

## Community-based animal health workers and the veterinary profession in the context of African privatization

D.K. Leonard<sup>1</sup>, C.Ly<sup>2</sup>, and P.S.A. Woods<sup>3\*</sup>

<sup>1</sup>University of California at Berkeley

<sup>2</sup>École Inter-États des Sciences et Médecine Vétérinaires de Dakar

<sup>3</sup>University of Zimbabwe, Harare

The future shape of veterinary practice in Africa hangs in the balance. Historically full veterinarians (DVMs) were both central and peripheral to the services offered to African livestock producers; they now are in danger of becoming only peripheral. The pattern of veterinary medicine initiated under colonialism and brought to fulfillment by governments in the early years after independence had paraprofessionals at the front line of service but put them firmly under the control of their DVM superiors. If we look only at levels of training, the current emphasis on community-based animal health workers (CAHWs) is a revival of a colonial practice. But with regard to authority and finance CAHWs are new. With the collapse of budgetary support for government veterinary services in the 1980s, private veterinary practice has become more and more important. There is a great danger, however, that it will be dominated by paraprofessionals, who will compete DVMs out of the market, escape their supervision, and reduce them to the role of pharmaceutical wholesalers. This change threatens not only the veterinary profession itself but also the disease prevention and public health functions (*le mandat sanitaire*) they are charged to protect. Unless the veterinary profession finds new ways of operating both it and the quality of animal health on the continent will be severely damaged.

### 1. Distinctions and Definitions

Before we begin a few basic distinctions and terms need to be clarified. Animal health involves a complex array of functions and those who provide it similarly have a wide range of skills. There is no one type of veterinary provider who is best for all functions, nor do all functions need to be performed in the same way in all production systems. Thus if we are to avoid dogmatism we need to proceed subtly to link different aspects of animal health to different methods of providing for them under different production conditions.

1.1. There are three basic *types of veterinary medicine* which we want to keep in mind. Their nature and the incentives governing them are quite different, suggesting that organizational arrangements that work for one may well not work for another.

1.1.1. *Curative* medicine involves the treatment of disease. As it involves a distinct intervention in response to a problem that can be clearly perceived by a livestock producer who also enjoys the full benefit of the cure, it is the part of veterinary practice that is most easily privatized.

1.1.2. *Preventive* veterinary medicine includes immunizations and other interventions to prevent the transmission of disease. Vaccinations against prevalent and easily recognizable diseases are readily valued by producers and their provision therefore often can be privatized, as was done in Central African Republic and Uganda for rinderpest (Koma, 2000; Tacher, 1986). When herd immunity has been achieved it is harder to convince traditional herders to maintain the necessary level of vigilance, and intervention by the public sector is frequently needed (e.g. Senegal as described by Ly 2000). In this latter case the individual producer may try to “free ride” off the actions of others and some sort of collective action is needed in order to maintain herd immunity. Prevention by means of movement control can be accomplished only through the coercive power of the state.

1.1.3. *Promotive* veterinary practice includes all management measures designed to increase the productivity of the animal and its general health. Save for range conservation measures, the full benefits of these measures are enjoyed by the individual livestock producer, but as the external

---

\* All three of us wish to acknowledge gratefully that most of the research on which we report here was financed by a grant from the Government of the Netherlands through the International Development Research Centre in Nairobi, Kenya. We alone are responsible for the views expressed in this paper, however.

intervention often consists of nothing more than information (advice) it too is hard to sell on the private market. The major exception to this rule occurs when the improved management practice involves a purchased input. The manufacturer of that input then has a financial incentive to provide the relevant extension for free – which we usually call advertising.

- 1.2. There also are distinctions that need to be made for *types of veterinary practitioners*.
  - 1.2.1. *Doctors of Veterinary Medicine (DVMs)* are full veterinarians with at least a first university degree in the subject.
  - 1.2.2. The term *Paraprofessional* is used for all animal health workers who lack university level qualifications, in other words are not DVMs. Within this category are two distinguishable practitioners, who are often confused with one another but whom we will want to keep distinct. There are:
    - 1.2.2.1. *Near Professionals* have at least a year of veterinary training and junior secondary education. Some of them, such as Livestock Officers in Kenya and *Ingénieurs des travaux d'élevage* in Senegal, have amounts of training that approaches that of the DVM. Others have less education but still have a solid foundation in the tasks for which they have been trained. Examples of this latter group would be Veterinary Livestock Technicians (Zimbabwe), Animal Health Assistants (Kenya), and *Agents techniques d'élevage* (Senegal).
    - 1.2.2.2. *Auxiliaries* have less than a year (and sometimes only a few weeks) of veterinary training and their formal education is limited. In the colonial era such personnel might have been called veterinary scouts or *infirmiers d'élevage*, but until recently most independent African countries were in the process of upgrading or phasing out those such staff who remained on the government payroll. Of course such auxiliaries in government service operated only within organizations where they were under the supervision of DVMs and Near Professionals.
    - 1.2.2.3. Auxiliaries are now reappearing in a new guise, that of the *Community-based Animal Health Workers* (CAHWs), who have some multiple of one week veterinary training sessions and are responsible to (and generally selected by) their communities. CAHWs are distinguished from the older government auxiliaries more by independence from formal veterinary supervision and lack of salary than by level of training and competence. The boundaries are sometimes vague – many CAHWs hope to become employed by the organizations that first train them and therefore accept supervision by them, even though they are unsalaried; many others in effect become poorly-trained private practitioners, responsive to their communities only through the market. (Research by Ly, 2002 in Senegal's Ferlo suggests that community control of CAHWs quickly eroded but most of them came to operate under some kind of supervision by private and NGO DVMs.)
    - 1.2.2.4. At the outer edge of the auxiliary category are producers recognized by their peers as local experts. They usually have had some modest training in the past but are no longer linked to a knowledge system. Woods found in Zimbabwe that a third of these local expert consultations resulted in some form of compensation (2001).
- 1.3. Finally, there are multiple *types of production systems*. The appropriate delivery structure for veterinary medicine very much depends on the nature of the production system. For Africa, the following distinctions are useful.
  - 1.3.1. *Pastoralist*: These systems are only partly commercialized, are of moderate to low productivity, run traditional breeds of livestock that are well adapted to African environments, are highly dispersed, and most often are migratory (*transhumance*). Herders tend to be highly skilled and run large enough herds to have experience in recognizing the most common animal diseases. The costs of reaching sick animals in these systems, particularly relative to their economic value, often are prohibitively high.
  - 1.3.2. *Traditional Sedentary* producers manage indigenous breeds in small numbers. The value of the animals is not high but the producers lack the experience to treat their diseases effectively themselves. Travel is a major part of the cost in accessing veterinary care.
  - 1.3.3. *Medium-value Commercial* production uses exotic and cross-bred animals and is oriented toward the market, often a local one and generally in milk products. The numbers of animals a producer has is few and consequently the experience with diseases most often is modest. Travel costs remain a barrier but the value of the animals generally make professional veterinary care economic.
  - 1.3.4. *High-value Commercial* production systems use exotic breeds and are tightly managed by producers who have sufficient training and numbers of stock to provide basic animal health services themselves. When these producers do require professional veterinary services, the value

of the animals and the logistics of reaching their herds generally make the use of DVMs economic.

## 2. Selective Privatization

- 2.1. After twenty years of economic crisis in Africa it is obvious that the state cannot provide all the animal health services to which it aspired in the heady days after independence. The crisis has either left livestock producers without critical veterinary services, exposed them to unregulated and unreliable pharmacists and practitioners in the informal sector (Ly, 2002), subjected them to unofficial charges by government practitioners (Leonard, 1987), or ushered in an era of open private practice supported by and in partnership with government.
- 2.2. Of these four alternatives the last is by far the best – at least for the producers. It enables them actually to get services on which their livelihoods depend, it makes veterinary practitioners more responsive to consumer demand, and it enables government to concentrate its resources on the preventive and public health aspects of veterinary medicine – where the returns are greatest and the private sector is less effective.
- 2.3. In principle one might think that fee-recovery would solve the problems created by Africa's economic crisis – it provides the missing finances while leaving the traditional government structures in place. By now, however, we know that this alternative has all the negative effects of the market and few of the positive ones – it imposes a price on the producer but does nothing to change the incentive structure governing the public system and therefore leaves it inefficient and unresponsive. There is a danger that the new funds that the fees provide will be lost in standard government financial procedures or in corruption. Even if they do result in adequate stocks of veterinary supplies, functioning transportation and more adequate provider salaries, they leave the management structures of the public sector untouched. Thus staff may continue to provide veterinary products to their friends without charge, to use government vehicles for private purposes, to be careless in the use and maintenance of equipment, and to refuse to answer inconvenient calls for service. The imposition of the fees does not create a new set of incentives to government providers to be more efficient and responsive in their duties.
- 2.4. The objections made to the expansion of private veterinary care are three:
  - 2.4.1. One, that *producers would be better off under the old free or highly-subsidized systems* that were created after independence. This is true but irrelevant; the public finances necessary to run these systems no longer exist. Pretending that they will come back only prolongs the period in which economically critical veterinary services are denied to livestock producers. It isn't even clear that the state's paying *part* of the costs for government animal health workers and letting livestock producers pay the rest in fees actually lowers charges. In Kerala and Rajasthan in India Ahuja (2000) found that private practitioners and government subsidized animal health providers actually charged the same fees. Observations by Woods suggest that the same is occurring in Zimbabwe for many services.
  - 2.4.2. Two, that *the poor are disadvantaged by the market*. At first blush this is plausible, for a market is driven by money and the poor have less of it than others do. In fact we now have ample evidence that this argument is false. In this sense the poor are *not* a special case.
    - 2.4.2.1. The existing studies suggest that the poor are less likely to gain access to subsidized government services than are the rich, for power and influence are distributed even more unequally than money (Leonard, 1977, 1987; Ahuja, 2000; Woods et al., forthcoming), that the poor often gain better access to veterinary care when there are realistic charges than when it is highly subsidized (Leonard, 1987; Gros, 1994), and that the poor are as willing as the rich to pay for access to the veterinary services they need (Ahuja, 2000; Koma, 2000). For example, Leonard (1987) found that when government animal health workers in Kenya stopped offering free services and began to charge, the poorer livestock producers were able to get them to treat their animals more often and the advantage of the rich in access to veterinary care *decreased*. Studies in both Uganda and India failed to show the poor making any less use of commercialized animal health services than the rich do (Koma, 2000; Ahuja, 2000). The issue for the poor is not whether they pay for veterinary care; it is whether they are able to get it at all.
    - 2.4.2.2. The one sense in which it is true that the poor are a special case is that there are different things that need to be done for geographic areas that are remote and/or rely upon livestock of low commercial value. But targeting of poor *individuals* does not seem to be feasible or necessary. Even in the poorer areas the challenge is to create the subsidies that will make veterinary practitioners *available*, not to try to provide special subsidies for the poor who are living there. The work of Woods in Zimbabwe (2000 and forthcoming) shows a very

strong drop off in use of veterinary services with distance from the provider. Frequently the costs in time and transport in bringing animal health services to the farm are more important in determining effective demand than the professional fee. Ahuja finds the same in India (2000).

- 2.4.2.3. Obviously there is moral merit in targeting assistance on the poor, but the evidence is that very few organizations (save some NGOs) can make it work in the real conditions of rural Africa. The critical thing is to make the services available to the poor at all, even at a price. After all, livestock are valuable as productive assets, not for their own sakes; even the poor will find ways to pay to maintain their economic value.
- 2.4.3. Three, that *the market left to itself will not provide for some critical aspects of animal health* – quality, prevention and promotion. This is true and it is to these challenges we now turn.

### **3. The Roots of the Challenge**

- 3.1. There are several different reasons why DVMs have difficulty surviving and the CAHW is favored in today's more private veterinary market. One of these is a legitimate challenge to the role of the DVM; the other two, however, suggest market imperfections that must be overcome if the interests of livestock producers are to be well served.
- 3.2. The first, legitimate challenge comes from the economics of the services veterinary medicine has to offer. There are several circumstances in which the services of a DVM are simply too expensive to be relevant:
  - 3.2.1. the animals are of low value;
  - 3.2.2. the medical problem is easily recognized and is well within the expertise of an experienced producer, CAHW or paraprofessional, who can offer service at much lower cost than the DVM; or
  - 3.2.3. the costs in transport and time in getting the services of a DVM are high (Woods, 2000).
  - 3.2.4. In none of these circumstances does it make sense to try to impose a DVM on the producer; it adds unwarranted cost and in any case will be unsuccessful (Odeyemi, 1996; Sere, 1979).
- 3.3. The second challenge is illegitimate and arises when it is difficult to recognize the extra value provided by a skilled veterinary practitioner. The markets for all medical services are troubled by hidden information, or what the economists call information asymmetry (unequal knowledge). In most circumstances the livestock producer finds it very difficult to judge whether a given veterinary practitioner is actually providing higher quality services and therefore is unwilling to pay more than would be necessary for a lower quality provider. Thus the paraprofessional or CAHW easily out-competes the DVM even when the latter's services are needed and economic. It is true that when a DVM conducts surgery on an animal the differences from a paraprofessional in training and skill *are* visible and the evidence we have suggests that even traditional producers will pay for this service (Koma, 2000 on Uganda). Much of the extra quality provided by the better practitioners is diagnostic, however – increasing the likelihood that hard to discern diseases are identified and that the medications prescribed are appropriate. The producers may know that the DVM has studied more than the paraprofessional or CAHW, but they may not know how experienced or skilled the DVM is and they certainly don't know the extent or honesty of the DVM's effort. Since some correctly treated animals will nonetheless fail to recover and others that are inappropriately treated will get well, it can be very hard for the producer to judge the quality of what the practitioner has to offer unless they have done a great deal of business together. As most of the maladies affecting African livestock are fairly easy for paraprofessionals and CAHWs to diagnose and treat and as most non-pastoralists have small herds, relevant experience with DVMs is very hard to accumulate. The result is that producers are unwilling to pay DVMs more than they do to paraprofessionals – unless surgery is indicated or some institutional mechanism exists to overcome their distrust.
- 3.4. The third challenge to the survival of DVMs in an increasingly privatized market is inherent to the practice of preventive and promotive veterinary medicine. Despite the fact that these aspects of the veterinarian's science are more important to reducing the impact of disease and increasing animal productivity than curative care is, it is harder to charge for them.
  - 3.4.1. The information the DVM provides about improved management practices can easily be passed on from producer to producer without involving the DVM again.
  - 3.4.2. Preventive measures, including inoculations, present a different set of problems.
    - 3.4.2.1. First, once herd immunity has been achieved a producer's herd will be protected even if no inoculations are given. Since inoculations often carry some collateral risks and may compromise production at least temporarily, it is in the interests of individual producers to neglect to protect their own herds *if* they believe that enough others will protect theirs. This is a classic collective action problem. Thus, as we mentioned earlier, livestock

producers in Uganda and the CAR were eager to pay for rinderpest inoculations when the disease was a serious threat there (Tacher, 1986; Koma, 2000) but they were much less willing to do so in Senegal's Ferlo, where the disease had been kept at bay successfully for over 15 years (Ly, 2000).

- 3.4.2.2. Second, the benefits of preventive measures are not always immediately obvious to the unsophisticated observer. Some uninoculated animals will escape infection or will get a mild case – and the less endemic the disease the harder it will be to observe the probabilities. Further, some preventable animal health problems (such as worms) may have only a subtle effect on production, rather than the dramatic impact of death. In both these cases the livestock producer will need to be *persuaded* of the value of the preventive measure. If there is a charge for the intervention, the credibility of the practitioner recommending it will be critical. This is another variant of the hidden information problem mentioned above – is the veterinarian recommending a particular measure because it really is valuable or because it will produce a profit or is being pushed by an administrative superior? Pam Woods observed an increase in pharmaceutical sales in Zimbabwe when DVMs worked in concert with paraprofessionals, rather than leaving them on their own (2001). Cheikh Ly found in Senegal's Ferlo that when the herders had confidence in the integrity of the DVM or the organization (in this case a Lutheran livestock program), they purchased significantly more preventive measures from the CAHWs they were supervising (Ly, 2000). The market for prevention and promotion is doubly imperfect and institutional measures are needed to overcome the problems.

#### **4. How to Structure Africa's New Veterinary Systems**

- 4.1. *Community-based animal health care is part of the solution.* We want to make several distinctions here, however, making clear just what is meant.
- 4.1.1. At the most general level it has always been true and remains so now that the value of most African livestock production is too low to justify animal health care by only full veterinarians (DVMs). This is not only a matter of the price that one must pay for someone with a higher level of training but also the location of the practitioner. Transportation (*both* for the practitioner and for the producer to call for the services) most often is an even bigger part of the cost in obtaining veterinary care in African conditions (Woods, 2000). Therefore the practitioner who is living close to the producer will enjoy a substantial competitive advantage.
- 4.1.2. Once we recognize that care will be provided by non-professionals, the question is of what type. Both government services and private practice have included near-professionals and auxiliaries. CAHWs are really auxiliaries in private practice, for it is rare for communities themselves to have the resources or organizational structures with which to employ these people – even if they initially designate them for the role (and the training needed to perform it).
- 4.1.3. The practitioners who are most threatened by CAHW are the near-professionals. There probably are some livestock production systems in Africa where this would not be a desirable development – areas such as central Kenya that are dominated by medium-value commercial producers, usually dairy farmers with exotic and cross-bred herds. We urge that in these commercial systems we must not throw away the huge investments made in the past in the training of near-professionals by now under-cutting them with a new crop of CAHWs. Near professionals instead have to be a part of a new, integrated private system.
- 4.1.4. On the other hand, pastoral production systems are particularly good candidates for CAHW, for the distances involved and the need to migrate with the herds make practice unattractive to near professionals. Good examples are the Peul (Fulani) in CAR (Tacher, 1986) and Senegal (Ly, 2000, 2002). The value of CAHW probably depends overwhelmingly on the quality of the linkages it has to veterinary professionals, an issue to which we will return below.
- 4.2. *Supplementary roles for community-based animal health workers – extension, human health and other options – are worth consideration.* It is particularly valuable to explore this issue for CAHWs operating in pastoral settings – the distances involved limit the volume of business that a CAHW can do and restrict the access of the families of producers to other services that are vital to the quality of their lives.
- 4.2.1. Extension is unlikely to occur save as a low cost by-product of curative care, i.e. CAHWs will pass on information that enhances their reputations as they respond to demands for curative care but they are not likely to go out of their way to provide such information in other settings unless it enhances the sale of the products they are carrying (Ly, 2002).
- 4.2.2. Majok and Schwabe (1996) have long advocated the combination of human and animal health roles – but we are not sure that they didn't have near-professionals rather than auxiliaries in

mind. It seems to us that the human health option depends hugely on context. Transportation costs are a major component of consumer costs in all health care – but much more so in animal health than in human health, for humans are easier to transport than large ruminants. Thus combined practices make sense only in pastoral contexts in which really serious remoteness is an issue. It probably makes sense to involve CAHWs in human health care only in the supply of very common pharmaceuticals (for which prescriptions are not really necessary) and in emergency treatments for children under five (such as oral rehydration therapy), for whom time to treatment is a critical issue in survival. The human health option is likely to steeply increase the training requirements for these positions. Since most CAHWs will be men, is it perhaps better to direct these extra training resources to women who will specialize in maternal & child health?

- 4.3. *The vet profession needs to build linkages.* DVMs neither can nor should compete with either near-professionals or auxiliaries (CAHW). They will have to link their practices to the work of these other actors if they are to survive outside a few market niches. CAH is an attractive option if the vets supervise the general functioning of near professionals and CAHWs, support their training, supply them with pharmaceuticals, and develop referral relations with them (Ly, 2002). At the moment many private DVMs are being reduced to the role of pharmaceutical wholesalers, using CAHWs and other paraprofessionals as their retail outlets. In fact, sale of pharmaceuticals represents as much of 80 percent of the income of veterinary practitioners (Ly, 2002) and it would be hard for them to survive economically if they were not the major purveyors of these products. DVMs have acquired this drug wholesaler role because most states do not allow non-professionals to deal in pharmaceuticals, and regulation is therefore giving DVMs a relatively protected niche (Ly, 2002). Counterfeit pharmaceuticals and sale of drugs by people with no diagnostic capability of any kind is becoming a problem in many parts of Africa (Koma, 2000; Ly, 2002). If only professionals have the legal right to supervise the sale of pharmaceuticals, this should have the benefit of creating rural actors who have the interest to identify counterfeit products and quack providers and the status to mobilize the state to prosecute them effectively. If, on the other hand, DVMs are selling pharmaceuticals to CAHWs and other paraprofessionals without any supervision of their use and if this function comes to dominate completely the DVMs' livelihoods, it would be a waste and abuse of their professional qualifications.
- 4.4. If DVMs are to supervise the occurrence of disease outbreaks and have a meaningful effect on the quality of animal health care, they must have a real relationship with the paraprofessionals to whom they sell. Unless the state prohibits paraprofessionals from practicing outside the supervision of a DVM (something that seems to be done effectively only in southern Africa), the relationship of the DVM and the paraprofessional will have to be one of mutual convenience, implying strong referral relationships running in *both* directions. As we have noted above, save for surgery DVMs have a problem selling their special expertise, as much of their work is subject to severe problems of imperfect information – that is, much of the value of what they have uniquely to offer is invisible to the livestock producer. DVMs will be more successful in building viable practices if they have relationships with NGOs which locals respect highly and/or have referral relations with near professionals and CAHWs who provide producers with regular, simple services and who therefore have had the chance to build up reputations for credibility with producers (Ly, 2002). The returns to both the DVM and CAHW in measures that build livestock owner confidence in the quality and honesty of their work are substantial. In Senegal's Ferlo Ly found that use of curative services doubled and the purchase of preventive measures increased by two to four times when producers were served by CAHWs who had strong linkages with a DVM employed by an NGO in which the locals had confidence (2000). Woods observed a similar effects for DVM-near professional links in Zimbabwe (2001).
- 4.5. Note, however, that it is extremely important that the DVMs and the paraprofessionals both need each other – otherwise their linkages will disintegrate. The DVM relies on the CAHWs and near professionals to provide routine, accessible and affordable care to livestock producers, to build a local reputation for reliability, and to refer upward cases that are beyond their capability. The CAHW depends on the DVM for training and the wholesale supply of pharmaceuticals. If the CAHW were to try to claim the part of the shared practice for which only the DVM is competent, the linkage would wither and the quality that is built into it would be lost. In Zimbabwe Woods observed that in dealing with better off clients near-professionals often assumed the title of “doctor,” presumably in order to expand the demand for their services. Ly (2002) reports that CAHWs in Senegal's Ferlo want to carry diagnostic tools they have not been trained to use and to perform surgeries. In doing so, they would be attempting to assume the externally visible symbols that distinguish the DVM from the CAHW in the popular mind and to sever the mutual benefit and linkage on a well-functioning veterinary system depends. It is important to guard against such “mission creep” on the part of the CAHWs.

- 4.6. *DVMs need to assume government contracts to provide for the organization of le mandate sanitaire.* It is not hard to privatize the delivery of curative veterinary medicine and we have argued strongly that African states should do so, given the inadequacy of public finances. When epizootics are prevalent or the state is effective in enforcing immunization requirements, a private market also can be sustained in preventive measures. Disease surveillance always is a public good, however, and public immunization campaigns frequently are the most efficient means of maintaining herd immunity once epizootics and enzootics have been brought under control. Where possible, then, it is desirable to maintain a state role in preventive veterinary medicine. This need not mean that state employees themselves do the immunizations and maintain surveillance. A number of European states have had very positive experiences with contracting private practitioners to provide these services (Hellberg, 1990; Ly, 2002). There are multiple benefits to extending this practice to Africa.
- 4.6.1. The first is one of efficiency. Disease prevention campaigns are required only sporadically. Costs are reduced if the staff needed to carry them out are already present on the ground, know the producers, and can fit the job around their other activities. Similarly, disease surveillance is a background activity, best done on the side by those who are already working in the area.
- 4.6.2. The second benefit is coverage. When the state contracts private practitioners to undertake *le mandate sanitaire*, it provides an inducement to qualified staff to remain in remote areas. Frequently a public health contract represents the difference between a viable private veterinary practice and none at all. The contracts therefore result in improved veterinary coverage across the country and to all types of producers. They are an excellent way of assuring that the poor are reached. (For more detailed suggestions on contracting, see Leonard, 2000.)
- 4.6.3. Finally, contracting for *le mandate sanitaire* strengthens the linkages that bind DVMs, near professionals and CAHWs together. The contracts almost always should go to DVMs, as they have the training to interface with the state apparatus and provide disease surveillance reports. The nature of their practice also makes it likely that they will have the equipment to maintain the cold chain and transport vaccines quickly to the sites where they are needed. DVMs, on the other hand, are too expensive and too socially distant from communities of traditional livestock producers to provide the best labor for actually carrying out the inoculations. This work is best done by CAHWs – most often under the supervision (or at least with the support) of near professionals. Thus vaccination campaigns provide the occasion and the finance to make these three groups work together and therefore strengthen the linkages needed to maintain the best quality *accessible* veterinary services possible.

## 5. Conclusions

The state has a critical role in the construction of appropriate veterinary systems for African livestock producers and in sustaining preventive interventions. However, private DVMs, near professionals and CAHWs, offering curative medicine for profit and providing prevention by state contract, are much the best system for accomplishing these objectives – particularly when they are strongly linked together through mutual referrals, the chain of pharmaceutical supply and the execution of *le mandate sanitaire*. The poor will be well-served by such a system. Both experience and theory are united on what needs to be done. We must continue the hard work of implementation.

## REFERENCES

- Ahuja, Vinod, P.S. George, Sunil Ray, K.E. McConnell, M.P.G. Kurup, V. Gandhi, D. Umali-Deininger, and C. de Haan. (2000) *Agricultural Services and the Poor: Case of Livestock Health and Breeding Services in India*. Amedabad: Indian Institute of Management; Washington, D.C.: The World Bank; Bern: Swiss Agency for Development and Cooperation.
- Gros, Jean-Germain. (1994) "Of Cattle, Farmers, Veterinarians and the World Bank: The Political Economy of Veterinary Services in Cameroun," *Public Administration and Development*, 14:1, pp. 37-52.
- Hellberg, I. (1990) "The Swedish Veterinary Profession and the Swedish State," in R. Torstendahl and M. Burrage (eds.), *The Formation of Professions: Knowledge, State and Society*, pp. 174-85. London: Sage.
- Koma, Lee M.P.K. (2000) "Can Private Veterinarians Survive in Uganda?" in Leonard, ed. 2000.
- Leonard, David K. (1977) *Reaching the Peasant Farmer: Organization Theory and Practice in Kenya*. Chicago: University of Chicago Press.
- \_\_\_\_\_. (1987) "The Supply of Veterinary Services: Kenyan Lessons," *Agricultural Administration and Extension*, 26:4, pp. 219-36.
- \_\_\_\_\_. (2000) "The New Institutional Economics and the Restructuring of Animal Health Services in Africa," in Leonard, ed. 2000.
- \_\_\_\_\_. ed. (2000) *Africa's Changing Markets for Health and Veterinary Services: The New Institutional Issues*. London: Macmillan.
- Ly, Cheikh. (2000) "Management and the Impact of Auxiliaries on Pastoral Production and Veterinary Services Delivery in Senegal," in Leonard, ed. 2000.
- \_\_\_\_\_. (2002) "The Economics of Community Based Animal Health Workers." Unpublished paper.
- Majok, Aggrey. A. and Calvin W. Schwabe. (1996) *Development Among Africa's Migratory Pastoralists*. Westport: Bergin & Garvey.
- Odeyemi, I.A. (1996) "Location –Allocation Modeling of Veterinary Services in Africa: A Case Study of Zimbabwe." Institute of Ecology and Resource Management, Edinburgh University.
- Sere, C. (1979) "Towards an Economic Assessment of Veterinary Inputs in Tropical Africa," Working Document No. 1. Addis Ababa: International Livestock Centre for Africa.

- Tacher, G. (1986) "Projet de Développement de l'Élevage dans l'Ouest de la République Centrafricaine: Evaluation Ex Post." Maisons-Alfort: Institut d'Élevage et de Médecine Vétérinaire des Pays Tropicaux.
- Woods, Pamela S.A. (2000) "The Importance of Proximity, Transport, and Gender as Transaction Costs in the Use of Veterinary Services in Zimbabwe," in Leonard, ed. 2000.
- \_\_\_\_ (2001). Poster presentation. Conference of AITVM. Copenhagen.
- Woods, PSA, HJ Wynne, HW Ploeger and DK Leonard (forthcoming) "Path Analysis of Farmers' Use of Veterinary Services: A Survey of Subsistence Farmers in Zimbabwe," *Preventive Veterinary Medicine*.