THE VETERINARY EDUCATION. V. THE RELATIONSHIP OF VETERINARY SCIENCE TO OTHER SCIENCES, DIVERSIFICATION OF THESE RELATIONS AND THE VETERINARY SCIENCES IN TANZANIA

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SUMMARY

General relationship of Veterinary Sciences to other Sciences represented by the Faculties of Medicine, Science and Agriculture as well as special relations which influence the development of Veterinary Sciences in various areas through such local conditions as the climate, economic requirements and the structure of the society were discussed.

The diverse development of the contemporary Veterinary Sciences due to their regional and special relationship was exemplified through modifications of the Veterinary Sciences in Australia, Europe and Africa.

The Tanzanian situation was studied and it has been concluded that the strong medical component of the Veterinary Sciences in Tanzania should be maintained and that preventive medicine and public health, food hygiene and subjects comprising veterinary zoology have to be the mainstay of Veterinary Sciences in this country.

INTRODUCTION

The present content of Veterinary Sciences is the result of the scientific progress, fluctuations in the scope of veterinary activities and the changing role of animals in the human society. As the historical aspect of the modifications within the Veterinary Sciences has been covered before (Tucker, 1978), the present paper concentrates on the contemporary situation characterised by the search for new certainties, the search which in itself is an outcome of rapid technological changes introduced in the 20th century and the consequent mutations in social organization of the societies. These changes exerted a strong destabilizing effect on all professions which occupied the middle position in the chain of specializations inserted between primary production and man himself. The veterinary practices were particularly affected by this, some vistas were closed or restricted while the search for others still is going on. It should, however, be always remembered that introduction of new accents must be proceeded by a comprehensive and careful analsis and, because the equipping of every professional man starts with his education, only the examinations of both the professional and educational aspects can offer the guidance for an educational policy and for its execution. This brings us to the analytic and revisionistic trend in Veterinary Education which is in evidence already for some time, although not yet in Africa. It is however in Africa where the

Veterinary Education is presently in a particularly important and even in a crucial stage (Tucker, 1978). Therefore a closer look into the situation in Tanzania is pertinent to the preparation of the veterinary curricula.

EDUCATIONAL RELATIONSHIPS BETWEEN VETERINARY AND OTHER SCIENCES

The Veterinary Sciences and therefore also the veterinary curricula overlap with Medicine, Science and Agriculture and the overlapping is most extensive with the medicine, and the least extensive, as expressed by the number of subjects, with the agriculture.

1. RELATIONSHIP BETWEEN VETERINARY SCIENCE AND MEDICINE

The oldest and closest of links which relate the Veterinary Medicine to other sciences is that with human medicine. The Veterinary Schools were the Schools of Veterinary Medicine and the great majority of them still uses this name. The alternative name of Veterinary Sciences is of a very recent coinage. Its acceptance was prompted by the incorporation of animal husbandry into the veterinary curricula. This will be discussed in more detail below.

In the early years of study the subjects in both the veterinary and medical schools are traditionally the same; anatomy, physiology, biochemistry, pathology, microbiology, parasitology, pharmacology and so on. In the later years in the veterinary schools the main subjects are that of surgery and medicine.

What is more, the veterinary and medical curricula not only overlap but also influence each other. Thus the introduction of genetics and reproduction to the Veterinary Schools was followed by the establishment of genetics, as well as human biology and sexuality into the medical curricula, while recognition of the importance of psychology has occurred parallelly in the Medical and Veterinary Schools. The latter is now taught under the variety of names such as psychology, comparative psychology, behavioural studies, ethology or even included in human biology.

In all subjects mentioned above, and in the pursuits similar or included in them, the methods of research, and the teaching materials as well as the approach and scientific language are the same. The anatomists, physiologists, biochemists or microbiologists to mention only few, belong to the same sections of the scientific societies, ponder about similar problems and understand each others goals and difficulties. Further, their findings and their knowledge are mutually complementary.

2. RELATIONS BETWEEN THE VETERINARY SCIENCE AND SCIENCE

The rapid development of sciences in the 19th and 20th century did bring about multiplication of subjects and the students concentrate now on the narrow areas of the study only. Such subjects as physiology, bacteriology or parasitology, which were initially taught within the medical and veterinary curricula, become established also in the Faculty of Science and the scientists working in these areas become colleagues as well as contributors to the development of their subjects. Some

of them did obtain appointments in the professional schools, forming a significant element in teaching and research. So, on the basis of common disciplines, new connections have been developed between the Veterinary and Medical Schools, on one hand, and the Science, on the other. It is important however to note that there is a difference between the veterinary-medical and veterinary-scientific relations. In the Veterinary and Medical Schools the design of the course of study is similar and therefore their curricula are similar while comparisons between the Veterinary and Science Faculties shows that their curricula are quite different but a number of subjects taught have their counterparts in the other Faculty. So these differences can be reduced to the differences between the design of the curricula and to that of occasional correspondence.

3. RELATIONS BETWEEN VETERINARY SCIENCES AND AGRICULTURE

The curricula of the Veterinary Schools overlap with the agricultural curricula to a lesser degree (smaller number of subjects) than with those of the sciences. The design of veterinary studies is also very different from that of agriculture and the real link between the Veterinary Sciences and Agriculture is formed only through the animal husbandry. However, because animals which are the subject of veterinary attention are often kept in rural areas, the contact with agriculture extends beyond the years of study. It becomes also that of the proximity of the occupation site.

Each of these links gave rise to various concepts about the veterinary activities. For this reason they will be discussed separately.

The position of animal husbandry

The idea that veterinarians would benefit from the knowledge of the habits and practices of the people they work with, is not a new one. In the times past the veterinarians have learned how to manage military convoys (Tucker, 1978), as well as the language of butchers, blacksmith's and horse dealers, so the frequent contacts with the owners of flock and herd animals naturally lead to the notion that the knowledge of animal husbandry will bring about a better understanding of breeding problems. On such premisses the teaching of animal husbandry was introduced into the veterinary curricula, and as a contact and ancillary subject, it was initially taught by the external staff. Such is still the practice in Tanzania, although in the majority of modern schools the animal husbandry (or animal science) courses are incorporated into the veterinary faculties. The reasons for such incorporation were threefold: firstly, in countries where the herds are located in remote areas the breeders and farmers seek the veterinary advice not only on the health of animals but also on matters related to the animal husbandry, secondly the knowledge of the practices of breeders allows for their critical assessment and increases the accuracy of the veterinary diagnosis. So it facilitates the veterinary advising. Thirdly the addition of informations on the nutrition and other husbandry subjects to the already extensive training which veterinarians receive in medicine, biochemistry, physiology, embryology, etc. etc. should form a broader preparation for the solution of the complex epidemiological and metabolic problems

However in this connection still another aspect can be mentioned, namely the medical and biological specificity of the producing animal. In the present author's opinion this point is important and takes the whole argument into the realm of medicine. Biologically and medically the extensively producing animal is a special case. Such an individual is pushed to its physiological limits and is therefore in a state of delicate balance maintained precariously by its metabolic efficiency, nutrition and husbandry methods, as well as the environment and other factors. An upset in any of these factors changes the production. The care of an extensively producing animal can be therefore best compared to other medical branches which deal with individuals under stress, such as sport, space, underwater or horse racing medicine. For this reason today the care of the dairy herd became now a very complicated activity which includes a great variety of factors; genetic nutritional, reproductive, metabolic, medical, statistic and an extensive recording. In this field the veterinarians have introduced recently some new approaches which bring, on the whole, quite spectacular economic results.

Thus the incorporation of the animal husbandry subjects into the veterinary curricula can be treated in the same way as incorporation of genetics, human biology or zoology into the Medical Studies, so no more than a preparation to other activities which have essentially diagnostic or preventive character.

Except for animal husbandry, the Veterinary Science and Agriculture spread into different areas and the character of their courses vary greatly. The veterinary course is supported by the basic, so large and scientific subjects. The subjects, which bring only some practical information obtained from other areas are few and applied subjects are mostly limited to the practical portions of surgery and medicine, so to the courses which also contain a large quantity of theoretical material. On the other hand the agricultural studies comprise a great number of short, rather introductory, courses of a very different character. These supply a guidance for the practical situations. For this reason the Agriculture can extend, remove or replace some of them, so have the options during the undergraduate studies why the Veterinary Sciences cannot. The veterinarians must specialize later, during the postgraduate training.

These differences are the result of a diverse historical background, the Veterinary Sciences concentrating early on health of animals while Agriculture starting with preparation of agricultural managers, which needed informations on variety of topics like animals, plant, buildings, machinery and so on, but, of necessity, of a limited scope.

The location of professional activities

As far as the locations of the veterinary patients is concerned it must be noticed first that it is variable. Man has kept the domesticated animals in turn around his settlements, within the army establishments, on farms and in the cities, although nowadays the majority of the companion animals are kept in the city and that of the productive animals in the country side. The number of species of veterinary interest is also changing. Initially the oxen and horses were the most important, but dogs, cats, birds, sheep, pigs and goats were soon added to them, and today the veterinarians may need to attend any mammal or bird and even become interested in fish or insects.

The double relations (overlapping the study subjects and that of the location of practice) between the Veterinary Sciences and Agriculture have lead to a number of different opinions on the study and performance of the veterinary profession. Curiously enough it was the frequency of the veterinary practices in the rural areas which has formed, mostly in the non-veterinary circles, the basis for a notion that the Veterinary Faculty should be located whithin the agricultural complex although the contact through the animal husbandry has also been drawn into the argument.

It is true that Veterinary Sciences serve the Agriculture in a similar way to that in which medicine serves the miners or sailors, zoology the conservation of fauna and botany the utilization of flora. However, this by itself does not form a sufficient reason to place the Veterinary Schools with the Agriculture Faculty as it also does not give any basis for placing Medical Schools in the mine or on the boat, neither that of locating the Zoology Department deep in the forests and marshes. What is more, locating the Veterinary School on some remote farm weakens its natural and vital links with Medicine and Science, and this has a deliterious effect on many subjects in the curriculum. This point is very important in relation to the needs of the veterinary profession in Africa, and it will be discussed in more detail below.

All experiences so far, and that includes Tanzania, show that the supply of clinical material is difficult in the remote areas and that this hampers the teaching of medicine considerably.

In fact there are also very strong hygienic and prophylactic reasons against a too close physical association between a farm and the Veterinary School as the pathogens travel from the farm to the laboratory and vice versa. Veterinarians may work on the farm like human pathologists may work in the mortuary but neither of them needs to stay there all the time.

4. VETERINARY SCIENCE IN VARIOUS ENVIRONMENTS

Within the above outlined educational relationship between the Veterinary Sciences and other professions the more specific regional relations do develop. As these relations modify the trend of the Veterinary Sciences in various countries they are of great interest to a Veterinary Educator. They are defined by such factors as the local conditions, climate, historical period or the socio-economic features of the society. We are presently experiencing a period of new adjustments caused by the technological changes as well as the expansion of the Veterinary Sciences into a number of new areas. In such a period the careful analysis of the situation as well as the projection into the future are necessary indeed. This is particularly pertinent to Africa where the Veterinary Schools are developing rapidly within a specific environmental conditions. To illustrate the fact how the local conditions influence the development of the Veterinary Sciences let us note some of the contemporary developments. For instance, in Australia the veterinary specialization is highly diversified and develops along so different lines as the character of the production, species of the producing mammal, and the medical approach. In the cities the Veterinary Hospitals are numerous and geared for surgery and medical treatment of the companion animals. The race horses and race dogs form a basis for the medicine of efforts as well as that of the species. Country pract-

ice involves large and small ruminants, pigs and horses and often offers opportunity for specialization in the disorders of a particular species, while specialization along medical lines involves nearly every medical subject. Specialization in the academic subjects, diagnostic services, wild life and quarantine procedures complete the picture.

In Europe, the picture of the veterinary profession resembles that of Australia although due to the variety of conditions present some features specific for the national areas can be also distinguished. Specialization is according to the species and effort (for instance - buiatrics), academic pursuits, and medical disciplines are clearly in evidence. However in the areas where there is a vast majority of small producers the stress is also placed on the food hygiene.

The conditions in Africa may supply the third example. As a starting point here can be taken the reply of an African veterinarian who when asked by me, about a few local veterinary problems answered we are not interested in them we are interested in the animal production. In this connection it must be remembered that animal production is also higly developed in Europe and Australia but this does not mean that the veterinarian must become thus another Animal Science man and nothing else. If this would be the case then there would be no need for the veterinary training, neither there could be produced any good reason for the duplication of an animal scientist. Consequently, reducing the veterinary profession to that of the animal scientist does not serve the interest of any of these professions neither the interest of the country, and if such suggestions are coming from outside of Tanzania they are, to say the least, particularly uninspiring. Naturally there are also other specializations within the Veterinary Services in Tanzania than the animal production but so far the scope for them is limited. Therefore an analysis of the possibilities and of peculiarities of the whole area seems to be indicated. This leads us to the discussion of the situation in Tanzania. Here the most prominent factors, which should be taken into consideration are the tropical conditions, the economic requirements of the country and the character of the society.

The tropical conditions

A characteristic of the tropical conditions is the strong interaction between the man ans his stock on one hand and the free living forms of life on the other. This interdependence of the different forms of life affects all veterinary activities and therefore must be constantly attended to.

Hence the importance of Veterinary Zoology. As a scientific subject the veterinary zoology has been established in the 20th century and its development has been closely related to the conditions in Africa. The great part of it dealt with the parasites because the economic and medical importance of parasitism become evident early and the extensive research on various parasites and the large volume of knowledge in this area soon lead to the establishment of a new subject of parasitology. But the context of veterinary zoology is much broader than that of parasitology. Not only the parasites but also the bacteria, viruses and fungi circulate between various organisms and through a variety of living channels. Naturally a great number of other data can also be obtained from the non-domesticated animals, such as on wound healing, immunity, detoxication, physiology, anatomy, behaviour, biochemistry, embryology and so on, which elucidate or bring solution to the economic or veterinary problems. A good example is supplied by Rodents, a group of

mammals, which is particularly involved in the affairs of man. The already existing literature on them is so voluminous that it was necessary to introduce the special abstracting journals to cover only this field. However other groups of mammals are also important as well as birds and even invertebrates.

In Africa the importance of all this is further accentuated by the diversification of fauna which is greater than in other continents or in other climatic zones. A particularly great variety exists among mammals, therefore the second important part of veterinary zoology (first being parasitology) is mammalogy. It covers domesticated, laboratory and free living mammals. In the past it was customary to divide the mammals and birds into the domesticated and wild, the domesticated being the revenue bringing animals while the latter were not. However today with the establishments of National Parks, which are such a great attraction to tourists, the wild animals become also the money raising animals, and often even to a greater extent than the domesticated animals. In other words the wild animals are today an important scientific and economic natural resource. Their economic importance lies not only in being a foreign exchange earner but also in supporting other industries connected with tourism (such as transport, hotels and curios). The wild life is also a natural resource which if properly maintained will not be quickly exhausted.

Besides tourism there are two other vital economic and natural interests connected with wild life. One is the research into production potentials of wild animals and the other investigations into the health and the problems covered by basic sciences. It is worth mentioning here that the veterinarian can, and should, contribute to the wild life research and that in many areas he is often the most qualified person to conduct such a study. At present wild life research is nearly exclusively ecological or behavioural and the whole range of important problems based broadly on anatomy and physiology is not attended to at all. This is in spite of that the scope of both morphological and physiological mammalogy is already delineated. Special journals serve the needs of the subject of morphological mammalogy and a textbook of physiological mammalogy appeared as early as 1963 (Mayer and Gelder, 1963, 1965). It can also be added that parasitology and mammalogy do not exhaust the context of veterinary zoology and also that the conditions in Africa on one hand necessitate a closer attention to this subject and on the other offer the unique opportunity for the local and overseas veterinarians to specialize along this line. Another part of zoology - the environmental biology is of importance to both the Veterinary Sciences and the Agriculture. The opportunity for leadership lies here also.

The economic requirements

In the content of this paper only the requirements which fall within the area of veterinary activities can be pointed out. Here contributions to the national economy are based on:

a. animal production

b. animal health and prevention of diseases

c. food hygiene

d. production and other contributions obtained from the free living animals.

At present only the first point is strongly accentuated and, as it has been pointed out above, the omission of the others brings about the narrowness of the outlook, the diminishing of the activities of the veterinary profession, as well as the loss of many economic opportunities. Putting all eggs in one basket is proverbially a bad economic and professional policy, neither it could be maintained on the basis of analysis of the situation. What is more the animal production, animal health and food hygiene are inseparately connected. Production methods and health of animals are reflected in the level of production, while the quality of production and food hygiene are bound together, the latter resulting in preserving and better distribution of the products, and these finally reflect in the health of the consumer or in the value of the export.

The proper attention to the last area - the wild life - also increases indirectly the production of the domestic stock and creates a large source of continuous income. Further it offers an opportunity for finding new producing and economic animals. The obvious need for this was stressed by the International Biologic Programme. It is discussed now for over a decade and the real possibilities of such findings lie in the tropics.

The organization of the society

Every profession operates within a society and the structure of society naturally must influence the character of the profession. As far as the Veterinarians in Tanzania are concerned the following features of the society must be considered:

1. the number of companion animals in the cities are relatively small
2. there is paucity of the traction, or physical effort, animals (for instance horses)
3. many productive animals are kept on a great number of small farms as well as
4. on ranches and large farms
5. the food hygiene is hardly developed
6. the wild life has enormous scientific as well as
7. economic value
8. the veterinary problems are essentially of a tropical character
9. the number of mammalian species is large
10. there exists potential for developing of new productive species
11. the small ruminant of importance is not sheep but the goat
12. the European breeds of cattle are not particularly well adapted to the tropical requirements
13. the environmental conditions of a large portion of the country are changing fast.
14. the public health problems need a special attention.

The following conclusions can be drawn out from this:

a. that the establishment of the food hygiene must be considered

b. that the attention to individual animals is as important as the herd medicine

c. that the development of the preventive and comparative medicine is imperative

d. that more attention should be given to the diseases of the goat

e. that the production must be increased along two lines: 1) domesticated stock and 2) new food producing animals.

The above means that the efficient veterinary service in Tanzania must concentrate on the preventive medicine and public health, health of individual animals as well as of the herd, and on the veterinary zoology.

5. THE DIVERSIFICATION OF VETERINARY SCIENCES

Today the veterinary studies are basically similar through the world. The frequent communications between various parts of the world lead not only to the same definition of veterinary activities but also to considerable integration of the Veterinary Studies and to the acceptance of common standards. These standards should be maintained for the reason of efficiency, of national pride, as well as of the need to keep up with the current technological advances. It should be remembered that differences in the local conditions do not diminish, in any way, the requirements of high educational standard but merely put in front of the profession the tasks which arise from specific conditions. This point is important to stress particularly in times when some sources advocate the curtailing of African Veterinary Studies to certain narrowly described, and only hazily stated, problems. The Veterinary Sciences in Tanzania will be discussed below in relation to:

1. their definition and
2. their economic and national significance.

Definition of Veterinary Sciences

Some contemporary confusions related to the relationship between the Veterinary Sciences and Agriculture as well as to the rapid social changes of the technological age have been already mentioned. The essence of those uncertainties may be summarized as follows.

The veterinary studies and veterinary activities were always oriented towards the medicine. This was true in the times of Hammurabi as it is true now. The official and universally accepted name for the veterinary activities was the Veterinary Medicine. This description is today also predominant in Europe, U.S.A. and many other parts of the world. However the incorporation of the animal husbandry into the veterinary studies and veterinary activities has introduced what, at least in some minds, was an extension into the non-medical areas. These together with the specific conditions prevalent in some countries notably in Australia, lead to the

notion that the interests of the veterinarians are much broader than thus the treatment of animals and that this broadness is best expressed by describing veterinarians as scientists. So the Veterinary Sciences have been introduced.

It must be however mentioned here that for the veterinarians the animal husbandry subjects such as nutrition, genetics and the others can be considered no more than an aid to diagnosis in a similar way to that in which the genetics or nutrition are looked upon at the Faculty of Medicine. Therefore they do not necessarily change or curtail the main activities of the veterinary profession.

Consequently it is easy to see that, whatever the name, the medical part of the veterinary education and veterinary activities is not only characteristic but also essential to it, and that any other veterinary function must be viewed in this light.

As far as the animal production is concerned the work of veterinarians consists of:

1. the prevention of diseases in stock and man
2. the medical care of the extensively producing animal
3. the interpreting and managing of various forms of interactions (especially the pathological interactions) between the different species.

Such specialized work enhances the animal production but does not duplicate the activities of an animal scientist.

The frequent call from various bodies for concentration on animal production in Africa is well based on the need for proteins as well as on the economic reasons (for instance Scheper 1978, Clemens 1978). It is also obvious that the veterinarians not only want to be involved in animal production and that they have a proper training for it, but also that they can contribute greatly to its volume as well as to its quality, however, it is equally obvious that the way in which they can participate in the production must be defined and specified. Otherwise the interest in the animal production turns into unnecessary duplication or may be (and sometimes is) used as an excuse for not attending to the full scope of the profession.

Thus the Veterinary Sciences by definition, practice and tradition are based on medical subjects and the veterinarians (like medicos for man) are also attending to nearly all medico-scientific problems which involve animals. Their preparation for some scientific areas such as comparative anatomy, physiology, medicine and epidemiology is unequalled by any other study. With respect to the animal production, an area attended also by other professionals, the veterinary contributions are most valuable and even irreplacable, in treatment and preventive medicine.