

SHEEP AND GOATS, MEN AND WOMEN: HOUSEHOLD RELATIONS AND SMALL
RUMINANT DEVELOPMENT IN SOUTHWEST NIGERIA

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INTRODUCTION

Farming systems in humid West Africa reflect rural household needs, as is typical of family farming systems throughout the world. These systems are small-scale by nature, and incorporate a degree of flexibility that enables them to be adapted to changes in family circumstances. Rural families dynamically exploit their environment to maintain or improve family welfare.

In West Africa, rural families have been particularly successful with export crops such as cocoa, which has been developed by millions of small-holders in Ivory Coast, Ghana and Nigeria. Although governments have exploited cocoa producers through taxation, many families have incorporated cocoa into their farming systems and use it to strengthen traditional societal ties (Hill, 1963; Okali, 1983). Cassava is a recently introduced food crop that is widely cultivated by farm families in the zone, with another effect: it has dramatically increased the economic independence of women, and initiated major changes in family relations (Ottenberg, 1959). In contrast to rural families, agricultural development institutions have been unable to use or mimic the apparent flexibility of these systems to further improve family welfare.

Farming systems research should attempt to institutionalize this flexibility, and this paper examines the role and potential of small-scale sheep and goat production in the zone, presenting two alternative development models. The models allow for two extreme situations in which owners might find themselves, and each model incorporates some choice about its implementation.

Small ruminants, by virtue of being owned by men and women independently, their widespread distribution, and their market and biological potentials, are a unique development resource. Small ruminant production is a minor farm enterprise not presently integrated with cropping. With low capital and management inputs,

and in spite of significant mortality due to disease, small ruminant production offers excellent but highly variable returns. The International Livestock Centre for Africa is evaluating small-scale sheep and goat production systems based on disease control and improved nutrition. An "alley farming" model links crop and livestock production through leguminous browse trees, while an "intensive feed garden" model is used where animals are confined and land is scarce.

In the following pages, the background and rationale underlying these development models is outlined. Each model is evaluated in the light of resources available to either men or women. Household relations, particularly decision making processes related to the potential use of browse as fertilizer or feed, are highlighted.

SHEEP AND GOATS

The humid zone of West Africa has traditionally depended on areas to the north to meet its demand for animal protein. The disease trypanosomiasis has generally limited livestock production in the humid zone, and most resident animals are the indigenous, trypanosomiasis-tolerant dwarf breeds. Dwarf sheep and goats are the most common ruminant species found; there were an estimated 14 million dwarf sheep and goats within the zone in 1979 (Jahnke, 1982).

Small ruminants are a major under-exploited food and capital resource in the humid zone. There has been no systematic attempt by farmers or development agencies to increase small ruminant production, and small ruminants are rarely mentioned in descriptions of farming systems in the area. These animals are raised exclusively for meat, providing a flexible financial reserve and playing important social and cultural roles. The majority of rural owners are male farmers involved in food and tree crop production, or women involved in food processing or marketing. Both

groups of owners have relatively limited skills in livestock husbandry.

Individual owners typically keep 2-4 breeding animals; goats are more commonly kept than sheep. Although small ruminant management systems vary within the zone, the vast majority of animals are free-roaming and receive only limited management or capital inputs. In general, owners of free-roaming animals provide no special feed, housing or veterinary care. The major investment is in acquiring new stock; however, caretaking of animals is commonly practiced, greatly reducing the initial cash investment.

Mortalities from disease are high, particularly among goats. Peste de petits ruminants (PPR), a rinderpest-related viral disease, is perhaps the most important cause of mortality, and can quickly decimate whole flocks. Small ruminant production therefore entails a considerable degree of uncertainty. Despite this high mortality, the potential returns from sheep and goat keeping under the traditional management system are high (Upton, 1984).

Sheep and goat production is one of a number of minor farm enterprises that lend a measure of diversity to the larger farm economy. Small ruminant keeping is not generally integrated with crop production in the zone. No forage crops are grown, and manure is not returned to cultivated plots.

Several examples can be cited to illustrate the flexibility of the small ruminant production system in responding to changes in the production environment, as well as to more general shifts in the rural milieu. Sheep, for example, are consumed primarily during Muslim religious holidays, whereas goats are consumed for all ceremonies throughout the year -- including births, deaths, and marriages -- in addition to being used at festivals. Demand for goats is therefore consistently high. This distinctly seasonal demand, reflected in the availability of southern dwarf sheep, is

illustrated in Figure 1 for four rural markets near Ibadan. There is a clear price premium for male sheep during the festival period, and some early purchasing for fattening and re-sale takes place.

Largely because of this price premium, sheep appear to yield a higher output and rate of return than goats. Goats are considerably more prolific, but sheep are bigger, heavier, and experience lower mortalities, in addition to fetching a higher price (Upton, 1984). Sheep, however, require somewhat more attention than goats because of their tendency to wander and to damage crops. They are, therefore, often tied or tethered during the cropping season. Small-scale sheep production is a somewhat more specialized enterprise than goat rearing, demanding greater management input while offering higher returns. This specialization, often involving older men with more available time, is a direct response to market forces, and illustrates one potential development path for small ruminants in the zone.

The complementary role of small-stock production is evident in the combination of food processing and goat production common among women in many rural areas. Household wastes, combined with cassava peels or other crop by-products of small-scale commercial food processing, are important feed resources available without direct access to land or to fodder crops. Individual ownership of a relatively limited number of animals makes this an attractive and efficient subsidiary enterprise.

As is typical of many farm enterprises, and livestock enterprises in particular, the characteristics of the small ruminant production system are determined largely by external forces. In southeast Nigeria, for example, traditional husbandry systems are being modified by high human population density and increasing pressure on agricultural land. As land use becomes more intensive, free-roaming animals pose an increasingly important threat to growing crops. Indeed, in many locations in this region, free-roaming

animals have been banned; sheep and goats are now kept in pens or tethered.

A recent survey of 26 Local Government Areas (LGAs) in four southeastern states indicates that restriction of animal movement exists where open, derived-savanna vegetation predominates, but is less common in more heavily forested areas (Table 1) (ILCA, unpublished data). In 15 LGAs in Anambra and Imo states, for example, 86% of households restricted movement of their animals either during the whole year or at least during the cropping season. In contrast, only 16% of households in the more heavily forested Rivers and Bendel States restricted animal movement at any time in the year. It would appear from these data that restriction of animal movement is a forced response directly related to the intensity of agricultural land use.

Once animal movement is restricted, housing, feed and water become critical. Restricted animals require a higher level of input and management than free-roaming animals, and this is most clear in the need for daily feed. Under these conditions it seems likely that small ruminant production might evolve from a low input minor farm enterprise to a more intensive and specialized enterprise. This may be particularly true as specialized feed production systems are introduced to fulfill the daily demand for high quality feed.

The further development of sheep and goat production to benefit rural households in the zone will need to exploit not only the biological potential of the animals, but must take advantage of traditional production relations within the family. Perhaps the most important of these relations are those between men and women, that determine the control and use of resources.

MEN AND WOMEN

Since Roserup (1970) published her work, considerable concern has

been expressed about the way in which men and women are frequently unequally involved in the development process. Women invariably participate only indirectly through men, even in countries where they traditionally played prominent independent roles in political, economic and religious spheres (Oppong et al, 1975). In agriculture, this situation can be partly attributed to the fact that in many countries land resources are traditionally held by men on behalf of group members.

All the available evidence suggests that small ruminants are owned by a large proportion of the rural population in the humid zone, with ILCA's village surveys in southwest Nigeria indicating that up to 75% of the population in some villages may own animals (Table 2). Small ruminants are also widely reported to be owned by individual men and women rather than by domestic units or kin groups. In a number of respects, therefore, small ruminants are a unique resource, the development of which poses important questions about the extent to which men and women can develop their own resources.

Sheep and goats may be grouped together as small ruminants, but they differ in a number of ways, including the ways in which they are owned and managed. Goat ownership is far more widespread than sheep ownership, and in this respect ILCA's village data from southwest Nigeria are supported by market survey information. In many communities and households, sheep are banned altogether because of their potentially destructive grazing habits, as well as for ritual reasons. The latter is true of a number of ethnic groups, and not only of the Yoruba, who are the dominant ethnic group in this southwestern area.

Women in particular often argue that they are unable to keep sheep because of their grazing habits. A large part of a woman's day is spent around the compound; if she goes to farm she returns early to cook or complete other tasks around the house. Goats, which are notorious for staying near the house and even sleeping in outdoor

fireplaces, appear the more appropriate livestock for women with such commitments, and women in fact restrict themselves almost entirely to goat production (Table 3). Sheep, which are largely kept by men and older people, are often in the fields or on the roadside, and require a greater degree of attention than goats.

Providing feed supplements in the form of crop by-products is the main management intervention in small ruminant production in the area, and here it would appear that women actually have a distinct advantage over men. These supplements are kitchen wastes which are available daily if food is cooked in the house, or by-products of food processing, both of which are exclusively female concerns. Yoruba women in particular are less involved in farming than in other activities such as food processing and trading (Table 4).

Like ownership, livestock management involves different responsibilities, benefits, and potentials for different household members. Livestock usually require more continuous management than crops. This creates peculiar problems in locations such as parts of southwest Nigeria, where people often retain two residences, one in the village or farm camp and one in town. Most festivals and ceremonies are celebrated in the urban home, and at these times animals are unattended for long periods. Rural Yoruba women, who are also usually wives, are the more regular rural residents. Even when men are resident, they work away from the house, and women more commonly take care of the animals. Their responsibility may even extend to animals owned by co-wives or other relatives who normally live in urban areas. For this caretaking service, rural residents usually acquire the kids or lambs of breeding animals. Caretaking is common in southwest Nigeria, and borrowing for breeding is practiced throughout the south. This probably reflects the overall shortage of breeding stock and the fact that markets are unsuitable for purchasing breeding stock because they are a source of disease.

Although in most cases small ruminants are owned by individuals,

they are largely consumed at public ceremonies during the celebration of births, marriages, deaths, and religious events. After these requirements are met, any surplus is sold. Animals produced in the south are generally insufficient for these purposes (Table 5), and few animals are available for the market. In the south, therefore, the market potential for these dwarf animals appears to be almost unlimited. This is true even in rural areas which presently import northern animals from the major urban markets to meet their own internal demand.

Although small ruminants are referred to here as a minor farm enterprise, they may be an important income source for individual owners. To fulfill their obligation to provide daily food, women require small amounts of cash on a regular basis. This they can earn from selling food, palm kernels, and firewood. Small ruminants, on the other hand, are one of a limited number of sources of income large enough to be used for capital investment. They are therefore a highly suitable development resource which may help equalize development within the rural areas, while also providing capital for other activities. However, this is only possible if appropriate development models are used.

A DEVELOPMENT APPROACH

Since small ruminant production is an ubiquitous minor farm enterprise in the humid zone of West Africa, the improvement of small ruminant production and productivity poses several unique challenges. The small basic management unit of 2-4 animals, that lacks almost all of the elements of animal management, appears to leave little upon which improvements could be based. In addition, limited livestock husbandry skills, and the present low level of investment in sheep and goat production, would seem to exclude most "traditional" livestock development strategies. Despite these problems and the significant risk due to disease, small ruminant production continues to be economically attractive, and makes an

important contribution to animal protein supplies in the rural areas. The overall demand for small ruminants in the zone can be met only with the importation of large numbers of northern animals. These importations fail to control large price increases during times of peak demand, thus indicating the strength of demand and an important potential market for additional southern animals (Okali and Upton, 1984).

Small ruminants are a widely available resource with clear potential for more efficient exploitation. A fundamental choice in development strategy must be made about the role an improved small ruminant production system might play in the larger farming system, and consequently, the approximate scale of the improved management unit. Sheep and goat production is currently a subsidiary farm enterprise which adds to the diversity and presumably the stability of the household economy. The relevant development choice is to either strengthen the role of small-stock production as an easily accessible minor farm enterprise, or to develop specialized production systems by which small ruminant production becomes the primary economic activity for a more limited number of individuals.

While the latter approach is often advocated because of its potential impact on aggregate meat supplies, it can be argued that in light of the widespread distribution of sheep and goats, even relatively small increases in productivity will have a major impact on overall meat supplies. In addition, enhanced small-holder production systems can be expected to make an important contribution to rural welfare.

The rationale for a development strategy which seeks to enhance an existing subsidiary farm enterprise is founded on the principle of complementarity between activities within the farming system. Complementary activities generally permit more efficient use of resources such as land, labour and capital, and in so doing increase the overall returns to the system. Complementarity plays an

important role in complex traditional farming systems, implying that there is some mutual benefit to two or more activities: a primary example is complementary crop and livestock activities. Appreciation of complementary relationships, particularly those involving minor farm enterprises, de-emphasizes the importance of single enterprise maximization as an agricultural development strategy. Risk reduction, which is assumed to result from complementarity among farm enterprises, remains a major goal of small-scale producers, and should not be discounted during development.

As indicated earlier, small ruminant production in the humid zone of West Africa is relatively independent of other farm enterprises, the notable exception being the strong complementarity between goat rearing and small-scale food processing by village women. The natural links between cropping and livestock husbandry have never developed within much of the zone because the readily available vegetation is generally sufficient to fulfill the food requirements of the low density small ruminant population. Systematic fodder production is therefore not practiced, and manure of free-roaming animals is essentially lost to the system.

The present state of low-level equilibrium is presumably maintained by the disease PPR, which severely restricts the expansion of the sheep and goat populations. Widespread control of PPR would be expected to have major effects on the production system, not the least of which might be the eventual development of feed deficits. Indeed, preliminary results from ILCA's Small Ruminant Programme in Ibadan, and from other field studies in West Africa, indicate that under village conditions, PPR can be effectively controlled with an annual vaccination of tissue culture rinderpest vaccine (TCRV). While widespread vaccination of small ruminants with TCRV will depend on large-scale government programmes similar to those for rinderpest control in cattle, the cost-benefit relationship of such an activity appears very attractive (ILCA, unpublished data).

The goal of ILCA's Small Ruminant Programme is to develop improved sheep and goat production systems that can make a significant contribution to income and to overall farm stability, and that remain subsidiary farm enterprises. A major component of the approach is improved feed, the need for which should become increasingly evident as PPR control causes animal populations to grow. Where possible, the Programme seeks to link small ruminant production with crop production, the major farm enterprise, thus developing a new measure of complementarity within the farming system. The primary elements of this new relationship are a chronic soil fertility problem manifested through low crop yields; a projected livestock fodder shortage; and fast-growing leguminous browse trees.

THE MODELS

Two specific models of improved small ruminant feed production are being developed and tested, both of which are predicated on the control of PPR. In areas such as southwest Nigeria, where animals are free-roaming, integrated alley farming systems linking crop and livestock production are emphasized. In those areas such as southeast Nigeria, where animal movement is restricted, a more specialized feed production system called an "intensive feed garden" is being developed.

The fast-growing leguminous trees Leucaena leucocephala and Gliricidia sepium are central elements in both models. These trees can provide high quality fodder and nitrogen-rich mulch for crop production. If they are properly managed, the trees will provide fodder throughout the year. Unlike grasses and some herbaceous legumes, browse shows relatively little decline in nutritional quality during the dry season. Trees have traditionally played an important role in the farming systems of the humid zone of West Africa, and the browse trees forming the basis of the two models can

be seen as an extension of this tradition.

The integrated alley farming approach is based on the initial work of the Farming Systems Program of the International Institute of Tropical Agriculture (IITA) (Kang, Wilson and Sipkens, 1981). Crops are grown in 4 meter wide alleys between rows of densely planted trees, which are pruned 3-5 times during each growing season. Trees managed in this way can produce 4-8 tonnes of mulch dry matter/hectare/year, yielding over 100 kg of nitrogen for crop production.

The trees in an alley farming system are effective nutrient pumps, bringing minerals from the lower soil profile to the surface where they can be used by the growing crop. If leguminous trees are used, significant quantities of nitrogen are added to the soil indirectly from the foliage (as mulch), and directly from decaying roots and nodules. This large input of minerals and organic matter can apparently support continuous cropping at intermediate yield levels with little or no fertilizer. In addition, alley farming addresses two issues related to the decreasing efficacy of the bush fallow strategy for maintaining soil fertility in the humid zone -- a rural labour shortage for bush clearing, and an inability to maintain soil fertility with ever shorter fallow periods.

Small ruminant production can be integrated with alley cropping through the cut-and-carry feeding of some portion of the tree foliage. The cut-and-carry system is highly flexible, and can be used with free-roaming or confined animals. Depending on the availability and quality of other feed, a range of browse feeding strategies can be developed. Browse may be fed, for example, as a protein supplement or as a sole feed, and may be used on a year-round basis or only during the dry season. Feeding browse to only particular classes of animals, such as growing weaners or lactating dams, may be desirable in some circumstances. In order to give sufficient benefit to the crop and avoid the possibility of soil

mining, approximately 75% of the available tree foliage should be applied to the soil as mulch. An annual tree foliage yield of 4 tonnes of dry matter per hectare would then give 1 tonne for feed. This amount would be sufficient to support 14 adult animals per hectare as a supplement (25% of feed intake), or 4 animals per hectare as a sole feed.

At a somewhat higher management level, short-term alley fallows, including browse trees, can be grazed. While the cut-and-carry system is applicable to both sheep and goats, the goats' propensity to de-bark the trees excludes them from the grazing system. A preliminary evaluation of the grazed fallow system indicates that with continuous grazing, 12-16 breeding ewes may be supported per hectare. At this stocking rate, potential returns from alley grazing are similar to those expected from maize/cassave intercropping. ILCA has also developed an inexpensive living fence woven from Leucaena (Sumberg, 1983), eliminating the need for purchased fencing, which usually limits the potential of grazing systems for small-scale farmers.

The use of natural fallow vegetation has been stressed to avoid the problems inherent in the establishment, management and eventual eradication of introduced pasture species. In any case, it would probably not be realistic to establish pasture species for the small flocks and relatively short-term fallows envisioned in this system. The grazed fallow system as it is now being evaluated consists of a rotation of blocks of alleys with 3-5 years of alley cropping followed by 2-3 years of grazing.

The intensive feed garden is in an earlier stage of development and evaluation, but currently consists of a small plot containing browse trees and productive fodder grasses. The objective of the garden is to produce the maximum amount of seasonally useful fodder from a limited land area. The garden is predicated on intensive nutrient cycling promoted by the periodic application of manure, bedding, and

refused feed from confined animals. The intensive feed garden is a specialized feed production strategy designed to address the problem of feed shortage with confined animals. The garden does not have any direct relationship to food crop production.

While the alley farming and the intensive feed garden models are intended for use under different circumstances, their eventual adaptation may result in considerable overlapping. The reasons for this can be illustrated by a discussion of the requirements of each of the respective models.

Alley farming is primarily a crop production strategy, and as such requires both long-term access to land and a continued interest in food crop farming. The alley farming model currently used in ILCA's on-farm research, and in a government sponsored pilot development programme, is based on an initial plot of 0.33 hectare. Since the average farm in southwest Nigeria ranges from 1 to 5 hectares, the initial alley farming plot is a relatively small part of the total farm. The trees are established from seed within a food crop, and during the establishment year weeding takes place when the crops are weeded. Tree establishment therefore requires little additional labour. While the labour necessary for tree pruning during subsequent years is not unsubstantial, it must be remembered that alley farming provides for continuous cropping, thus greatly reducing overall labour for clearing of fallow lands.

The intensive feed garden is a small plot, 200-500m², used solely for fodder production. Labour for land preparation, planting, and establishment is therefore additional to other farm labour demands. The small size of the garden, however, insures that these labour inputs will be limited. Since the feed garden should eventually make a significant contribution to the feed requirements of a flock of 2-5 animals, long-term labour required for locating and transporting cut-and-carry feed may actually be reduced.

A feed garden could be located on a plot of land unsuited to crop production, which might diminish problems of land availability, particularly for women not actively engaged in farming. While the feed garden was originally conceived in relation to the confinement of small ruminants, it could equally well be used to supply supplementary feed to free-roaming animals. This option might be particularly attractive to women who have limited access to land or who do not have sufficient labour resources to initiate alley farming. At the same time, there is no reason why alley farming cannot be used to supply feed to confined animals. Alley farming was not considered a viable first option in southeast Nigeria because the land preparation techniques required for yam cultivation produce large mounds with relatively little topsoil between them for tree cultivation.

Both of these models are based on the presumption that any development in small ruminant production must take place in the context of existing farming systems and the economies which these systems are designed to satisfy. While the positions of men and women in relation to small ruminant production have already been mentioned, it is necessary to examine the models in the context of intra-household processes as a whole.

INTRA-HOUSEHOLD PROCESSES AND DEVELOPMENT MODELS

From the discussion so far it is evident that present free-roaming systems of small ruminant production, particularly goat production, do not make heavy demands on time, cash or management resources. Matthewman (1980) emphasizes also that as the land used in these activities is the common land of the village, even the landless may engage in small ruminant production. Rural women are particularly disadvantaged in improved systems requiring independent access to land and considerable labour inputs.

Women's access to land varies within and between ethnic groups in

the zone. In most groups, both women and men living in their home areas have land use rights as community members. Yoruba women may inherit land from their fathers just as Yoruba men do (Marshall, 1964). Away from their home areas, as strangers, women may acquire rights through others, usually their spouses, or they may rent land (Green, 1964). In Yorubaland, the dual practices of exogamy and patrilocal residence place most married women in the position of strangers, and nowhere is independent farming emphasized as an activity for them. Among the Ibo of the southeast, a married woman's farming rights are in her husband's village, and the amount of farm land she may use depends on his standing in the community.

If land is plentiful, as it is in many parts of the humid zone, the ability to mobilise labour is more important than land use rights. For women with young children, their own time is a particularly valuable resource. Married women as a whole, because they must provide food for men and children, have less time to spend on their own economic activities. Although roles are commonly shared among female household members in traditional rural and urban communities, rural households are no longer always large, and consequently labour, even for domestic work, is limited. Current household statistics from a large village in Oyo State, Owu-Ile, where the population is permanently resident, demonstrate this clearly. With 40% of the population being adults, just over 33% of the occupied houses have only one female adult while a further 25% have two female occupants. This contrasts strongly with the commonly held view of the large rural household.

The situation is the same in households where women are in polygamous unions, since co-wives rarely live in the same house. In each of ILCA's 16 alley farming households in Oyo State, there is only one resident wife regardless of whether she has one, two or three co-wives.

Alternative employment opportunities have led to a reduction in the

population of working men in rural areas, while widespread education has clearly reduced the available child labour upon which women, in particular, would rely for assistance. Although some labour is available to be hired, only the wealthiest farmers can and do pay promptly.

While the differences in individuals' access to resources are reasonably well documented, their strategies for exploiting these resources are poorly understood. Among the Yoruba, women as daughters, sisters, wives and mothers have independent responsibilities. In addition, husbands and wives each contribute separately to the upkeep of the domestic unit, although responsibilities are not always clear-cut. Women provide food and a large proportion of clothing for themselves and their children. Marshall (1964) demonstrated how reciprocal obligations among kinsmen help women achieve these goals. Households in southwest Nigeria and elsewhere use various means for assisting individuals to fulfill their obligations, in spite of differences in land and labour resources.

In the case of land, more than one household member may plant the same piece of land with different crops. Women often plant vegetables and other crops to meet daily subsistence requirements, while the men may plant the basic staple, a root or cereal crop. Where more than one woman is involved, a farm may be shared between them, a system practiced by Akan cocoa farmers in Ghana. Where women do not farm and have no alternative roles, they may concentrate on processing crops produced by men. Cassava and palm nuts, for instance, have essentially little or no value before processing, and the market for these raw materials is limited outside the rural areas. In these cases, there are frequently monetary exchanges between the parties involved, even if the exchange is between spouse and kinsmen.

The diversity of rural households' agricultural income sources is

illustrated by Ay (1978) for an old cocoa area of southwest Nigeria. About 50 income sources are listed, excluding varieties of the same crop. Among these are about 20 trees and 30 arable crops. Fuel wood is also noted as an income source, particularly for women. For many men in the Badeku area, cocoa is the major source of farm income. Most of the rural area is marginal for food crop production, although he notes that there are wealthy food farmers. In such an area, it is relevant to consider the alternatives to further investment in livestock production. For women, these alternatives may be food processing and marketing, to which small ruminant production is already closely linked. Households, however, need to invest in a variety of items to enable all members to earn incomes with the minimum investment of scarce resources. This is true of all ages and sex groups. In rural surveys, adults are rarely recorded as unemployed or even retired. Farming systems research must consider this since technical innovations may result in individual incomes losses, and thus reduce total welfare. For example, in southeast Nigeria, the introduction of power-operated oil extraction mills caused the women to lose the palm kernels and a portion of the oil. In addition, men lost income because poor quality fruit was not acceptable to the mill (Lagemann, 1977).

The focus of ILCA's improved systems is small ruminant producers who have access to farm land. The alley farming model requires that individuals who grow the trees have an active interest in arable crop farming, which permits them to establish trees at little or no extra cost. The double use of browse as feed and mulch, however, allows it to be used by individuals with different economic roles. The present proposed strategy of allowing 75% of the browse to be used as mulch permits the major benefit to accrue to the individual with direct land use rights, and the major responsibility for producing arable crops. For the Yoruba, this is largely the men. The major issue in intra-household decision making is whether the women will be allowed to use the browse to feed their own animals.

The comparative independence of the West African woman is now well documented. However, she tends to be more independent in her use of money than in other aspects of decision-making. Married women are even reluctant to discuss the decision making process. All the wives of ILCA's 16 alley farmers claimed that their spouses took most decisions, even those connected with the sale of their own animals. They also reported that they rarely disagreed with their spouses on any subject, and that disagreements were in any case rarely voiced. It is clear that these women perceive male-female relationships in terms of dominant male models, as is reported by Karanja (1983) for educated Yoruba women in Lagos. Given this perception, the only way to determine if the trees will be shared is to monitor actual browse use from alley farms.

To date, ILCA has established 16 alley farms on farmers' fields and used these farms to work out appropriate establishment strategies and alternative ways of using the browse. Only in the two oldest farms have the trees grown sufficiently to allow feed to be used. One of the first reactions of the owner of the oldest farm was to confine the animals all the time, and to attempt to use the browse as a sole feed during the dry season when the feed first became available. He had little interest in using the browse as feed during the wet season. This experience suggests even greater flexibility in the alley farming system than had been foreseen.

As yet, no alley farms have been established by women, and the women in the households with the oldest farms claim they have no knowledge of them. In 1984, 30 women are expected to participate in a pilot development project that includes alley farming, organised by the Livestock Project Unit of the Federal Livestock Department. Each of these women has a separate piece of land to farm, or farms her husband's land. The first part of the monitoring work will involve watching and recording men's and women's levels of participation in the establishment of the trees. Browse for use as feed will not be available until the beginning of the second year.

The strategy of alley grazing potentially places some restrictions on the multiple uses of land. Still, it is proposed for fallow periods, and would not therefore cover all the available land at any one time. Moreover, alley grazing is a system for sheep producers who are already somewhat specialized. Sheep rearers tend to be older men in smaller households, where the problem of meeting a variety of needs is less important.

The intensive feed garden, although adapted to areas where land preparation techniques make the establishment of alley farms difficult, also presents itself as a suitable alternative for individuals, both men and women, with little or no interest in farming. Grass cutting and the routine pruning of browse trees is the extra labour demanded. For each adult animal, it is estimated that 1 kg of browse is required to provide 25% of its diet. Since a woman is invariably involved in the daily harvest of food for the house, from her own or her husband's farm, this amount of browse can be collected at the same time with little additional labour.

CONCLUSION

The overall objective of the development approach and models discussed in this paper is to increase the viability of small-scale sheep and goat production. This programme confronts two kinds of issues: highly focussed issues requiring specific technical solutions, such as PPR control, and more diffuse issues related to the links between small ruminants and other components of the farming system. These diffuse issues take on increased importance as the development potential of small ruminants is released through disease control. The challenge to farming systems research in the latter issues is to formalize the processes by which farmers have successfully incorporated other new resources, for example cocoa and cassava, into their systems.

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Table 1. Distribution of free-roaming and restricted animals in 4 states of southeast Nigeria.

Animal movement	State			
	Anambra	Imo	Rivers	Bendel
	----- % households -----			
Restricted year-round	65	48	11	9
Restricted farming season only	27	42	0	12
Free-roaming	8	20	89	79
Number of households surveyed	239	321	244	236

Table 2. Small ruminant flock characteristics in 2 villages in southwest Nigeria.⁽¹⁾

Flock type	Prevalence		Mean flock size	
	Eruwa	Badeku	Eruwa	Badeku
	%	%	Animals/owner	
Goats only	80.3	50.0	3.7	2.9
Sheep only	1.5	22.9	3.0	2.2
Goats and sheep	18.2	27.1	5.4	5.1
All flocks	-	-	4.0	3.2

⁽¹⁾ 59.4 and 74.2% of adult population owning some small ruminants in Eruwa and Badeku, respectively.

Table 3. Ownership of small ruminants by age and sex in two villages in southwest Nigeria.

Age of owner	Goats		Sheep	
	Men	Women	Men	Women
years	% of goats		% of sheep	
29	6.0	3.5	1.7	-
30 - 39	12.0	4.6	15.8	-
40 - 49	25.3	14.7	20.0	4.2
50 - 59	8.2	7.4	19.2	10.0
60 ⁺	10.9	7.4	24.2	5.0
Number of animals	229	138	97	23

Table 4. Occupational distribution of small ruminant owners by age and sex in two villages in southwest Nigeria.

Occupation	Eruwa		Badeku		Total	
	Men	Women	Men	Women	Men	Women
	%		%		%	
Farming only	59	10	53	5	56	8
Trading only	3	50	-	9	1	34
Food processing only	-	-	-	38	-	15
Farming and trading	12	31	16	5	14	21
Farming and other occup.	20	-	31	5	26	2
Other occupations	3	3	-	38	1	17
No occupation	3	6	-	-	1	3
Number in sample	34	32	49	21	83	53

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Table 5. Reasons for animal purchases over a 12 month period in two areas of southwest Nigeria.

Reason	Eruwa		Badeku		All localities
	Farm camps	Town	Farm camps	Village	
----- Number of animals -----					
GOATS					
Festivals	0	3	8	2	13
Ceremonies	9	10	13	28	60
Breeding	1	15	1	-	17
Total	10	28	22	30	90
SHEEP					
Festivals	0	4	12	5	21
Ceremonies	0	2	4	2	3
Breeding	0	1	0	0	1
Total	0	7	16	7	30

Note: A total of 59 people, 43% of those sampled, purchased sheep and goats during the 12 month period.

Figure 1. Mean daily supplies of dwarf sheep and goats in 4 rural markets in southwest Nigeria, 1983.

