

## Veterinary physiology and community development: are they compatible in a new South Africa?\*

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### INTRODUCTION

When I was considering the compatibility of veterinary physiology and community development as a topic for an inaugural address, a skeptical colleague remarked that to marry a basic with an applied science was impossible. However, I was not convinced, because I believe that it is possible. In this address I will attempt to convince you, the audience, that the two are compatible and that a veterinary physiologist has a role in community development. My hope is that at the end of this address you will share the same belief and enthusiasm.

### COMMUNITY DEVELOPMENT<sup>3,8,9,10</sup>

As a start we need to define what community development means. The term community development was apparently initiated in India in the 1950s, when Indians attempted to address problems facing their vast rural communities. They defined it as a partnership between communities and the government. The intention was not that it should be a distribution of gifts; it meant that people within communities participated, by using their own initiatives, in improving their standard of living. Government provided technical and other services in ways that encouraged such initiatives and self-help programmes, to the mutual benefit of both parties. From this definition we can conclude that:

1. It is important to identify community needs.
2. Initiatives for self-help should originate within the community and not be imposed upon it from the outside.

This means self-empowering communities so that they can decide their own futures.

### PHYSIOLOGY

Physiology is the basic functioning of the body. In this address we are looking at the functioning of domesticated animals in particular and especially those

used for production in a rural setting. This leads to a triangular model where humans, the environment and animals each represent an angle. I will endeavour to show that animals can be used for community development.

### THE NEED FOR COMMUNITY DEVELOPMENT

A question that may now arise is: is there a need for community development? Do we really have to develop communities? Well, we can answer intuitively by saying: yes, there are communities in South Africa that we must develop. Intuition is not enough and therefore demographic statistics and concrete evidence are necessary to support the hypothesis.

### SOUTH AFRICAN POPULATION DEMOGRAPHICS<sup>4</sup>

The population distribution in the different provinces, reveals that the Eastern Cape, Free State, KwaZulu-Natal, North West, Gauteng, Mpumalanga and the Northern Province have the largest black communities. In the Western Cape and Gauteng the population is mostly urban while in the Northern Province, Mpumalanga, North West, KwaZulu-Natal and to some extent the Eastern Cape the population is mainly rural.

Comparing economic activities and employment figures, the Northern Province, Mpumalanga, Eastern Cape and KwaZulu-Natal evidently have the highest unemployment rate. Further analysis of the distribution of unemployment between the different race groups reveals that unemployment is high among black people, less among coloureds and the least among whites.

The *per capita* income of the different provinces is highest in Gauteng and lowest in Eastern Cape, Northern Province, Northern Cape and North West. The poverty head count, which is the percentage of individuals living in poverty, is estimated to be 57 % among black people, 20 % among coloureds, 6.8 % among Asians and 2 % among whites.

Comparing poverty with unemployment and rural living, one concludes that

the areas with the highest rural populations are the poorest on the basis of high poverty head counts. Examples are the Northern Province, Eastern Cape, KwaZulu-Natal and Northern Cape. This problem of poverty is statistically quantifiable. We need collectively to declare war on poverty like Britain's effort in the war with Germany, where they displayed total commitment as a nation.

### LIVESTOCK NUMBERS<sup>4</sup>

The livestock population statistics in the country are not very reliable. Who bears the responsibility for collecting these data is still uncertain. We and many others in agriculture are attempting to convince the Central Statistical Services to do this. Medunsa's veterinary Community Service and Outreach Unit is attempting to remedy this deficiency by conducting needs analysis and surveys in various rural communities. Data that we do have that dates from 1993 show that in the old TBVC (independent) states that correspond to the present Northern Province, Eastern Cape and North West there are 4.6 million cattle and close to 3 million goats. This resource in these areas can be used to benefit the impoverished communities, by encouraging sustainable livestock production.

Most of the poor live in rural areas, they are black, they have large families and two-thirds of them are found in the Eastern Cape, KwaZulu-Natal and the Northern Province. These areas also coincide with the old self-governing states. Cattle numbers are half and goat numbers are double those of commercial farming areas, while sheep amount to one sixth and pigs to one twelfth of the commercial totals. Many black-owned livestock are found in rural, impoverished areas. Livestock management for production would obviously have to undergo a major paradigm shift in these areas if the intention is to use it for uplifting communities.

### REASONS FOR LIVESTOCK OWNERSHIP IN RURAL COMMUNITIES<sup>5,8,9,10</sup>

An analysis of the reasons for livestock ownership in communal areas is important if the attitude towards animal

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production is to be changed. The historical Eurocentric approach advocates that cattle should be kept mainly for production. People in the rural communal areas have a relationship with their cattle that is similar to a relationship with relatives (kinsmen). They form substantial social networks around cattle. Cattle are important in religious ceremonies and supernatural aspects are ascribed to them. Cattle traditionally were transacted for joining 2 families in marriage (lobola). Cattle can also act as a form of lease/lend treaty, where one owner would lend his cattle in return for labour. This relationship also enhances the social status of the owner of the cattle.

There are other aspects to consider. Fifty percent of the proverbs in the Zulu language relate to cattle. Cattle are not slaughtered at random for their meat but have a definite purpose for rituals and marriages. Merely to slaughter cattle for their meat would classify them as wild and thus break down the kinsmen relationship. Chickens, ducks, geese, sheep, goats and other animals are kept for slaughtering. Goats are sometimes used for religious purposes, but they obviously have a lower status than cattle.

The Eurocentric definition for use of animals to make a living, for food production and other economic activities poses a problem. This model does not supply all the answers to the problems experienced in communal areas. The people are too poor to provide an infrastructure for farming, the land is too small to carry the stock within a Eurocentric farming norm and the basic educational and management skills are not there.

## **SOCIOECONOMICS OF ANIMAL DISEASES<sup>6,7</sup>**

In 1995 we organised a workshop on socioeconomics and animal diseases. This workshop attempted to identify research roles for the state and institutes such as universities or university departments to assess the effects of animal diseases on community development.

The workshop identified a model that suggested that disease can be an inhibiting factor in development. This model provides for different groups of animals, for instance production animals or companion animals, and the effects these have on community development. Production animals would include livestock, game and aspects of eco-tourism. The effect that these have on community development is mediated through financial advantages, work opportunities, byproducts, food and food security, social and anthropological status, traction and

the promotion of human health. We concluded that animal disease does indeed have the ability to limit community development. This raised the question 'What needs to be done to alleviate this problem?'. We identified research areas that needed further examination. First, we need to collect information on animal diseases, in other words demography, disease incidence, prevalence, relative importance and priorities. Secondly, education and communications need to be re-examined with emphasis on extension methodology, technology transfer at all levels and research methodology. The 3rd area requiring attention is policy, with specific emphasis on production systems, land use, effective lobbying and a concern for negative impact on the environment. It is important to identify what kind of production system we need to promote in developing areas when considering environmental constraints. The 4th category is economics, including socio-economic profiles, production system viability, economic viability of control, the relative importance of disease and lastly obtaining credit and markets. When economic growth is stimulated, there must be markets for the animal products derived from farming with animals. Fifthly, we identified community needs as an important component in the entire process of community development. We need anthropological and social profiles. We must understand the need for infrastructure and we must find out whether people have access to resources. Finally, technologies need to be identified that are appropriate and transferable. The complex nature of the discipline of community development requires multidisciplinary and inter-disciplinary teams.

The lack of a basic resource such as water can jeopardise the good intentions of researchers and developmental workers. To this end the Department of Forestry and Water has provided water to many rural communities (1 million people to date).

## **PHYSIOLOGY AND TECHNOLOGY TRANSFER**

This address is mainly concerned with the transfer of appropriate technology to developing communities. Not repeating the failures of the past is crucial. We need to define appropriate technology and how to transfer that technology to individuals in rural communities. We must also recognise, and this is especially true for the physiologist, the need to be part of a multidisciplinary and inter-disciplinary team. The physiologist on his

own would not be effective, but a physiologist who, as part of a team, can identify and solve some problems facing people in rural communities, can make an impact.

## **ALTERNATIVES TO LARGE STOCK**

Cattle have a traditional connotation in rural societies. Changing people's attitudes towards cattle ownership is difficult because of the kinship relationship that exists. The situation with goats, sheep, poultry and geese is different. Medunsa has shown that motivating rural people to start small-scale poultry or goat enterprises is easier.

## **Crossbred goats**

Medunsa has made advances in this field in the goat project of Prof. N Donkin. This project produces crossbred goats from indigenous breeds and a European breed, the Saanen. The indigenous goats are resistant to some tick-borne diseases and other internal parasites, whereas the Saanen is a high milk-producer. The crossbred progeny harness the qualities of both parents but at a level between the two extremes, and are ideally suited for families. They require very little management, so that children or women who have other responsibilities can easily take care of them. The products are milk and meat.

## **Small-scale egg production**

Prof. L Abrams and Mr MacGregor initiated Medunsa's poultry project. This programme is successful in providing household protein. A household is provided with 10-12 point-of-lay hens, housed in battery cages hinged to the outside wall of the dwelling or hut. The hens lay eggs for a year, and can then be resold for slaughter or consumed by the owners. The eggs are used throughout the year to feed the family, barter with other villagers and pay for feed. The droppings are used to fertilise small-scale vegetable gardens. The capital investment is provided as an advance and is afterwards repaid from egg sales. This money is then recycled to start new egg farming enterprises. The construction of the cages by hand provides further employment for other villagers.

## **HOMEOSTASIS AND PRODUCTION**

In physiology we have a term called homeostasis. This concept infers that the body can control the internal environment within strict constraints. The level of electrolytes that exists at a constant range in blood best illustrates this. If a stimulus results in the levels of a particular electrolyte exceeding this range, mechanisms are

initiated to restore it to normal.

In developing areas, situations exist where homeostatic mechanisms are constantly challenged by a lack of good grazing, water and cover for new-born animals (which are subjected to a variation in external temperature). This implies that the animal is constantly drawing on reserves and consequently sacrificing its production of milk, eggs or meat. The situation in developing communal areas is thus that there are extreme limits on resources that can affect the internal environment of a particular animal. Here reference must also be made to excesses of certain formulated components in rations, owing to lack of training or management experience. The elevated levels can act as a challenge to the homeostatic band with a consequent influence on production.

### THE ROLE OF THE PHYSIOLOGIST

Production usually has a time constraint. The challenge to a physiologist is how can one obtain maximum production with minimal resources without inducing a stressful situation. As we move from the bounds of normality to abnormality, we should respect the animal's welfare. The task of the physiologist is to identify optimum conditions given the environmental constraints. Is there a point where production is maximal (for those conditions), inputs border on the abnormal but stress is minimised? The general wisdom is that animals that are producing well cannot be suffering from stress.

### An example – excess potassium in layer feed<sup>1,2</sup>

A developing farmer claimed that his hens experienced a drop in egg production. Analysis of the feed revealed high levels of potassium. The farmer blamed the feed company for the excess salt in the particular feed sample.

We conducted a trial where we fed

groups of hens different levels of KCl in the feed. The normal concentration of potassium in the feed is 0.4 %. The feed trial ranged from 0.4 to 2.2 %. At Days 0, 5 and 9 we sampled blood. The number of eggs and water consumption were monitored daily. We concluded from this trial that as salt concentration increases, water consumption also increases. There was no drop in the egg production. However, the consequence was that at 0.7 % the droppings became excessively wet if we increased the salt content.

We then changed the experiment. We fed 2 groups of birds rations with 0.5 and 0.9 % KCl respectively, and deprived these hens of a third of their water ration over a 24-hour period. The result was a 33 % drop in egg production on the following day.

Our model, which incorporates optimum production, low/excessive resources and reduced stress levels, can explain the results. The challenge is the high potassium, which is countered by the animal drinking more water. If we remove this compensatory mechanism, egg production drops. Stress was assessed by means of behavioural changes and this increased during deprivation.

These results allowed us to derive specific management information, which was that excess salt in the diets of laying hens is not detrimental to production when water is available. At salt levels of 0.7 % and higher in the ration, the problem encountered is wet malodorous droppings that attract flies. We made this information available to the farmer.

### CONCLUSION

I hope that I have shown that there is a role for a veterinary physiologist in community development. The role of the physiologist is to solve problems and to transfer technology so that people can apply the correct management tools to make a success of small-scale farming.

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