Urban and peri-urban production systems

There can be little doubt that two rather different milk production systems can be identified in and around Dar es Salaam (Table 20). One is essentially a sideline economic activity; it is characterised by small herds, feed gathered and grazed from public lands or purchased from boys who cut roadside grass, and direct marketing to individual consumers. The other milk production system is a specialised commercial enterprise that is characterised by larger herds, paddock grazing and marketing to institutions and through kiosks. The other major distinction between these two systems is that one is supported by a relatively high level of indirect subsidy, such that the enterprise never bears the true costs of production. A third production system that some observers believe may be of increasing importance in future years (AustroProject 1996), includes traditional cattle keepers such as the Masai located well beyond any definition of the city's peri-urban zone.

In fact, these production systems also have a distinct spatial distribution, with Type 1 enterprises generally located in higher density, urban areas, Type 2 enterprises generally located in lower density areas on the periphery of the city, and Masai produces located in distinctly rural areas more than 60 km from the city centre.

Table 20. General characteristics of two milk production systems.

	Production system	
Characteristic	**Type 1**	**Type 2**
Objective	Economic sideline	Specialised commercial enterprise
Animal type	Grade	Grade
Herd size	Smaller	Larger
Feed sources	Roadside grazing; purchased cut fresh fodder and hay	Paddock grazing; dairy cake
Marketing channels	Direct to individual consumers	Direct to institutional consumers; kiosks
Level of indirect subsidy	Higher	Lower

The larger-scale specialised producers are of interest in that they can be seen to represent at least one avenue for further development of the sector. These individuals come from a variety of backgrounds: some are active or retired military officers, civil servants, veterinarians and businessmen, and some continue several generations of involvement in commercial dairy production. Their direct involvement in the management of their dairy operations varies from nil to substantial. In any case it is clear that some, and probably many among them are well placed to tap sources of information and inputs as needed. During one interview with a farmer in Kibaha the research team members mentioned the existence of low-cost, odour-baited traps which might be useful for controlling tsetse around his milking area. The farmer immediately offered his own fax number with a request that details be sent forthwith!

In addition to the demise of the parastatal, large-scale producers and TDL, perhaps the most important change in the Dar es Salaam dairy scene over the last decade has been the dramatic increase in the number of grade cattle kept within the city. The future development of the Dar es Salaam dairy sector will to some degree

depend on and reflect the fortunes of these urban producers. There can be no question that developments within the urban production system will impact on the further emergence of specialised producers in peripheral areas, and vise versa. Three scenarios for the future evolution of the urban dairy cattle population are shown in Figure 9, and the likely determinants for each scenario are identified in Table 21. The basic proposition is that if the government's structural adjustment programme is successful, then there will be significantly less motivation for civil servants to keep cattle in urban areas. In other words, if the number of civil servants is reduced, and those remaining receive a living wage, and their ability to divert state resources to support private enterprise is restricted, then the true personal and financial costs of urban cattle will likely become much more obvious.

One can then envisage either the movement of these cattle to peripheral areas as the nucleus of commercial dairy herds that will supplement state pensions after retirement or retrenchment, or the expansion of existing commercial herds in these areas. Another unknown factor is the potential effect of significant increases in the shipment of milk from more distant production areas such as Arusha and Moshi, or the ability of traditional cattle keepers such as the Masai to further exploit urban demand for milk.

Figure 9. Possible scenarios for urban cattle populations.

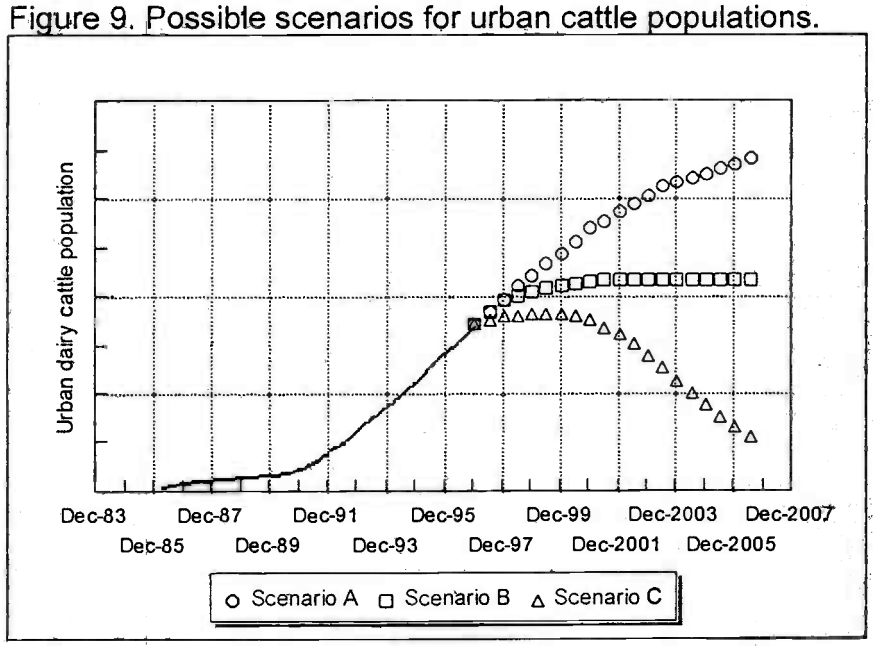


Table 21. Factors affecting the evolution of urban dairy cattle populations.

Scenario	Description	Likely determinants
A	Continued increase in urban cattle population	Purchasing power of public sector salaries remains low; limited alternative income opportunities; little regulation by city authorities; little increase in peri-urban and rural production; no milk marketing regulations
B	Levelling of urban dairy populations	Some combination of factors in scenarios A & B
C	Decline in urban cattle populations	Purchasing power of public sector wages increases significantly; producers have to bear the 'full costs' of production; those serious about dairy move to peri-urban areas and expand; peri-urban and rural milk production increases; city authorities enforce stricter planning and environmental regulations; milk marketing regulations re-introduced and enforced

Summary and observations

The analysis of the Dar es Salaam dairy system indicates the existence of several production systems which are associated with particular areas relative to the city centre. A significant proportion of these producers are located in more rural (i.e. low density) areas of Dar es Salaam and Coast regions. An even smaller proportion of these producers run specialised, commercial operations. There is clear evidence that these specialised dairy operations have larger herds and use significantly different feeding and marketing strategies than their urban counterparts. They also contribute disproportionately to their numbers to the urban milk supply.

Some of these dairy producers are located in the transition zone around Dar es Salaam which might be termed its peri-urban area. The question remains, however, whether there is any analytical or policy value in considering them as 'peri-urban producers' with 'peri-urban production systems', or alternatively as commercial dairy producers who happen to be located in at the edge of the city? This is not to deny the fact that some characteristics of these systems may be inextricably linked to the fact of their location in the peri-urban area, but that does not necessarily establish a solid basis for a separate approach in terms of policy, research, extension and the like.

Milk consumed in Dar es Salaam comes from local (urban and peri-urban) cattle, and from a variety of other production situations ranging from the Masai near Chalinzi to producers in Iringa, Tanga, Arusha and indeed Europe and other very distant places. The future contribution of these various sources to the Dar es Salaam milk system will be dependent on a wide range of factors, some of which can be manipulated by government, producers and consumers, and others of which cannot. There may always be niche markets for specialised products such as cheese and certain manufactured milk products, but the origin (in terms of production system and location) of the supply of bulk liquid milk will depend largely on the economic reality of comparative advantage. Perhaps the two major factors affecting the comparative advantage of milk producers serving or potentially serving Dar es Salaam are climate and transportation costs. While proximity to market and therefore low transportation costs is a major advantage for producers in and around the city, the climate and disease situations continue to pose serious challenges. If transportation networks linking Dar es Salaam with the areas of the country improve, it is likely that local dairy producers will come under increasing pressure from producers located in higher, cooler and more well-watered areas. There may well be some compelling arguments for fostering the development of certain kinds of livestock and agriculture production in peri-urban areas, but it is unlikely that in the long run economics will be among these (also see Ellis & Sumberg 1996).

It is important to remember that the development of dairy production in the Dar es Salaam peri-urban area has been under active discussion for over 50 years. The market existed, land and improved cattle have been available, but to date peri-urban dairy development has been very modest. Should this slow development be interpreted in terms of factors such as rainfall, temperature, forage availability and disease, or policy and institutional constraints, or perhaps a lack of technical competence and motivation on the part of would-be producers? Given the extraordinary growth of urban dairy cattle populations in Dar es Salaam and other

cities in Tanzania over the last decade, it is certainly impossible to argue that a shortage of market demand or of cattle has constrained peri-urban dairying.

The Mwanza and Shinyanga milk systems

The findings of a detailed comparison of the milk systems of Mwanza and Shinyanga are given in a paper entitled 'Milk Systems of Smaller African Cities: Two Examples from Tanzania', which appears as Appendix 1 to this report. The section that follows indicates the main findings and conclusions of this paper.

The results of this study indicate that the milk systems serving Mwanza and Shinyanga urban areas are functional and dynamic: they provide fresh milk to consumers, and well as providing employment and significant cash income to urban and rural based producers and milkmen. The milk systems of the two cities are remarkably similar, in terms of the quantity of milk supplied relative to human population, the relative importance of milk from urban and hinterland sources, and the rate of growth and composition of urban-based herds of grade cattle. The major differences appear to be in the overall size of the systems, the productivity and feeding strategies for urban cattle.

Neither the hinterland nor the urban-based producers have, to date, been targeted directly by policy or development programmes. It is true that some and perhaps many urban producers have benefited to some degree from government and donor investment in Livestock Multiplication Units and Heifer Breeding Units and, as already suggested, by their privileged position within the government bureaucracy (which lets them subsidise their milk production activities). Nevertheless, the dramatic growth of urban-based milk production in both cities appears to provide an example of a successful local development initiative. In evaluating the impacts and implications of this initiative, one question which does arise is whether milk produced by urban-based, grade cattle has simply substituted for milk which had previously come from hinterland areas. In other words, has the growth of urban milk production been at the expense of cattle owners in the hinterlands: is this local development initiative simply another example of educated urbanites appropriating economic opportunities to the detriment of rural people?

Unfortunately, available documentation gives only a very sketchy picture of the nature of the Mwanza and Shinyanga milk systems in previous years. The Annual Report of the Department of Veterinary Science and Animal Husbandry for 1957 comments that there was one 'enterprising individual' who had 'captured the fresh milk market' in Mwanza by collecting milk from Geita District and pasteurising it before sale. The following year the report indicates that several individuals were collecting milk from North Geita for sale in Mwanza, with the quantity varying from 470 litres per day in the dry season to 940 litres per day in the wet season. In addition, 'Mwanza township supplies are further augmented by livestock owners bringing small quantities in bicycles each day from adjacent areas' (DVSAH 1958:38). The report for 1959 mentions Lakeside Dairy which collected from Geita, and pasteurised and bottled it for sale in Mwanza, while the 1961 report mentions that Mwanza is supplied by Katanga Dairy and by 'individual Africans maintaining herds on the outskirts of the town' (Ministry of Agriculture, Veterinary Division 1961:5).

It is clear from these extracts that for at least 40 years milk has been supplied through two main channels: formal dairies which collected, pasteurised and bottled milk, and nearby producers who sold fresh milk directly to consumers. Therefore, neither the hinterland producers nor the milkmen which we describe in this study are recent phenomena. It is however not clear whether the milk collected by the formal dairies was produced by indigenous or grade animals.

There is little data available that allows any reasonable conclusions regarding changes in levels or patterns of milk consumption in Mwanza or Shinyanga. It is clear that since 1990 the price of milk has increased less rapidly that the price of the staple cereal, maize. In Mwanza in early 1990 the cost of 1 kg of maize would buy 0.2 litres of milk. This increased to as high as 0.6 litres during 1991 and 1992, and between early-1993 and late-1995 averaged 0.4 litres. One possible explanation is that the real price of milk declined in response to the increased supply from the rapidly expanding population of urban cattle. Everything else being equal, this would be expected to result in a decline in the amount of milk coming from the hinterlands. However, if the demand for milk is itself sensitive to price, the falling price may have stimulated an increase in overall demand, in which case the effects on hinterland producers are less certain. Further analysis is warranted to determine the wider impacts and effects of the expansion of urban dairy production. This complex situation illustrates once again the difficulty and the fallacy of studying (or promoting) urban food production systems in isolation from food production activities located in other areas (Ellis & Sumberg 1996).

The next stages in the development of the milk systems supplying smaller cities such as Mwanza and Shinyanga will be determined by a wide range of factors, of which government policy is only one. Much would appear to depend on what happens to the population of urban cattle, as continued expansion at the rate seen over the last decade would dramatically increase total milk supply. Thus, a central question is whether the keeping of dairy cattle in the city is a transient phenomenon in response to a particular set of circumstances (i.e. declining real wages of civil servants), that will disappear as the effects of the structural adjustment programme take hold, or is it a more permanent part on the urban economic and land-use scene.

Clearly the government's interest in establishing, and its ability to enforce, regulations relating to urban land use, milk sanitation, marketing and so forth will have important implications for the structure of these milk systems. Will hinterland producers step in to supply the urban demand if more restrictive municipal regulations and the loss of job-related subsidies make urban milk production less attractive? Will the urban producers simply move their cattle to peri-urban areas? What combination of factors will motivate hinterland producers to move from the opportunistic strategies currently pursued to more deliberate milk production and marketing?

One conclusion from this study is that in the light of the very poor track record of the government in relation to the dairy sector on the one hand, and the functional and dynamic milk systems seen in Mwanza and Shinyanga on the other, the overarching policy guideline should be one of non-interference. Left to their own devices

producers and consumers have responded to new opportunities and new constraints such that milk is widely available and significantly less expensive that before. At the present time the segmented market serves both producers and consumers, and attempts to unify or formalise it can only be justified on public health grounds. So far the data to support any such moves have not been forthcoming.

Egg and poultry production in and around Dar es Salaam and Mwanza

Inputs

There are three essential inputs for commercial poultry production: chicks, feed, and veterinary products. These are dealt with in turn in the sections below.
Hatcheries and chicks

At the time of the study there were seven operational hatcheries in the Dar es Salaam area producing approximately 170,000 DOCs per week (Table 22). Almost half of this output is from one hatchery, and over 70% are broiler chicks.[8] These hatcheries pursue a number of different strategies, from simply hatching imported eggs to rearing Parent and Grand Parent stocks. A variety of breeds are supplied, with breeding material originating from Holland, Hungary, France, Israel, Zimbabwe, and South Africa.

Table 22. Currently active hatcheries in and around Dar es Salaam.

			Current production (chicks/week)			
Company ID	Ward	Capacity	Layers	Broilers	Total	% utilisation
1	Kunduchi	85,000	20,000	65,000	85,000	100
6	Kunduchi	?	2,000	nil	2,000	?
28	Kawe	12,500	5,000	1,000	6,000	48
14	Ukonga	120,000	15,000	30,000	45,000	38
16	Ukonga	40,000	1,000	3,000	4,000	10
17 (1)	Bunju	25,000	nil	25,000	25,000	100
10 (1)	Kibaha	53,000	4,000	1,000	5,000	9
Total		335,500	47,000	125,000	172,000	51

(1) using imported eggs

In addition to local production, there is a certain level of importation of both breeding stock and DOCs (Table 23). While the quantity of imported DOCs is far less that 30% of local production, it is interesting to note the steep rise in hatching eggs, which compete directly with locally produced DOCs. DOCs are sold primarily at the hatcheries, at market places and through agents. A typology of hatcheries is shown in Table 24. The vast majority of DOC are supplied by hatcheries which are components of fully integrated operations, including feed, broiler and egg production, processing and retail sales.

[8] Code numbers will be used instead of the actual company names in order to protect confidentiality.

Table 23. Official imports of poultry breeding stock.

	Official imports					Interchick production	
Year	Broilers DOCs	Layers DOCs	G.P. Stock	Parent Stock	Hatching eggs	Broilers DOCs	Layers DOCs
1990	1,240,460	125,245	0	80,050	5,160	?	?
1991	316,584	35,450	3,841	52,925	0	1,324,135	488,155
1992	284,730	40,790	0	48,899	130,000	126,547	466,907
1993	620,500	100,049	0	205,219	818,800	2,100,860	444,373
1994	360,000	25,600	0	81,372	1,773,155	1,868,923	737,192
1995	323,000	39,000	3,315	68,736	1,968,800	1,186,100	173,888

Source: Extracted from....; G.P. = Grand Parent

Table 24. A typology of hatcheries, Dar es Salaam.

Type	Characteristics
A	* Fully integrated, large-scale * Privately owned * Retail through DOC agents * Use own P. and/or G.P. stock
B	* Partially integrated, small-scale * Privately owned * Do not retail through agents * Use own Parent Stock
C	* Partially integrated, medium-scale * Private ownership * Do not retail through agents * Use own P. and/or G.P. stock * DOC production is primary activity
D	* Specialised, small-scale * Private ownership * Do not retail through agents * DOC production is primary activity * Use Imported eggs

Feed

There are approximately 15 operational mills in and around Dar es Salaam that together produce nearly 100,000 tons of poultry feed per year (Table 25, Map 6). Approximately 80% of the feed in milled in rural wards with the remaining 20% being milled in mixed wards. As is the case with DOCs, current production is well below installed capacity, and is dominated by the same firm that dominates the DOC market.

Map 6. Distribution of feed mills and feed agents.

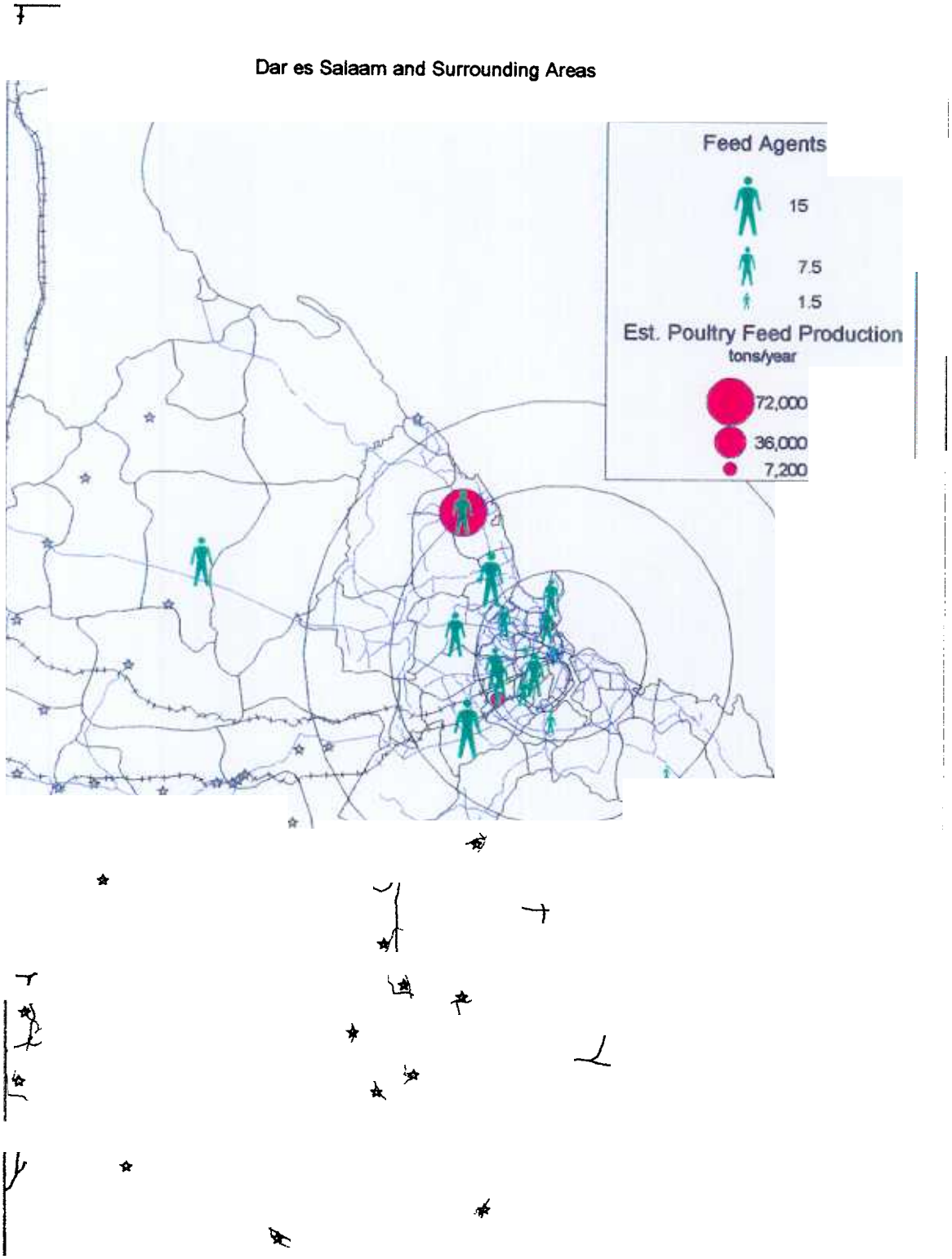


Table 25. Currently active feed mills in and around Dar es Salaam

Company ID	Ward	Capacity tons/year	Production tons/year	utilisation %
1	Kunduchi	72,000	72,000	100
5	Kawe	31,200	0	0
4	Kipawa	31,200	0	0
2	Kinondoni	15,600	4,800	31
		15,600	8,400	54
		5,200	?	
			4,200	100
		3,120	0	0
16	Ukonga	3,120	?	?
15	Manzese	3,120	48	2
10	Kibaha	2,400	1,200	50
28	Kawe	1,560	120	8
32	Ubungo	1,560	144	9
8	Ubungo	1,560	?	?
7	Msasani	720	?	?
13	Ukonga	?	?	?
Total		192,160	90,912	47

Table 26. Typology of feed mills, Dar es Salaam.

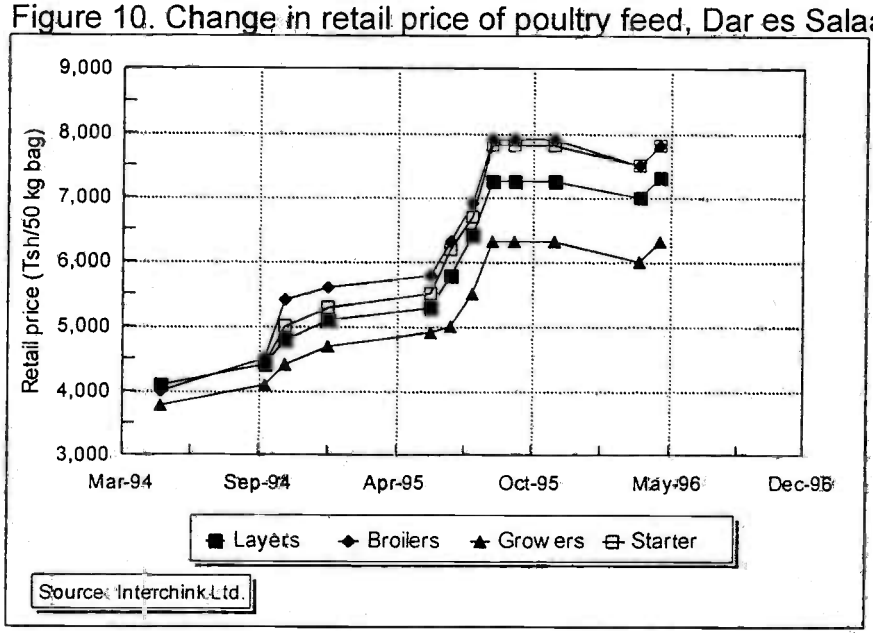
Type	Characteristics
A	* Fully integrated, large-scale poultry operation * Private ownership * Well developed network of feed agents
B	* Partially integrated poultry operation, small-scale * Private ownership * No feed agents
C	* Partially integrated poultry operation, medium/large-scale * Public ownership * Feed milled primarily for own consumption, sale of surplus * Feed production is secondary activity * Poorly developed network of feed agents
D	* Specialist operation: feed production is primary poultry-related activity * Medium scale, private ownership * Use of feed agents for distribution
E	* Specialist operation: only involved in feed milling * Small scale, private ownership * Sell other feed ingredients * No feed agents
F	* Specialist operation: only involved in feed milling * Small scale, private ownership * May sell some feed ingredients * People mill own feed - 'BYO mill' * No feed agents

The retail price of poultry feed varies over products and producers, with broilers mash generally selling for a small premium compared to layers mash (Table 27). Producers clearly have a choice in terms of price, with broilers mash available from 6,000 to 13,888 Tsh/bag, although the relationship between price, quality and consistency is unclear. In the two years since May 1994, retail feed prices nearly doubled (Figure 10).

Table 27. Retail price of poultry feed, March 1995 (Tsh/50kg bag).

Company ID	Layers	Broilers	Growers	Chick
1	7,000	7,600	7,500	6,000
2	6,400 - 6,500	6,500 - 6,700		
14		13,800	13,800	
5	6,700	6,800		
3	6,500 - 7,000	6,700 - 7,000		
7	N/A	N/A		
10	7,200	7,400		
16	N/A	N/A		
15	N/A	7,000		
11	7,300	6,300		
13	6,600	6,300		
32	7,400	7,800		5,500
8	6,000	6,500	6,500	5,500

Figure 10. Change in retail price of poultry feed, Dar es Salaam.



Poultry producers often comment on the quality of the compounded feed supplied by the large mills through their agents. This concern is manifested by the not uncommon practice of purchasing of individual feed components such as fish or blood meal with which to increase what is assumed to be the low protein content of the mixed feed. There were also reports of poultry producers abandoning a particular brand of feed for a period following real or rumoured problems with the quality of the feed. In principle the nutritional characteristics of poultry feed are established and monitored by the Tanzania Bureau of Standards (TBS). However, while standards for layers and broilers mash have been established (Table 28) there is currently little if any attempt to monitor or enforce these. Of the major feed companies only one is a member of TBS 'Certification Mark Scheme', which should provide some guarantee of quality to consumers (TBS n.d.).

Table 28. TBS standards for poultry feed

Feed type	Crude protein	ME
	%	MJ/kgDM
Layers mash	16	12.2
Broilers mash	19	13

Source: LM (TZS 28:1979); BM (TZS 32:1979)

Analysis of 26 samples of layers mash from four commercial mills indicates that there is a significant variability from bar to bag, and that on average the samples were lower in both crude protein and ME than the TSB standards (Table 29). Thus, supplementing these feeds with additional protein and/or energy may well make good economic sense. The difficulty is that there is no way for the poultry producer to tell the composition of the feed within any individual bag and therefore the degree of supplimentation is necessarily somewhat random and therefore inefficient and costly.

Table 29. Crude protein and metabolisable energy (ME) of layers mash samp

		Crude protein (%)				ME (MJ/kgDM)			
Company ID	n =	Range	Mean	S.D.	CV (%)	Range	Mean	S.D.	CV (%)
3	7	8.0	15.3	2.2	14.2	1.7	10.2	0.5	5.1
1	11	3.4	16.1	1.1	6.9	3.2	9.5	1.0	10.8
19	5	8.3	15.7	2.3	14.4	3.3	10.8	1.2	10.9
33	3	3.4	14.4	1.5	10.4	0.8	10.4	0.3	3.3
BYO	10	8.3	15.7	2.3	14.4	3.3	10.8	1.2	10.9

Source: Analysis of samples collected during feed work. Chemical analysis performed by Natural Resource Management Ltd., of Bracknell, UK. BYO = 'bring your own' mills that grind and mix feed components supplied by the customer. BYO mills may also supply some feed components.

Using standard tables to gauge the nutritional characteristics of feed components, the crude protein and ME levels of a number of feed formulations which were given by feed companies, extension agents and individual producers were also estimated (Table 30). It is interesting to note that that while on average the crude protein content resulting from these formulations is adequate, ME is considerably lower that the TBS standard.

Table 30. Estimated nutrient value of poultry rations

		Crude protein (%)				ME (MJ/kgDM)			
Feed type	n =	Range	Mean	S.D.	CV (%)	Range	Mean	S.D.	CV (%)
Layers mash	23	5.9	16.6	1.7	10.2	7.7	8.8	1.7	19.3
Broilers mash	11	5.3	20.2	1.7	8.4	5.3	8.7	1.6	18.3

Source: calculations based on field interviews

Feed agents

Feed agents are key players in the Dar es Salaam poultry system as they link the large, integrated operations with the small-scale producers. There are more than 100 outlets selling poultry feed in and around Dar es Salaam. As shown in Map 6, most of these feed outlets are located within the municipal boundary, and they are concentrated in Ukonga and Kawe wards and in Kibaha ward of Coast Region. 19%, 16% and 65% of feed agents are located in rural, mixed and urban wards

respectively, which contrasts with the fact that 80% of the feed is actually milled in rural wards.

Many feed agents sell individual feed components (fish meal, blood meal, mineral pre-mix), drugs, vaccines and DOCs in addition to the compounded feeds which are the mainstay of their business (Table 31).

The survey of feed agents asked for the approximate quantity of various feeds sold per week. Data presented in Table 32 indicate weekly sales of 10 to over 500 bags, which would indicate annual sales of 600 to 5,000 tons per agent. Agents reported that layers mash constituted between 50 and 76% of all feed sold. Overall, the estimated combined annual sales of feed of the 46 agents surveyed is 10,000 tones, 70% of which is layers mash.

Table 31. Range of poultry-related products sold by feed agents (% of agents who report regularly selling these products).

	Ward					
	Kibaha	Kunduchi	Massani	Ubongo	Ukonga	All
Product	**n = 10**	**n = 8**	**n = 5**	**n = 8**	**n = 16**	**n = 47**
Mixed feed	100	100	100	100	100	100
Feed components	10	38	20	50	44	34
Vaccines & drugs	0	25	20	25	25	19
DOCs	0	13	40	0	6	9

NB: feed components includes protein concentrates such as blood meal and cotton seed cake; mineral pre-mixes, cereals, etc.

Table 32. Sales of all feeds by feed agents interviewed

Location		Reported weekly sales (bags)							
	No. of agents	Max.	Range	Median	Mean	S.D.	Total	Est. annual sales (tons)	% as Layers Mash
Dar es Salaam									
Kibaha	10	200	188	40	64	64	574	1,492	76
Kunduchi	7	100	90	33	42	31	251	653	64
Massani	5	400	390	31	102	168	508	1,321	51
Ubungo	8	250	234	48	81	82	644	1,674	68
Ukonga	16	566	551	54	123	152	1,968	5,117	74
Overall	46	566	556	48	90	116	3,945	10,257	70

Assuming that these 46 feed agents are representative of the total of 113 agents in and around Dar es Salaam, we can estimate that in total they sell over 26,000 tons of feed per year (Table 33) or approximately 30% of the estimated output of the feed mills.

Given the relatively well developed network of feed agents in and around Dar es Salaam it is not surprising that they serve a predominately local clientele. Of 170 customers interviewed at 4 feed shops over a period of 15 days, 65% lived in the same ward in which the shop is located and 15% live in adjacent wards (Table 34). It is clear, however, that there is also considerable variation from one feed agent to

another. Feed agents located on main roads leading from Dar es Salaam are more likely to benefit from sales to individuals outside the immediate area.

Table 33. Total estimated sales of poultry feed by agents in and around Dar es Salaam.

Ward	Agents	Layers mash	Broilers Mash	Total Feed
	no.	tons/yr	tons/yr	tons/yr
Kunduchi	9	632	351	983
Kunduchi[1]	1	204	115	319
Ubungo	9	1,287	608	1,895
Kibaha	11	1,258	486	1,830
Ukonga	17	4,022	1,414	5,437
Masasani	7	983	855	1,856
Kinondoni	6	952	421	1,404
Kigogo	1	159	70	234
Kawe	13	2,062	913	3,042
Manzese	5	793	351	1,170
Tabata	8	1,269	562	1,872
Vingunguti	7	1,110	491	1,638
Kariakoo	1	159	70	234
Kisarawe	1	159	70	234
Mbagala	3	476	211	702
Temeke	4	634	281	936
Keko	9	1,427	632	2,106
Kipawa	2	317	140	468
Total	114	17,902	8,042	26,361

[1] Interchick's retail outlet

Table 34. Location of clientele relative to the feed agent.

		Customers			
Agent ID	Ward	n =	% from same ward	% from adjoining ward	% from other wards
16uk	Ukonga	48	85	0	15
6kb	Kibaha	20	95	0	5
7ub	Ubonga	84	49	30	21
8k	Kunduchi	18	50	6	44
Total		170	65	15	20

The local nature of the clientele is also indicated in the fact that at some shops much of the feed is transported back to the farm on bicycle or simply carried by the purchaser (Table 35). The shops in Ubonga and Kunduchi, which had a relatively high level of sales to persons not living in the immediate area, also had more customers using private vehicles to transport the feed. Given the predominately local clientele, it is possible to use the spatial distribution of feed agents as a proxy for the distribution of poultry producers, for which there is as yet no better data available.

Table 35. Transportation used by feed agent clientele (% of transactions)

		Mode of transport used to collect feed					
Agent ID	Ward	n =	1	2	3	4	5
16uk	Ukonga	49	55	18	24	0	2
6kb	Kibaha	19	37	16	37	0	11
7ub	Ubonga	83	19	11	60	10	0
8k	Kunduchi	27	15	0	67	4	15
Total		178	30	12	49	5	7

1 = bicycle; 2 = hirebike; 3 = private vehicle; 4 = carried; 5 = other

As will be seen in the next section many poultry producers keep only a relatively small number of birds. This is also reflected in the fact that approximately 50% of the purchases of feed made at the agents' shops involved only 1 bag of feed, and 67% involved less than 3 bags (Table 36). These small purchases of feed also seem to reflect a strategy of minimising the amount of capital tied up in poultry production, as many producers purchase feed every day or every other day. Many producers simply send there houseboy, children or spouse to the local feed agent as part of the daily routine.

Table 36. Size of transaction (% of transactions)

			Number of bags			
Agent ID	Ward	n =	1	2	3-4	5+
16uk	Ukonga	48	75	15	0	10
6kb	Kibaha	20	45	15	5	35
7ub	Ubonga	84	38	20	26	15
8k	Kunduchi	18	39	22	6	33
Total		170	49	18	14	18

Of the 42 feed agents interviewed, approximately two-thirds were male, and most were engaged in other agriculture-related economic activities such as poultry or milk production, or owned other feed shops. In terms of their other economic activities, 40% reported that they were not engaged in any, while 22% were also shop keepers or traders and 16% were nurses, teachers, accountants or secretaries.

A typology of feed agents in and around Dar es Salaam in presented in Table 37.

Producers and production

In both Dar es Salaam and Mwanza over approximately 70% of poultry producers interviewed were female. Most producers in Dar es Salaam were engaged in other agriculture-related economic activities such as milk production or farming (Table 38). In contrast, poultry producers in Mwanza were less likely to farm and more likely to have an office job than those in Dar es Salaam (Table 39).

Table 37. Typology of feed agents in and around Dar es Salaam

Type	Characteristics
A	Company owned
B1	Fully integrated individuals: DOC agents & poultry keepers Agent for more than one company Primary or secondary activity
B2	Partially integrated individuals: poultry keepers Agent for one company only Employed full time in poultry Feed agency is primary activity
B3	Partially integrated individuals: poultry keepers Agent for one company only Not employed full time in poultry - side line business Feed agency secondary activity
B4	'Entrepreneurial' individuals Feed agents only Other commercial businesses Agent for one or more companies

Table 38. Agriculture-related occupations of poultry producers.

Occupation	Dar es Salaam		Mwanza	
	no.	%	no,	%
Keeps dairy cows	23	37	18	50
Sells poultry feed	3	5	0	0
Sells other livestock products	3	5	1	3
Operates feed/maize mill	2	3	3	8
Sells DOCs	0	0	1	3
Feed Company employee	1	2	0	0
Farms	25	40	4	11
Veterinarian/ag. extension agent	2	3	3	8
Other small livestock	3	5	4	11
Sells cooked food	0	0	2	6
Total	62	100	36	100

Some producers gave more than one response.

Table 39. Non-agriculture related occupations of poultry producers

Occupation	Dar es Salaam		Mwanza	
	no.	%	no.	%
Shop keeper/trader	8	36	5	15
Other job	5	23	0	0
Retired/unemployed	3	14	4	12
Professional/office job	1	5	14	41
Mechanic/engineer	1	5	1	3
Sewing/tailor	1	5	8	24
Lawyer/doctor/Co. Director	1	5	0	0
Shop employee	1	5	0	0
In school	1	5	0	0
Military/govt. employee	0	0	2	6
Total	22	100	34	100

Some producers gave more than one response

Flock size, survival and production

Data gathered during the survey of customers at the shops of four feed agents around Dar es Salaam indicated that flock sizes ranged from 50 to 5,000 birds, and that 50% of all customers kept less that 360 birds (Table 40).

Table 40. Flock size information from Dar es Salaam customer survey (number of birds).

	n =	Minimum	Maximum	Median	Mode	Mean	S.D.
Layers	109	50	3,000	300	200	555	635
Broilers	76	50	2,500	300	200	591	690
All birds	160	50	5,000	360	200	663	791

Layers

More information concerning the size and structure of flocks and the production systems overall emerges from the detailed interviews with producers. Taking layers first, the median and mean number of birds per farm in Dar es Salaam is somewhat greater than that found during the customer survey (Table 41), and maximum, median and mean flock sizes in Dar es Salaam are considerably higher that those in Mwanza. While in Dar es Salaam half of the producers interviewed had less that 600 layers, in Mwanza 50% of those interviewed had less that 175 birds.

Table 41. Total number of layers reported per farm.

	Count	Minimum	Maximum	Median	Mode	Mean	S.D.
Dar es Salaam	51	65	4,470	600	650	834	909
Mwanza	47	30	1,443	175	260	275	309

There is a small difference in the number of batches of birds, with the median being 2 in Dar es Salaam and 1 in Mwanza (Table 42). This would appear to indicate a more sophisticated strategy on the part of Dar es Salaam producers, with new batches of birds being established and grown before the previous batch is culled, thus ensuring more continuous production.

Table 42. Number of batches of layers reported per farm

	Count	Minimum	Maximum	Median	Mode	Mean	S.D.
Dar es Salaam	51	1	5	2	1	1.8	0.9
Mwanza	47	1	3	1	1	1.4	0.6

There is considerable variation in the survival percentage of layer flocks, but as illustrated in Figure 11 and Figure 12, survival over time has some relationship to the ln of the age of the birds. Thus, there is a relatively steep decline in survival during the first months of the life of a flock, after which survival % declines much more slowly. For Dar es Salaam flocks between 1 and 20 weeks of age (i.e. approximate point of lay), 56% had a survival % of less than 90%, and 35% had a survival % of less than 75%. For Mwanza layer flocks, between 1 and 20 weeks of age, 31% had a survival % of less than 90%, and only 8% had a survival % of less than 75%. Interchick uses an assumption of 90% survival for layers in the financial calculations which accompany its promotional material.

Figure 11. Survival of layers over time, Dar es Salaam

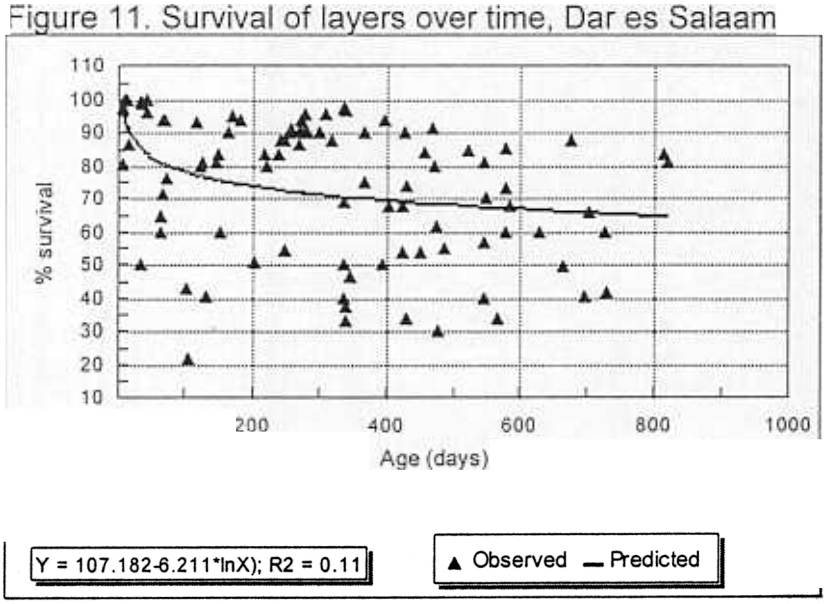
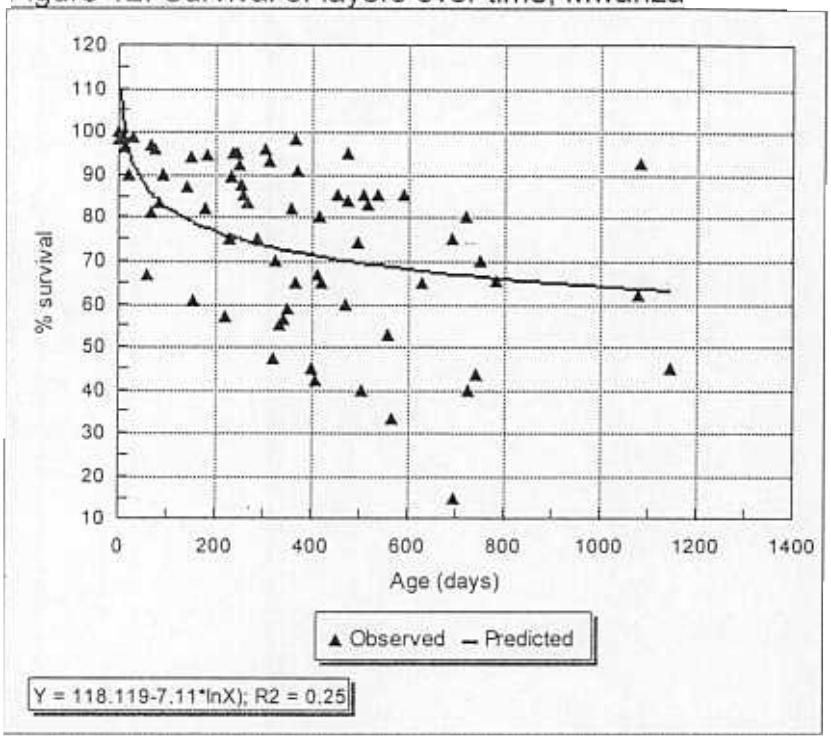


Figure 12. Survival of layers over time, Mwanza



The reported productivity of layer flocks also varied considerably. Producers reported gathering from less than 0.1 to 0.9 eggs/bird/day from batches laying at the time of the interviews. Overall producers reported an average of 3.5 eggs/bird/week in Dar es Salaam and 4.2 eggs/bird/day in Mwanza (Table 43). These figure compare to Interchick's use of an assumption of 5 eggs/bird/week in its financial calculations. In Dar es Salaam only 20% of flocks reported productivity equal to or above 5 eggs/bird/week, while in Mwanza 40% reported productivity above this mark.

Table 43. Eggs produced per bird per week (based on individual batches)

	Count	Minimum	Maximum	Median	Mean	S.D.
Dar es Salaam	66	0.5	6.0	3.7	3.4	1.3
Mwanza	50	1.3	7.0	4.2	4.2	1.2

These levels of productivity per bird give levels of daily production in the range of 0.5 to 120 trays, with median values for Dar es Salaam and Mwanza of 5.5 and 2.2 trays respectively (Table 44).

Table 44. Number of trays of eggs produced per farm per day (tray = 30 eggs)

	Count	Minimum	Maximum	Median	Mean	S.D.
Dar es Salaam	46	1.5	120.0	5.5	11.0	18.7
Mwanza	42	0.5	14.5	2.2	3.7	3.4

The vast majority of egg producers in both Dar es Salaam and Mwanza reported using purpose-built housing to house their birds, and 90% of producers in both cities reported never receiving formal credit for their poultry activities (Table 45 and Table 46). In contrast, nearly 25% in Dar es Salaam and 17% in Mwanza reported having used informal credit arrangements to support their poultry activities.

Table 45. Reported use of purpose-built housing, and formal and informal credit by egg producers, Dar es Salaam.

	purpose-built housing		Formal credit		Informal credit	
Response	**no.**	**%**	**no.**	**%**	**no.**	**%**
No	3	7	42	93	33	75
Yes	38	93	3	7	11	25
Total	41	100	45	100	44	100

Table 46. Reported use of purpose-built housing, and formal and informal credit by egg producers, Mwanza.

	purpose-built housing		Formal credit		Informal credit	
Response	**no.**	**%**	**no.**	**%**	**no.**	**%**
No	5	10	42	89	40	83
Yes	43	90	5	11	8	17
Total	48	100	47	100	48	100

Broilers

The total number of broilers kept by respondent's ranged between 86 and 3,600 in Dar es Salaam and between 80 and 378 in Mwanza (Table 47). Broiler flock sizes are not greatly different from those for layers (compareTable 41): half of all producers interviewed in Dar es Salaam have less that 500 broilers while the median flock size in Mwanza was 190.

Table 47. Total number of broilers reported per farm

	Count	Minimum	Maximum	Median	Mean	S.D.
Dar es Salaam	22	86	3,600	513	926	968
Mwanza	7	80	378	190	192	100

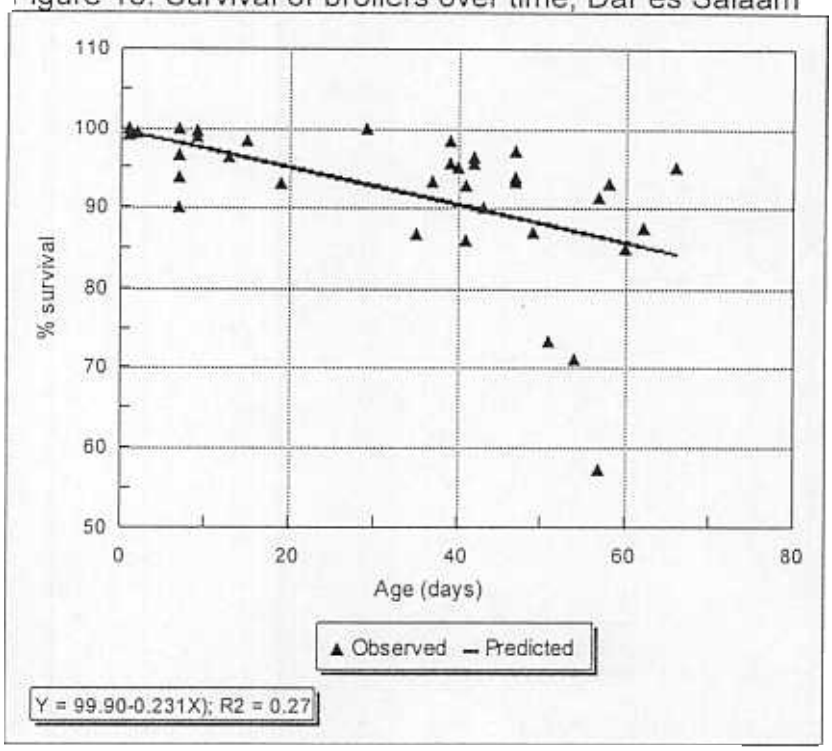
There is little indication that broiler producers are phasing the batches of birds for continuous production. In fact, in Mwanza no producers reported having more than 1 batch of broilers, while in Dar es Salaam the median number of batches was 1 and the mean 1.6 (Table 48).

Table 48. Number of batches of broilers reported per farm.

	Count	Minimum	Maximum	Median	Mean	S.D.
Dar es Salaam	22	1	3	1	1.6	0.8
Mwanza	7	1	1	1	1	0

The survival % of broiler flocks in Dar es Salaam showed a negative linear relationship with flock age (Figure 13), and almost 25% of broiler flocks of all ages had a survival % of less than 90. For the 24 flocks older than 30 days, 38% had survival % less than 90 and 13% had survival % less than 70.

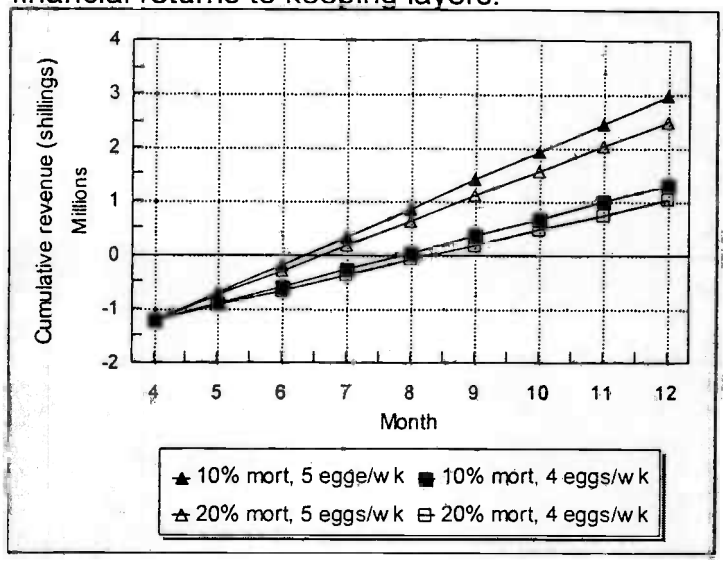
Figure 13. Survival of broilers over time, Dar es Salaam



Economics

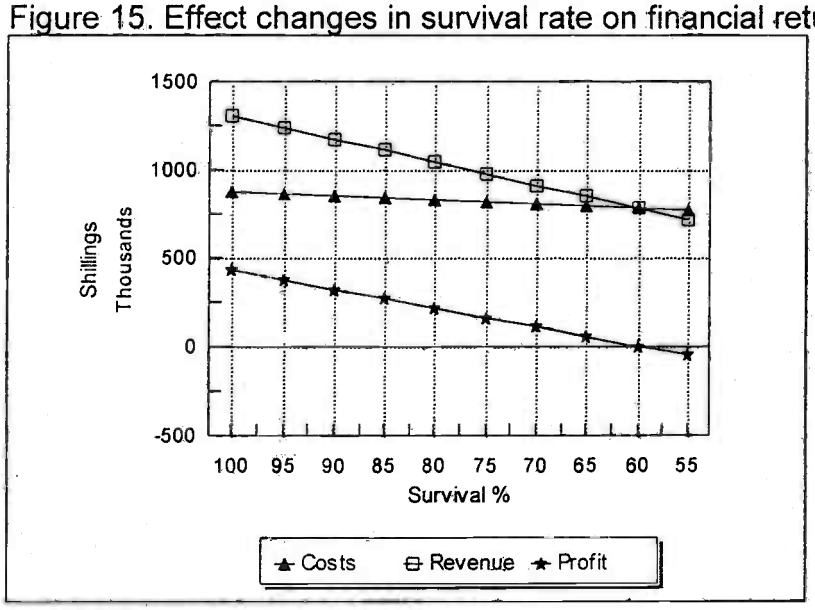
In its promotional material Interchick provides financial calculations for the profitability of layer and broiler production. For layers the sensitivity of these calculations to changes in survival % and egg productivity are shown in Figure 14. Interchick assumes a survival % of 90 and average productivity of 5 eggs/bird/week. It is clear from the figure that overall profitability is more sensitive to egg productivity than to survival %, and that with productivity lower than 4 eggs/bird/week, it is many months before revenue flow is positive. The fact that 80% of producers in Dar es Salaam reported productivity of less than 5 eggs/bird/day, and 43% reported less than 4 eggs/bird/day, indicates that the financial returns to many producers must be far less than assumed by Interchick. The picture in Mwanza is somewhat better as only 24% of flocks were reported to be at a level of productivity less than 4 eggs/bird/week.

Figure 14. Effect of changes in survival rate and egg productivity on the estimated financial returns to keeping layers.



For broilers, Interchick's model assumes a survival % of 90 to the point of sale, and using this model the sensitivity of projected profit to changes in survival % are illustrated in Figure 15. At less than 60% survival, there is little potential for profit. While all but one flock were calculated to have a survival % greater than 60, that fact that the survival % for a quarter of all flocks was less than 90 indicates that there are probably a significant number of broiler producers with relatively thin profit margins.

Figure 15. Effect changes in survival rate on financial returns to keeping broilers



The overwhelming majority of broiler producers in Dar es Salaam use a purpose-built structure to house their birds (Table 49). Less than 10% of these producers have benefited from a formal credit arrangement to support their poultry production activities, while nearly 30% have benefited from informal credit arrangements.

Table 49. Reported use of purpose-built housing, and formal and informal credit by broiler producers, Dar es Salaam.

	Purpose-built housing		Formal credit		Informal credit	
Response	no.	%	no.	%	no.	%
No	1	9.1	10	90.9	8	72.7
Yes	10	90.9	1	9.1	3	27.3
Total	11	100	11	100	11	100

Other elements of the production systems

In terms of sources of information, 58% of responses from producers in Dar es Salaam indicated that they went to either a feed company (specifically Interchick) or a private veterinarian for information, but only 13% of responses from Mwanza indicated the same (Table 50). In fact, producers in Mwanza seem to rely much more heavily on government extension officers for information. Again this probably reflects the more competitive, commercial environment around Dar es Salaam, as well as the extension activities undertaken in recent months by Interchick including the formation of producers clubs.

Table 50. Sources of information about poultry production.

	Dar es Salaam		Mwanza	
Source	no.	%	no.	%
Feed company/feed agent	22	29	9	16
Private veterinarian or vet. shop	22	29	4	7
Govt. vet, clinic or ext. officer	16	21	29	50
Husband, son or neighbour	5	6	7	12
Kibaha Education Centre	4	5	0	0
Self	3	4	4	7
Husband, son or neighbour who is vet.	3	4	0	0
Nobody	2	3	0	0
Agricultural institute	0	0	5	9
Total	77	100	58	100

Some producers gave more than one response.

One issue which is often raised in relation to the production of livestock in and around urban areas is the potential environmental hazard posed by the disposal of manure and other waste (Mvena et al 1989; Mlozi 1995; Allison & Harris 1996). Poultry waste can be seen as a particular threat in this regard in that it is highly concentrated, and poultry production often takes place on a very limited land base, thus apparently restricting the most obvious means of disposal.

In fact, the majority of respondents indicated that their poultry manure was both valuable and used. Thus, 94% and 93% of responses from Dar es Salaam and

Mwanza respectively indicated that manure was either used on the producers' own farm or garden, sold, or given to friends or neighbours (Table 51). It is interesting to note that while 23% or response in Dar es Salaam indicated that manure was sold only 3% in Mwanza mentioned the sale of manure. This may reflect greater demand and competition for plant nutrients due to the intensive vegetable production which takes place in and around Dar es Salaam. At Mwanza 7% of responses indicated that the manure was either burned or dumped, the two options which perhaps imply the greatest potential environmental danger.

Table 51. Disposal of manure.

	Dar es Salaam		Mwanza	
Value	**no.**	**%**	**no.**	**%**
Own farm/garden	41	55	40	67
Sell	17	23	2	3
Give to friend/neighbours	12	16	14	23
Unknown	4	5	0	0
Burn	0	0	3	5
Dump	0	0	1	2
Total	74	100	60	100

Some producers gave more than one response.

Future plans

During the course of the research is was stated repeatedly by government officials and others that small-scale poultry production was becoming less and less attractive because of increased competition from the large, integrated producers. However, this sense is not reflected in producers' responses to questions about their future plans. 69% and 89% of producers in Dar es Salaam and Mwanza respectively reported that they either plan to increase their production or stay at their current level of production (Table 52). Only 8% of responses from Dar es Salaam and 2% from Mwanza indicated plans to either reduce or to stop production. Additional responses from producers in Dar es Salaam, such as becoming a feed agent and grinding and mixing feed, seem to reflect a greater range of opportunities available in Dar es Salaam and an interest in creating more integrated enterprises.

Summary and observations

This study of egg and broiler production in and around Dar es Salaam and Mwanza highlights several key points that bear directly on an analysis of livestock production activities in urban areas. In terms of both chicks and feed the system is effectively dominated by a small number of large integrated firms. In fact, one firm alone accounts for perhaps 70% of all feed milled and sold in Dar es Salaam. In addition there are other smaller firms which may be more or less integrated, and a large number of very small-scale producers. Overall these small-scale producers probably account for something less than 30% of total broiler and egg production, with the remainder coming from the large-scale integrated operations.

Table 52. Reported plans for the future relating to poultry production

	Dar es Salaam		Mwanza	
Value	no.	%	no.	%
Increase flock size	30	56	26	59
Same as now/not sure/no plans	7	13	13	30
Start to keep broilers	4	7	1	2
Mix and sell feed	3	6	1	2
Become a feed agent	2	4	0	0
Open additional feed outlets	2	4	0	0
Reduce flock size	2	4	1	2
Stop production altogether	2	4	0	0
Buy a car	1	2	0	0
Get into DOC production	1	2	0	0
Keep turkeys	0	0	1	2
Buy more dairy cattle	0	0	1	2
Total	54	100	44	100

NB: Some individuals gave more than one response.

It is probably important to see the large companies and the small-scale producers as complimentary parts of the same picture, as opposed to simple, and unequal, competitors. Clearly small-scale production would be more difficult and less attractive if DOCs and compounded feed were not readily available. At the same time, the small-scale producers provide the large companies with an additional outlet for their production. This complementarity is further illustrated by the fact that many feed agents are also small-scale producers (and many other producers would like to be feed agents), and at least one feed company has initiated an extension education programme for small-scale producers.

Because of lower than expected survival % and egg productivity, it seems likely that the financial benefits of poultry production for many of these producers are relatively limited. One hypothesis is that despite widespread record-keeping, the hand-to-mouth way in which these small-scale operations are managed, as illustrated by the very frequent purchase of feed, means than producers do not actually have a very good handle on profitability. It is also clear that producers' potential profits are siphoned-off at all stages of the production process: during the field research fiddling with the quantity of feed in bags being handled by feed agents' employees and indeed by producers' own employees was repeatedly observed. Many of the producers interviewed indicated that they frequently stopped production for a period, commonly citing a lack of money or available DOCs. This intermittent participation in the production system only re-inforces the view that for many small-scale producers poultry production is something of a gamble, the true costs and benefits of which are difficult even for the producer to assess.

It appears that one strategy on the part of small-scale producers to increase profitability and reduce uncertainty is to move to more integrated operations. Thus, many producers wish to become feed agents, and some also purchase a small

freezer from which dressed, frozen birds are sold. If successful these initiatives will enable the producer to capture more of the overall margin associated with the production and marketing of poultry products. In may be that in the long-run production on its own is not really profitable or sustainable. Thus, small-scale producers are in effect mimicking the behaviour of large-scale firms who determined years ago that vertical integration was the key to survival in the poultry industry.

One important complication is the problem of variable feed quality, and the costly, and presumably only partly effective, steps commonly taken to correct it. The necessity for hit-or-miss supplimentation of compounded feed with fish and blood meal reflects both the domination of a limited number of firms, and the ineffectiveness of the existing quality control and monitoring mechanisms. Establishing a long-term relationship with a particular feed mill, by, for example, becoming a feed agent, may be one way that producers attempt to overcome the uncertainty and risk associated with dependence on what is essentially an unregulated product.

As indicated earlier, many officials voiced the opinion that small-scale poultry production in and around Dar es Salaam was doomed because of the level of dependence on and competition with the large integrated firms. However, neither the behaviour of the firms, nor the plans of the producers reflects this same pessimism. A closer analysis may indicate the existence of a market that is sufficiently segmented, and other synergistic benefits from poultry production such as manure to support intensive vegetable cultivation, that intensive, small-scale production in urban and peri-urban areas will continue.

Women are heavily involved in poultry production in Dar es Salaam and Mwanza, and for many of these producers poultry is only one of a number of economic activities in which they are engaged. The very considerable cash outlays that poultry production requires means that the rearing of even a relatively small flock requires substantial financial backing. Poultry production is therefore not an activity engaged in by poor women, and it is unlikely that it can become viable for limited resource producers. The risks and uncertain profitability make formal credit programmes untenable, and indeed very few current producers reported making use of such facilities. There would appear to be little scope for the use of poultry production in urban and peri-urban areas as a poverty-focused intervention.

Agricultural policy implications of and for urban and peri-urban agriculture

The following section presents a summary of a paper entitled 'Food Production, Urban Areas and Agricultural Policy', which appears as Appendix 2 to this report. The paper takes as its starting point the growing interest of scholars and some international development agencies in farming activities that take place in and around urban areas in developing countries. The paper's first aim is to review the theme of food production in and around urban areas, with special reference to the evidence emerging from case-studies of African cities. The second aim is to consider critically the prevalent approach to this theme, and to bring back into policy discussion interactions between rural and urban sectors that are essential for understanding poverty and food security in towns and cities. The third aim is to

make connections between agricultural policy and food production in and around cities.

The paper expresses some doubts about the validity for policy purposes of identifying farming in cities as a special activity in some way different from crop and livestock production taking place elsewhere in the national economy. The term urban agriculture has come to convey this sense of exclusiveness, as well as blurring useful distinctions concerning patterns of land use between urban and peri-urban locations. In a sense the term urban agriculture both claims too much and offers too little in the policy context of urban poverty and family food security. It claims too much by equating all food production in towns with improved food security for poor people, and it offers too little by failing to consider the role of rural-urban interactions in explaining the survival capabilities of the urban poor.

Empirical work undertaken in African cities over the past ten years has generated a considerable body of knowledge concerning the patterns of engagement in food production arising from the livelihood strategies of households and individuals. An almost universal finding of the sample surveys of urban food producers is that food production is an important part of their survival strategy; however, such surveys fail to describe the survival strategies of those urban dwellers not fortunate enough to have access to a piece of land to cultivate, nor, with rare exceptions, do they convey the overall livelihood status of those who engage in food production. Plenty of evidence points to the high participation of civil servants in urban and peri-urban food production in many cities and towns, and this participation appears to be becoming more market oriented over time. It is unclear, in the African case, that the food security needs of the urban poor and farming in urban areas are as closely related as is sometimes suggested.

This paper rejects any notion that sectoral policy interventions have a place in promoting farming in towns, when it is only recently that such policies have fallen from grace as a means of achieving output and income goals in the countryside. In the long run comparative advantage in production that requires land as its fundamental resource must lie outside urban areas for the simple reason that land is cheaper outside cities than within them. The occurrence of short-term exceptions to this rule, and of niches for very small-scale or specialist gardening activities even in the most densely populated urban zones, does not change this basic principle. The task of policy is to set the ground rules for the achievement of efficiency and equity goals across national economic space, and to intervene in events only when private outcomes are manifestly to the detriment of social welfare goals. Policy directed at improving the comparative advantage of urban and peri-urban food producers against more remote rural farmers hardly complies with this criterion, however well intentioned it might be with respect to alleviating the plight of the poor in cities.

Having made this general point, it is evident that land tenure issues differ in urban contexts from rural ones. In particular, given the rather anarchic way in which farming activities have arisen in and around African cities, establishing a well understood leasehold framework for publicly and privately owned open spaces, and compensation for improvement in the event of eviction, are regulatory devices that could possibly reduce the high degree of uncertainty that confronts food production by poor people in urban areas.