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ASSISTANCE IN THE PRODUCTION OF
VETERINARY DRUGS IN
SADCC COUNTRIES

DP/RAF/86/012

MALAWI

Technical report: The supply of veterinary drugs and vaccines in Malawi*

Prepared for the Government of the Republic of Malawi
by the United Nations Industrial Development Organization,
acting as executing agency for the United Nations Development Programme

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INTRODUCTION

Malawi is a land-locked country of 118,484sq.Km of which 28,000sq.Km are taken up by lakes Malawi, Chilwa, Malombe etc.

It lies entirely in the tropics south of the equator and is bordered by Zambia to the north-west, Tanzania, north and north-east and Mozambique to the east and south-west.

The human population is estimated at about 7 million (last census 1977 growing at an estimated 2.9% p.a.). Should this growth rate be maintained this would give a population of about 10.6million by the year 2000.

Agriculture is widely developed and practiced in Malawi, over 85% of the population being engaged in some aspect of it, however only about 10% own cattle. About 95% of cattle and an even higher percentage of goats and sheep are owned by smallholder farmers, most of whom also own chickens.

In spite of this, the livestock industry is estimated to contribute only a low per cent of G.N.P.

The cattle population is concentrated in the Central Region (48%) with 27% in the North and 25% in the South. Large scale ranching is insignificant and is limited to one or two private organisations and government schemes. Commercial dairying is not yet significant.

1. LIVESTOCK POPULATION AND PRODUCTION TRENDS

The number of livestock in the country between 1974 and 1984 are shown in Annex 1 and the rate of recent and projected increases in Annex 2.

There has been a steady growth in the number of cattle in the traditional sector between 1974 - 1984 (Annex 1) at an average annual rate of 4.9% (Annex 2) During the same period of time there was an actual decrease of 1.7% p.a. in the commercial sector. Thus by 1984 96.8% of all cattle were kept in the traditional sector. The decrease in the commercial sector came about despite government policies, undertaken in 1971, to expand government livestock farms to produce high grade stock for sale to farmers for breeding and fattening purposes. These farms, however, have not been able to fulfill demands and only 40% of the demands for dairy cattle and 20% of that for beef steers have been met till the present time. Because of that and other reasons, there are only 7500 dairy cattle in the country and very few ranches. The latter is also affected by shortage of grazing land and the low price of beef.

The prospects for growth even in the traditional sector, is coming under increasing pressures. There are many reasons for this. One of the most important reasons is that natural grazing land is being taken over for cultivation. This equally effects the commercial sector where in recent years cattle has been given up for growing cash crops such as tobacco.

As land pressure continues to grow the emphasis in livestock production is changing from expanding numbers to increasing productivity of existing population.

The other major impediment of livestock production is adequate disease control, resulting in high calf mortality (25-30%) and high overall mortality (7%) in the national herd.

It is estimated that the annual growth rate is not likely to exceed 3% p.a. until 1990, slowing down to perhaps 2% p.a. during the last decade of this century. This would result in a total cattle population of 1.12 million by 1990 and 1.34 million head by year 2000.

Sheep, goats and pigs are kept mainly for meat supply in rural areas. These animals are kept under rudimentary management and virtually without veterinary care. There has not been much interest in increasing the number of goats in the country, thus the recent increases in their number (2%) is likely to prevail for the next 10-15 years. This would lead to a population of 0.83 million by 1990 increasing to 0.89 million by the end of the century.

There has been greater interest in the production of more and better quality mutton to eventually replace imports from New Zealand. To encourage this development price control of mutton was removed. Establishment of commercial farms and involvement of many more farmers, keeping improved flocks are planned. Yet the forecast of yearly increases is a modest 2% p.a. resulting in well under 0.2 million sheep in the country by 2000.

A large majority of the 180,000 pigs in the country are of local breed and kept under very poor conditions. Productivity is very low and the highly fatal African Swine Fever which is endemic in the country, prevents establishment of more commercial units. Control and eradication of this disease is beyond the present means of the country. Thus it is envisaged that the yearly increases will be similar (1%) to that of the past 10 years or so, leading to a little over 0.2 million pigs by the end of this century.

The poultry sector can be divided into traditional and commercial sectors. In the traditional sector poultry keeping is almost universal and management is rudimentary. Over 90% of poultry is in the traditional sector where the yearly increase has been 2%. To improve the output of this sector government schemes have been introduced aiming to provide improved breeding stock (Black Australorp chicken from Mikoloagwe) and make more and better quality feed available. The aim is to increase the number of birds between 5-7% p.a. from about 9.0 million to 12.0 million by 1990 and to ca. 20.0 million by the end of the century.

The commercial sector is mainly in the hands of the large scale producers. However, due to recent government policies, increasing quantities of poultry meat and eggs are derived from the expanding number of small holders. The fortunes of the commercial sector in particular has undergone some unfortunate changes in recent years, mostly due to a lack of balanced compounded feed at competitive prices. The ever present Newcastle disease all over the country is also a severe impediment of growth both in the traditional as well as commercial sector. The lack of transport and poultry distribution centers are additional constraints to overcome. The record of the commercial sector during the last 10 years is very disappointing and it is only now that the number of layers and broilers are approaching those of 1974.

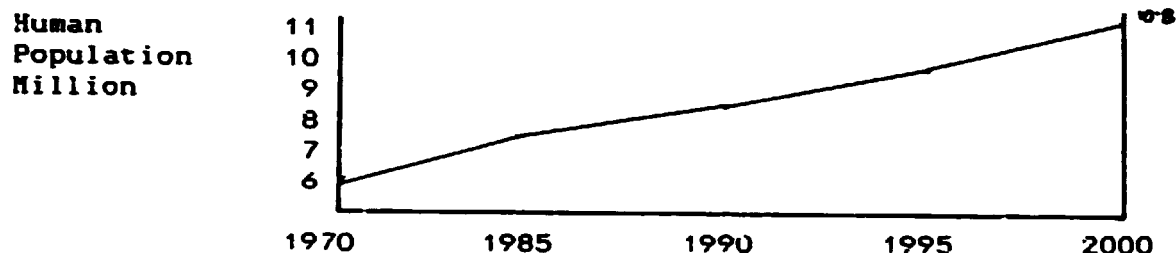
Therefore government policy of increasing the number of 0.1 million layers to 0.5 million by 1990 and to 1.0 million by year 2000 seems over ambitious. Similarly the number of broilers from 0.7 million should increase to 1.3 million and 2.5 million by 1990 and 2000 respectively. To achieve this, not only the output of hatcheries need to be doubled but very large numbers of day-old chicks have to be imported. A pre-requisite of all this is that both the quality and quantity of stock feed will improve and be available at a competitive price and that Newcastle disease is brought under control.

Fish. Malawi is unique in Southern Africa in having 70% of the human animal protein requirement met by fish (from the Lakes).

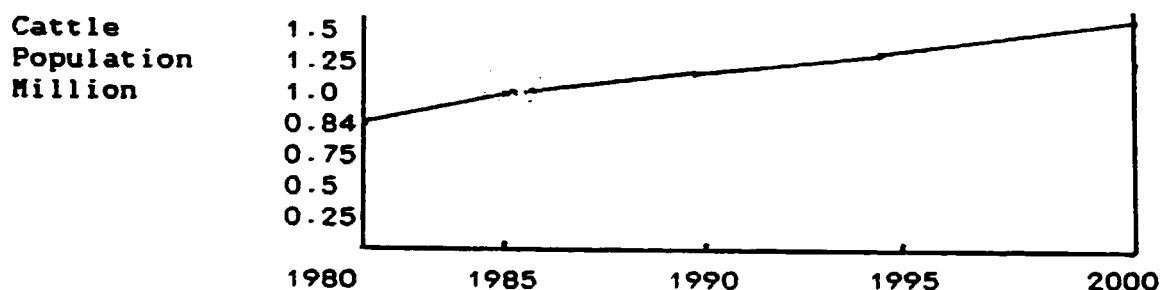
In 1950 the per capitum human consumption of animal protein was estimated at about 15.5Kg, broken down approximately as:

Beef	11%
Goat and Sheep	5%
Pig	2%
Poultry meat)	12%
eggs)	
Fish	70%

Projected Human Population Growth Rate in Malawi



Projected Cattle Population Growth Rate in Malawi



Assumptions:

Growth rate 1980-85	3%
1985-90	2.5%
1990-95	2.0%
1995-2000	1.5%

Estimated human/cattle ratios

1980	1:7.1
2000	1:8.5

2. NATIONAL DISEASE CONTROL STRATEGIES

Animal diseases of economic ranking.

2.1 Trypanosomiasis, a scheduled disease.

In the late 1970's trypanosomiasis was reduced to a low localised incidence through the control of the tsetse fly and by the use of trypanocides. Since then the tsetse-infested areas have increased particularly in the North of the country and it is now believed that 25% of the cattle population is at risk. In one particular region (Kasungu) the cattle population has diminished during the last few years from 40,000 to 16,000 mostly, it is believed, as a result of trypanosomiasis deaths.

A trypanosomiasis survey is now in progress with the intention to include Malawi in the EEC scheme to control tsetse and trypanosomiasis together with Zimbabwe, Zambia and Mozambique, by the use of attractants, fly traps and strategic use of trypanocides.

2.2 Tick-borne diseases

The control of tick-borne diseases is the object of a national campaign based on tick control and carried out by the Department of Animal Health and Industry. Although East Coast Fever is the major killing disease, the effects of anaplasmosis, pyroplasmosis and heartwater must not be minimised both in terms of mortality and loss of productivity.

East Coast Fever is estimated to be responsible for at least 15% of cattle deaths in Malawi, occurring in Northern and Central Regions.

Together, tick-borne diseases represent a major impediment to livestock development in Malawi.

Although there is good coverage of dip tanks (304) and spray races (45) the success of the policy to control tick-borne disease is severely hampered by:

1. Overwhelming shortage of acaricide.
2. Transportation difficulties.
3. Effects of rainy season on communication, access of animals to dips and persistence of acaricide on dipped animals.
4. Lack of water in dry season.

As a consequence, the incidence of all tick-borne diseases is increasing, particularly E.C.F.

Although regular dipping is the mainstay of the policy to control tick-borne disease, important advances are being made in the immunological approach (at the FAO., ECF Bridging Operation Project, CV) and could make a significant contribution to the control of E.C.F. in the future.

2.3 Fascioliasis and Gastro-intestinal Parasites

Over 75% of bovine livers are condemned as a result of fascioliasis (*F.gigantica*).

Little control is practiced in the traditional herd of either this or other internal parasites, which must constitute a major restriction to livestock productivity in Malawi.

Limited treatment is carried out in the commercial sector.

2.4 Viral and bacterial diseases

In order to economic ranking:

Foot and Mouth Disease (FMD) is one of the major threats to cattle in the country and it is endemic in certain border areas causing significant losses. The aim of the control strategy of this disease is to prevent its introduction and, if the disease is introduced, to contain the outbreak and prevent its spread to the highly susceptible cattle population. This is to be attained by the use of a strategic vaccination policy aimed at creating a buffer population of vaccinated cattle in those areas and time of the year when the risk of the disease being introduced is at its highest. Two buffer zones have been created, one in the Karonga district on the Sangwa plains in the North along the Malawi-Tanzania border where some 40,000 cattle are at risk. In this region the outbreaks come in 3-4 year cycles, the last outbreak was in 1983. The other buffer zone is in the Lower Shire Valley along the Southern border with Mozambique. Here some 85,000 cattle are at risk and the last outbreak was in 1985. Cattle (but not the other susceptible species) in these two areas are supposed to be vaccinated twice annually. A multi-valent vaccine is used, the serotype being determined by the type of virus isolated from outbreaks in neighbouring countries. (Annex 5)

A further more limited campaign is conducted at the end of the dry season, when calves in these areas are vaccinated to sensitize them for next years inoculation. The vaccination measures are reinforced by a system of movement controls, limiting movement of animals into, within and out of the vaccination zones. The importation of livestock from Tanzania and Mozambique is prohibited unless a certificate is obtained from the Chief Veterinary Office, which would be granted only in exceptional circumstances. Whilst the control measures outlined are wholly adequate its execution at times leaves much to be desired. The reason for this is the lack of funds for vaccine purchases leading to the use of a single injection per year or no vaccination at all.

Blackquarteris another notifiable disease, occurring sporadically all over the country, although not with the same frequency. It is commonest in the Central and Northern regions. Outbreaks follow a seasonal pattern mainly from August to October, late in the dry season. When an outbreak occurs ring vaccination is recommended. This, however, cannot be always observed due to a lack of funds for the vaccine. Annual use varies between 20,000 - 30,000 doses, which covers ring vaccination and up-take by parastatal cattle (8000 doses p.a.).

Present usage is not regarded adequate and is thought that 200,000 doses would be more appropriate. Opinions, however, differ since the reported annual death is around 100 animals. Judging by the 1985 demands (over 200,000 doses) present usage is very inadequate and prophylactic use of vaccine should take priority augmented with ring vaccination.

African Swine Fever is regarded as having been responsible for the poor development of the pig industry. It is endemic in the Central region, where one outbreak was reported in 1984 and two in 1985. There is a slaughter policy in force. However, this can only be enforced on the few commercial piggeries since the vast majority of the 180,000 swine in the country are kept "free range" (scavengers). Although there is a great desire in the country to develop the pig industry A.S.F. is a major obstacle, since a vaccine is not available for immuno prophylaxis.

Newcastle Disease is considered to be by far the most important viral disease in the poultry industry both in the commercial as well as the traditional sector. The disease is endemic throughout the country. It has been estimated that ca. \$25 million worth of poultry meat and eggs are lost per year due to this disease. Control policy, which is never implemented satisfactorily due to lack of funds for vaccines, is ring vaccination in case of an outbreak and routine vaccination on government poultry centres and commercial farms. The average yearly use is between ca. 1.5 - 2.0 million doses which is one half to one third of the yearly requirements.

This policy has not proved adequate and if the very ambitious policies of the government are to succeed vaccination must be extended very substantially. Thus all day-old chicks from the hatcheries and those imported must be vaccinated during the first few days of life. Those going for broilers need to be vaccinated once more and layer and stock birds 3 times on an average p.a.

Lumpy Skin Disease of cattle has been on the increase in recent years, and judging by the demand for the vaccine, is seen as of great importance. In the indigenous breed of cattle damage is mainly confined to the hides, but in exotic breeds it can be a fatal disease. For the last few years, strategic vaccination in the affected areas are advocated. However, due to lack of funds this has only been carried out on government livestock centres and on some commercial farms, none in the traditional cattle, where ca. 250,000 animals are at risk. To stem the spread of the disease these animals should also receive prophylactic vaccination.

Rinderpest has never been recorded in Malawi. However, there is a constant threat in the Northern region where a buffer zone in the Karonga and Rumpi districts is maintained by vaccination. In 1985, near 100% of animals at risk, ca. 110,000, were vaccinated. In subsequent years only replacement stock receive the vaccine.

This usage does not meet the demands of the Pan-African Campaign which requires vaccination of all cattle at risk twice in consecutive years within a period of four years. This is to be followed by calf vaccination in the ensuing three years. Calf vaccination may be extended for longer if circumstances justify it.

Rabies is endemic in nearly all parts of the country. In 1985 some 150 cases were confirmed by the Central Veterinary Laboratories. It is not an economically significant disease but is zoonotic. To control the disease, dogs are supposed to be vaccinated once per year, combined with a destruction campaign of stray dogs. However, due to lack of funds policy cannot be enforced. (Current cost of 70,000 doses of the vaccine is over \$42,000). It is estimated that ca. one quarter of the dogs are vaccinated. To affect near complete coverage ca. 200,000 doses p.a. are required.

Bovine tuberculosis is a most important zoonotic diseases occurring nationwide but predominantly in some areas of the North and Central regions. Between 1980-1984 about 2% of the carcasses were condemned, due to TB, at the Kasungu market. A slaughter policy of positive reactors is recognised as being the only effective means of eradication. However, due to a lack of tuberculin only 5000 doses were used in 1985 on government farms where about 30% of the animals were positive reactors. Plans are underway for a project that would have the "test and slaughter" method of control be conducted on a much wider scale.

Marek's disease is regarded as the second most important disease of poultry. The importance of vaccinating the day-old chick is appreciated but, due to lack of funds for vaccine, only government and commercial farms use the vaccine routinely.

Application of the vaccine in the traditional sector present difficulties which do not apply to the vaccination of day old chicks in the hatcheries or to imported young birds prior to distribution. It is strongly suggested that vaccination of these is carried out as well as ring vaccination is introduced to prevent the spread of the disease following on outbreaks.

Fowl Pox at least seven outbreaks of the disease were confirmed in various parts of the country during 1985. It is thought that these only represent the major rather than all outbreaks. The importance of this disease may also be assessed by the demand for this vaccine in 1985 which, at over 900,000 doses, was not quite twice as much as for Marek's vaccine. No control policy is in force at the present time. However, inoculation of all those birds which became layers or stock birds should be carried out once at 10 weeks of age.

Fowl Typhoid and Fowl Cholera, only a few cases of these diseases are reported per annum but neither of them are regarded as sufficiently important to warrant introduction of vaccination. An apparent lack of demand for the vaccines seem to support this policy.

Bovine Brucellosis A few positive cases have been recorded on both government and commercial farms. Vaccination by S19 or 45/20 are practiced on such farms. S19 for calves between 4-8 months of age and 45/20 in older females. This policy should be gradually extended to cover the whole of the national herd.

Anthrax No case has been recorded in Malawi. However, an outbreak that occurred in Tanzania near the border with Malawi is a threat that will necessitate vaccination of cattle in Karunga District where 98,000 animals are at risk.

Haemorrhagic septicaemia In recent years sporadic cases of death of cattle have been attributed to Pasteurella multocida infection. At the present time no vaccination policy is in force against this disease. Before any changes may be recommended it is essential to verify that the disease does occur before a vaccination policy may be

considered. Should the disease be confirmed, a policy of ring vaccination would be a reasonable option.

2.5 Nutritional Diseases

Specific deficiencies are not recognised but gross nutritional deficiency is widespread, especially in the dry season.

3. ORGANISATION OF VETERINARY SERVICES

3.1 Animal Health control is exercised by the Department of Animal Health and Industry (DOAHI).

DOAHI is responsible for the control of all scheduled diseases and for the drug importations associated with them.

3.1.1 Control of Animal production and Health is effected through the departments of Animal Husbandry and Industry, Veterinary Investigation Services (and Research) Field Services, and Administration.

3.1.2 Specific disease control campaigns. These have been referred to in the diseases sections, but can be summarised:

- 3.1.2.1 Tick-borne diseases
- Foot and Mouth Diseases
- Rinderpest
- Rabies
- Trypanosomiasis
- Newcastle Disease

By far the most important disease control campaign in terms of cost, resources and administration is the ectoparasite control and ancillary measures (e.g. movement control) to combat tick-borne disease.

A potentially interesting adjunct to this strategy is the immunological approach to the control of tick-borne disease carried out at the C.V.L.

4. VETERINARY DRUG AND VACCINE MARKET (1985/86) AND ESTIMATED FUTURE REQUIREMENT (1990-2000)

4.1 The Malawi Veterinary Pharmaceutical market in 1985-86 is valued at \$250,000, broken down in the main product groups as follows:

Ectoparasiticides	31%
Trypanocides	19%
Anthelmintics	12%
Antibiotics	11%
Sulphonamides	4%
Coccidiostats	5%
Feed additives etc.	18%
Plus biologicals	

Total US \$250,000

4.2 Importation, production and marketing of veterinary drugs in Malawi

4.2.1 There is not yet registration of Veterinary Drugs and vaccines in Malawi although Legislation is being introduced with the intention of adopting the B Vet C or Eur Ph. Standards.

4.2.2 Import Licences. These are controlled by the DOAHI, but licenses are given for established Veterinary Medicines.

4.2.3 Importation and Foreign Exchange Control. The great majority of Orders for Veterinary Drugs and Vaccines emanate from DOAHI and are placed either direct (e.g. on B.V.I. or N.V.I., Maputo), via Malawi Pharmacies or Piper Pest Control.

Foreign Exchange is a major constraint and limits the importation of all veterinary medicines to levels far below the actual requirements.

4.3 Estimated Requirements for Drugs

It can be seen from Table 1 that future requirement for veterinary drugs is on average many times the current importation, limited by foreign exchange.

For example the cattle-dipping campaign for the control of ectoparasites on which the whole animal health strategy is based, could profitably utilise three times the current quantities of acaricide. Furthermore, there is an urgent need to substitute the use of organophosphorous and other acaricides for arsenic and toxaphene for reasons of safety and efficacy. This would have the effect of increasing the cost per animal treated but would be more than justified by reduction of tick incidence and better control of tick-borne disease.

4.4 Current Use and Estimated Optimal Requirement for Vaccines

The year to year demand forecasts for veterinary vaccines in Malawi originate from three different quarters.

- (i) District Veterinary Officers in each of the 8 Agricultural Development Districts (ADD) collect vaccine requirements for their particular district which in turn are submitted for approval to one of three government Controller Stores. Once approved, the order goes to Malawi Pharmacies Ltd (who represent some 40 foreign companies) who is responsible for importation. Imported vaccines are sent to Controller Stores who send them out to the 8 ADD for distribution to end users.
- (ii) In addition the Veterinary Department of the Ministry of Agriculture and National Resources also places orders directly with manufacturers by tender.
- (iii) Demand for vaccines are also collected by the representatives by Malawi Pharmacies Ltd either directly from the livestock owner or from the veterinary assistant. These also require approval by Controller Stores before the order may be placed.

Due to severe limitations of availability of foreign exchange less vaccines than demanded are ordered each year. This is borne out by the comparison of demands submitted for 1985 and actual quantities received (Annex 3). The shortages were the greatest with Lumpy Skin (11%), Braxy/Blackleg (12%), Fowl Pox (34%), Rabies (36%), Bruceila S19 and 45/20 (43%), Marek's (83%), Rinderpest (87%) and Newcastle (89%) vaccines. Indeed the only vaccine where the demand appears to have been met is that for FMDV. However, the 190,000 doses of the vaccine received is only sufficient for once a year vaccination of cattle in the buffer zones instead of the much safer practice of twice yearly vaccination.

Comparing the quantities of these vaccines made available in earlier years (1982-84 Annex 3) it will be seen that the total number of dosage imported has not changed much although supply of some might have increased (Marek's, Lumpy Skin, Fowl Pox, FMD) whilst that of the rest decreased. In 1985 ca. US \$226,000 worth of vaccines were used for the 949,000 head of cattle (82% of total expenditure for vaccines) representing an average of \$0.23 per head per annum. A relatively high proportion of expenditure was

spent on rabies vaccination (12.5%) even though only one third of the demand was met. The remaining ca. 5% of expenditure was spent on poultry vaccines and virtually none on immuno-prophylaxis for sheep, goats or swine.

It is recognised that investment in justifiable veterinary care of livestock ensures the quickest return.

This was very much borne in mind when preparing estimated future requirements of priority veterinary vaccines until the end of this century. For that purpose it was assumed that vaccines were available and projected requirements were based on correct vaccination policies and on the number of livestock at risk. These estimations, however, can only be as good as the number of livestock perceived to be at risk.

The estimated national requirements for priority vaccines are shown in App. 4 together with the 1985 demands for comparisons.

Anthrax Vaccine Although the disease has not been recorded in this country the outbreak on the Tanzanian side of the border makes it desirable that cattle in the Karonga district, ca. 98,000 animals, should be vaccinated until the situation on the Tanzanian side of the border improves. Maintaining a strategic reserve of 100,000 doses of this vaccine would seem advisable for meeting emergencies such as the need for ring vaccination in case of an outbreak.

Braxy/Blackleg vaccine is principally used for its Cl.chauvoei component for the prevention of Blackquarter (Blackleg) and only incidentally for the control of Cl.septicum (the other component of the combined vaccine) causing malignant oedema, which is of much less importance in the country. Considering that the disease occurs in the whole of the country, if sporadically, and the demand for over 200,000 doses in 1985, it would seem reasonable to make available 300,000 doses by 1990. It is hoped that by the increased use of the vaccine disease incidence may be substantially reduced, and no more vaccine may be necessary towards the end of the century.

Brucella S19 and 45/20 vaccines The former vaccine is used for female calves between 4-8 months of age whilst the latter vaccine is used for older females, in order to avoid complications in diagnosis which arises with the use of S19 vaccine in elder cattle. As far as it is known, this is not a significant disease at the present time. To prevent it ever becoming significant it is advisable to extend calfhooed vaccination to cover all female calves in the country, presently running at ca. 100,000 (Source: 1985 Livestock Census) and increasing to ca. 115,000 by 1990 and 138,000 by the end of the century.

Haemorrhagic septicaemia vaccine has not been used in the country, although sporadic death of cattle had been attributed to Pasteurella multocida. The importance of adequate diagnosis, complete with isolation and typing of the ethiological agent, cannot be overemphasized.

If required a strategic stock of this vaccine, say 50,000 doses, should be kept in store for emergency vaccination. This vaccine has a reasonably long shelf-life of three years or more.

Of the viral vaccines

Foot and Mouth Disease Vaccine (FMDV) is the most important. To meet government policy of twice yearly vaccination in the buffer zones some 250,000 doses of the appropriate virus types are required at the present time. This should increase by 15% to 300,000 doses to meet the expected 3% increase in cattle population by 1990. Should the number of cattle increase by an additional 20% in the border zones by the end of the century this would necessitate the use of 360,000 doses p.a.

Rinderpest vaccine Although the disease has not been reported in the country, to prevent its spread from Tanzania, about 110,000 animals were vaccinated in the buffer zone in 1985. This way almost all the animals at risk were vaccinated in the buffer zone. In future years only new stock will require vaccination unless the threat of disease becomes negligible. If vaccination of new calves remains necessary in future years, reckoning on 15% increase in herd size by 1990 and a calf-crop of 25% per annum then 31,000 calves would require vaccination in 1990. If vaccination is still necessary by the end of the century the need for vaccine increases to 37,000 doses.

Lumpy Skin Vaccine The disease is on the increase not only in Malawi but in neighbouring countries as well. In 1985 240,000 doses of this vaccine were demanded and only 25,000 doses delivered. To stem the spread of the disease strategic vaccination of animals around outbreaks must be vigorously carried out. It is recommended that at least the spontaneous demand for the vaccine is met, and should the use of 0.25million doses fail to curb the disease, it may have to be increased to 0.35million doses.

Rabies Vaccine Of the 154,000 doses demanded in 1985 just over one third was delivered. To meet government policy to vaccinate all dogs in the country, at least 200,000 doses would be required now. Because of the uncertainties about the number of dogs in the country, which may be substantially higher than the estimated 200,000 animals, and to extend vaccination to cats, as much as 0.5 million doses may be required by the year 2000.

Newcastle Vaccine This disease has been one major reason for the decline in the poultry industry and is seen as a major impediment of its future development unless suitably controlled. Recent use (1982-85) of ca. 2.8-2.9 million doses p.a. was not adequate either to meet the demand for ca. 3.2 million doses or for adequate control of the disease. To achieve this all day-old chicks from the hatcheries and those imported must be vaccinated. Those going for broilers need a second dose of the vaccine and those becoming layers and stock birds (for the hatcheries) need a third dose on average per year.

To meet the demand, implicit in this policy and on the basis of government forecasts of the number of birds at risk, in the commercial sector alone 3.6 million doses would be required by 1990 and almost doubling to 7.0million doses by the year 2000.

To provide cover for 10% of the birds in the traditional sector the demand would increase to 6.0 and 11.6million doses respectively by years 1990 and 2000.

Marek's Vaccine All day old chicks from the hatcheries need to be vaccinated. Presently this would require the use of 0.5million doses of the vaccine increasing to 0.9million and 1.2million doses respectively by years 1990 and 2000. Imported day-old birds should be purchased vaccinated or they too would require vaccination.

Fowl Pox Vaccine Even though there is no government policy in force for the control of this disease, the demand for almost 1million doses in 1985 signifies its importance. All layer and stock birds should be vaccinated at 10 weeks of age requiring 1.8million doses by 1990 and 3.5million doses p.a. by 2000 just for the commercial sector. To provide vaccine for just 10% of birds in the traditional sector requirement would increase to 2.8 and 5.0million doses respectively.

5. CONSTRAINTS ON DRUG AND VACCINE USAGE AND PROPOSALS FOR INCREASED USE

In order to be able to utilise extra drugs and vaccines (given their availability) attention would have to be paid to:

- (i) Transport
- (ii) Extension services
- (iii) Diagnostic services

One of the constraints with the diagnostic services at present are the difficulties of getting samples from the D.A.D. to the diagnostic laboratory in good condition. This needs to be improved.

Given the opportunity to expand livestock development and health care programmes there are two obvious sectors where considerable advances could be made in a short time.

Cattle Industry. On the framework which exists through the cattle-dipping infrastructure, a whole animal health policy could be developed which would have a significant effect on cattle productivity in Malawi.

Solving the acaricide, transport and extension problems would naturally lead on to greater offtake of flukicides and other anthelmintics, antibiotics, biologicals and antiprotozoan drugs. Trypanosomiasis control, however, would have to be dealt with separately.

Poultry. With the short-term requirements for animal protein and the pressure of space limiting growth in the cattle population, an obvious source of increased protein is poultry.

Attempts have previously been made to build up the commercial poultry industry but have foundered principally because of constraints of nutrition and disease. The time is opportune to restimulate poultry production (commercial and traditional) with an integrated plan providing for good-quality feed and adequate disease protection, especially Newcastle Disease.

6. CONSIDERATIONS FOR LOCAL MANUFACTURE

6.1 Pharmaceuticals

It would be unrealistic at this stage to propose the production of Veterinary Pharmaceutical Drugs in Malawi. However the immunological approach to the control of Protozoal Diseases (The Central Veterinary Laboratory East Coast Government and FAO) is of great interest and of considerable local and regional potential significance.

6.2 Biologicals

There is no vaccine production in Malawi at the present time. However, consideration has been given to the production of viral vaccines for poultry and to Newcastle vaccine in particular.

A prerequisite of vaccine production of this kind is the provision of Specific Pathogen Free (SPF) eggs. For that end an appropriate flock of breeding birds need to be maintained which, apart from being very costly, require a great deal of experience and monitoring. In the absence of SPF eggs there is a danger that egg-borne diseases may be spread by the use of the vaccine leading to other problems

At the present time the country spends ca. \$15,000 on poultry vaccines per annum. Whilst this is inadequate, the cost of these vaccines, forecast for year 2000 at today's price, is still under \$80,000.

It is therefore considered that importation of finished products at competitive prices, is much more economic than home production would be. Although importation does not provide independence, or free the demand for foreign exchange, yet supply of vaccines for Malawi may be better resolved on a regional basis than from home production.

7. RECOMMENDATIONS

7.1 Production of egg-derived viral vaccines for poultry should not be attempted.

7.2 The ECF Immunisation Project should be evaluated from the point of view of possibilities of eventual industrial scale production, once the technical feasibility of this approach has been demonstrated under the varying field conditions.

TABLE 1

ESTIMATES OF VETERINARY DRUGS REQUIREMENTS IN MALAWI

DRUG/BIOLOGICAL	YEAR					
	1986		1990		2000	
	UNITS	VALUE US\$000's	UNITS	VALUE US\$000's	UNITS	VALUE US\$000's
Ectoparasiticides (Litres)						
Arsenic and Toxaphene	120,000	63				
O.P.)	5,000	15	125,000	340	250,000	680
Amidine)						
Anthelmintics	150,000	30	300,000	60	600,000	120
Antibiotics (Doses)	120,000	40	240,000	80	480,000	160
Antiprotozoans						
Samorin	47,000	13	150,000	150	150,000	150
Berenyl		34				
Feed Supplements etc.		55		90		90
Total		250		720		1,200

A NEX 1

Number of Livestock, Malawi 1974 - 1984

YEAR	CATTLE		CATTLE TOTAL	SHEEP	GOATS	PIGS
	Commercial	Traditional				
1974	380000	614000	652000	77775	694652	154912
1978	34001	647532	681537	78747	655084	174323
1979	33655	754867	788522	57069	650213	197212
1982	36390	806539	842939	76553	692451	198716
1983	25715	882244	907959	155607	631071	211704
1984	30618	917901	948519	149854	758547	186031

Source: Livestock Census Statistics, Ministry of Agriculture and National Resources

ANNEX 2

Number of Livestock and Projected Increases 1974 - 2000

		Numbers (000)		% Av. Annual Chgs		Projected inc. (000)	
		1974	1984	Post	Proj.	1990	2000
CATTLE	Traditional	614	918	4.9	3-2	1083	1300
	Commercial	38	31	-1.7	3-2	37	44
	TOTAL	652	949	4.5	3-2	1120	1344
	SHEEP	N/A	150	-	2	168	188
	GOAT	655	739	2.1	2	827	887
	PIGS	174	186	1.1	1	196	214
POULTRY	Traditional	8021*	8986	2.0	5-7	12000	20000
	Layers	114*	100	-2.0	65-10	500	1000
	Broilers	840*	706	-2.7	14-15	1300	2500
	Day-old chicks	292	541	14.0	10-3	905	1200

N/A = Not available

* = these data apply for 1978

ANNEX 3

Quantities and Values of Vaccines* Used in Malawi 1982 - 1985

VACCINES	Av. No. Doses rec'd 1982-84	1985 No of doses (000) Dem'd Rec'd		% Rec'd Dem'd	Price/ dose (US \$)	1985 value (US \$)
Braxy/Blackleg	70	220	26	12	0.09	2358
Brucella S19 & 45/20	6	14	6	43	0.30	1770
FMDV	151	160	190	118	1.10	209000
Rinderpest	134	115	100	87	0.067	6700
Lumpy Skin	1	240	25	11	0.27	6582
Rabies	76	154	56	36	0.60	33600
Marek's	205	500	417	83	0.0143	5963
Fowl Pox	263	906	313	34	0.0082	2566
Newcastle B1	370	376	66	17	0.0015	100
Newcastle V4	1566	1352	2510	185	0.0020	5020
Newcastle Kamarov	891	1456	283	19	0.0037	1047
Newcastle Total	2827	3187	2859	89	-	6167
TOTALS						274706

* Sources: Veterinary Department of the Ministry of Agriculture and Natural Resources; Malawi Pharmacies Ltd., Blantyre; Pipers Pest Control Ltd., Blantyre.

ANNEX 4

Estimated National requirements of priority
vaccines in Malawi 1986 - 2000

VACCINES	No. of doses (000) demanded 1985	Estimated requirements (000)	
		1990	2000
Anthrax	0	100	100
Blackquarter	210	300	300
Brucella S19	14	115	138
Haemorr.Septic	0	50	50
Lumpy Skin	240	250	350
FMDV	160	300	360
Rinderpest	115	31	37
Rabies	154	200	250
Newcastle	3187	6000	11600
Marek's	500	900	1200
Fowl Pox	906	2800	5000

FMD OUTBREAKS IN MALAWI

The first reported outbreak of FMD was in 1957 in Karonga District in the Songwe Valley. Control was by movement restrictions and aphisation in the infected area.

Six outbreaks occurred between 1958 and 1974, all of them in Karonga District. All were confined to an area along the Songwe River, Northern Malawi boundary with Tanzania. In these outbreaks the virus types isolated with O, A, SAT 1 and SAT 2, and they occurred in that sequence.

Vaccine was first used for control in 1962 outbreak when inactivated type O vaccine supplied by the State Veterinary Institute of Amsterdam was obtained. In the next outbreak, 1966, line type A vaccine, attenuated by arian passage and supplied by the Burrough's Wellcome Laboratories, United Kingdom, was used.

From 1972, following studies in the country on immune response using bivalent vaccines, types A and O were combined SAT1 and SAT2 combined. Prophylactic vaccinations usually cover over 40,000 cattle along the entire boundary with Tanzania.

In the Southern part of Malawi, the first outbreak occurred in 1973, and this was traced to a current outbreak in the neighbouring Mozambique. Bivalent vaccines, i.e. type A and O, and SAT1 and SAT2, were used in the control. The virus types isolated were O, A and SAT2. The 1976 outbreak was the first type SAT3 in Malawi and occurred in this area. This took long to control because Wellcome Laboratories in Kenya had never used this type before, and the vaccine had to be ordered from Spain.

The area affected in the Shire Valley is over 60 miles long and cattle population is over 80,000.

The last two outbreaks in the North occurred in 1981 in Karonga District and in 1982 in Chitipa District affecting a strip of land along the Songwe river. In both outbreaks the virus type was O. While in the South the last outbreak occurred in 1985 and the virus type was O too.

During all the outbreaks mentioned, sheep, goats and sheep have never been infected, and samples collected from them have never shown any carrier status. Vaccination in both areas only involves cattle although emergency measures in the face of an outbreak always includes all cloven-footed animals.

Because of its awareness of the hazards of the presence of the disease in the country to the economy, the Malawi Government offer all these disease control measures, including vaccinations, free of charge.

FOOT AND MOUTH DISEASE OUTBREAKS IN MALAWI

Year	Month	Location	Virus Type
1957	August	Karonga District	O
1959	September	Karonga District	SAT 2
1962	September	Karonga District	O
1966	July	Karonga District	A
1970	November	Karonga District	SAT 1
1973	August	Lower Shire Valley	A
1974	April	Lower Shire Valley	O
1975	September	Karonga District	SAT 2
1976	June	Lower Shire Valley	SAT 3
1981	September	Karonga District	A

Types of P.M.D. Vaccines used and
Total Number of Vaccinations, Malawi - 1969-81

Year	Region		Total Number of Vaccinations
	Karonga District	Lower Shire Valley	
1969	O, A, SAT2		81,240
1970	O, A, SAT2		69,235
1971	O, A, SAT1, SAT2		55,079
1972	O, A, SAT1, SAT2		54,340
1973	O, A, SAT1, SAT2		85,385*
1974	O, A, SAT1, SAT2	O, A, SAT1, SAT2	134,769
1975	O, A, SAT1, SAT2	O, A, SAT1, SAT2	125,769
1976	O, A, SAT1, SAT2	O, A, SAT1, SAT2	120,871
1977	O, A, SAT1, SAT2	SAT3	110,691
1978	O, A, SAT1, SAT2	SAT1, SAT2	82,436
1979	O, A, SAT1, SAT2	SAT1, SAT2	N.A.
1980	O, A, SAT1, SAT2	SAT1, SAT2	116,911
1981	O, A, SAT1, SAT2	O, A, SAT1, SAT2	120,000

*Includes some vaccination in the Lower Shire Valley during the Type A outbreak.

There is now much cooperation from farmers in this respect that an almost 100% vaccination is always achieved. The information from the neighbouring countries, where the disease originates, indicates that vaccinations are either offered at a fee or that the response is very low. The challenge to Malawi will, therefore, always be there.

The disease is endemic in Tanzania where types O, A, SAT1 and SAT2 have been diagnosed. Similarly it is endemic in Mozambique where types O, SAT1 SAT2 and SAT3 have been diagnosed.

The risk from Zambia is minimal because FMD occurs sporadically along their borders with Tanzania, Angola and Namibia. Control of the disease is similar to that of Malawi.