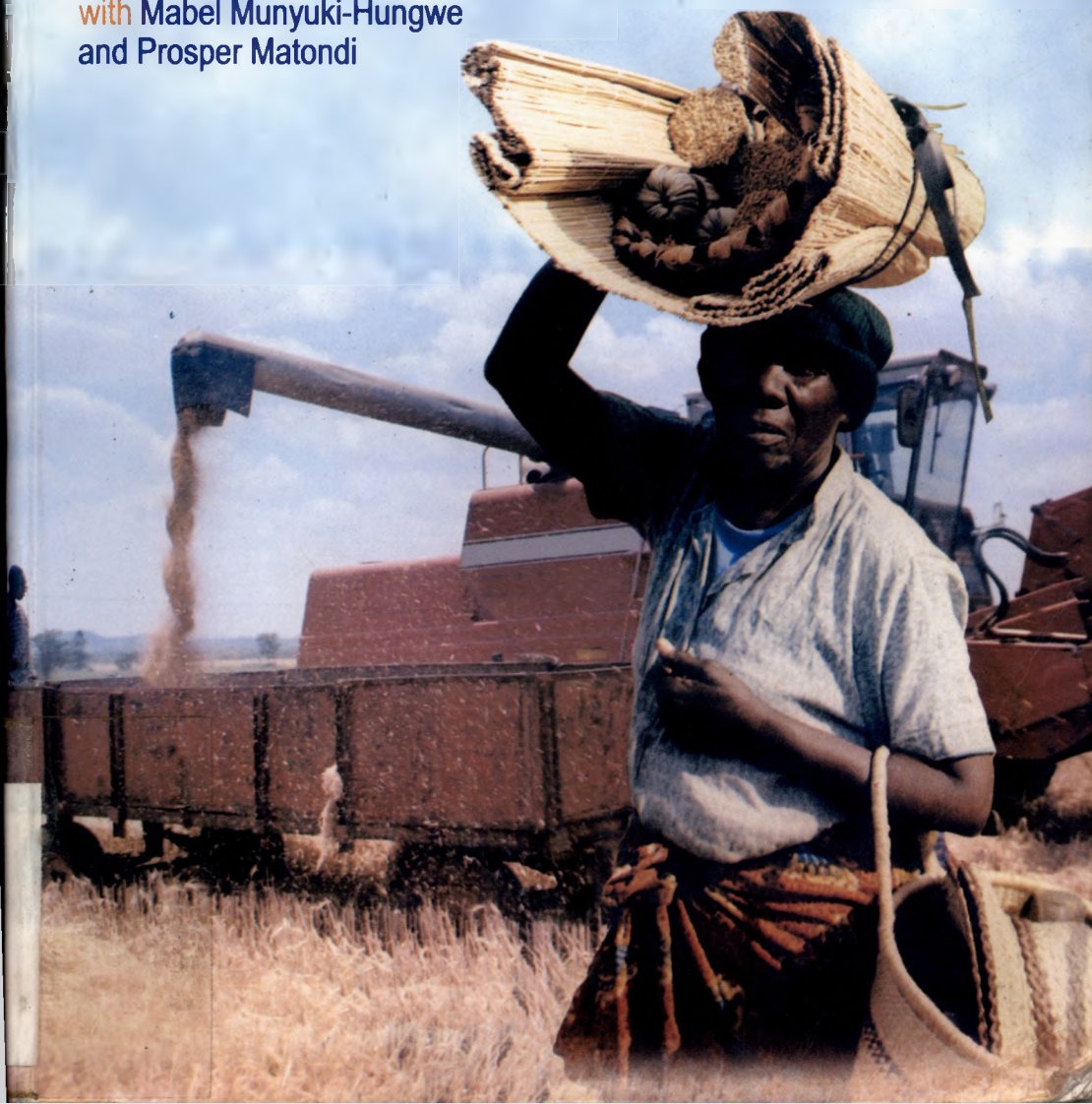
ZIMBABWE'S AGRICULTURAL REVOLUTION REVISITED

Edited By:
Mandivamba Rukuni,
Patrick Tawonezvi,
Carl Eicher
with Mabel Munyuki-Hungwe
and Prosper Matondi



ISBN 0-86924-141-9

Published by University of Zimbabwe Publications, P. O. Box MP 167,
Mt. Pleasant, Harare, Zimbabwe
First printed: 2006
Publishing consultant: Margo Bedingfield,
Cover and inside photographs supplied by Manfred Takaendesa, Centre for Rural Development

Printed by Sable Press Private Limited

Multiple use of livestock requires good nutrition

21

Animal health research and development

Alec Bishi, Pious V. Makaya and Andrew Chamisa

Zimbabwe's veterinary delivery system and research capability have been shaped by the need to prevent, control, manage and/or eradicate animal diseases.[202] Although major epidemics like rinderpest, contagious bovine pleuropneumonia and African east coast fever have been eradicated, there is still need to ensure that any reintroduction of these diseases is prevented. The Department of Veterinary Services has the mandate to provide animal health services and has had to put in place special control measures for some of the endemic diseases such as foot and mouth disease, contagious abortion, anthrax, beef measles and salmonellosis. These diseases affect both the export and domestic beef markets. For purposes of foot and mouth disease surveillance and control, the country is divided into foot and mouth disease control zones through a network of cattle and buffalo proof cordon fences. Epidemiological surveillance, monitoring and reporting of specified diseases and pests as of 2004 relied on a countrywide network of veterinary infrastructure that comprised the following: eight provincial and 53 district offices; 308 subdistrict animal management and health centres in the smallholder sector and six in commercial farming areas; one central veterinary laboratory; and three provincial diagnostic laboratories in Bulawayo, Mutare and Masvingo.

The Department of Veterinary Services is responsible for providing cattle dipping services in smallholder farming areas where there are over 2,660 dip tanks. Before the fast track resettlement programme, there were about 4,000 operational dip tanks in the commercial farming sector. The department, through the veterinary services public health branch, provides meat inspection services at export establishments. Meat inspection services at other slaughter facilities are provided by the Ministry of Health and Child Welfare and by local authorities. There are 32 private veterinary surgeries in Zimbabwe which are located mainly in the large urban centres. Their main role has been providing clinical

[202] The major diseases affecting livestock in Zimbabwe include foot and mouth disease, anthrax, contagious abortion, leucosis, tick-borne diseases, rabies, trypanosomiasis, newcastle disease, salmonellosis, collibacillosis, internal and external parasites, dermatophilosis, pink-eye and nutritional diseases.

services to pet owners but some also provide clinical and advisory services to commercial farmers. The pharmaceutical industry in Zimbabwe is well developed in comparison with most countries in sub-Saharan Africa. This chapter will examine the development of animal health services from the colonial period and how an effective disease control system contributed to the growth of the livestock industry in the country.

Animal health services during company rule: 1890–1922

Southern Rhodesia, as Zimbabwe was then known, was under British South Africa Company rule between 1890 and 1922. The foundation of the present veterinary services was laid during this period. The period 1890 to 1896 was characterized by a command-type of veterinary service (Lawrence, 1970; Ushewokunze-Obatolu and Peter, 2000). Prior to the appointment of the first government veterinary surgeon in 1896, 'native commissioners' dealt with matters relating to animals and animal health. One of the main successes of the native commissioners was the forced use of legislation to control diseases, especially contagious bovine pleuropneumonia between 1890 and 1896. Animal health regulations were made under the laws of the Cape Colony, particularly the Animal Disease Act of 1881.

In 1896 a rinderpest epidemic which swept across the country from Zambia (then Northern Rhodesia) prompted the company rule administration to appoint a veterinary surgeon, C. E. Gray, and a controller of cattle who could order isolation and destruction of infected cattle. The policy of destruction of cattle by force contributed to the outbreak of the first war of resistance by the indigenous people. The spread of the disease through uncontrolled cattle movements following the war resulted in over 95 per cent mortality of the national cattle herd estimated at 500,000 head prior to the outbreak (Sinclair, 1922).

In 1897 the slaughter-out policy was abandoned in preference for inoculation using the Turner-Kolle method developed in South Africa. Stringent control of livestock movement, destruction of sick animals and establishment of quarantine and inoculation stations at border posts supported this inoculation policy. The disease was eradicated within three years with the last case being recorded at Salisbury (now Harare) in September 1898 (Sinclair, 1922). The eradication of contagious bovine pleuropneumonia or lung sickness in 1904 was made easier partly by the reduced number of cattle that remained after the rinderpest epidemic and the legislative provisions which gave officials the power to destroy all infected animals and to inoculate all in-contact animals (Sinclair, 1922). The other outstanding achievement of this command-type of veterinary service was the eradication of rabies between 1902 and 1913.

In an effort to replace cattle destroyed by rinderpest, a restocking programme was implemented using animals imported mostly from East Africa and Aus-

tralia. In January 1902 the first case of African east coast fever, transmitted from animals imported from East Africa, was reported in Zimbabwe (Gray and Robertson, 1902). With rinderpest and lung sickness having been eradicated, African east coast fever together with tick-borne diseases such as gall sickness, red water and heart water remained the main challenges faced by cattle owners and veterinarians.

Research on animal diseases was dictated by the need to solve problems that at the time were of epidemic proportions, particularly among exotic breeds that the settlers were importing into the country. The British South Africa Company leased the Kimberley Rinderpest Experiment Station from the Cape government for three months to produce a stockpile of hyper-immune serum for rinderpest immunization after the Cape government had decided to discontinue production (Sinclair, 1922). In 1903 the company employed Professor Robert Koch and two assistants from Germany to develop a method of immunization against African east coast fever but the method failed (Gray, 1904). The administration then turned to tick control by dipping, using techniques developed in South Africa, in conjunction with the control of livestock movement. The British South Africa Company established dip tanks, fences and regulations that reduced the incidence of African east coast fever and other tick-borne diseases. This infrastructure also formed the basis on which control measures and disease surveillance for other cattle diseases could be developed.

In 1909 the British South Africa Company administration appointed the first government veterinary bacteriologist (L. E. W. Bevan) to carry out diagnostic and research work and provided him with a small laboratory at what has become the Agriculture Research Centre in Harare. Bevan's notable achievements towards the control of animal disease were the introduction of methods of immunization of cattle against anaplasmosis and babesiosis developed in South Africa and Australia, the development of novel vaccines for bovine brucellosis and African horse-sickness, and the development of a method of chemotherapy for bovine trypanosomiasis using antimonials.

A veterinary inoculation centre was established in Harare in 1918 at the site of the present central veterinary laboratory for the immunization of imported cattle against anaplasmosis and babesiosis. Immunization made it safe to introduce high quality breeding stock from overseas to 'improve' the productivity of local breeds. A larger and better-equipped veterinary research laboratory was then built in 1922 with financial assistance from the private sector.

The effective application of knowledge acquired in research, disease surveillance, mass dipping, vaccination, enforcement of regulatory provisions and other control measures were the driving forces in the rapid recovery of the cattle population in the country. The cattle herd, which was only 25,000 head in 1898, had increased to 371,000 head by 1910 and rose to 2.5 million head by 1931. Annual exports of cattle increased from just 12 head in 1914 to over

71,000 cattle and 5,000 sheep in 1928. The country was also able to import exotic breeds of cattle into the country in large numbers. For example, 13,867 head of cattle were imported from neighbouring countries in 1909 alone. This was due to the fact that the breeding programmes were still weak.

The rinderpest epidemic taught researchers that the presence of a host is a crucial factor in the distribution of the tsetse fly and that removal of hosts limited the vector's role in trypanosomiasis transmission. Animal hosts were eliminated within a 16 km band and it was reported that tsetse flies disappeared from the band. The success of the trial led to the adoption of the technique as a means of tsetse control. Later modifications included the use of game and cattle fences to separate cattle from wildlife. Concerns for the loss of wildlife were raised but elimination of game remained the method of choice up to the late 1950s. By 1945, over 25,000 square kms of previously fly-infested land had been reclaimed using game elimination.

Animal health services during the colonial period: 1923–1952

When Southern Rhodesia became a formal British colony in 1923, a director of veterinary research was appointed to complement and assist the director of veterinary services. The directors of veterinary research and services were responsible for all veterinary issues in the territory. In 1948 the two departments were amalgamated under a director of veterinary services with two assistant directors for field and research branches, respectively.

The most characteristic feature of this period was a boom in the beef cattle industry and a rapid growth in dairy, poultry and pig farming. In 1928 the first export consignment of chilled and frozen meat and other animal products from the Bulawayo abattoir left for the Congo (now Democratic Republic of Congo). The need to comply with veterinary sanitary requirements for export saw the birth of meat inspection services in the Department of Veterinary Services (Lawrence 1971; Chief Veterinary Surgeon, 1928). The increase in international demand for exports resulted in the need to construct more abattoirs that met international veterinary standards. By 1951, additional abattoirs with meat inspection services were functional in Mutare, Harare, West Nicholson and Masvingo. This enabled more cattle owners to access export markets.

Against the background of growing export markets, the first foot and mouth disease outbreak since the nineteenth century occurred at Nuanesti Ranch in Mwenezi in 1931. The outbreak increased the workload of a relatively small department and reduced the numbers of cattle for slaughter as a result of veterinary restrictions. The disease was brought under control but was never eradicated because the reservoir of infection (buffalo) remained in game areas.

In 1936 theileriosis was discovered and differentiated from African east coast fever as a distinct form of tick-borne disease. Lumpy skin disease was

reported for the first time in 1944 in Salisbury district. Rabies resurfaced in 1950 as it spread northwards from the Transvaal in South Africa. Newcastle disease, which was suspected to have originated from Zambia through the railway system, was diagnosed in Bulawayo in 1952. Rift valley fever and wesselsbron virus were also diagnosed in the same year. Improved laboratory diagnostic capacity resulted in the diagnosis of fowl cholera, psittacosis and the isolation of *Pasteurella multocida* in sheep.

The main achievements in animal production and health during the colonial period included a highly successful beef industry and the growth of other livestock sectors. This opened up opportunities for Zimbabwean beef and other animal products to access international markets. The capacity to control important diseases such as foot and mouth disease enabled Zimbabwe to compete in the international market. Although foot and mouth disease remained endemic, the stringent control measures put in place assured trading partners and local consumers of foot and mouth disease free cattle and other animal products. In general, the smallholder sector marginally benefited from animal disease control as their livestock survival rates increased. However, they did not benefit from the exports, unlike the large-scale commercial farmers.

Animal health services during the federal period: 1953–1963

During the Federation of Rhodesia and Nyasaland from 1953 to 1963, some veterinary services were under the responsibility of the federal government, while others remained territorial. During this period, agriculture became a federal responsibility while some services under it generally operated as national units. The veterinary services remained essentially territorial (Lawrence, 1971) and were mainly concerned with regulatory measures affecting imports and exports in the three federal territories.

The increased demand for diagnostic and research services resulted in the expansion of the central veterinary laboratory and the appointment of additional professional staff. The Animal Health Act was promulgated in 1961 to consolidate the legal framework and give the department sweeping powers to control animal diseases. In the same year, the first senior meat hygiene officer was appointed. This was followed by a series of overseas training programmes for meat inspectors. The federal system also encouraged collaboration between the three countries and resulted in the need to jointly control transboundary diseases. To this end, the Federal Agricultural Research Council which funded research in tick-borne diseases, tsetse fly and trypanosomiasis and infertility in cattle was formed in 1961.

By 1955 public opposition to game elimination had reached such unprecedented levels that the governor general of the federation set up a commission of inquiry to investigate all issues pertaining to human and animal trypano-

somiasis. The commission recommended the investigation of other methods of tsetse control while at the same time allowing some form of modified game control. Other methods of tsetse control – which included discriminative bush clearing, intensified hunting in some areas, the construction of game cordon fences and use of insecticides – were adopted. A total of 1,261kms of game fence and 1,091kms of cattle fence were erected. The need to carry out rapid control of human trypanosomiasis around Kariba dam (during its construction) in order to protect workers on the site led to the use of aeroplanes to spray insecticides in the early 1950s.

A number of chemoprophylactic programmes were developed following the discontinuation of the use of sodium antimony introduced by Bevan in 1907. Initial tsetse fly control trials using benzene hexachloride were carried out in the Kariba area but success was limited. Dimidium bromide was used until the 1950s when it was discontinued due to adverse side effects and the prophylactic use of methyl sulphate mixed with a chloride was adopted. This drug was in use until drug resistance was recorded in 1962 and was replaced by new drugs that included somarin as a prophylactic drug and berenil as an ultra short-acting curative drug (Boyt, 1979).

The joint collaborative approach by the federal member countries and regional states in veterinary research and development was instrumental in enhancing regional animal production and health. The construction of cordon fences and aerial spraying of insecticides freed vast tracks of land from tsetse fly infestation resulting in the availability of more farming land for livestock production and human settlement. The combined efforts to put regional disease control systems in place to control trans-boundary diseases such as contagious bovine pleuropneumonia, foot and mouth disease and trypanosomiasis minimized the incidence of these diseases in Zimbabwe.

Animal health services during the UDI period: 1965–1979

Between 1967 and 1975 there was a rapid increase in the cattle population associated with the diversification away from tobacco production following change of policy after the Unilateral Declaration of Independence (UDI) (Lawrence and Norval, 1979). The growth of the cattle industry necessitated the expansion of the veterinary services. In 1966 the Royal Society of Health of the United Kingdom approved Zimbabwe conducting its local examinations for meat inspectors. This resulted in the establishment of in-service training facilities at the Bulawayo abattoir. In 1967, Germany and France certified and registered the Bulawayo abattoir. Additional abattoirs were opened and registered in Kadoma and Chinhoyi. Similarly, the veterinary services public health branch was established in the early 1970s.

The spirit of self-reliance and innovativeness among researchers resulted

in some great strides in veterinary research, especially in the fields of diagnostics, artificial insemination, serological surveys, tick ecology and taxonomy, poultry diseases, carrier state studies, viral diseases, tick-borne diseases and wildlife diseases. A strong focus on viral diseases such as foot and mouth disease, infectious bovine rhinotracheitis, rift valley fever and wesselbrons resulted in the establishment in 1970 of a virology unit at the central veterinary laboratory. Research into wildlife diseases also intensified. This was matched by phenomenal expansion of diagnostic infrastructure and diagnostic capacity in serology, biochemistry, toxicology, bacteriology and pathology.

Prior to 1968, dieldrin was the insecticide of choice in the control of tsetse fly. It was, however, replaced in 1969 with the cheaper dichloro diphenyl trichloroethane (DDT). In the southeast, tsetse flies were driven out of Zimbabwe and about 90kms south of the Save river in Mozambique. This success was a result of joint operations conducted by the veterinary and tsetse control services of Mozambique, South Africa and Zimbabwe that was first implemented in 1962. By 1975 approximately 50,000 square kms of infested area were reclaimed within Zimbabwe. Support for regional tsetse eradicators was obtained from European countries that had a certification system developed for animal disease control.

The escalation of the armed struggle for independence in the 1970s disrupted the dipping programme resulting in an unprecedented increase in morbidity and mortality from tick-borne diseases. Mortality from tick-borne diseases accounted for an estimated one million cattle deaths in communal areas. This massive toll was attributed to the effectiveness of the previous dipping programme which had achieved the virtual eradication of disease vectors and so interrupted natural transmission and the maintenance of a stable enzootic situation (Lawrence *et al.,* 1980; Norval, 1983). Another casualty of the war was the cessation of tsetse fly and trypanosomiasis control which also resulted in tsetse fly reinvading ground that had been cleared. Foot and mouth disease and rabies spread unchecked in most communal areas until after independence. The most serious outbreak of anthrax in the world – in cattle and humans – occurred in 1979, accounting for over 5,000 cattle deaths and 10,000 human cases. This was a time when many lessons could be drawn on the merits and demerits of classical, command-type veterinary services that had been set up since 1890.

Inadequate research funding was generally a long-standing constraint. Although the government and a few producer organizations provided support, funds remained generally inadequate. The Federal Agricultural Research Council which collapsed with the inception of UDI, was re-established as a national body in 1970 but veterinary research did not benefit from the funds because of a bias towards financing crop research.

Animal health services during the post-independence period

Immediately after independence there was a period of reconstruction and re-establishment of disease control programmes that had been disrupted by the war. The focus of the new government was to develop the smallholder sector which had been neglected in the past with the aim of poverty alleviation and general socio-economic development focusing on this sector. At independence, the government undertook an ambitious programme to bring veterinary services to over two million households in communal areas. To meet the increased demand more structures had to be established. The Veterinary Training Institute was established and 320 animal management and health centres were set up in communal and resettlement areas and veterinary livestock technicians were recruited and trained to work with the smallholder farming sector. The inauguration of the Faculty of Veterinary Science at the University of Zimbabwe in 1982 enabled the country to train veterinarians for local and regional needs. Support for the new research and development came from the European Union, British Overseas Development Administration and the Danish International Development Assistance programme and others. International donors have funded over 70 per cent of the research programmes which have been successfully carried out at the central veterinary laboratory.

One of the major achievements of the public veterinary services since independence has been the control of foot and mouth disease and the resumption of trade in animal products following the lifting of trade sanctions. With irrefutable evidence that buffalo were the reservoir of infection, it was decided to eliminate them from farming areas and to construct a network of cattle and game cordon fences in areas populated by buffalo. Vaccination buffer zones, intensive surveillance zones and foot and mouth disease free zones were established beginning in 1985. Some of the outstanding achievements included development and expansion of laboratory infrastructure, establishment of better diagnostic tests and research tools, implementation of laboratory quality management and assurance systems, control of ticks and tick-borne diseases, the shift from intensive dipping to the integrated tick-borne disease control approach, and the introduction of herd health research programmes in the smallholder sector.

In 1987, the central veterinary laboratory became one of the Southern African Development Community's reference laboratories and a World Health Organization collaborative centre for zoonoses. This led to development of improved techniques for the diagnosis of various diseases. An increasing number of farmers adopted the new integrated tick-borne disease control approach involving a combination of reduced dipping and enhancing lifelong immunity. Adoption of findings from research on herd health has also equipped smallholder farmers in communal lands with skills for sound animal health and man-

agement and has enabled them to participate in the diagnostic process using decentralized pen-side diagnostic kits.

In the 1980s, trypanosomiasis research was focused on perfecting the knowledge on visual and olfactory responses of tsetse flies. This research found that tsetse flies were attracted to pthalogen blue but preferred to land on dark places (black). The two colours were adopted for traps and targets. The shapes of traps and targets were modified to optimize effectiveness for various species and to reduce costs. Studies carried out with pyrethroid dips showed that these were effective in tsetse and trypanosomiasis control, especially when they were used in combination with other control methods. Insecticide-treated traps and insecticide-treated cattle are the methods in current use in tsetse control. Between 1986 and 1998, an area covering 20,400 square kms in the northeastern and northern districts of Zimbabwe was cleared of tsetse fly with the assistance of the Regional Tsetse and Trypanosomiasis Control Programme. The focus has been to protect the northeast and east of the country from tsetse fly reinvasion from Mozambique by a 350km target barrier extending from Matisi river in Nyanga North communal lands to Musengezi river in the west. The barrier is supported by the application of deltamethrin dip on cattle.

These achievements have been realized even though the Department of Veterinary Services budget declined by 34 per cent in real terms from 1990 to 1999. Secondly, the human resource base had been severely eroded as government reduced expenditures, although donor-funded programmes were helpful from 1980 to 1990. New strategies to finance major veterinary activities need to be put in place in order to maintain the gains.

Current focus on animal health services

For sustainability purposes, the veterinary research mandate needs to be carried out within the dictates of national agricultural policy. Currently, no policy blueprint exists for veterinary services. The Department of Veterinary Services has recognized that donor projects do not always reflect national priorities. Consequently, the Department of Veterinary Services has adopted a policy of inviting stakeholders to participate in the identification, prioritization and implementation of research activities. Through a stakeholder consultative process, Department of Veterinary Services has garnered new sources of funding mainly through cost recovery, commercialization and privatization of some of its activities. The department has also restructured and streamlined its service delivery to concentrate on core business and shed non-core activities to other players. Furthermore, the department is considering the introduction of community animal health workers to reduce costs. Cost recovery is being implemented in meat inspection services, tick-borne disease control, laboratory services, and in certification and provision of permits. The sale of drugs and vaccines

has been commercialized as well as wildlife clinical services. Subcontracting non-core activities to the private sector is being implemented on a trial basis in tsetse control and in construction and maintenance of cattle and game cordon fences. Privatization is being considered in the delivery of clinical services.

Future developments and conclusion

Zimbabwe remains free of or has at least kept under control most of the World Organization for Animal Health list A diseases which are significant in international trade and can spread across international boundaries. Whilst a foot and mouth disease free zone that was recognized by the European Union had been achieved in late 1999, the fast track resettlement programme reversed this. The occupation of land within the Gonarezhou national park made it very difficult to maintain the foot and mouth disease free zone and this had culminated in the ban of exports to the European Union during the land reform period. In addition, lack of funding by the donor community has contributed to the spread of foot and mouth disease and compromised effective surveillance of other diseases. However, the completion of the land reform programme and the efforts being taken by the government to ensure an effective agrarian reform, where resuscitating the livestock sector is a priority, provides hope for the future of animal health services. The indications are that the current Department of Veterinary Services rationalization process will help to bring about a sustainable animal health research and delivery system whose future success hinges on stakeholder support and responsiveness to client needs. The land and agrarian reform has increased demand for services because of widespread animal movement. This will require sustained adaptive research and reliance on innovative strategies. Strategic planning will be required to meet the challenges ahead. Much has been achieved in research and development over the last 100 years and much more will need to be done to maintain and improve the status of animal health.

The preoccupation of veterinary research and development over the past 100 years has been on diseases of epidemic proportions that induced a sense of urgency. Many of these diseases have been successfully controlled. Production-related problems are now taking centre stage as the focus of the modern farmer is to maximize productivity for better returns on investment. Complex disease problems, such as mastitis, pneumonia, internal parasitism, nutritional disorders, infertility and gastro-intestinal disorders, will inevitably attract greater attention in future years.

References

Assistant Director of Veterinary Services (Research), *Annual reports*, Department of Veterinary Services, Harare, 1949–2000.

Boyt, W. P., 'Trypanosomiasis in Zimbabwe Rhodesia', in *Rhodesia Veterinary Journal*, 10:54–63, 1979.

Department of Agriculture, *Annual reports*, Salisbury, 1902–1922.

Department of Veterinary Services, reports, Harare, 1923–2000.
– *Handbook for tsetse field staff*, Harare, 1997.

Gray, C. E., 'Inoculation of African coast fever', in *Rhodesia Agricultural Journal*, 2: (1) 8–9, 1904.

Gray, M. A. and W. Robertson, *Report upon texas or red water fever in Rhodesia*, Argus Printing and Publishing, Cape Town, 1902.

Lawrence, D. A., 'The history of veterinary services in Rhodesia: Earliest veterinary developments 1890–1899', in *Rhodesia Veterinary Journal*, 1:29–30, 1970.
– 'The history of veterinary services in Rhodesia: period 1922–1948', in *Rhodesia Veterinary Journal*, 1:71–74, 1971.

Lawrence, J. A. and R. A. I. Norval, 'A history of ticks and tick-borne diseases in Rhodesia', in *Rhodesia Veterinary Journal*, 10:28–40, 1979.

Lawrence, J. A., C. M. M. Foggin and R. A. I. Norval, 'The effects of war on the control of diseases of livestock in Rhodesia (Zimbabwe)', *Veterinary Record*, 107:82–85, 1980.

Norval, R. A., 'Arguments against intensive dipping', in *Rhodesia Veterinary Journal*, 14:19–25, 1983.

Sinclair, J. M., 'A short history of the infectious diseases among the domestic animals of Southern Rhodesia since the occupation', in *Rhodesia Agricultural Journal*, 18:10–20, 1922.

Ushewokunze-Obatolu, U. and T. A. Peter, 'Century of veterinary research in Zimbabwe', in *Zimbabwe Science News*, 34:3–12, 2000.