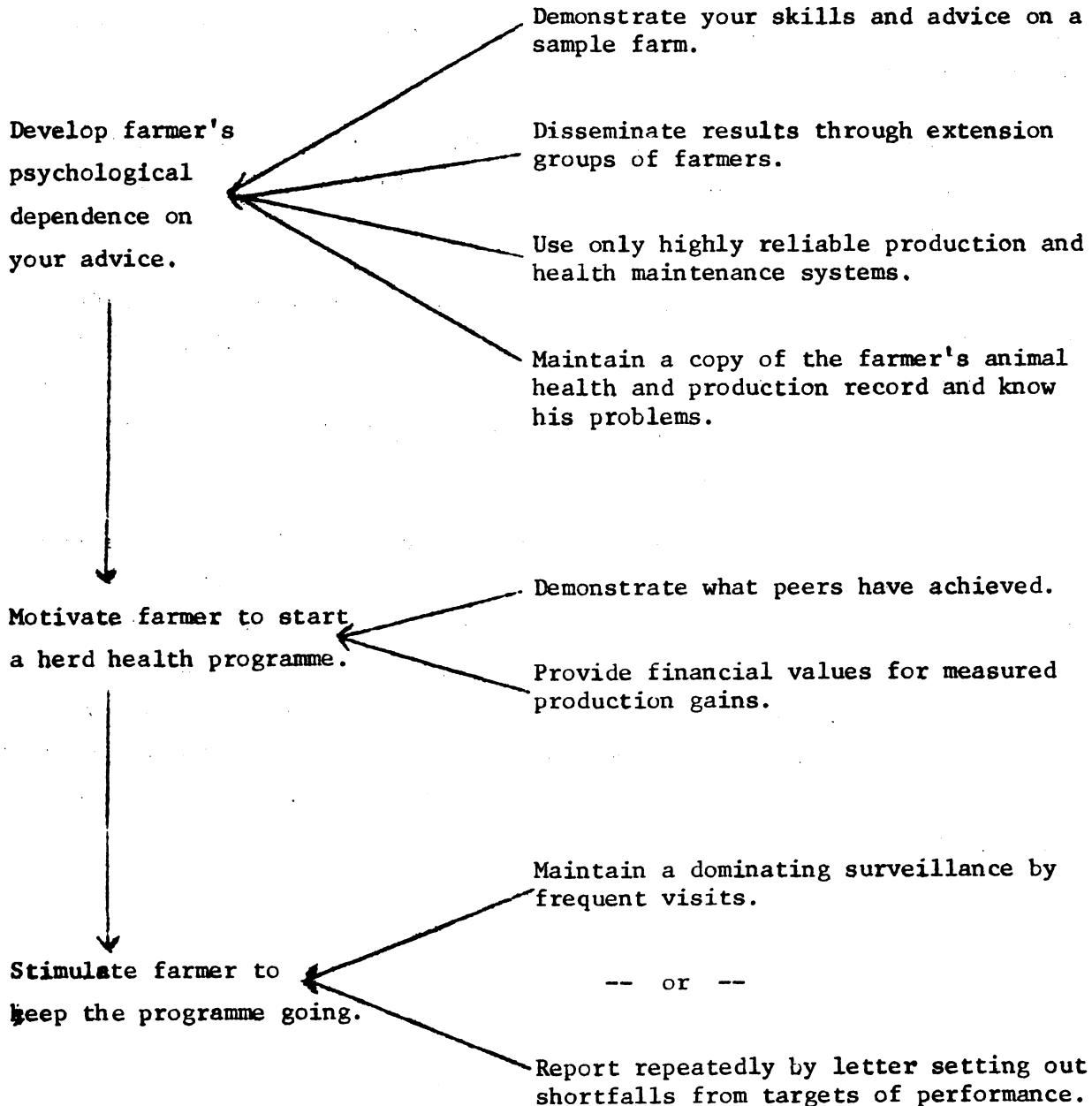
- The simplest data recording system possible is a critical component of a programme. A farmer's natural inclination is to avoid paper work especially large sheets of it carrying many columns and many figures. Where possible data already provided, e.g. herd and milk testing data, artificial breeding data, should be used. The farmer's own observations should be restricted in scope, if possible limited to disease, reproduction and culling data, and it should be transcribed, collected and entered into tables by professional data handlers.
- The quickest possible turn-around time for analysis of data and reporting back to the farmer. Instant turn-around by computer printout or visual display is most satisfying. Reporting back in numerical terms is usual, but if the results can be expressed in financial terms they have more impact.
- A data analysis system which gives early warning of impending deviations of production performance or disease prevalence from set targets.
- The introduction into the production and disease control systems of the most up-to-date new technical information as soon as it becomes available.

/...



- The creation of a data base of information accumulated from the co-operating farms to serve as a realistic guide to performance targets.
- The conducting of inter-herd comparisons anonymously to indicate to each farmer where he stands with respect to performance in a variety of parameters, and contrasted with their peers.
- The promotion of exchange of information between farmers about modifications of techniques, problems with existing techniques and developing needs by conducting group meetings at intervals of six months to one year.
- Visiting the herd regularly, punctually, and for a sufficient time period to allow discussion of all problems. In beef cattle or sheep operations where visitation is less frequent the maintenance of personal surveillance must be less personal, but can be complemented by written reports at intervals between physical visits.
- Ensuring that farm staff, especially managers and share-farmers are included in the competitive atmosphere of the programme. They are critical because they are responsible for putting the recommended procedures into practice (8). These parts of a total programme are set down graphically in Table 2. They all encourage a degree of psychological dependence by the farmer on the system. They also impose an acceptance of responsibility by the veterinarian to provide the necessary inputs and to keep on providing them and to be financially responsible if he provides the wrong advice.

/...

Table 2: Converting Farmers to a Herd Health Service

/...

### The Enthusiasm and Competence of the Veterinarian

Veterinarians have traditionally been viewed as healers of the sick, but they are situated in the advisory support system of farmers in a way that makes them strategically the best person to ensure that there is integration of the various components of management (5). These include health maintenance, genetic input through artificial breeding, nutritional and calving pattern advice, and in the northern hemisphere, housing. All these advisory and management aid services must be integrated so as to give maximum beneficial effect on the total farm programme. The veterinarian is the person closest to the interface between the support systems and the farm itself. The veterinarian is one of the most frequent visitors and often the most familiar with the farm's objectives and resources, especially its management skills. Also, much of what the veterinarian does can significantly affect the influence of the other advisory inputs. It is not intended to suggest that veterinarians will necessarily proceed to encompass all areas of advice to animal farmers, but for the reasons stated he is a logical selection from the team of management advisers who could act as the co-ordinator of all of the streams of advice. If veterinarians had the proper training and interest to adopt such a role they would be in a much better position than they are now to work with other specialist advisers. This would include a better appreciation of when such specialist advisers. This would include a better appreciation of when such specialist could help and should be called on to do so, and then how their advice should be incorporated into the overall plan of management. It would be a much better service of advice to farmers if it resulted in a reciprocal development of understanding the constructive criticism between veterinarian and agriculturalists rather than the inter-professional competition which tends to be the order of the day.

It is desirable too that the professional veterinarian should be convinced that the conventional stance of the physician, with the treatment and control of clinical disease as a sole objective, is inappropriate to agricultural practice. This attitude fails to recognize the strong relationship between management and disease, especially the effect of disease on management, and the need to consider benefit-cost relationships in veterinary professional advice. There is ample evidence that veterinarians can play an important role in improving the profitability of farming because of the economic importance of disease and the large returns which have been shown to be attainable by investment in disease control programmes.

To participate properly in planned animal health and production programmes a veterinarian has to make certain commitments. However, participation can be at a number of levels so that its intensity varies.

Some of the important commitments are:

- making regular visits, punctually and at the specified times and completing the visit without interruption. This virtually creates a requirement for a practice employing more than one veterinarian.
- maintaining the necessary expertise in such things as pregnancy, diagnosis in cattle, semen examination in rams.
- checking the analyses on every report that comes out of the data-analysis system and advising the farmer of the implications of these results for that particular herd.
- giving first priority to being available for consultation on management matters to these participating farmers.
- keeping up with technical and scientific advances and feeding them into the information extension system.
- being aware of political, sociological and financial pressures on the relevant industry which are likely to affect its financial status.

Participation of the veterinarian may be at one of several levels. The common ones are as a herd health veterinarian and as a species specialist. In the former, the veterinarian limits his expertise to the prevention, control and treatment of disease and is aware of the implications of production matters, but not skilled in handling them. When questions related to nutrition and breeding programmes arise, the veterinarian consults with colleagues in the allied professions and arranges for their advice to be provided to the farmer (27). The species specialist is skilled in all facets of knowledge and manipulation of the particular industry and deals with all of these matters. Whether or not the work is done by a private practitioner or a government salaried officer seems to be irrelevant except where both are available. In those circumstances the private practitioner would seem to be the logical person because of his greater familiarity with and preoccupation with individual herds or flocks. However, it is a common experience to find a private practitioner who is not skilled in the necessary techniques, or who is not interested in participating in the programme, and there is no reason why a veterinarian of another genre should not take over its direction.

### The Records System and Animal Identification

A simple, reliable system of recording animal health events and production performance is a fundamental requirement for a successful herd health programme. Without recording, the control of productivity is guesswork. The records system involves all of the components from the records containing the raw data through to the summaries of animal health and performance. Many different systems are available but the fundamental requirements include the following:

- Positive identification of the individual animal or groups of animals is an absolute requirement.
- The system must be simple to use and understand.
- Only that animal health and production data which are considered necessary to assess herd performance are collected and analyzed. The types of data collected will vary between species and classes of livestock but clearly established terminology should be used to avoid confusion and to allow comparisons to be made between co-operating farms.
- The system must be structured so that the data is easily collected, gathered, analyzed, summaries prepared and reports returned to the farmer within a few days of the herd health visit.
- The veterinarian should maintain a file of each summary report which was sent to the farmer.

In the simplest form of record-keeping, the data from individual animal cards or from groups of animals is collected and analyzed regularly and summaries of herd performance are reported. In small cattle and swine herds the manual handling of records is satisfactory but still time-consuming. As the size of herds has increased, it has become necessary to consider the use of a computer.

The introduction of a computer-based data-recording system has revolutionized the handling and analysis of animal health and production data. The computer is able to store a large amount of data about a large number of individuals. It has the capacity to analyze and integrate current data with historical data and provide a summary of up-to-date performance. It can be programmed to compare actual performance with pre-set targets of performance.

If the computer can prepare action lists which advise when certain events will

occur or when certain procedures should be performed. It is now possible for the computer to take over the entire chore of record-keeping and to provide summaries of performance as frequently as necessary. Only the most elementary records of observations should need to be made by the farmer.

#### Additional Requirements

Some additional requirements include adequate physical facilities on the farm for the handling of animals, particularly cattle, during the farm visit. Adequate facilities are required for doing rectal examinations on cattle and pens for keeping separate groups of animals up close to the examining point so that examinations and treatments can be completed with a minimum loss of time.

A veterinary diagnostic laboratory is also necessary for assistance in making a definitive etiological diagnosis in the case of herd problems.

#### The Components of a Herd Health Programme

The components of a herd health programme include.

- Regularly scheduled farm visits by the veterinarian. The responsibility of the veterinarian.
- Good animal farming by the farmer. The responsibility of the farmer.
- The recording and analysis of animal health and production data.
- The provision and co-ordination of advice by the veterinarian.

The success of a herd health programme will depend on the competence of the veterinarian, the level of management of the farmer, the reliability and adequacy of the records and how well the veterinarian provides advice and follows up the results of the advice.

The veterinarian should identify the objectives of the farmer before beginning a programme. A clear picture of the production objectives compared with actual performance will often identify the presence of problems which have interfered with performance.

The initial stages of any programme should concentrate on solving obvious

disease or production problems for which there are simple and reliable solutions. When these problems are solved, attention can then be given to evaluating the health and production status of the herd and the identification of other economically significant problems. Gradually over a period of 2 to 5 years, the veterinarian will become acquainted with the herd, its characteristics, and where additional effort should be directed to improve health and production. It is a gradual evolutionary process.

### Regular Visits to the Herd

Frequency: The most common aspect of any herd health programme is the regularly scheduled visit to the herd. The frequency of each visit will depend on the class of livestock, the size of the herd, the incidence of disease, and the length of time the herd has been on a programme. Twelve monthly visits are common for year-round dairy herds with less than 100 cows. Weekly visits become necessary for herds of 300 to 500 cows and more frequent visits may be necessary for larger herds. Four visits per year are common for commercial beef herds and weekly visits are usually necessary for beef feedlots with a total capacity of 5000 head. For 100-sow farrow-finish swine herds, monthly visits are common.

### Activities During the Farm Visit

The veterinary activities conducted during each visit are similar for each species or class of livestock but the specific activities will vary dependent on the class of livestock, the season of the year, and the length of time the herd has been on the programme.

The primary purpose of the farm visit is to organize and concentrate the veterinary activities into a regular schedule to ensure that they get done. There are several animal health and production activities which occur during the production cycle of each animal. The primary objective of the farm visit is to determine the actual performance of animal health and production and to compare it with targets of performance. In other words, the regularly scheduled farm visit is a surveillance system designed to detect or predict animal health and production problems before they become economically significant and to take the necessary corrective action. Under ideal conditions, each visit should provide a summary of the animal health and production status, the reasons for failure to achieve certain targets of

performance and recommendations for corrective action. For some parameters of performance, the data will be available directly from the records or the computer print out. Examples include milk production, number of pigs born alive, number of pigs weaned per litter, average daily gain in feedlot steers, and the somatic cell count of milk. For other parameters, the veterinarian will have to carry out certain diagnostic skills, such as pregnancy diagnosis, in order to obtain the information.

Some examples of specific activities include the following:

Reproductive Performance: In breeding herds, the emphasis is on surveillance of reproductive performance. For example, in dairy herds which calve year round, at each monthly visit all cows bred more than 40 days are examined for pregnancy by rectal examination. The cows to be examined are identified by examination of the individual cow records or by the use of a computer. Regular pregnancy examinations will identify non-pregnant cows as soon as possible so that early corrective action can be taken. In beef breeding herds, the bulls are examined for breeding soundness before the breeding season ends. Pregnancy examinations are done only once annually, usually following the breeding season. In swine herds, reproductive performance may be monitored regularly by pregnancy examination using an ultra-sound pregnancy tester and monitoring of the number of sows which return to heat three weeks after breeding and the number of pigs born alive per litter.

Production Performance: The production of livestock and livestock products can be monitored on a regular basis and can be used as indicators of performance. These include average daily milk production, butterfat test, average daily body weight gain in feedlot cattle, days to reach market weight in pigs, feed efficiency in feedlot cattle and finishing pigs and grades of carcasses at slaughter.

Nutritional Status: The feeds and feeding programme have a major influence on reproductive performance, growth rate and milk production and must be monitored regularly (27). The veterinarian must be aware of any changes in the feeding programme which have occurred since the last farm visit or which are intended in the near future. On breeding farms, there are several different age groups of animals at different levels of growth and production. This requires close surveillance to avoid under- or over-nutrition.

Clinical and Pathologic Examination of Animals: On a herd basis, there are usually some animals affected with clinical disease which the farmer has identified. These should be examined and the necessary laboratory samples taken to obtain a definitive etiological diagnosis. In beef feedlots and swine herds, necropsy examinations of animals which have died naturally or on selected clinical cases is a common practice in order to obtain an etiological diagnosis.



Disease Incidence: The records of all clinical diseases which have occurred since the last visit should be examined. If possible, the veterinarian should attempt to determine the etiology, even though retrospectively from the evidence available and prescribe advice on the treatment and control of future cases.

Routine Elective Activities: In some programmes, veterinarians perform certain routine activities at strategic times. These include vaccination, administration of anthelmintics, dehorning, castration, foot trimming, and other minor surgical procedures such as spaying beef heifers. While it may be argued that these procedures are too technical for a veterinarian, the veterinarian should be aware of when and how these things are being done if he is not doing them. However, many farmers prefer to employ their veterinarian for these tasks and it provides an excellent opportunity to get on the farm on a regular basis.

Examination and Discussion of Records and Reports: There are always some problems with the accuracy or completeness of the records and these should be corrected each month. All production and disease reports should be interpreted and recommendations made for corrective action if necessary. The results of the previous herd health visit should be discussed with the farmer. The results of recommendations made on previous visits should be assessed and changes made if necessary. This will require that the veterinarian brings with him to the farm a current client file which contains the results of herd health visits, necropsy reports, feed analysis reports and recommendations which were made for the previous few months.

Emergency Farm Visits: The emergency farm visits are independent of the programmed visits. However, the nature and amount of emergency veterinary medicine necessary in the herd will be relevant to the overall herd health programme. Every disease incident treated by the farmer or the veterinarian must be recorded. At each farm visit, the diagnosis, treatment and control of the diseases encountered are discussed.

Investigations of Outbreaks of Disease: Unexpected outbreaks of disease should be investigated as soon as possible by a carefully planned clinical and epidemiological examination of the herd (31, 32). The investigation will include clinical examination of clinically affected animals and the submission of appropriate laboratory samples. Detailed recommendations for treatment and control should be reported in writing to the farmer and a copy of the report retained by the veterinarian for future reference.

Consultation by Telephone: A significant amount of consultation can occur by telephone and may consume a large amount of the veterinarian's time. Recommendations for the treatment and control of herd problems may be given over the telephone provided the veterinarian is confident that he has sufficient knowledge about the particular

problem from previous visits to the farm. However, all major recommendations should be recorded and followed by a written report to the farmer. This is particularly important when prescriptions for mass medication of feed and water are given by telephone.

Meeting with Participating Farmers: A valuable aspect of any herd health service is the convening of regular meetings of participating farmers to discuss the results of performance of the herds. The results may be presented anonymously and individual farmers can compare their performance indices with others in the anonymous group. The high levels of performance can be used as targets of performance which are possible under the conditions of the local area.

Provision of Drugs and Vaccines: Drugs and vaccines to be used in the herd can be supplied by the veterinarian at reduced cost. This will encourage the farmer to purchase these supplies from the veterinarian who will provide recommendations for their use. The veterinarian will also then be aware of the drugs and vaccines being used in the herd.

Responsibility of the Farmer: The success of a herd health programme depends heavily on the level of management and the desire and ability of the farmer to carry out the recommendations of the veterinarian and any other agricultural advisers who may be involved.

The principal mechanism in these programmes is to encourage farmers to compete against each other for ranking, and also against approved standards. The standards are presented as targets, which are arrived at by estimation of what should be possible in an ideal situation as created by experimental research, tempered with what appear to be attainable results in a particular environment, as disclosed by a data base developed in it. This does not appear to have been too difficult, but many of the targets in use have not been submitted to extensive field testing. What is difficult is selecting the individual criteria, the indices in which the targets are to be set. There is no rule to selecting the indices. They are peculiar to each species and are presented in each of the programmes in later chapters.

The target concept assumes that the only objective is maximum financial profitability. That is often not so, and other objectives, as presented in the introduction to this chapter, are often included in a farmer's objectives. To ensure that the herd health programme for a particular herd keeps these objectives in sight, it is recommended that they be recorded in a farm profile created for the purpose. The profile should include:

- Details of other enterprises on the farm. This may be important because they

may compete with each other for available labour land and financial resources.

- Details of physical resources, land area, water availability and soil type and fertility are factors which are often responsible for variations in performance between apparently comparable farms.
- The farmer's objectives. These might well include a guaranteed two months' vacation each year or a desire to win an agricultural contest which does not include economic profitability.
- The management systems used, such as all-grass pasture, biological manures only, dry lot farming, and type of housing.
- Classes and breeds of livestock, and especially changes in them.

Each year when the performance of the farm is reviewed, the opportunity should be taken to update the farm profile and compare the achievement with the objective, rather than just the target.

Farmers receive advice from a number of sources which often present different or conflicting opinions. The progressive farmer would prefer to have all of these channels of advice integrated through a common programme. Planned herd health and production programmes set out to do this, but the objective, admirable though it is in every way, is not easily attained. The problems encountered include the reluctance of the institutions which control production data to make it accessible and the difficulty created by different computer languages, different indices used in assessment and different and incompatible computer programmes.

The segments of information and attendant advice which suggest themselves as potential facets of an inclusive data and advice programme include milk quality and volume in DHIA testing, artificial breeding records relative to reproductive efficiency, cow quality records in breed society catalogues, hard data from regional applied research on feeding programmes and pasture utilization and data from disease eradication programmes, e.g. tuberculosis and brucellosis.

#### The Collection, Analysis and Use of Animal Health and Production Data in a Herd Health Programme

One of the most important components of a successful herd health programme is the keeping of good records which can be used to monitor and evaluate the incidence

of disease and production.

The kinds of records will vary considerably dependent on the class of livestock and the stage of the herd health programme. In the simplest and most common form used in dairy herds, for example, there is an individual lifetime card for each cow. All events of the reproductive cycle and incidents of clinical disease are recorded on the card when they occur. At regular intervals, monthly or less frequently, the veterinarian analyzes the data and prepares a summary of the reproductive performance and disease incidence. This kind of an individual card manual-analysis system has been successful for small 50 to 80 cow dairy herds. Some larger herds, up to 200 to 500 cows, have maintained this manual system and various bookkeeping techniques have been used to make the analysis efficient. In dairy herds the emphasis has been on assessment of reproductive performance and the manual systems have been satisfactory. Similar manual systems have been used in beef breeding herds (38), swine herds (35, 36) and beef feedlots (37) with success. However, as livestock herds become larger and more intensive, farmers become more cost-conscious and require the rapid analysis of a wide spectrum of production data which cannot be done manually. This has led to the use of the computer which can store and analyze large amounts of data and provide useful performance statistics for decision-making on a daily basis. The computer is "automating" the eyes of the herdsman (33, 34).

The computer has already had a major impact in the development of efficient modern livestock production. Much of the progress in animal breeding programmes in cattle and swine was made with the use of the computer. Initially, the information from the farm was mailed to the computer centre, processed and the report mailed out to the farm. One problem with this system was the long turn-around time, as long as two weeks or more, which often made the information too historical. The introduction of farm-located terminals linked to the central computer by telephone eliminated the turn-around problem. The recent development of microcomputers has now made it possible for farmers to own and operate a computer completely independent of any outside agency. However, there are two major problems with stand-alone on-the-farm microcomputers. The first is that the development of software programmes has not kept pace with the development of computer machines. As a result there is considerable worldwide activity in 1982 in the development of useful, reliable software programmes for the different classes of livestock. The second problem or deficiency is the lack of access to central information for comparative purposes.

/...

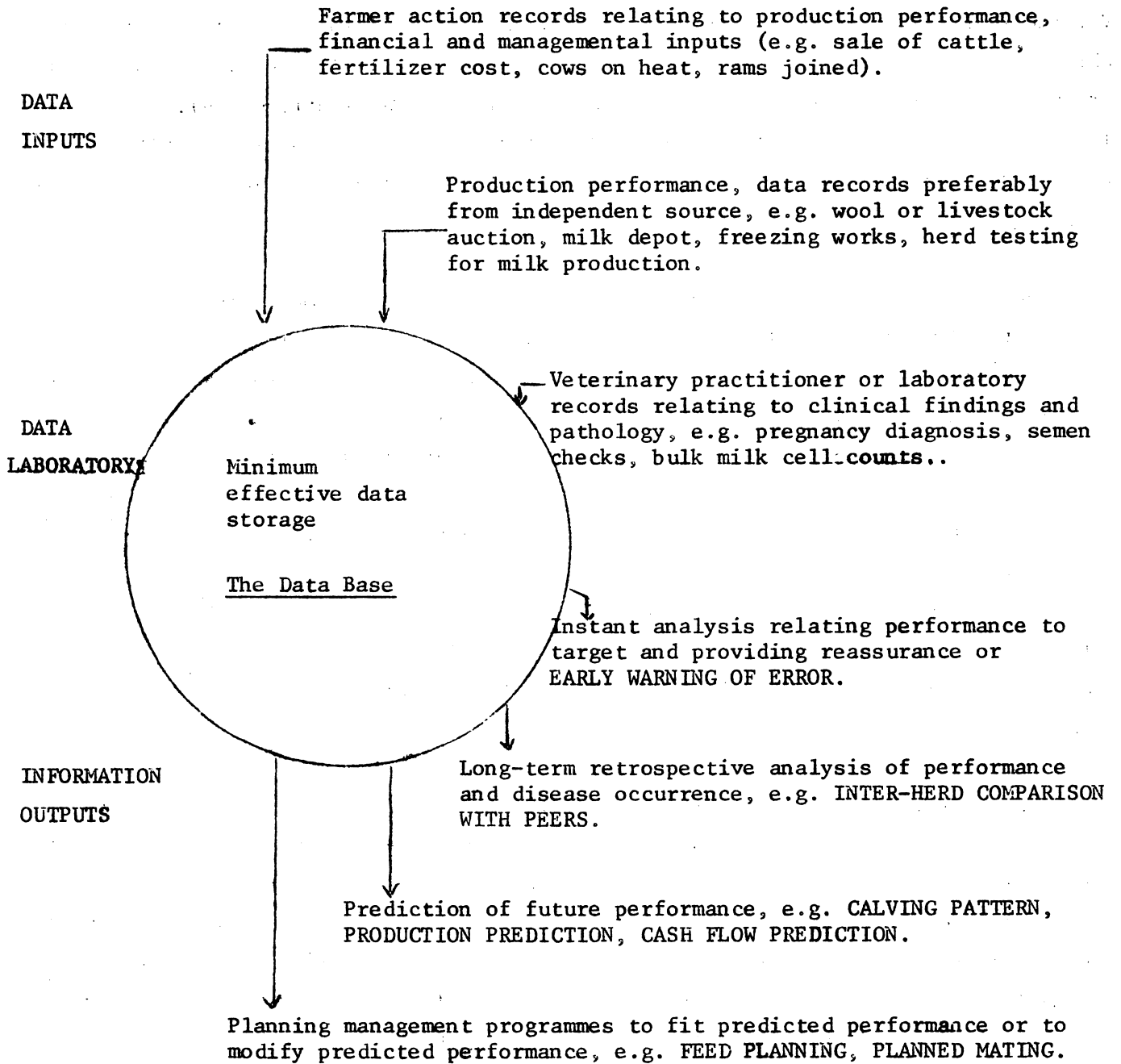
However, it appears that on-farm computers will be used extensively for analysis of farm accounting, crop production and livestock performance on individual farms. Veterinarians providing a herd health service must use all the production information which is available from the farm programmes, or if unavailable, develop computer programmes which are located and operated in the veterinarian's office (39). The data is sent to the office on a regular basis, processed, and the results returned to the farm. In this way, both the farmer and the veterinarian maintain a record of the animal health and production of the herd.

The flow of data and information in a herd health programme is represented diagrammatically in Figure 1. The data is collected from available sources on a regular basis, entered by codes into the computer which analyzes the data and produces useful information. The veterinarian must then interpret the information and make recommendations for action to improve performance. The results of the action to improve performance are monitored over the next few farm visits and the cycle is repeated. It is a constant self-analyzing surveillance system. For each action there is a measurement, and for each period of monitoring there is either more action or a decision that none is necessary. The targets of performance can be incorporated into the computer programme and compared with actual performance. An examination of the computer print out for the period will indicate the areas in which shortfalls have occurred.

The collection of data as presented in Figure 1 - data can come from several sources. In order to maintain the programme's profile of economy, and to use information efficiently and as inexpensively as possible it is necessary to use data already accumulated for other purposes, e.g. herd testing, or the artificial insemination records from breeding co-operatives. Use of this material can effect considerable economy, especially if it is already computerized and is in a compatible language. Only data which is critical to the assessment being undertaken should be collected. It is easy to collect enormous amounts of data which are irrelevant or redundant. The sole purpose of the programme is to do every part of it with the greatest economic efficiency, and this applies to the data collection and analysis as much as it does to the veterinary part of the programme.

The data provided by the co-operating herds and flocks can be accumulated into a data bank, and from this bank, performance levels can be estimated and targets set. This information usually comes to the data bank as a monthly return on a

Figure No. 1: The Flow of Data and Information in a Herd Health Programme



/...

structured report form. As much basic and detailed information about the relevant animal species and industry as possible is desirable. For a practising veterinarian this may be limited to disease incidence and reproductive performance. For a species specialist, the expertise will extend over the field of nutrition, breeding programmes and housing. A collaborative effort with an animal husbandry adviser would complement the service.

The pattern of flow of information is illustrated in Figure 2. A more detailed flow chart of an interactive programme applicable to dairy herds at an advanced level is in Figure 3.

Analysis of Data: After the animal health and production data is collected from the farm it must be transferred to and incorporated into the previously collected data and analyzed periodically. The data must be stored and retrieved easily and economically. A variety of codes are used which simplifies data handling. Manual systems are satisfactory for small herds but as herds become larger the computer becomes necessary to minimise the number of errors and to obtain rapid analysis of the data.

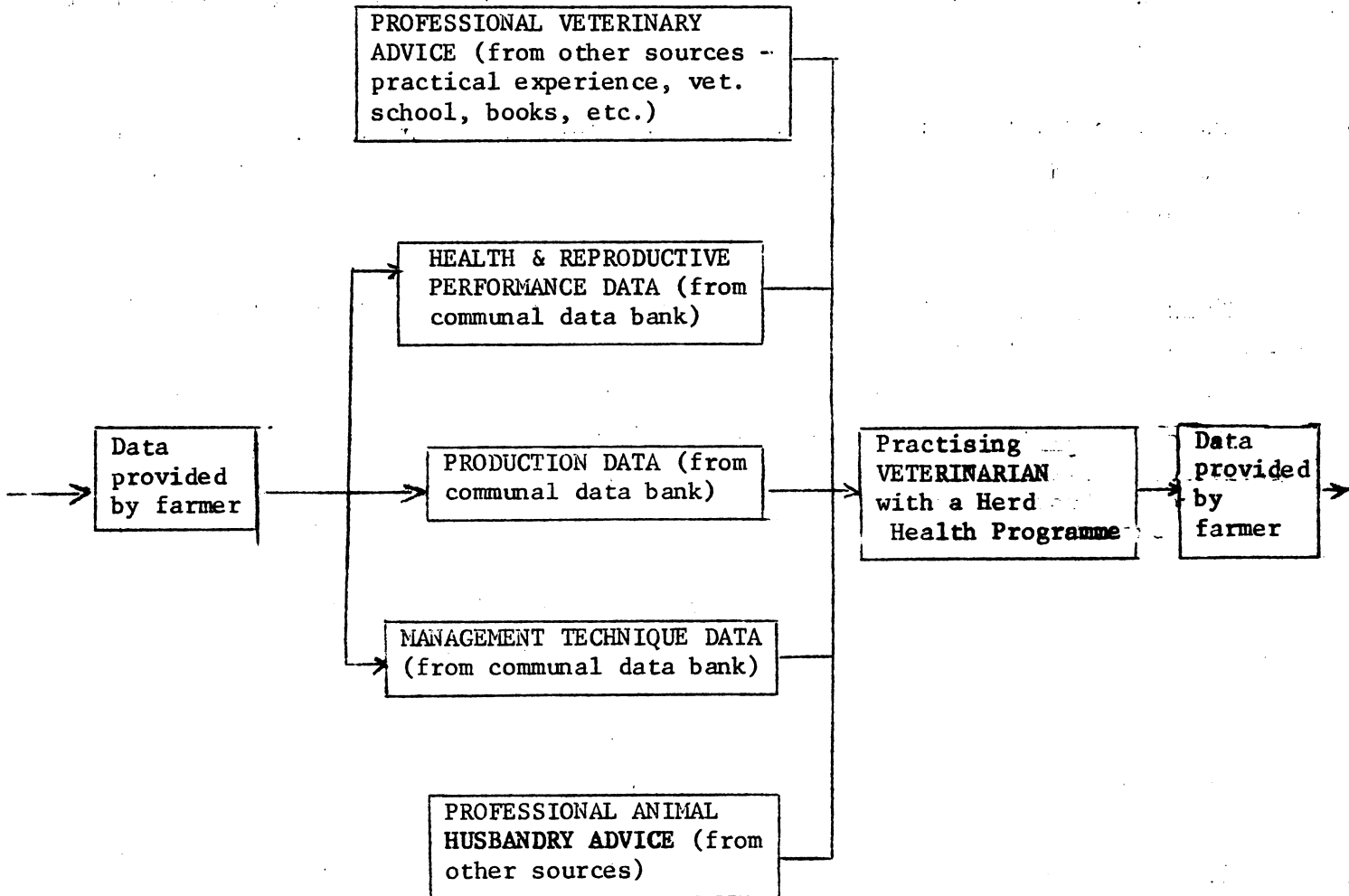
The most important aspect of the analysis of the data is to select the most useful indices or parameters which are required to accurately monitor performance.

Following analysis of the data, reports containing useful information and recommendations are prepared and sent to the farmer.

Periodic reports to the farmer: Regular reports must be prepared and sent to the farmer. The reports are provided after each visit, and the number of reports depends on how frequently the veterinarian visits the herd as part of a herd health programme. The reports contain the following kinds of information:

- A list of clinical examinations and treatments carried out as a record of the events.
- An updated list of the individual animals or groups of animals, depending on how they are handled in the particular programme. This includes all the data relating to disease, reproductive performance and preventive procedures for the unit and enables each animal's (or group's) history for the immediate past to be reviewed. A lifetime history also is available on request for producers who require the information for decisions on culling and to provide a health and production record at the time of sale.

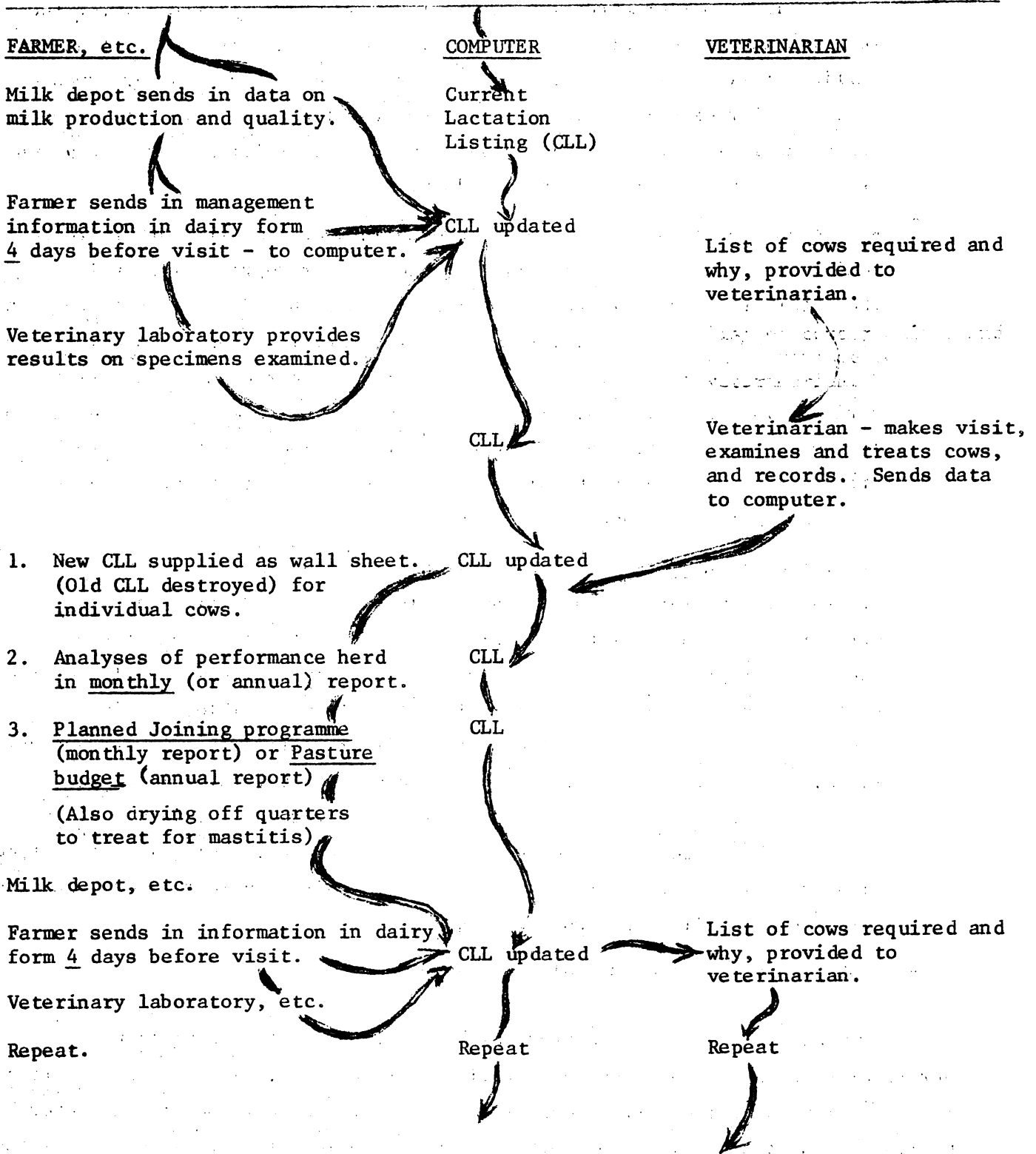
**Figure No. 2: The Flow of Data and Information in a Herd Health Programme**



/...



Figure No. 3: Pattern of Information in an Advanced Herd Health and Production Programme



/...

- An analysis of the parameters used to evaluate reproductive efficiency, and the wastage caused by mastitis and other diseases. These are accompanied by the levels of performance proposed as targets and an opportunity for the veterinarian to comment on performance, good or bad. It is important that sufficient flexibility be retained when assessing changes in performance indices. For example, bulk milk cell counts fluctuate visibly from month to month and it is usual to wait until a three-month rolling average continued at a high level before raising an alarm.
- Recommended actions: These are recommendations arising from other programmed reminders for that particular time of the year of reproductive cycle, or from the interactive part of the computer programme. Based on the data which has already been provided to it, the computer identifies those cows which have had a poor reproductive performance, a poor production record, or experiences serious disease incidents. These cows can be considered with a view to culling some of them. Similarly, the computer will identify the cows to be dried off and the dates on which this should be done, cows to be bred, and cows to be examined for pregnancy or for abnormal reproductive function.
- Predicted production events: This is a developing and vital segment of the programme. The farmer can preplan a calving or reproductive pattern for his herd or flock. Armed with a knowledge of the fertility index of the herd, the computer programme can then advise when individual cows should be bred to conform with this pattern. Similarly, it is then possible, knowing the reproductive data, to predict what the milk production will be at particular times, and to predict the feed requirements week by week. All of these functions are performed by modern programmes. Farmers receiving this advice can plan their feed programme six months in advance. This gives them time to plant a field of crop, or boost pastures with nitrogen fertilisers, purchase more land or cull more cows.
- Cash flow predictions may also be included.

An annual report may be prepared which is a retrospective summation of the other reports which have already been provided for the year. This is the opportunity for a major review of the performance of the herd for the year, and for an inter-herd comparison amongst a local group, with an annual meeting of participants to discuss progress and performance. The annual review of the herd needs to be done in conjunction with an updating of the herd profile. A copy of an annual inter-herd report is in Table 4.

General advice in output: This is advice which does not originate from the monitoring programme. It relates mostly to those actions which the farmer must take regularly during the year. Mostly the action is directed at the prevention of specific diseases and the maintenance of production. Some of the actions are stimulated by events in the reproduction cycle. For example, it may be necessary to vaccinate cattle for vibriosis and other infectious diseases before breeding; ewes may need to be vaccinated for enterotoxemia in late pregnancy; cows which are susceptible to milk fever will need to be treated prophylactically near to the day of calving.

The range of the recommendations is not universal for every farm and will depend on the prevalence of disease in the individual herd and in the area. What the veterinarian recommends will depend on his knowledge of these matters, and his expectations of bad seasons or bad years for particular diseases, often depending on the climate and the availability of feed. Also, his recommendations will be affected by the need to remain cost-effective. For example, it may be financially more beneficial on some farms, in some years, to restrict the supplementary feeding of ewes, done normally to avoid pregnancy toxemia, because the expected prevalence may not warrant the additional expense.

This general advice can be sent by mail at strategic times of the year, without the necessity of visiting the farm. In addition, new information and techniques may be included and reported in the form of a newsletter to the veterinarian's clients.

Table 4: Annual Interfarm Comparison of Targets of Performance and Actual Performance

<u>Data</u>	<u>Target of Performance</u>	<u>District Average</u>	<u>Actual Performance</u>
Average daily milk yield (litres)	15	13.2	14
Bulk milk cell count/ml	300,000	500,000	200,000
Percent Cows on heat last 30 days	100	85	75
Percent Cows pregnant at 90 days	100	80	70

#### Benefits of a Herd Health Programme

Financial Gains: The economic benefits derived from a herd health programme have been the subject of considerable debate. When progress has been made and performance has improved, it has been difficult to identify which factor or combination of factors was responsible. A successful comprehensive herd health programme

involves more effective management by the farmer, the introduction of specific disease prevention techniques, regular visits by the veterinarian, improved nutrition, improved breeding programmes, and possibly some unidentified variables.

The veterinary costs of a herd health programme are part of the variable or optional costs of farming such as those associated with feed, fertiliser, supplies and services. The net return to the farmer of money spent on veterinary services directed towards a comprehensive herd health programme has been calculated for some specific disease control techniques such as mastitis control and improved reproductive performance in dairy herds. The net returns have been of the order of 200 to 500 percent.

The technique of partial budgeting can be used to determine the gain or loss associated with the selection of certain strategies of disease control (9). The financial changes which occur are grouped according to extra costs, costs saved, revenue foregone and extra revenue.

A herd health programme will increase the costs of production but the net return from improved performance must exceed the input costs or the programme is inefficient. A detailed record of all input costs must be kept for an accurate assessment of the programme.

The increased costs of a herd health programme can be substantial and may include the following:

- Professional veterinary fees for the regular farm visits and for the analysis of problems and the preparation of reports.
- Professional fees for consultants used by the veterinarian.
- Records and computer costs.
- Drugs, vaccines, anthelmintics and other supplies used.
- The costs associated with changes in any aspect of the management of livestock such as nutrition, breeding, housing, additional labour, new equipment.

Preventive veterinary medicine pays. Most of the documented evidence has been generated from dairy herd health programmes in which comparisons in animal health and production performance were made on dairy farms before and after a herd health

programme was initiated and operated for up to 3 years (23, 24). In the Joint Exercise in Animal Health and Productivity (Jointex) in Britain, the effects of joint advice by veterinarians and agricultural advisers on productivity and profitability of 114 farms over a three-year period were examined and compared to farms not enrolled in the exercise. The combination of all the factors resulted in an improvement in total gross margins of 126 percent on the exercise farms compared with 42 percent on the farm management survey (23). Similar results were obtained in a three-year study of dairy farms in Holland (24).

There is also some indication that as the level of performance improves, the health costs will decrease. The health costs are lowest in dairy herds with near annual calving intervals compared to much higher costs in herds with longer lactation lengths (25).

Aids to management: An established operative herd health programme with a reliable records system will result automatically in the development of several useful aids to management. These have been most successful in dairy and swine herds. They include "action-lists" which assist the farmer in identifying when certain events will occur or actions which must be taken in particular animals. These animals are highlighted by the records system which prompts the farmer to perform the action when necessary. Some examples in a dairy herd include:

- Cows for reproductive tract examination (pregnancy diagnosis, post-partum examination or infertility);
- Cows to be dried off;
- Cows due to calve;
- Cows to be culled;
- Cows for mastitis examination;
- Cows for examination because of history of clinical disease.

Other aids to management include prediction of calving pattern, prediction of feed requirements, prediction of milk production and cash flow.

Continuous Assessment of the Farming Unit: The herd health programme can be regarded as a recurring assessment of the farming unit as a functioning unit. The assessment can be used at any time as a check on the efficiency of a manager, herdsman or partner (share-farmer). It can also be used by the manager or managing partner

as justification for a change in shares in the proceeds. For a banker, or investor or buyer, or seller, an annual report can provide evidence of biological managerial efficiency to supplement a financial statement of profit and loss. In extension exercises, field days, farmer's discussion groups and meetings, the information provided in annual and monthly reports is most valuable because of the actuality and local origin of the data.

Efficiency Utilization of Rural Veterinary Practitioners: Rural veterinary practices have participated in governmental disease regulatory work on a fee-for-service basis for many years. The government benefitted by being able to extend its surveillance and eradication programmes, and by using practitioners as part-time and casual employees were able to remain flexible and relatively uncommitted for a significant segment of its work. Veterinary practices benefitted by an improvement in their financial viability, partly because of added income, but largely because the regulatory work could be programmed in parts of the year when emergency work is at a low level and practitioners tended to be under-employed. The success of eradication programmes for brucellosis and tuberculosis, which provided most of this regulatory work for veterinarians, has resulted in a marked reduction in the volume of this work available to practitioners and in the regular income which it used to provide. In veterinary practices where work is seasonally distributed, with the peak at the time of calving, herd health programmes are a suitable alternative to governmental regulatory work because the reproductive programme on which they are based is busiest in the slow season for emergency work.

Encouragement for Veterinarians to become Species Specialists: Good farmers are able to integrate the information and advice that they receive from various sources and make the appropriate decisions themselves. Many others are not capable of doing this and this creates a vacancy in the ranks of advisers to food animal farmers - the professional adviser who can provide farmers with a list of alternative strategies and be able to recommend the best solution after making an objective evaluation of the herd, using all of the available information.

Veterinarians are situated in the advisory support system of animal farmers in such a way that they are the most strategically placed persons to ensure that there is integration, and not confrontation, between the components of management. However, veterinarians have traditionally been cast in the role of healers, and additional training and experience for them is required if they are to be involved in decisions on management. This is not to say that basic clinical skills will no longer be

necessary. The entire preventive programme depends on fast accurate diagnosis and prompt action when problems arise and this required careful clinical examination and proper field and laboratory investigations. If a veterinarian in rural practice wishes to restrict his activities to traditional medicine, surgery and theriogenology, he will find a need to consult animal husbandry advisers when necessary. A veterinarian who wishes to become fully involved in production management as well will need to develop his expertise as a species specialist (40, 41).

Increase in the Involvement of Veterinarians with Subclinical Disease: A large part of the impetus to the development of herd health programmes has arisen from the realization that the most severe losses in productivity, especially in grazing animals, are caused by subclinical rather than clinically apparent disease. Subclinical disease may affect a large number of the herd and may require extensive epidemiological and laboratory investigation if a diagnosis is to be made. Treatment and control procedures usually involve the whole herd, and economic considerations assume first priority. The treatment and control procedures for diseases such as parasitoses, nutritional deficiencies, metabolic diseases and chronic staphylococcal mastitis in cattle and foot rot in sheep require not only herd treatments, but need to be integrated with the grazing management of pastures and the management of technical procedures such as shearing and milking, and the known epidemiology of pathogens, such as the seasonal appearance of fungi on pasture. Veterinarians have been increasingly involved with the diagnosis and management of subclinical diseases for some years, but the inclusion in our disease lists of entities listed as "failure to meet mathematical targets" has increased the involvement even further.

Research and Development Opportunities: Field investigations into the effects of changes in management, the administration of anthelmintics and vaccination schedules on the efficiency and volume of production, are difficult and expensive to arrange. A well-managed herd health programme provides data from a large number of cows whose health and production records are monitored for health maintenance purposes. However, it is relatively easy to insert a research protocol into such a system and to have access to a large number of cows in a conventional, commercial situation and to determine the outcome of the treatment in real-life circumstances.

Herd Health Programmes and the Future of Rural Practice: There is a growing demand for veterinarians to participate in planned programmes which set out to maintain health and production in dairy herds. If these programmes are to be serviced properly, the number of veterinarians available would need to be modified. Their awareness of the

industry and of animal management would need to be increased to the point where they could be involved in significant decisions in farm management. Formal post-graduate training as a species specialist would need to cross the traditional boundaries and provide an education in animal science, especially nutrition and genetics, in agricultural economics and engineering, agronomy and veterinary science. The major objective is to train the veterinarian in these other fields and at a level which will provide an understanding of the problems, and promote consultation and co-operation with the appropriate specialists with the objective of using a team approach to solving them. This should integrate knowledge from a number of disciplines and avoid confrontation between their spokesmen, an all too common occurrence.

The real need in farm management is to find compromises between the often conflicting requirements of the management tools, including health maintenance, nutrition and breeding plans. The objective of planned health and production programmes is to integrate the advice streams relating to these subjects and thus provide an overall, whole-farm policy. Compromise between the conflicting demands to get the best whole-farm answer requires a sufficient understanding of all the needs, all the resources and their availability, and all the principles of feeding, reproductive management and so on. Basically, it is the farmer who should have this broad understanding and be capable of putting advice from all of his advisers into its proper perspective. Some farmers do, but many do not and it is these who require the co-ordinated advisory service that a properly educated veterinarian is capable of providing.

Alternatives to Herd Health Programmes Provided by Veterinarians: The responsibility of co-ordinating animal production and health advice for farmers has been unclear for a long time and the veterinary profession and animal scientists have not appeared anxious to assume the role. Veterinarians have seemed such an obvious choice because they are on most farms frequently, and if they provide herd health programmes they are already making the periodic visits which are required for this kind of work.

Of the possible alternatives the obvious one is to establish animal husbandry advisers in this role and have them use veterinarians as consultants in matters where etiologically specific disease is concerned. There are combinations of people and circumstances now where such an arrangement is producing satisfactory results. However, it is not possible to produce a species specialist in this way. A fully qualified veterinarian who develops a species specialty can provide a major component of a herd health service.

There are differences between the species in the balance between health and



production problems as causes of economic loss. In dairy cattle, disease is probably the greater of the two, or at least so great that it requires a veterinarian in constant attendance. In beef cattle and pigs, the veterinarian and the animal scientist can probably make equal contributions, with the possible exception of beef feedlots and intensive pig units which require more veterinary input. Sheep are probably a species in which planned animal health and production programmes could logically be supplied by the animal husbandry profession with the veterinary profession providing additional consulting services.

In most countries at the present time these programmes are developing and the opportunity is there to lead them and participate in them. The veterinary profession has not fully grasped the opportunity and may find itself in a secondary role as the leadership is taken up by others. For the veterinarian to retain or gain a firm hold on this role in agriculture he will need to participate actively by ensuring that much of the information stored in the data bank is provided by veterinarians. This may be in the form of reproductive examination records for beef cattle, mastitis examination data in dairy cattle, or necropsy and clinical pathology data in feedlot and sheep enterprises. The greater challenge to the veterinary profession is to create ways of making even bigger contributions by devising new, but cost-effective, reasons for maintaining their involvement in planned herd health and production programmes.

Payment for Services Provided: The service provided is strictly tailored to provide the best financial climate for the farmer and it is logical that the farmer should pay for it. However, in the initial stages when a programme is beginning or in circumstances where the farmer's financial returns are poor, the question of subsidization or other forms of support may be raised. It is apparent that there are fringe benefits for units other than the farmer and it is logical that they might contribute to initial or continuing costs if their involvement is great. Some of the receiving organisations are:

- Government departments of agriculture could have access to data on disease occurrence at all levels, including diseases recognised and treated by farmers.
- Pharmaceutical industry could have use for similar information relevant to potential demand for their products.
- Dairy product processing units who would be better able to rationalize their purchasing and storage data if accurate production prediction was possible.

- University or other research organisations which need access to source material for research.

Implementation of a Herd Health Programme: There is considerable information available about animal health and production which is not being utilized by livestock producers. Failure to apply this information is a major cause of economic loss in livestock production. There is a need for a Herd Health Alert campaign directed towards livestock producers which will emphasize that an integrated animal health and production programme, on the farm, can improve animal production and economic returns to the producer. There has been considerable research done on individual diseases and many aspects of animal production. However, there has been almost no research done on the implementation of animal health and production practices using the whole farm approach which will yield the best economic return to the producer. Educational efforts have been effective in implementing mastitis control producers in commercial dairy herds (42).

A Herd Health Alert campaign would make producers more aware of the large economic gains which are possible by the application of an integrated animal health and production programme. There is a need for veterinarians and agricultural advisers to put together, using the printed word and the mass media, the principles of the programme which will change the attitudes of producers and motivate them to improve animal health and production. An important research objective is to address the issue of the education of livestock producers to apply the information which is already available on the control and prevention of animal disease.

A major challenge of the 21st century is the efficient production of wholesome meat and milk using a completely integrated animal health and production system.

There is also an urgent need for a restructuring of veterinary curricula to meet the needs of the veterinary students who desire to become food-animal practitioners (5). There should be a continuum of courses and experiences throughout the veterinary curriculum which give proper emphasis to the herd health concept (14, 15). Courses offered should include: 1) financial management; 2) farm management; 3) animal production; 4) animal nutrition; 5) experimental design; 6) data processing; 7) economic decision-making; 8) statistics; and 9) business administration. Continuing education programmes in which subjects should also receive a new emphasis to update the skills of those currently in food animal practice.

On a more immediate level practising veterinarians must reorient themselves and make a commitment to provide an integrated animal health and production service.

The challenge of the 1980's for veterinarians in large animal practice will be to fill the scientific veterinary journals and textbooks with examples of how applications of preventive medicine have increased profit at the head level (10). This information is vital to the development of practitioners of preventive medicine who have confidence in their capability as consultants to management.

/...

## R E F E R E N C E S

1. Blood D.C. The veterinarian in planned animal health and production. *Can. Vet. J.* 20: 341-347, 1979.
2. Anderson D.P. and Pritchard W.R. Animal Health. In: *Animal Agriculture, Research to meet human needs in the 21st century.* (Edited by W.G. Pond and Others). Proc. of a meeting held at Boyne Mountain, Mich. May 4-9, 1980. pp. 129-151. 1980.
3. Watson W.A. Large livestock units and notifiable disease. *Brit. Vet J.* 136: 1-17, 1980.
4. Schwabe C. The current epidemiological revolution in veterinary medicine. Part 1. *Prev. Vet. Med.* 1: 5-15. 1982.
5. Goodger W.J. and Ruppanner R. Why the dairy industry does not make greater use of veterinarians. *J. Amer. Vet. Med. Assoc.* 181: 706-710. 1982.
6. Gasson, Ruth. Goals and values of farmers. *J. Agric. Economics* 24: 521-542. 1973.
7. Camm R.M. Animal health today: problems of large livestock units. *Economics of disease control.* *Brit. Vet. J.* 136: 313-320. 1980.
8. Henderson D.C. Animal health today. The problems of large livestock units. The role of the farm staff. *Brit. Vet. J.* 136: 203-205. 1980.
9. Ellis P.R. and James A.D. The economics of animal health. 2. Economics in farm practice. *Vet. Rec.* 105: 523-526. 1979.
10. Hubbert W.T. Perspective on veterinary preventive medicine in the United States. *J. Amer. Vet. Med. Assoc.* 174: 378-379. 1979.
11. Schurrenberger P.R. Defining preventive medicine in veterinary practice. *J. Amer. Vet. Med. Assoc.* 174: 379-380. 1979.
12. Blaxter K.L. The limits to animal production. *Vet. Rec.* 105: 5-9. 1979.
13. Huffman D.C. Economic decision making by livestock producers. *J. Amer. Vet. Med. Assoc.* 174: 381-384. 1979.
14. Hagstad H.V. Preventive medicine in today's curriculum. *J. Amer. Vet. Med. Assoc.* 174: 384-386. 1979.
15. Hagstad H.V. and Hubbert W.T. Interfacing professional training in health maintenance and preventive medicine. *J. Amer. Vet. Med. Assoc.* 175: 210-211. 1979.
16. Bailey D.E. Preventive medicine in sheep and goat medicine. *J. Amer. Vet. Med. Assoc.* 174: 388-389. 1979.
17. Becker H.N. Preventive medicine in swine practice. *J. Amer. Vet. Med. Assoc.* 174: 389-393. 1979.
18. Cope G.E. Preventive medicine in feedlot practice. *J. Amer. Vet. Med. Assoc.* 174: 394-395. 1979.
19. Haines J.M. Preventive medicine in equine practice. *J. Amer. Vet. Med. Assoc.* 174: 396-398. 1979.

20. Harrington B.D. Preventive medicine in dairy practice. J. Amer. Vet. Med. Assoc. 174: 398-400. 1979.
21. Winkler J.K. Prevention for profit. J. Amer. Vet. Med. Assoc. 174: 401-403. 1979.
22. Report of the Committee of Inquiry into the Veterinary Profession. Volume 1. Chairman, Sir Michael Swan. July 1975. pp. 1-238.
23. Jointex: Preventive medicine in practice. News & Reports. Vet. Rec. 98: 349-350, 371. 1976.
24. Sol. J. Economic and veterinary results of a herd health programme during three years on 30 Dutch dairy farms. Proc. XII World Congress on Diseases of Cattle. The Netherlands. Sept. 7-10. 1982. Volume I pp. 697-701. 1982.
25. Shanks R.D., Berger P.J., Freeman A.E., Kelly D.H. & Dickinson F.N. Projecting health cost from research herds. J. Dairy Sci. 65: 644-652. 1982.
26. Goodger W.J. & Ruppanner R. Historical perspective on the development of dairy practice. J. Amer. Vet. Med. Assoc. 180: 1294-1297. 1982.
27. Lesch T.E., Troutt H.F. & Jones G.M. Expanding food-animal veterinary services through nutritional consultation. J. Amer. Vet. Med. Assoc. 176: 734-737. 1980.
28. Heider L.E., Galton D.M. & Barr H.L. Dairy herd reproductive health programmes compared with traditional practices. J. Amer. Vet. Med. Assoc. 176: 743-746. 1980.
29. Barfoot L.W., Cote J.F., Stone J.B. et al. An economic appraisal of a preventive medicine programme for dairy herd health management. Can. Vet. J. 12: 2-10. 1971.
30. Muirhead M.R. The pig advisory visit in preventive medicine. Vet. Rec. 106: 170-173. 1980.
31. Kahrs R.F. Techniques for investigating outbreaks of livestock disease. J. Amer. Vet. Med. Assoc. 173: 101-103. 1978.
32. Kahrs R.F. Teaching the techniques for investigating animal disease outbreaks. J. Amer. Vet. Med. Assoc. 173: 387-388. 1980.
33. Puckett H.B., Olver E.F., Harshbarger K.E. & Spahr S.L. Automating the eyes of the herdsman. J. Amer. Sci. 53: 516-523. 1981.
34. Russell A.M. & Rowlands G.F. COSREEL: Computerized recording system for herd health information management. Vet. Rec. 112: 189-193. 1983.
35. Pepper T.A., Boyd H.W. & Rosenberg P. Breeding record analysis in pig herds and its veterinary application. 1. Development of a program to monitor reproductive efficiency and weaner production. Vet. Rec. 101: 177-180. 1977.
36. Pepper T.A. & Taylor D.J. Breeding record analysis in pig herds and its veterinary application. 2. Experience with a large commercial unit. Vet. Rec. 101: 196-199. 1977.
37. Church T.L. Preventive medicine and management in beef feedlots. Can Vet. J. 21: 214-218. 1980.

38. Janzen E. Health and production records for the beefherd. The Vet. Clinics of North America Volume 5. No. 1. March 1983. pp. 15-28. Symposium on Herd Health Management - Cow Calf and Feedlot. Editor. O.M. Radostits.
39. Sard D.M. Computer systems in veterinary medicine. Practice experience. Vet. Rec. 109: 262-265. 1981.
40. Blood D.C., Williamson N.B. and Morris R.S. The future of large animal practice. Vet. Rec. 103: 246. 1978.
41. Radostits O.M. Specialization in large animal practice. Can. Vet. J. 15: 339-344. 1974.
42. Crist W.L., Heider L.E., Sears P.M., Barr H.L., Kowalski J.J. & Schmidt G.H. Effectiveness of educational efforts in implementing mastitis control procedures in commercial dairy herds. J. Dairy Sci. 65: 828-834. 1982.
43. Henderson J.A. The prospect before us. Can Vet. J. 1: 3-9. 1960.



II CA  
EIB  
Bogotá

LA  
mbia





**INTER-AMERICAN INSTITUTE FOR COOPERATION ON AGRICULTURE**

**P.O. BOX 10-1089, GEORGETOWN, GUYANA,**

Third Veterin  
ca