Characterization of peri-urban dairy production system in Ghana: 1. Social attributes and characteristics of the production environment

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SUMMARY

A survey was carried out in five districts on the Accra plains to characterize the peri-urban dairy system. Results of the survey indicated that about half of the farms visited had hired herd managers who were paid in kind with milk. The Fulani ethnic group constituted 58.2 per cent of the herdsmen encountered, followed by Ga, 20.9 per cent, Ewe, 12.0 per cent, and other mixed group, 8.9 per cent. The educational level of household heads was generally low; 49.1 per cent were illiterate, 22.0 per cent had arabic education, while 18.0 and 10.9 per cent had primary and secondary education, respectively. Utility services, namely electricity, water and telephone, were non-existent. There were little or no farm equipment and most farmers used hand dipping as a means of applying acaricide. Integration of crops and livestock production was very low. Tenancy was communal with no private grazing lands. It was concluded that the factors mentioned above were constraints to smallholder peri-urban dairy production and need to be addressed.

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RÉSUMÉ

OKANTAH, S. A., ODDOYE, E. O. K., OBESE, F. Y., GYAWU, P. & ASANTE, Y. : *La caractérisation du systéme de la production laitière peri-urbaine au Ghana: 1. Les attributs sociaux et les caractéristiques de l' environment de la production.* Un levé s'est déroulé en 5 districts dans les plaines d' Accra pour caractériser le système laitier peri-urbain. Les résultats du levé inquaient qu' à peu-près une moitié des champs qu' on a rendu visite avait des gardiens de troupeau loués qui étaient payés en nature avec le lait. Le groupe ethnique de fulani constituait 58.2 pour cent de gardiens de troupeau rencontrés, suivi par le Ga 20.9 pour cent, L' Evé 12.0 pour cent et d' autre groupe mélangé 8.9 pour cent. Le niveau d'instruction des chefs de ménage était bas dans l'ensemble: 49.1 pour cent étaient analphabétes, 22.0 pour cent avaient l'instruction arabe, alors que 18.0 pour cent et 10.9 pour cent avaient l'enseignement primaire et secondaire respectivement. Les services publiques à savoir l' électricité, l' eau et le téléphone, étaient inexistants. Il y avait peu ou nul équipement agricole et la plupart des cultivateurs utilisaient la méthode de plonger la main comme un moyen d' appliquer l' acaricide. L' intégration de cultures et la production du bétail étaient très faible. La location était communautaire sans aucun de pâturages privés. La conclusion était tirée que les facteurs cités ci-dessus étaient les contraintes des petit-cultivateurs de la production laitière peri-urbaine et exigent d'être réglées.

Introduction

High population growth in Ghana, coupled with rapid urbanization, has led to a high concentration of people on the Accra Plains. The Greater Accra Region is the most densely populated region in Ghana, particularly around the Accra-Tema metropolitan area. A market has been created with high demand for milk from smallholder peri-urban dairy farms on the Accra Plains. Production is based on cattle of varying composition of mainly indigenous origin. There is, however, very little documentation on the development, characteristics and contribu-

tion of peri-urban dairy production systems to domestic milk production in Ghana (Okantah & Gyawu, 1993). There is, therefore, a need to characterize and evaluate the existing production systems in Ghana, with a view to evolving strategies for the development of appropriate research support for sustainable increases in milk production in Ghana. This is of particular importance since after reports by Okantah (1990a) and Okantah (1992), the Government of Ghana has set up a Pilot Milk Collection Project to stimulate peri-urban milk production on the Accra Plains.

Several attempts have been made to use imported specialized dairy cattle for milk production in Ghana with variable results, e g. at Amrahia Dairy Project, Boadi Dairy Project, UST and Agricultural Research Station, Legon. The literature has been reviewed by Kabuga (1989), Danbaro (1990) and Okantah (1990b). The alternative approach of milk production from indigenous cattle herds is the interest of this study.

The general objectives of this study were, therefore, to characterize the system in terms of productivity and factors affecting same. The immediate objectives were to identify some of the social attributes and infrastructural characteristics of the rearing environment. Productivity of animals, constraints to production and marketing of milk are taken up in subsequent papers.

Materials and methods

A questionnaire, developed by the International Livestock Research Institute (ILRI) and modified to capture major characteristics of milk production in smallholder herds on the Accra Plains, was administered in five districts. Selection of districts was based on distance from Accra. The five selected districts and their capitals are shown in Table 1.

The survey was designed to sample six farms in each of four villages within the five districts making a total of 120 farms in all (i.e. $5 \times 6 \times 4$). In the actual survey, a total of 107 farms were sampled (Table 1).

The survey was undertaken between April and August 1994. The questionnaires were administered to the farm owners or herd managers through interpreters.

Data from the field administration of questionnaires was coded using a format supplied by International Livestock Research Institute (ILRI) and analyzed using the Statistical Analysis Systems Institute (SASI, 1987) software. Associations were tested with the χ^2 statistic for significance.

TABLE 1

Districts Sampled During the Survey

Distance from Accra (km)	*Name of district*	*District capital (km from Accra)*	*Frequency (herds)*	*Percentage*
0 - 49	Ga Rural	Amasaman (20)	17	15.9
0 - 49	Tema	Tema (25)	21	19.6
0 - 49	Dangbe West	Dodowa (45)	24	22.4
50 - 100	Awutu - Effutu-Senya	Winneba (50)	24	22.4
> 100	North Tongu	Juapong (110)	21	19.6

Results and discussion

General characteristics of the environment

About 69.0 per cent of cattle herds were in peri-urban environment, the remainder occurring in rural environment. All herds in the North Tongu district were in rural environment while all those found in Tema and Ga districts were in peri-urban environment (Table 2).

Other general characteristics of the farm environment are included in Table 2. Farms in peri-urban environments such as Ga and Tema districts tended to be on average, only 2.6 km from main roads. Farms in rural environments, eg., North Tongu district, were on average 14.5 km from major roads. North Tongu was the farthest district from Accra.

The topography of the Accra Plains is gently rolling, low-lying between 15

TABLE 2

General Environmental Characteristics of Cattle-Rearing Districts

District	*City*	*Herds (No.)*	*Altitude (m ASL)*	*Distance from main road (km)*	*Distance from Accra (km)*	*Environment Peri-urban percent*	*Rural percent*
Awutu-Effutu-Senya	Accra	24	15	6.9	69	75	25
Dangbe West	Tema	24	76	6.6	69	75	25
Ga Rural	Accra	17	42	2.5	22	100	-
North Tongu	Ho	21	48	14.5	130	-	100
Tema	Tema	21	32	2.6	29	100	-

and 76 m above sea level (ASL). Accessibility to consuming urban centres is important for milk production as the commodity is highly perishable.

Farm facilities

There was no significant difference ($P>0.05$) between districts in terms of available farm facilities such as telephone, electricity, tick control equipment and access to transport. Virtually all farms had neither electricity nor telephones. For mobility, 97.2 per cent of farms surveyed had access to public transport. For tick control, only 17.8 per cent had some equipment. The majority 82.2 per cent practised hand-dipping (application of acaricide by a wet rag). Lack of utility services such as electricity, telephone and good water supply would impede dairy development, e.g., use of artificial insemination and milk-processing. Poor tick control facilities would lead to tick infestations and tick-borne diseases. Policies to increase dairy production would, therefore, need to address the problem of lack of utility services in peri-urban and rural areas as well as the poor farm facilities.

Family composition and labour

About 44 per cent of the farms surveyed had the farm owner as the manager. In all other cases, the farm owner had hired a herd manager to look after the herd. The herd manager got milk from the herd as his remuneration and sometimes a small salary in cash or kind (maize, rice, etc.). In most cases, the herd manager was not able to take major decisions affecting the welfare of the herd unless he has consulted the owner. This is a major constraint as the owners sometimes stay away for long periods.

In this analysis, information on the household head refers to the manager of the herd, whether actual owner or the hired herd manager. The management style of the household head has a major effect on the success of the dairy operation, and this in turn is related to his socio-cultural attributes such as ethnicity, education and previous experience or profession.

Household heads tended to be males with the exception of one female in the North Tongu district. Sex was, therefore, dropped from subsequent analyses.

There were no differences between districts in terms of other occupation of the household head ($P>0.05$). In general, over 85 per cent of household heads had no other occupation than cattle rearing.

There was a highly significant association between ethnic group of the household head and the district ($P<0.001$). The Fulanis are the major herders in the Accra Plains, accounting for about 58 per cent of all herders (Table 3).

The concentration tended to be heaviest (87.5 per cent) in the Awutu district. There was the tendency for Ewes and Dangbes to be concentrated in their respective districts, Juapong and

TABLE 3

Ethnic Group of Household Head (percent)

District	*Ethnicity*				*Total*
	Fulani	*Ga*	*Ewe*	*Others*	*No.*
Awutu-Effutu-Senya	87.5	8.3	0.0	4.2	24
Dangbe West	45.8	41.7	12.5	0.0	24
Ga Rural	52.9	11.8	0.0	35.3	17
North Tongu	57.1	4.8	38.1	0.0	21
Tema	47.6	38.1	9.5	4.8	21
Total (percent)	58.2	20.9	12.0	8.9	

Dangbe West. The Ga ethnic group comprised seven Gas and 13 Dangbes whilst the "others" group was made up of four Northerners, two Akans, and two others of unknown ethnicity. The ethnicity profile indicates a socio-cultural constraint with regard to livestock farming. Ghanaians are generally arable farmers. There is a need to train Ghanaians in dairying as a profession. The strong migrant Fulani involvement in cattle rearing is not peculiar to Ghana, as Jabbar & di Domenico (1992) reported strong Fulani influence on milk production and consumption in southern Nigeria.

In all districts, the educational level of household heads was low, with 49 per cent being illiterates and only 10.9 per cent having had secondary-level education (Table 4). This low educational background may also adversely affect dairy production. As a policy to improve dairy production, there is the need to give some incentives to people of higher educational background, particularly agriculturists, to go into dairy production.

The type of labour used for herding cattle was similar in the districts surveyed. In all districts, cattle herders were one or a combination of the following: children, hired labour, household head or herd manager. The herds, manager or hired labour took the older animals out to graze while children and women looked after the calves. Household characteristics such as age of household head, the number of people in the household, the percentage of hired labour used in the herds, and the size of the household consumption units varied between districts (Table 5).

Household heads in Juapong, Tema and Dangbe West tended to be older (around 70 years) than those in Awutu and Ga Rural districts (around 60 years). This, taken in conjunction with farm age, suggests that cattle rearing is a recent introduction in the Ga Rural and Awutu districts. Farms in these districts were below 16 years on average whilst those found in the other districts were over 19 years on average (Table 5). This result suggests that peri-urban dairying can be introduced in other areas of the country for employment and income generation. The educational background of the household head also had significant influence on household variables ($P < 0.05$). Illiterate and Arabic schooled household heads tended to be older, had larger household numbers, and depended less on hired labour. As a consequence these had larger household consumption units than those with conventional education, i.e., primary or secondary school background. Education in cattle-rearing communities would need special attention.

Apart from significant differences in age, whether household

TABLE 4

Education of Household Head/Farm Manager (percent)

District	*Education of household head/farm manager*				
	Illiterate	*Primary*	*Secondary*	*Arabic*	*Total No.*
Awutu-Effutu-Senya	50.0	16.7	4.2	29.2	24
Dangbe West	54.2	12.5	12.5	20.8	24
Ga Rural	41.2	17.7	23.6	17.7	17
North Tongu	66.7	14.3	9.5	9.5	21
Tema	33.3	28.6	4.8	33.3	21
Total (percent)	49.1	18.0	10.9	22.0	

TABLE 5

Least Square Means for Household Variables

			Age of household head (years)		*Household number*		*Hired labour (no.)*		*Hired labour (percent)*		*Consumption units*		*Farm age (years)*	
Class	*Level*	*No.*	*Mean*	*SE*	*Mean*	*SE*	*Mean*	*SE*	*Mean*	*SE*	*Mean*	*SE*	*Mean*	*SE*
ψ Overall mean		107	49.2	13.0	4.0	2.6	1.9	2.2	39.7	25.2	3.6	2.3	16.8	11.4
District														
	Awutu-Effutu-Senya	24	56.7c	8.6	3.0c	1.0	2.5b	0.8	51.8ab	9.3	2.8c	0.9	15.6c	4.2
	Dangbe West	24	72.7a	8.4	5.1b	0.9	2.2b	0.7	36.6b	8.5	4.5b	0.8	22.7a	3.9
	Ga Rural	17	66.9bc	8.8	2.7c	1.0	3.4a	0.7	53.0ab	10.1	2.6c	0.9	12.1d	4.6
	North Tongu	21	69.0ab	8.7	2.4c	1.1	3.9a	0.9	71.3a	10.4	2.2c	1.0	19.4b	4.7
	Tema	21	70.4ab	8.7	7.3a	0.9	3.7a	0.8	54.5ab	9.2	6.5a	0.9	20.6ab	4.2
Activity														
	RCS	6	82.7a	8.9	4.2	1.1	3.1	0.9	35.2	10.6	3.8	1.0	28.6a	4.8
	PRB	6	56.6b	9.5	4.5	1.2	2.7	1.0	44.0	11.4	4.3	1.1	11.5b	5.2
	NOA	95	64.1b	7.0	3.9	0.4	2.5	0.3	44.6	4.1	3.5	0.4	17.5ab	1.9
Ethnic group														
	Fulani	63	64.4	8.6	3.4	0.9	2.3	0.7	52.1	8.7	3.1	0.8	11.9b	3.9
	Ga	23	70.4	9.1	3.7	1.1	3.2	0.9	66.4	10.3	3.5	1.0	29.7a	4.7
	Ewe	13	66.7	8.2	5.5	1.0	3.3	0.8	41.1	9.7	5.1	0.9	14.2b	4.4
	Others	8	67.1	9.6	3.7	1.2	3.6	1.0	54.2	12.1	3.2	1.1	16.4b	5.5
Education														
	Illit	53	70.3ab	8.7	4.6b	0.9	2.7b	0.8	44.3bc	8.9	4.2ab	0.8	19.2	4.1
	Prim	19	60.2b	8.1	3.0b	1.0	3.0b	0.8	61.3ab	9.3	2.8ab	0.9	18.2	4.2
	Sec	11	60.3b	9.0	2.9b	1.0	3.9a	0.8	65.9a	9.7	2.7b	0.9	16.7	4.4
	Arabic	24	77.8a	9.0	5.8a	1.1	2.8b	0.9	42.3c	10.5	5.2a	1.0	18.3	4.8

ψ **unadjusted overall mean ± standard deviation**

Means within the same column with different letters are significantly different ($P>0.05$). Illit-Illiterate, Prim-Primary School, Sec-Secondary School, **Arabic-Arabic School**, RCS-Retired Civil Servant, PRB-Private Businessman, NOA-No other occupation.

head was a retired civil servant, private businessman, or had no other occupation than cattle-rearing did not influence household variables (Table 5).

Land tenure/land use

Practically all herds visited were on traditional land tenure system. They all grazed communal lands and, therefore, there were no irrigated or improved pastures. Nobody takes care of communal grazing lands and this is a constraint to milk production.

There was a significant variation between districts in terms of farm size ($P<0.05$) (Table 6). The variation between ethnic groups was very highly significant ($P<0.001$). The Fulani showed limited interest in cropping, tilling only 1.6 ha on average compared to 10.4 ha tilled by Ga ethnic group (Table 6). The number of hired labour had a significant effect on farm size. The regression of hired labour on farm size was 0.66. The regression of household number on farm size (0.11) was, however, not significant ($P>0.05$). The age of household head had no important effect on farm size ($P>0.05$) These regressions suggest that labour was hired for land preparation and cropping operations, whereas activities of household members were more or less limited to the tending of cattle.

There was a highly significant variation between districts with respect to land/labour ratio ($P<0.01$). Some districts were more efficient in their use of labour per hectare.

Water resources

All ethnic groups and all districts had similar watering frequencies for cattle. The distance between farm and water body did not influence the frequency of watering ($P<0.05$) (Table 6). This is probably due to the practice whereby animals are watered on their way to grazing and again on their way back to their kraals.

TABLE 6

Least Square Means for Land Tenure/Land Use Variables

			Farm size (ha)		*Watering frequency*		*Land/labour ratio*		*Yield (kg/ha)*	
Class	*Level*	*No.*	*Mean*	*SE*	*Mean*	*SE*	*Mean*	*SE*	*Mean*	*SE*
ψ Overall mean		107	4.0	5.8	2.4	0.6	0.9	1.4	295	264
District										
	Awutu	24	5.7b	1.5	2.3	0.1	0.8b	0.3	385a	59.0
	Dangbe West	24	4.9b	1.4	2.6	0.1	1.0b	0.3	303ab	58.0
	Ga Rural	17	2.1b	1.6	2.3	0.2	0.3c	0.3	347ab	88.0
	North Tongu	21	3.9b	1.6	2.3	0.2	0.3c	0.3	305ab	62.0
	Tema	21	9.0a	1.6	2.2	0.1	1.8a	0.3	191b	63.0
Ethnic group										
	Fulani	63	1.6b	0.8	2.4	0.1	-	-	291b	100.5
	Ga	23	10.4a	1.3	2.6	0.1	-	-	224b	108.1
	Ewe	13	2.7b	1.8	2.1	0.2	-	-	310b	109.3
	Others	8	5.7b	2.3	2.3	0.2	-	-	575a	142.0
Education										
	Illiterate	53	-	-	-	-	-	-	258b	100.6
	Primary	19	-	-	-	-	-	-	432a	106.6
	Secondary	11	-	-	-	-	-	-	212b	105.2
	Arabic	24	-	-	-	-	-	-	298ab	120.0

ψ unadjusted overall mean ± standard deviation

Means within the same column with different postscripts are significantly different ($P<0.05$).

The main sources of water were rivers, dugouts, and dams. Dams accounted for 75 per cent of sources of water on the cattle farms surveyed. Farms in the peri-urban areas, Awutu, Dangbe West, Ga Rural and Tema relied heavily on dams while farms in the rural areas such as Juapong relied mostly on dugouts and rivers. In each of the Awutu, Dangbe West and Ga Rural districts, there was only one river source for cattle and none in the Tema district. On average, most herdsmen watered their animals twice a day which may be considered low and may affect milk production rather adversely (Table 6).

Cropping systems

Generally, there was very little crop farming in the area covered by the survey and cropping was mainly subsistence in nature. The average farm size was 4.0 ha. Farm size ranged from an average of 2.1 ha in the Ga Rural district to 9.0 ha in the Tema district (Table 6).

There was a positive association between the use of cattle manure and district for cropping ($P < 0.05$). In Ga Rural, Dangbe West and Tema districts, 55.6, 72.7 and 90.5 per cent of farmers respectively used cattle manure. On the other hand, in Awutu and Juapong, at least 50 per cent of farmers did not use cattle manure. The major food crop grown by farmers was maize. The ethnic group of the household head highly affected crop yields ($P < 0.01$), as indicated in Table 6, and education of the household head also had a significant effect ($P < 0.05$). Other factors such as district, manure use, other occupation of the household head, number of household members, amount of hired labour, farm size, environment and land/labour ratio had no effect on food crop yield ($P > 0.05$).

Conclusion

There is the need to encourage crop × livestock integration in the study area. Smallholder farmers must be encouraged to grow a larger hectarage of crops and to use the residues from these crops in feeding cattle. Manure from livestock would then go to improve and maintain soil fertility and structure.

Cattle owners themselves need to get involved in on-farm management of the herd instead of relying entirely on the herd manager. More educated people need to be enticed into cattle farming. The provision of basic infrastructure and utility services should help in this regard. There is a need for the provision of dams and dugouts for watering animals and possibly for irrigation of pastures, in the short term. In the long term, however, farmers could be assisted to acquire their own dams or dugouts. According to Nell (1992), the successful smallholder dairy development project of Kenya started in 1980 against a background of good infrastructure and favourable government policies.

Land tenure systems need to be revised to allow cattle owners long leaseholds. This will encourage the building of better structures for housing cattle and is also likely to encourage pasture production and the establishment of fodder banks and leguminous multi-purpose trees for improved milk and meat production.

In conclusion, the social and cultural attributes of the household head or herdsman such as ethnicity, education, age, and family size may have important effects on dairy production. Education of present herdsmen and aculturalization of indigenous Ghanaians in dairying could help improve domestic milk production. Sustainable improvements in dairying can only be achieved through the provision of basic infrastructure and favourable policies for on-farm milk production.

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