



Summary

Improving the production and marketing of livestock kept by smallholder farmers in Africa has the potential to be a route out of poverty for millions of families. However farmers' ability to improve livestock production is constrained by access to key services such as veterinary and breeding services. FARM-Africa has pioneered an approach to establishing dairy goat enterprises on small farms that places all key services in the hands of farmers and the private sector. An example of this approach implemented in a project in Kenya is described. The approach has been extremely successful and is already spreading across East Africa. Total milk production and incomes have increased ten-fold within 5 years. Farmers are starting to sell fresh milk to supermarkets in Nairobi. With greater investment the model could reach many more families. FARM-Africa is planning to expand the breeding and animal health-care model through a franchising business model.

Abbreviations: Animal Health Assistant, AHA; Community Animal Health Worker, CAHW; Meru Animal Health Workers' Group, MAHWG

Background

The problems facing farmers living on small farms in Africa are many. Most farmers continue to rely on growing staple crops for survival combined with a few crops for sale. The decline in the real prices of many traditional cash crops, e.g. coffee, tea and tobacco, combined with uncertain markets, all contribute to the growing and deepening poverty seen in rural Africa today. Child malnutrition rates continue to rise in many parts of Africa despite increased investment in health services. The stark reality is that smallholder farmers have few options to improve their lives and the lives of their children.

A decline in farm size with each generation inheriting land further decreases available household options. Intensification of crop production may be an option for some farmers but many farm plots used for generations are experiencing declining yields. The impact of climate change is only likely to make a difficult situation worse.

Livestock play a critical role in supporting families in most parts of rural Africa and can be the basis for families escaping poverty. Peacock (2005) described the multiple roles played by goats in Africa and the reasons for the current interest in more intensive systems of livestock production.

Problems of access to livestock services

One of the main problems faced by farmers in Africa is the lack of access to reliable inputs previously delivered by the state. Since independence most African governments have reduced subsidies to the rural community owing to growing government fiscal deficits during the 1980's and '90's. These policies attempted to reduce costs of running large state organisations such as Ministries of Agriculture. This put a stop to subsidised services and attempts were made at dismantling the government agencies responsible for providing services to farmers and livestock keepers. The hope was that these services would be delivered by the private sector (World Bank 2007), however the state only partially withdrew, inhibiting the emergence of private sector services in all but the lucrative areas. Access to quality and affordable livestock services is constrained by many factors including limited numbers of service providers, physical distance, price, information and socio-cultural barriers.

Poorer areas may receive help from a weakened and under-resourced government service or from non-governmental organisations (NGOs). However, most farmers receive little or no service at all.

The broad range of services required by 21st century livestock keepers in Africa is diverse and includes – veterinary, feed, fodder, breeding, credit, insurance and marketing. Livestock keepers also need reliable advice and up to date information on marketing opportunities and new technologies. The emerging opportunity for livestock owners to receive payments for environmental services will require new and detailed advice.

The changing role of the state opens up new business opportunities for the private sector, including farmers groups. However there are many constraints to private sector development including access to finance, business development services as well as a progressive and supportive regulatory environment.

A new vision for livestock service provision is needed in Africa so that the roles and responsibilities of state and non-state actors are well-defined. Fundamental to this is a clear definition of what constitutes a public and private good, so that state and non-state actors co-operate and do not compete.

The FARM-Africa goat improvement model – community-based breeding and private veterinary services. The difficulties facing smallholder farmers make switching to more intensive goat farming systems attractive (Peacock 2005) and one of FARM-Africa's most successful interventions has been the development of an intensive dairy goat system for poor farmers in densely populated parts of East Africa. It is based on the delivery of all services through a unique mix of farmer-managed and private sector service delivery. It places the delivery of breeding services in the hands of farmers and the delivery of vital veterinary services in the hands of self-employed veterinarians running private practices who, working in partnership with animal health assistants, (who in turn support trained farmers) deliver affordable basic veterinary care. This innovative system has been working in Kenya, Tanzania and Uganda for 14 years. It delivers affordable services that have opened up new opportunities to farmers who would otherwise have been ignored.

Animal Health system

This three-tiered community-based animal health care system is financially viable and delivers affordable health care even to the poorest livestock keeper. Qualified veterinarians, running their own private practices, train a network of farmers called Community Animal Health Workers (CAHWs) to treat simple diseases. The training covers diseases affecting both goats and other species of livestock so that CAHWs can offer advice to farmers on how to prevent their livestock getting ill by the use of vaccination, good feeding, and management. In order to supply these CAHWs with drugs, a middle tier of veterinary professionals, often called Animal Health Assistants (AHAs) are helped to set up small rural drug shops, normally in market centres, easily accessible to CAHWs and other farmers. The AHAs purchase their drugs from the private veterinarians who are helped to establish good links with reliable drug companies. The volume of drugs purchased by the veterinarian on behalf of their 'network' helps to ensure a good discount on the price of drugs, keeping costs low and prices affordable to farmers.

This linked network of animal health care has proven to be financially viable for the service providers and offers a means by which farmers can have access to affordable treatments and reliable advice. It also offers a referral system whereby CAHWs can refer difficult cases to AHAs, and AHAs can consult a qualified veterinarian for the most difficult cases. As mobile phone coverage expands, this system will become even more effective.

The significant added advantage of this system is the role CAHWs can play in reporting notifiable diseases to the relevant government authorities, thus helping them to take appropriate control measures in a timely manner.

CAHWs require training from a qualified veterinarian and equipping with a kit of drugs and basic equipment. Careful consideration needs to be given to the level of fees they will charge to make sure they have sufficient incentive to be active and yet charge a price that is affordable to farmers. In Kenya and Tanzania CAHW training is approved by relevant professional bodies. Where a national standard exists it should be followed. The FARM-Africa training package not only conforms to, but also exceeds, all the national standards currently found in East Africa.

Housing goats reduces the amount of energy they waste looking for food and redirects that energy into production. It also keeps animals healthier by reducing contact with other goats, which might carry diseases, and considerably reduces their exposure to internal parasites (esp. *Haemonchus contortus*) acquired during grazing on common land contaminated by other livestock. Infection with internal parasites is probably the single biggest health problem of goats in Africa.

Role of farmer organisations

Farmer-managed organisations are established to co-ordinate and extend services during and after the intervention period. This has been found to generate significant and sustained economic, social and environmental benefits to both households and communities. The model may be targeted at particularly vulnerable households such as those affected by HIV/AIDS or households headed by women. In addition to the technical elements of the model additional activities can be added to enhance the model such as adult literacy training, support for savings and credit funds, or small enterprise development. The model has generated sufficient economic benefits to enable families to invest in new on- and off-farm enterprises. However, the model is not a quick-fix solution, it takes two-five years to yield the full range of benefits.

The FARM-Africa Goat Model consists of several inter-linked components that need to be implemented together for the model to have its full impact, it is this synergy that is the strength of the model. The model must be adapted for local needs and participatory techniques are used to make sure that the way each component is implemented is tailored to local circumstances.

This synergy is not limited to goats and depending on local need the goat group can become the focal point for savings and micro-finance, or training in health, HIV/AIDS and human nutrition etc. If women are targeted they may be trained in understanding their legal rights and if illiterate, supported to access literacy and numeracy training.

Case study of goat project in, Meru and Tharaka-Nithi Districts Kenya 1996-2006

At the request of the Ministry of Agriculture and Livestock Development, FARM-Africa planned a Dairy Goat and Animal Healthcare Project in Meru and Tharaka-Nithi districts of Kenya in 1994. The project design, on which the Goat Model is based, ensured that at the end of the project farmers would have everything they needed to ensure the sustainability of all project interventions and would not be reliant on the government, or on any outside provider, for any key inputs. The project began as a partnership between FARM-Africa and Government of Kenya extension staff. This was important to ensure that farmers received the support they needed from staff already based in the field, and it reduced the overall cost of the project by harnessing under-used government staff.

Beneficiary selection and group formation

Participants were selected based on poverty. Community leaders used quantitative methods to identify who was to be included in the project. The selected farmers, over 8,000, (61 per cent women 39 per cent men) were formed into 162 groups of 20-25 members that elected a committee and registered with the Ministry of Social Affairs. Non-goat owning members were provided with two Galla goats.

Breed improvement

Breed improvement was through cross-breeding local goats owned by group members with a pure Toggenburg buck at a buck keeping station. The Toggenburg goat has been found to be ideal as an improver breed. The foundation stock of 130 British Toggenburg goats was imported in three batches from the UK during the first three years of the project. The first cross-bred was crossed again with a pure Toggenburg to produce a 75 % Toggenburg goat, named the Meru Goat. Replacement bucks were bred at a small number of Breeding Units consisting of four females and one Toggenburg buck, these were managed by a farmer nominated by their group.

The group selected individuals to be trained to become buck keepers and CAHWs. Training was provided to farmers on improved goat management, group dynamics, breed improvement and goat health. Buck keepers were trained how to manage the Toggenburg bucks, use them effectively, record their performance and promote their use in their community.

Animal health care

The health care system consisted of a network of CAHWs (33 per cent women, 67 per cent men) treating goats and other species supervised by Animal Health Assistants (AHAs) — 50 per cent women — supported to obtain loans from the Co-operative Bank to establish rural drug shops in local market centres. In each of the two districts a young newly qualified veterinarian (one woman, one man) was helped to obtain a loan from Barclays Bank to establish a private veterinary practice, consisting of a drug shop at the district headquarters, transport, drugs and

equipment. These veterinarians would oversee the network in their district, supply drugs and treat cases referred to them. It was not easy to obtain loans from Barclays Bank -FARM-Africa was forced to act as guarantor for part of the loan.

The results

The project has been successful and generated huge interest from farmers within the project area and all over East Africa (Olubayo 2003). Farmers involved but 'outside' the project far out-number those originally targeted, but the technology has spread rapidly and continues to do so. It has spread spontaneously from the original five divisions to 13 divisions, and breeding goats have been sold to 71 districts in Kenya, as well as to Uganda, Tanzania, Burundi and Rwanda. It is hard to measure the total impact and benefits from the original project investment because it has passed from farmer to farmer so rapidly, and continues to do so, that it has become impossible for the project team to track the adoption and performance of 'adoptees' outside the project area (Laker and Omore 2004).

Economic benefits

The introduction of Toggenburg goats to Kenya has been of great benefit to farmers.

The improved performance on farmers' incomes is dramatic, increasing them from \$93 per annum to \$995 per annum. The value of the goat stock owned increased in value from \$156 to \$918. This tenfold increase in incomes and asset value represents a

significant step out of poverty for the thousands of families benefiting from the project. Many farmers have been able to invest in their farms, for example by buying land, and some have invested in small businesses in rural centres (Laker and Omore 2004).

Benefits of improvement programme

Buck keepers

The average number of services per buck per year was 120. Average income from buck service charges was \$79/year and from manure \$55/year, making a total income of \$134/year. Due to his role the buck keeper becomes a focal point of village life and source of advice for farmers bringing their goats for mating which gives them great status in their community and other social benefits.

Breeding unit

Over 120 breeding units have been established under the project. They produce pure Toggenburg goats for new buck stations and new breeding units. Their performance is crucial to the success of the whole project. Breeding units need to be managed by outstanding livestock keepers as the units place a great demand on

labour and skills early in the project. Breeder unit managers derive significant benefits early in the project as they quickly have a significant supply of milk for home consumption and sale.

CAHWs' performance

CAHWs are farmers working part-time as CAHWs treating an average of 11 cases per month and charging an average of \$2/case. Annual incomes average \$264 p.a. . CAHWs offer treatment for all livestock and also offer advice and training on how to keep livestock healthy, becoming valuable extension workers in their communities.

Animal Health Assistants (AHAs)

AHAs are the vital link in the animal health system and are the main source of drugs for CAHWs and farmers. Of the eight AHAs, most earn their income from clinical services (41 per cent), drug sales (27 per cent) and AI (31 per cent). All AHAs successfully repaid their loans obtained from the Co-operative Bank and are investing in their businesses mainly to obtain motorbikes increasing their mobility and coverage (FARM-Africa 2003).

Veterinarians

Veterinarians oversee the AHAs and CAHWs, they are based in urban centres and serve as the main supplier of drugs, as well as providing surgery, (mainly to cattle) and AI services. The two veterinarians supported by FARM-Africa set up their veterinary business and repaid their loan to Barclays Bank on time. After FARM-Africa's departure, one veterinarian recruited from government service returned to it, while the other, is expanding her business. Vets obtain most of their income from drug sales (48 per cent); clinical services (25 per cent) and AI services (23 per cent).

Farmer organisations and associations The Meru Goat Breeders' Association (MGBA) This farmer-based organisation serves many functions and its role is changing as the project proceeds. It controls the maintenance of the breed by setting breed standards and supplying breed information as well as recording the performance of the goats. It is responsible for registering the goats with the Kenyan Stud book and the members act as judges at shows.

The members are involved in the marketing and processing of the milk and organise field days and auctions. The interest in the project has placed so much demand on the leaders of the MGBA that they are currently charging \$60 for visits to interested groups.

MGBA is currently the only supplier of pure Toggenburg goats in East Africa, which presents an immense challenge for such a small and relatively inexperienced farmers' organisation.

The MGBA officials are under huge pressure to sell breeding stock with the risk of jeopardising the viability of the Toggenburg goat population in Meru itself. MGBA has already sold breeding stock to Uganda, Tanzania, Rwanda and 75 districts in Kenya. It currently has a waiting list for over 3000 goats.

The Meru Animal Health Workers' Group

The growing project needed some co-ordination of the health care providers and in the year 2000 all those involved in goat health set up the Meru Animal Health Workers' Group (MAHWG). MAHWG aims to :

Act as a forum to exchange ideas for all service providers working in the project area;

Organise training for their members; I Represent members in scientific meetings and workshops and inform members of latest practices;

Develop linkages with important partners – drug suppliers and govern- ment bodies.

The group is allowed to lend money to members wishing to develop their business in some way. Examples include: one veterinarian who has opened a second drug shop and one AHA who has paid for their drug shop attendant to train as an AHAt. MAHWG itself has won a contract from the government to deliver AI services throughout Meru district and MAHWG plans to build its own diag- nostic laboratory.

Environmental benefits

In addition to the direct performance of the goats there are significant bene- fits to the environment from the proj- ect. Goats are housed and are not out grazing, thus making easy the collec- tion of urine-enriched manure. This manure is highly valued as fertiliser by coffee and vegetable growers. Over 200,000 leguminous trees, mainly Calliandra, have been planted, togeth- er with several miles of elephant grass strips on the edges of farmers' fields, protecting and stabilising the soil.

Conclusions

Cohesive action by the selected households is important to the operation of the health and breed- ing components of the Goat Model. Once a new group is formed, or an existing group has decid- ed to adopt the goat model all the members of the group need to be made fully aware of their roles and responsibilities. The group needs to select members for training as a buck keeper, a breeding unit manager and as a CAHW. The group must be trained to function as a group, 20-25 has been found to be the ideal number for a group. The group leader needs to be trained in lead- ership skills, responsibilities, stewardship of group resources, record keeping and conflict resolu- tion.

All farmers need to be taught how to look after the cross-breed goats to maximise the goat's potential. The procedure is considerably different from local practices and all farmers need to be educated in the structure and functioning of the goat model.

The ways in which farmers can improve the feeding of goats by growing fodder crops and using wild plants need to be explored and tested by farmers at a local level. Good experience needs to be shared within the group. Conserving feed, from one season for feeding in another needs to be explained clearly and tested by farmers.

The heart of the goat model is the development of a reliable health care system to which farmers can turn for guidance to prevent their goats becoming ill, and by which they can obtain help if they do fall ill.

Due to the success of the project it was tempting to deviate from the strict breeding protocol. Any repeat project must ensure an adequate supply of breeding material for the size of the project. As this was not properly addressed in this first instance it is now a matter of very great urgency for Toggenburg goats to be bred in viable units throughout East Africa if the gains of the project are not to be eroded and subsequent development is not compromised.

These Breeding Units which comprise of three females and one buck need to be established at the community level to ensure a continuous supply of bucks for buck stations. It is not necessary to have a Breeding Unit for every farmer group. The units need to be located strategically throughout the area of the project and managed well because they contain valuable breeding stock of benefit to the whole community for generations to come. The goats provided to the breeding unit are given on credit. The same number and sex ratio are repaid to the provider, as weaned kids, to enable a new breeding unit to be set up in a new location.

The most cost-effective method of organising mating systems is to form Toggenburg buck stations where the buck lives and is accessible to all group members. To avoid inbreeding the bucks do not remain at one station for longer than 18 months so there is no danger that they will mate with their daughters. This buck rotation is an essential part of the model that needs to be well co-ordinated.

The buck station keeper who feeds and manages the buck must be trained to record buck services, collect fees, and promote the bucks use in the community. The keepers also need to be trained in basic skills so they can act as a source of advice and training to the whole community.

The importance of the MGBA and MAHWG was known to be vital from the start of the project but FARM-Africa underestimated the scale of the role they would be required to undertake. They oversee the breed improvement component by co-ordinating the buck rotation, establishing new buck stations, and setting up new breeding units.

In future projects the size and scope of the equivalent organisations will depend on the scale of the goat model set up. The associations will need representatives from each farmer group and will need to prepare a constitution and elect a committee to manage their affairs.

The system of delivering services to goat keepers described above is effective, as it not only supports the introduction of a new system of production, but also it stimulates its growth and expansion to many new families, districts and even countries. The key to this is that all necessary inputs are in the hands of farmers and the private sector working as a unit. The breeding and animal healthcare system is now ready to scale-up and FARM-Africa is exploring the potential of using a franchising business model for that purpose. Franchising offers the potential for economies of scale and quality assurance systems.

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Figures

	Responsibilities
Farmer groups	Manage goat credit, buck management, dispute resolution
Breed Association	Manage buck rotation, register goats with stud book, market goats outside district
Buck keeper	Care for buck, promote its use & collect breeding fees
Group breeder	Care for pure Toggenburgs and ensure supply of pure replacement bucks
Qualified veterinarian	Oversee animal health care system, ensure drug supply, treat difficult cases, alert government vet. to disease outbreaks
Livestock technician	Treat simple cases, sell basic drugs to farmers, provide advice, refer cases
Community Animal Health Worker	Treat simple cases and promote preventative health care, such as anthelmintics, refer cases
Government extension staff	Provide initial training, support breeder association
FARM-Africa	Provide start-up funding, train extension staff and farmer leaders, monitor and evaluate performance

Figure 1.

Table 1. Roles and responsibilities of the key participants for community based goat improvement programmes

Table 2. The milk production and survival rates of various breeds of goats in the FARM-Africa project 1996-2006*.

Breed	Mean milk yield (ml/day)	Mean lactation length (days)	Mean total lactation (litres)	Mortality rate before weaning (%)	Adult mortality (%)
Local (n = 300)	0.2	70	14	15-20	10
Toggenburg (n = 150)	2.7	186	503	9	6
50% Toggenburg (n = 800)	2.6	200	520	7	5
75% Toggenburg (n = 350)	2.8	193	536	8	5

* Source Camillus Ahuya, personal communication (2007)

Table 3. Goat prices for different breed types in 2007**

Breed type	Price/kg + premium for breeding value (US\$)	Total price (US\$)
Local	1	25
75% Toggenburg	3 (+ \$31 for breeding value)	154
Pure Toggenburg	9 (+ \$46 for breeding value)	415

**The value of various breeds of goat in Kenya in 2007. Source: FARM-Africa: Camillus Ahuya, personal communication (2007)

Table 4. Typical local goat enterprise performance (4 females producing 5 kids of which 3 are sold)

	Quantity (per year)	Unit Price (US\$)	Total value income and stock (US\$)
Manure	130 kg	1	8
Milk	14 litres	0.5	7
Sales, kids	3	26	78
Total			249
COSTS			
Labour		184	184
Total			184
Net benefit			65
Stock value	6	26	156

Table 5. Typical 75% Toggenburg goat enterprise (4 females producing 5 kids of which 3 are sold)

	Quantity (per year)	Unit Price (US\$)	Total value of income and stock (US\$)
INCOME			
Manure	260 kg	1	16
Milk	2144 litres	0.5	1072
Sales	3 (75% Toggenburg)	153	459
Total			1547
COSTS			
Mineral licks	4	2.5	10
Veterinary costs			180
Labour	1	369	369
Total			559
NET BENEFIT			988
STOCK VALUE	6	153	918

Source: FARM-Africa: Camillus Ahuya, personal communication (2007)

Table 6. Proportions of total animals cared for by CAHWs [‡]	
Animal	Percent of total livestock
Cattle	39
Goats	31
Poultry	22
Other	8
Total	100

Figure 3.

1114

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