STUDIES ON THE STRUCTURE AND PROBLEMS OF FAMILY POULTRY PRODUCTION IN TANZANIA

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Abstract

STUDIES ON THE STRUCTURE AND PROBLEMS OF FAMILY POULTRY PRODUCTION IN TANZANIA.

In order to identify the major disease conditions and factors limiting family chicken production in Coast and Dar-es-Salaam regions of Tanzania a survey was undertaken in six villages in two zones involving a total of 43 households. Field data were collected through identified farmer interviews in the wet and dry seasons of 1999/2000. During farm visits, the birds were clinically examined, sick and dead ones autopsied. Blood smears, serum and faecal samples were collected for laboratory examination. There was significant variation in the flock size and structure in the interviewed households. The 43 households kept 1099 chickens with an average of 25.5 per household in the wet season while in the dry season the numbers were 1352 and an average of 31.4. The ratio of chicks:growers:adults was 10:10:14 in the wet season and 11:10:10 in the dry season. The cock:hen ratio was 1:3.5. Average numbers of clutches per year ranged from 2.80–3.02 (average 2-94). The average number of eggs per clutch was 12 and consequently the number of eggs was 36 per hen/year. Hatchability was recorded to be 84.5. Chick mortality was found to be 30% and resulted mainly from diseases and predation. Out of 43 households interviewed, 23 kept their chickens in the chicken house, 12 within the family house, four in the kitchen/store, three kept their birds perched in trees and one used a woven basket. In all the households, scavenging was the system of feeding and sometimes supplemented by household scraps and other feeds. Poultry movement into the household's flocks resulting in mixing of birds from different flocks was rampant. Several diseases and in particular Newcastle disease were mentioned by farmers in both zones as the major constraints restricting rural chicken development. Other diseases included coughing/sneezing, fowl pox and parasitic diseases (helminths, external parasites, protozoa). Women played a major role in family poultry development through provision of labour, but men made various decisions on the use of the resources.

1. INTRODUCTION

Rural life in Tanzania is similar to that in many other developing countries. The rural poor survive by various forms of subsistence farming. The only livestock enterprise available to all farming families, even the poorest, is poultry production. Throughout the developing world, indigenous chickens, referred to as "village chickens" or "rural chickens", scavenge for survival, their diets sometimes supplemented by household scraps. Under most forms of management, these chickens are not very productive, but every egg and every chicken that becomes available for consumption or sale is a benefit to the owner and produced at minimal cost. Many international organisations and veterinarians are now becoming interested in the potential productivity of village chickens. The causes of low productivity are being defined and suitable interventions are being designed. Under the auspices of the International Atomic Energy Agency (IAEA), a research project on family poultry was started in March 1999 to identify the major disease conditions and factors limiting family chicken production in Coast and Dar-es-Salaam regions of Tanzania. The present paper describes the results obtained during the wet season of the long rains of 1999 and the dry season of 2000.

2. MATERIALS AND METHODS

2.1. Study areas

The study area was selected according to the guidelines for fieldwork provided by the IAEA. Two ecological zones in the Coast (zone I) and Dar-es-Salaam region (zone II) of Eastern Tanzania were selected for the field study. These zones were selected on the basis of short distance location from the Animal Diseases Research Institute (ADRI) being accessible at least within three hours of driving. Another criterion used for selection was ethnic difference of the inhabitants and geographical positioning whereby one zone was close to the Indian Ocean and the other was further inland. The weather in the zones is characterised by marked seasonality. Rainfall is usually seasonal: dry season (June-October, January-March) and rainy season [March-May (long rains), November-December, (short rains)]. On the coastal strip the climate is warm and tropical, with temperatures averaging 26.7° C and rainfall varying from 1016 to 1930 mm.

Field visits centred on three villages (Mwendapole, Pangani, Boko) from Kibaha District (zone I) and three villages (Toangoma, Mbande and Gezaulole) from Temeke District (zone II). With the assistance of Government and Livestock Field Officers responsible for the respective villages, 6–11 farmers preferably female who kept family chicken were identified from each village. Visits were made to the respective village for the purpose of explaining the objectives of the research project to the village leadership, villagers and in particular to the participants of the project. The latter were notified of the specific visiting dates for data and sample collection during both the wet and dry season.

2.2. Data collection techniques

Field data were collected through standardised interviews of farmers in the selected villages. A structured survey form designed, discussed and adopted at the first Research Co-ordination Meeting of the FAO/IAEA Co-ordinated Research Programme was used in the present study for collecting socio-economic data. The data were stored in excel spreadsheets for eventual analysis.

2.3. Sampling techniques

Visits to selected farms were conducted in the two seasons. Thorough histories were recorded, a clinical examination of the birds was conducted and those showing symptoms were purchased and post-mortem. Dead or slaughtered animals were examined for lesions and appropriate samples for laboratory tests were collected. The village extension officers submitted sick or dead birds to the laboratory during the period of investigation. Any abnormal health status was reported to the principal researcher.

Puncturing the wing vein of chickens was done for collecting blood samples. The number of samples collected was: 353 samples in the wet season (May, 1999), 278 samples in the dry season (February, 2000, pre-vaccination), 246 samples at 14 days post-vaccination and 259 samples at 105 days post-vaccination (June, 2000). After coagulation, sera were harvested, divided in two equal aliquots and preserved in cryo-tubes at -20°C until use. Haemolytic sera were cleared by centrifugation at 4000 rpm for 5 minutes before storage.

It was essential to organise an initial visit to notify the farmers about the specific visiting dates for data and sample collection. Pre-vaccination sera were collected prior to vaccination at day 0 (February, 2000) and subsequently after vaccination at day 14. A thermostable vaccine, I-2 strain, was used being produced locally at ADRI. The vaccination procedure was repeated every three months and it is intended to organise a total of four vaccinations throughout the year. All sera were tested for specific antibodies to Newcastle disease using a haemagglutination inhibition (HI) test in order to assess the immune status of the chicken. The other aliquot of the serum samples will be preserved at -20°C for testing in an ELISA system.

During the wet season 349 smears were prepared for examination of blood protozoa and 278 were collected during the dry season.

Detailed post mortem examinations were conducted on 12 birds in the wet season and 15 in the dry season. The birds were either submitted to the laboratory by the field staff or were collected during field visits.

Fresh faecal samples were collected in small plastic containers from a total of 209 birds in the wet season and 211 in the dry season. These were preserved at 4°C until examined for egg worm count using the McMaster technique. In the laboratory, 2 g of faeces were mixed thoroughly with 60 mL of saturated sodium chloride solution. The solution was subsequently poured through a tea strainer and transferred to a specimen bottle. Using a Pasteur pipette, one compartment of a McMaster counting chamber was filled with the solution. The counting chamber was left to stand for 3 min to allow the eggs to float to the surface before counting the number of eggs. The number of eggs observed was multiplied by 200 to calculate the total number of eggs present per gram faeces.

TABLE I. DETAILS OF FARMS VISITED, FLOCK SIZE AND NUMBER OF SAMPLES TAKEN DURING THE WET SEASON

District	Village	Number of households interviewed	Flock size range	Serum samples	Blood smears	Faecal samples
Kibaha	Mwendapole	6	17-34	56	53	37
	Pangani	11	9-44	76	80	46
	Boko	6	10-48	46	46	29
Temeke	Toangoma	6	8-38	48	48	31
	Mbande	7	9-100	69	61	33
	Gezaulole	7	10-43	58	61	33
Total		43		353	349	209

TABLE II. DETAILS OF FARMS VISITED, FLOCK SIZE AND NUMBER OF SAMPLES TAKEN DURING THE DRY SEASON

District	Village	Number of households interviewed	Flock size range	Serum samples	Blood smears	Faecal samples	Number vaccinated
Kibaha	Mwendapole	6	1-19 (13.2)*	31	31	21	
	Pangani	11	10-102 (39.1)	79	79	45	397
	Boko	6	10-42 (27.5)	47	47	30	126
Temeke	Toangoma	6	6-34 (20.2)	40	40	60	
	Mbande	7	23-35 (29.1)	50	50	35	
	Gezaulole	7	9-88 (43.4)	31	31	20	115
Total		43		278	278	211	

* Figures in parentheses denote flock size averages for each village.

3. RESULTS

3.1. Production data

Flock sizes ranged between 8-100 birds in the wet season and 1-102 in the dry season. The 43 households kept a total of 1099 chickens with an average of 25.5 per household in the wet season, while in the dry season the total number was 1352 with an average of 31.4. Thus, an increase of 23% occurred in a period of 8 months (May, 1999 to February, 2000).

Different age groups were observed with hens forming the majority of the flock in the wet season, followed by chicks and growers (Table III). In contrast, during the dry season, the majority of the birds were chicks followed by growers and then hens (Table IV).

TABLE III. FLOCK STRUCTURE DURING THE WET SEASON

	Chickens	Ducks	Guinea fowl	Turkeys	Pigeons
Cocks	91	19	18	8	12
Hens	355	46	39	24	36
Growers	327	31	14	10	8
Chicks	326	33	9	0	3
Total	1099	129	80	42	59

TABLE IV. FLOCK STRUCTURE DURING THE DRY SEASON

	Chickens	Ducks	Guinea fowl	Turkeys	Pigeons
Cocks	110	9	9	0	1
Hens	340	20	9	0	2
Growers	437	22	8	0	0
Chicks	465	32	3	0	0
Total	1352	83	29	0	3

Of the 43 farmers participating in the survey 11 (25.6%) kept other species of birds (ducks, guinea fowl, turkeys and pigeons) and only one kept turkeys during the wet season. Domestic fowl were the most common species kept in both seasons followed by ducks, guinea fowl, pigeons and turkeys. The latter species was absent during the dry season.

TABLE V. PRODUCTION DATA ON THE BASIS OF HEN HISTORY (WET SEASON)

	Hen 1	Hen 2	Hen 3	Hen 4	Hen 5	Hen 6	Average
Clutches per year	3.02	2.91	3.00	2.90	2.80	3.00	2.94
Eggs per clutch	12.30	11.79	12.3	12.3	12.6	11.77	12.18
Clutch eggs incubated	11.30	10.06	10.53	10.94	11.2	10.33	10.73
Chicks hatched	9.10	8.60	8.76	8.85	10.1	9	9.07
Chicks reared	5.30	5.30	5.7	5.97	5.1	4.11	5.25

TABLE VI. PRODUCTION DATA ON THE BASIS OF HEN HISTORY (DRY SEASON)

	Hen 1	Hen 2	Hen 3	Hen 4	Hen 5	Hen 6	Average
Clutches per year	3.22	3.36	3.15	3.23	3.00	3.00	3.16
Eggs per clutch	12.03	11.17	11.38	11.88	11.67	14.50	12.10
Clutch eggs incubated	10.36	10.11	10.29	10.15	10.33	11.00	10.38
Chicks hatched	9.03	8.19	8.74	8.69	9.33	8.00	8.66
Chicks reared	6.51	5.60	5.52	6.62	8.33	6.00	6.43

The number of clutches per year based on individual hen histories ranged from 2.80-3.02 (average 2.94) and from 3.0–3.36 (average 3.16) in the wet and dry season, respectively (Tables V and VI). The number of eggs per clutch varied slightly in the wet season (averaging 12.18), but the variation in the dry season was considerably larger (ranging from 11.17 to 14.50). Out of the 10.73 incubated eggs, 9.07 chicks were produced on average in the wet season (84.5 hatchability), while the corresponding figure was 9.38 chicks in the dry season (75% hatchability).

No significant difference was observed in production parameters between the two zones.

3.2. Housing

Out of 43 interviewed households 24 kept their chickens during the wet season in a chicken house, 10 within the family house, 2 in the kitchen/store and 3 left the birds to perch in the trees (Fig. 1). The corresponding figures were 22, 12, 3 and 2 for the dry season (Fig. 2). Three out of 10 respondents, who kept the chickens within the family house, had erected a small hut in which the birds were confined to prevent them from roaming about the house.

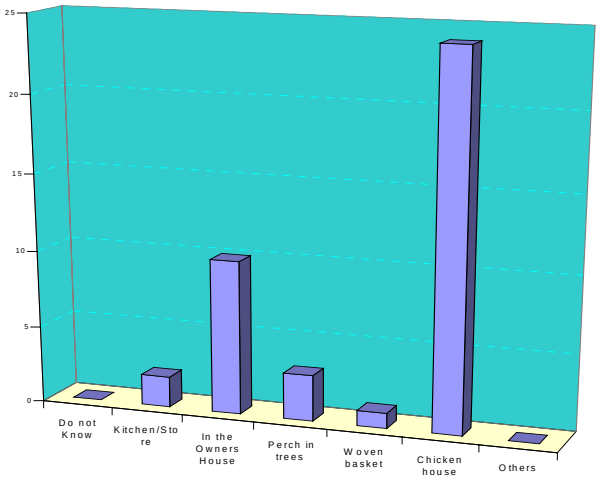

FIG. 1. Housing structures in two zones investigated during the wet season.

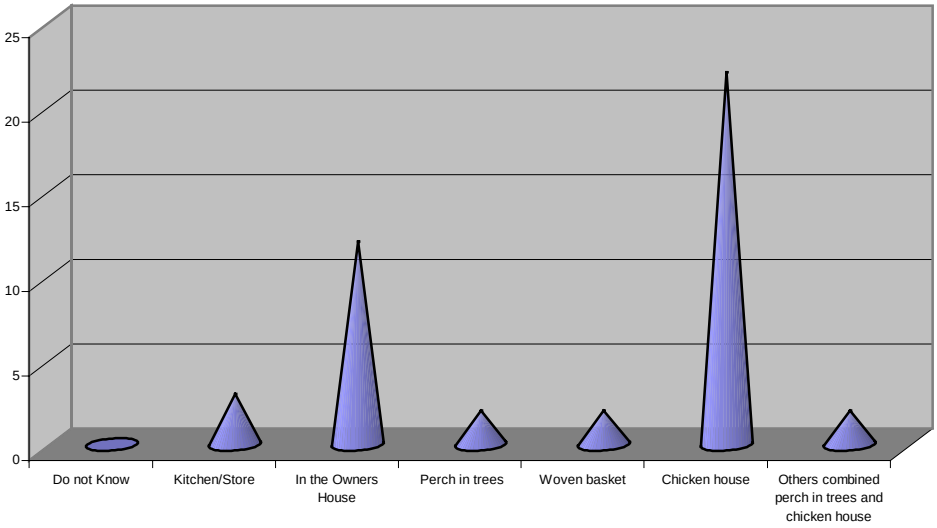

FIG. 2. Housing structures in two zones investigated during the dry season.

The frequency of cleaning in both zones was daily in 21 and 16 cases; weekly in 13 and 10 cases and monthly in 2 and 8 cases in the wet and dry season, respectively. Three farmers cleaned the chicken house at longer intervals than once a month. In both zones, chicken manure was used in the garden, and on the farm (Fig. 3).

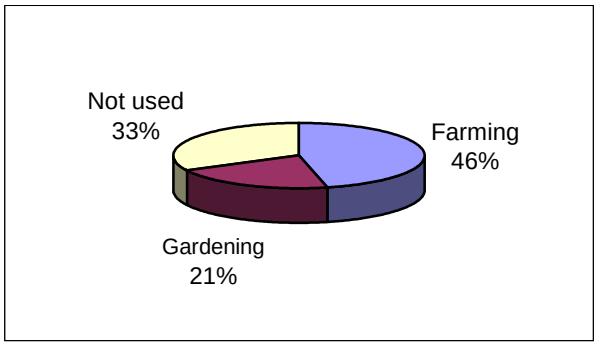

FIG. 3a. Utilisation of manure in the wet season

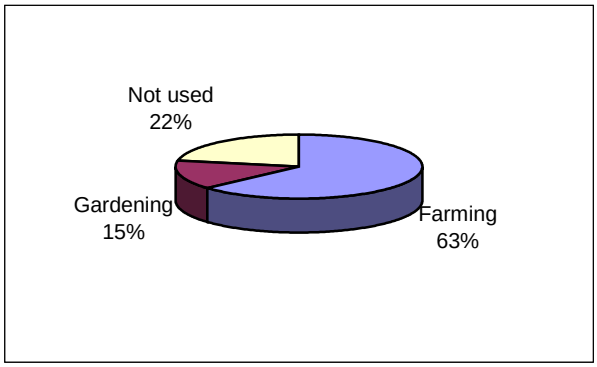

FIG. 3b. Utilisation of manure in the dry season.

3.3. Feeding

In all farms scavenging proved to be the most common method of feeding for the birds. Farmers reported that insects, leftovers, greens, coconut cake, cereals, bran and fruits were the major feed ingredients abundant in both rainy and dry season (Table VII). Several farmers were supplementing

the scavenged feed. The type of supplementary feeding included coconut cakes, food leftovers and maize bran (Table VIII).

TABLE VII. AVAILABILITY AND TYPE OF FEED CONSUMED BY SCAVENGING FAMILY POULTRY

	Wet season			**Dry season**		
Type of feed	Abundant	Moderate	Rare	Abundant	Moderate	Rare
Insects	23	8	11	15	4	14
Leftovers	5	2	9	1	3	3
Greens	16	5	8	14	5	10
Coconut cake	0	2	5	0	0	2
Cereals	0	3	1	0	1	5
Bran	0	0	1	0	0	0
Fruits	0	2	6	1	3	1

TABLE VIII. SUPPLEMENTARY FEEDS PROVIDED TO FAMILY POULTRY IN INTERVIEWED HOUSEHOLDS

Wet season			**Dry season**		
Type of feed	Purchase	Harvest	Type of feed	Purchase	Harvest
Bran	25	7	Bran	27	2
Leftovers	0	1	Leftovers	0	1
Seedcake	3	9	Seedcake	8	0
Cereals	0	3	Cereals	0	0
Fish meal	1	0	Coconut cake	0	0

Of the farmers interviewed in the wet and dry season 93% and 97.6%, respectively, reported to provide water to their chickens (Table IX).

TABLE IX. PRESENCE AND TYPE OF WATER PROVIDED TO VILLAGE POULTRY

	Wet Season	Dry Season	Source	Wet season	Dry season
Water provided	40	42	Tap water	5	5
Water not provided	2	0	Well water	33	35
Unknown	1	1	Unknown	5	3

3.4. Introduction of new birds in the flock

Introduction of new birds into the flock was reported by 34 farmers in the wet season and the major source was from commercial farmers (Table X). In the dry season, 26 farmers reported to have introduced birds into their flock and the major source was again the commercial farmer. Only three farmers who introduced birds in their flocks were aware of the danger of introducing diseases this way.

The main methods of exchange of chicken products was by buying and selling (54%), followed by gifts (23%) and as foods/feasts (23%). No exchange was reported to occur through barter system.

Twenty-nine respondents sold their chicken products mostly to itinerant salesmen within the same village during the wet season and the dry season; it was almost the same number (28) with 64% selling in the same village (Table XI).

TABLE X. ORIGIN OF NEWLY INTRODUCED BIRDS INTO THE FLOCK DURING THE WET SEASON

	Commercial farmer	Market	Other
Zone I	12	2	3
Zone II	12	3	2

TABLE XI. SALE OF CHICKENS

	In the same village	In neighbouring villages	In nearest shopping centre	Town	Itinerant sales man
Zone I	11	3	1		2
Zone II	7	1	1	1	1

3.5. Flock ownership pattern and management at household level

Whereas women either alone or in collaboration with the family, men or children, owned the family poultry in 24 households, men were sole or part owners in 23 households (Table XII).

TABLE XII. FLOCK OWNERSHIP AND LABOUR PROFILES

	Family	Men	Women	Children	Women and Children	Women and Men	Total
Ownership	13	7	5	0	3	3	34
Shelter construction	3	27	4	1	1	0	37
Cleaning chicken house	2	4	21	2	5	4	43
Supplementary feeding	3	8	19	0	3	3	39
Providing water	9	9	6	0	2	4	32
Selling chickens	1	5	6	0	0	1	13
Treatment	1	16	3	0	0	5	25
Selling eggs	4	5	4	0	1	3	18
Selling Chickens	9	6	7	0	2	5	31
Home consumption of eggs	0	0	1	0	0	0	1
Home consumption of chickens	13	16	8	0	0	5	42
Purchase of drugs	1	22	3	0	0	1	27
Total	59	125	87	3	17	34	342

When farmers were asked to rank the functions of chickens in their village, source of food was ranked highest (67%), followed by source of income (31%) and social functions such as ceremonies, gifts and rituals (2%).

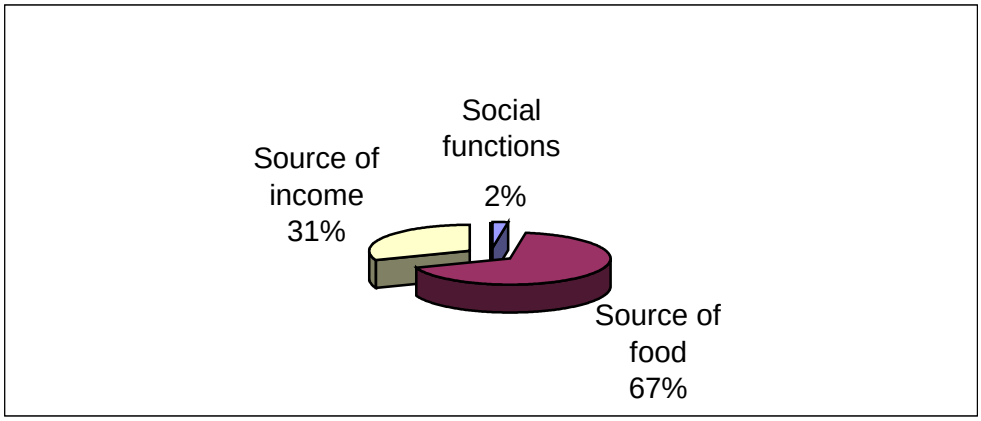

FIG. 4. Functions of poultry in daily village life.

3.6. Poultry farms in relation to village amenities

The distance of the poultry farms to the nearest market, good road, veterinary office or neighbouring village varied from 0-45 km (Table XIII).

Only four farmers knew of farmer groups/associations operating in their village while 39 were unaware. The four farmers were members of a women group or association. The villages did not have access to formal or informal credit sources.

TABLE XIII. LOCATION OF POULTRY FARMS IN RELATION TO SEVERAL AMENITIES

	Maximum distance	Minimum distance
Distance to nearest neighbouring village	10	0.6
Distance to nearest market	32.5	0
Distance to nearest town centre	45	5
Distance to nearest good road	11.5	0
Distance to nearest animal health or veterinary office	45	5

3.7. Animal health

Disease problems occurred in 31 out of 43 households during the previous year (Table XIV).

TABLE XIV. NUMBER OF CASES WITH SYMPTOMS OR A DISEASE REPORTED DURING THE DRY SEASON

Disease condition/symptom	Number of cases reported
Swollen Head	9
Swollen Joints	4
Diarrhoea (bloody/greenish)	24
Twisted neck	21
Fowl pox/warts	3
Paralysed legs/wings	6
Fowl pox/warts	17
Mites/Ticks	1
Fleas	11
Motor accidents	3
Total	99

Forty-five cases with either greenish diarrhoea or a twisted neck were indicative of Newcastle disease and formed the majority of the total of 99 cases reported. Other symptoms or diseases mentioned limiting local poultry development were in order of importance coughing/sneezing, fowl pox, mites, ticks, and fleas. Post mortem examination was conducted on 12 and 15 birds during the wet and dry season, respectively. The birds were either submitted to the laboratory by the field staff or were collected during field visits. Laboratory investigation detected the following diseases: fowl pox (8), infectious coryza (4), vitamin A deficiency (3), *Knemidocoptes mutans* infestation (4) and flea infestation (5). Newcastle disease was confirmed in six outbreaks.

Flock mortality was higher during the dry season (25.3%) than during the wet season (17.6%). The age group mostly affected by disease were the young chicks (Table XV).

TABLE XV. MORTALITY RATE (%) BY AGE AND SEASON

Percent of deaths in wet season	17.6
Percent of deaths in dry season	25.381
Percent of deaths as chicks	30.342
Percent of deaths as growers	20.287
Percent of deaths as adults	14.535

3.8. Serological results

During the wet season, serum samples were collected from a total of 352 birds and analyzed by haemagglutination inhibition test for Newcastle disease virus antibodies. The results indicated that only 127 had antibodies against Newcastle disease, while 225 birds had no antibodies at all and were, therefore, completely susceptible to Newcastle disease.

Strain I-2 of heat-resistant NDV was adopted for vaccination because laboratory trials conducted at ADRI found that it was effective in conferring immunity to birds [1]. Following the laboratory results field trials were conducted to assess whether V4 vaccine was useful for providing an

acceptable level of protection against ND under village conditions in central Tanzania [2]. During the dry season (February 2000), serum samples were collected in three phases: 277 samples pre-vaccination, 246 two weeks post vaccination and 259 samples at 105 days post vaccination. The results of the haemagglutination inhibition tests indicated that vaccinations had been very effective (Table XVI).

TABLE XVI. RESULTS OF SEROLOGICAL SCREENING FOR NEWCASTLE DISEASE USING THE HAEMAGGLUTINATION INHIBITION TEST

Wet Season (May 1999)

Serum dilutions	-Ve	1:2	1:4	1:8	1:16	1:32	1:64	1:128	1:256	1:512	1:1024	1:2048	
No. Positive	235	39	14	3	4	6	2	10	3	6	20	20	362
% Positive	64.9	11	4	0.9	1.1	1.7	0.6	2.8	0.9	1.7	5.7	5.7	101

Dry Season (February 2000)

A: Pre-vaccination

Serum dilutions	-Ve	1:2	1:4	1:8	1:16	1:32	1:64	1:128	1:256	1:512	1:1024	1:2048	1:4096	
No. positive	47	16	55	56	52	20	11	4	6	9	0	0	1	277
% positive	17	6	20	20	19	7	4	1.5	2	3	0	0	0	

B: Two weeks post vaccination

Serum dilutions	-Ve	1:2	1:4	1:8	1:16	1:32	1:64	1:128	1:256	1:512	1:1024	1:2048	1:4096	
No. positive	19	1	2	5	10	17	44	65	54	20	7	2	246	492
% positive	8	0	0	2	4	7	18	26	22	8	3	0		

C: 105 Days post vaccination

Serum dilutions	-Ve	1:2	1:4	1:8	1:16	1:32	1:64	1:128	1:256	1:512	1:1024	1:2048	1:4096	
No. positive	51	20	39	64	29	21	10	13	4	5	0	2	1	259
% positive	20	8	15	25	11	8	4	5	1.5	1.5	0	0	0	

3.9. Faecal sample examinations

A large number of faecal samples (209) was collected during the wet and the dry season from poultry in 43 homesteads. They were examined for eggs per gram (EPG) faeces (Tables XVII and XVIII).

TABLE XVII. HELMINTHOLOGICAL RESULTS OF THE WET SEASON

Helminth spp.	Number detected	Percentage of total
Ascaridia	57	27.3
Capillaria	15	7.2
Coccidia	29	13.9
Echinuria uncinata	11	5.3
Heterakis spp.	1	0.5
Hymenolepis	3	1.4
Negative	9	4.3
Ornithobilharzia pricei	2	1.0
Raillietina	56	26.8
Syngamus bronchialis	3	1.4
Syngamus trachea	1	0.5

TABLE XVIII. HELMINTHOLOGICAL RESULTS OF THE DRY SEASON

Helminth species	Number of eggs per gram
Coccidia oocysts	43
Ascaridia spp.	18
Capillaria spp.	6
Raillietina	4
Heterakis spp.	3
Trichostrongylus tenuis	3
Heterakis	2
Trichostrongylus	1
Syngamus brochialis	1
Ornithobilharzia pricei	1
Syngamus trachea	1
Negative	65
Total	148

The cross-sectional prevalence study included 43 households and a total of 209 chickens from the two ecological zones. All farms showed helminthosis and only a total of 11 out of 209 faecal samples examined for worms using the EPG technique gave negative results. A total of 8 different species of helminth eggs were identified. The most frequently encountered worm species during the rainy season were *Ascaridia* spp. (27.3%), followed by *Raillietina* (26.8%), *Coccidia* (13.9%), *Capillaria* (7.2%) and *Echinuria uncinata* (5.3%).

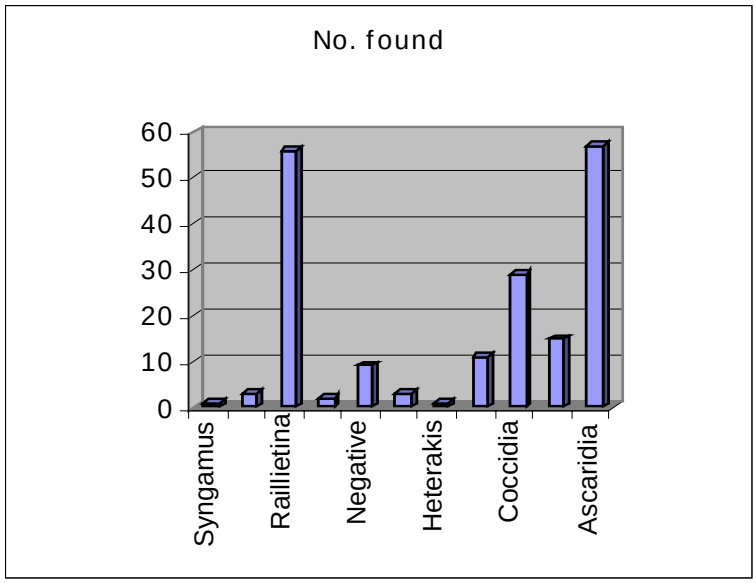

FIG. 5. Frequency of worms encountered in the wet season.

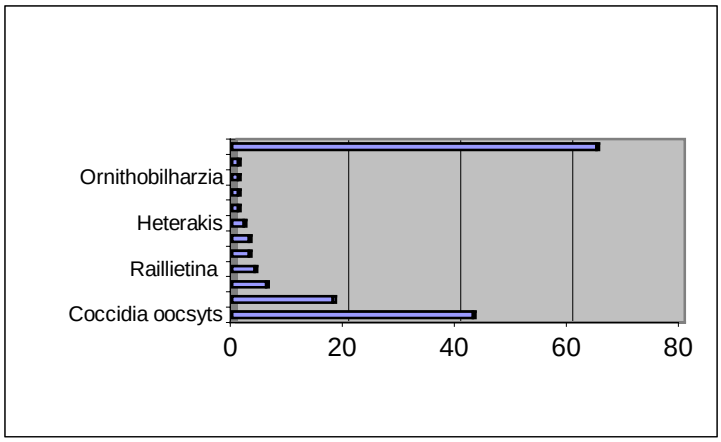

FIG. 6. Frequency of worms encountered in the dry season.

3.10. Haematological results

Blood smears prepared from 349 birds were examined for the presence of haemo-protozoan parasites (Table XIX).

TABLE XIX. RESULTS OF PROTOZOOLOGICAL EXAMINATIONS

Zone	Village	Household	Parasite detected	Number
Zone I	Pangani	Francis Mtwale	*Leucocytozoon simondi*	2 birds
		Edna Mchome	*L. simondi*	1 bird
		Lucia John	*L. simondi*	2 birds
Zone II	Mbande	Hassan Dyemla	*L. simondi* (round macrogametes)	1 bird
	Mwendapole	Felician Sintole	*Haemoproteus columbae*	1 bird
	Gezaulole	Hassan Mohamed	*L. simondi* (elongated microgametocyte)	1 bird
		Hamida Ramadhani	*L. simondi* (round microgametocyte)	1 bird
		Anna John	*L. simondi* (round macrogametes)	2 birds

4. DISCUSSION

Production data showed that cocks were fewest in number during both seasons comprising about 8.2% of the flock. This was due to the fact that cocks were culled at an early age for either sale or slaughter. The ratio of chicks:growers:adults was 10:10:14 in the wet season and 11:10:10 in the dry season. This is inconsistent with the ideal ratio of 2:2:1 [3]. The low number of growers and chicks was mainly due to high chick mortality resulting from diseases, predation and nutritional disorders. However, no difference was detected in flock size between the two zones.

The output in terms of number of eggs was on average 36 eggs per hen/year. This is very low when compared to 40-60 eggs as recorded elsewhere [4]. The intensive commercial systems have a much higher output reaching 280–320 eggs per hen/year. Out of an average of 12.18 and 12.10 eggs laid, only 10.73 and 10.38 were incubated in the wet and dry season, respectively. The rest were either consumed by the farmer or sold at a local market. Despite the high hatchability reported by the farmers in both seasons in the two zones, the number of chicks reared was low (70%). The high chick mortality was attributed to diseases and predation. Predation resulted mainly from Indian crows and hawks, but a considerable number of farmers reported predation from weasels (*Mustela frenata*) called kicheche in Kiswahili and monitor lizards (*Varanus* spp.) known in Kiswahili as kenge.

In general, the birds had a low nutritional status reflecting in low growth rates, high chick mortality and low mature weights. Beetle larva developing in decaying cattle manure was witnessed to be a source of food for scavanging birds. Supplemented food was either purchased or obtained from the harvest. Two farmers mentioned providing maize porridge (ugali).

The results underlined the major role women play in family poultry development. Women provided most labour for family poultry activities but men made several of the major decisions. This points out the importance of addressing both genders equally.

Twenty-one households out of 42 interviewed had access to extension/veterinary services for their poultry. The type of service was mainly advisory and diagnostic. Cost incurred for the services ranged from US$ 0–4.5. The frequency of services provided varied greatly.

In particular Newcastle disease (called Mdondo/Kederi in Kiswahili), was mentioned by farmers in both zones as the major constraint affecting village chickens. When outbreaks occurred they were usually accompanied by high mortality rates and this discouraged farmers from investing much time or money in their flocks. Newcastle disease showed a seasonal occurrence pattern with a peak in the dry season (August - November). All age groups were equally affected. The disease is endemic in the country and three types of Newcastle Disease virus (NDV) have been isolated [5]: (1) velogenic (2) mesogenic and (3) lentogenic. The direct losses incurred as a result of bird mortality (estimated to reach 13 549 356) have been assessed at over US$ 34 million [6].

Most farmers reported that flock mortalities were higher during the dry season than the wet season. The age group mostly affected by disease were the chicks and losses were mostly due to both disease and predation.

Helminth infections were detected in all farms, although 23% of the faecal samples were negative for worm eggs. In previous studies conducted on 600 birds in Morogoro, all birds were infected with worms. In previous studies in Tanzania a total of 29 different helminth species have been detected [7].

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