

SURVEY OF THE TRADITIONAL POULTRY PRODUCTION SYSTEM IN THE BAMENDA AREA, CAMEROON

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Abstract

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A study of the traditional poultry production system in the Bamenda area in Cameroon was conducted using a baseline survey covering the rainy and dry seasons from December, 1999–June, 2000. This survey focused mainly on the characterization of the flock size and structure, housing system, feeding, marketing of chickens, health, flock breeding and ownership patterns.

The results showed that among poultry species surveyed, chickens predominated in all households, followed by ducks (15.4%) and pigeons (7.7%). A cock had access to about 2–3 hens and one hen had a brood of 1–3 chicks at a time with an overall higher hen/cock and chicks/hen ratio for the dry season. Production and reproduction performance results showed that hens laid about 3 clutches of 12 eggs per year and this was similar for both seasons. The most predominant disease symptoms in descending order of importance included diarrhoea, coughing and ectoparasitism. Although the overall disease occurrence rate was high in growers, chicks suffered from many unclassified ailments.

From the survey results, ethno-veterinary therapy featured as the most frequent method of treating diseases in rural poultry in the Bamenda area. With regard to flock ownership and management patterns, the survey results showed that women owned birds in the majority of the cases (38.5%) followed by men (23.1%) and children (15.3%). Although all gender categories were involved in village chicken management, the greatest participation came from women, followed by men, children and the family as a whole. Construction of shelters was mainly a job for the men with assistance from the children. Women were mostly involved in providing water to the birds, preparing supplementation rations and selling eggs.

Finally, with regard to household decision making on issues related to poultry management, men played the leading role (66.7%), followed by women (28.4%) and then children (3.7%).

1. INTRODUCTION

The poultry sector in Cameroon can be subdivided into the modern and the traditional sub-sectors. Each of them has its own peculiarities that make them so special with respect to their contribution to national food security. Poultry meat and eggs represent about 10% of the total meat produced in the nation.

The traditional sub-sector also called rural or backyard production system largely dominates poultry keeping in Cameroon. The sub-sector is very important for the livelihood of many Cameroonians, contributing up to 10% of the income earnings of the rural population. In contrast to the modern sub-sector, which is found mostly in urban and peri-urban areas, the traditional poultry system is distributed all over the country. This is due to the fact that there is space for extensive rearing, few socio-economic constraints such as high investment costs and the restriction of the movement of chickens, and a possibility to utilize crop residues and kitchen wastes which otherwise will be of little value [1].

The traditional system comprises about 70% of the estimated 19 million chickens nation wide, but provides only about 50% of the average chicken meat and egg intake of 1.8 kg and 20 eggs per capita per year, respectively [2]. It has been reported that about 43% of the local chickens are used for home consumption, while 34% and 23% are used for sales and gifts, respectively [3].

Because little care is provided, the sub-sector depends on the ability of the local “breed” to survive within harsh environments. Yet, the protein quality and the erratic income derived from poultry products are necessary to supplement the daily farming activities of the rural population. Chickens are also involved in many social and cultural or religious ceremonies leading to some ritual beliefs [1, 4, 5].

Chickens in Cameroon can generate about 1.5 million tons of fresh (25% dry matter) droppings annually [6]. These droppings are richer in nitrogen, phosphates and potash than livestock manure and more efficient for vegetable gardening and other crop production.

Meat and eggs from local chickens are considered more natural and tasty for many Cameroonians. The products form the core of traditional hospitality, serving as a gift to an unexpected “important” guest. Price-wise a local chicken of the same body weight sells at a higher price than a

broiler chicken. Eggs from a local hen sell at a 75% higher price than the larger eggs laid by an exotic strain.

Despite all the good qualities of the local chicken, the traditional poultry production system is still very backward and suffers from several constraints. Therefore, the overall objective of this project is to increase village poultry production through identification of the major constraints and the implementation of improvement strategies.

2. MATERIALS AND METHODS

A study of the traditional poultry production system in the Bamenda area in Cameroon was conducted using a baseline survey during the rainy and dry season. To start, preliminary informative contacts were made with the Provincial Delegates of the Ministry of Agriculture (MINAGRI) and of the Ministry of Livestock, Fisheries and Animal Industries (MINEPIA). The purpose of the project and the various components were explained and later reported to the subordinates down to the level of village extension workers (VEW). Discussions with some of the VEW's and some of the farmers were constructive as they helped in testing and amending the base line survey questionnaire provided by the IAEA.

Two survey sites or ecological zones were chosen for the administration of the questionnaire and sample collection based on criteria related to:

- Altitude (high versus low);
- Easy accessibility;
- Proximity to the research station within a radius of 30 km; and
- Availability of family poultry.

According to the criteria, Zone 1 is situated in Mezam Division in the Santa Sub-Division with an altitude of >1200 m.a.s.l. Zone 2 is situated in the Ngoketungia Division within the Ndop Sub-division in a low altitude area of <1200 m.a.s.l.

A stratified sampling technique was employed to administer the questionnaires and collect samples. Three villages were selected from each zone and four households from each village giving a total of 24 households or experimental units. While villages were chosen at random, care was taken to ensure that each household kept at least 10 traditional chickens of which at least 4 were adult hens. Moreover, in each village households were chosen to reflect the existing tribal settlements, either of the Fulani or the indigenous Grassfield settlers. Each group of settlers corresponded to specific environments, ways of life and poultry production/management patterns.

The questionnaires were jointly administered by the research team and the VEW's of the locality in pidgin English although in a few cases the VEW's used the local vernacular terms for clarification. It took about 45–60 minutes to cover one household depending on the complexity of explanations by the respondent.

In each of the selected households, a maximum of six adult birds was selected, wing-tagged and bled. Serum samples derived from the blood samples were identified and divided into two aliquots where possible and stored at -20°C in the laboratory for future serological analysis. Faecal samples were collected from birds in each household during each season to determine the prevalence of gastrointestinal parasites. Observations on both sick and healthy birds including autopsy, was also a component of the continuous survey. The production data collected for the dry and wet season were compared using the student T-test.

3. RESULTS

The purpose of the survey was to characterize the flock size and structure, housing system, feeding, marketing of chickens, health, flock breeding and ownership patterns.

Among the poultry species surveyed, chickens predominated in all households, followed by ducks (15.4%) and pigeons (7.7%). A total of 505 chickens were counted in the survey, followed by 44 ducks and 16 pigeons. This trend remained the same during both the dry and wet season. The average flock size per household was 17 for Santa, 22 for Ndop and 19 for both zones. There were more chickens in Ndop than in the Santa zone but there was no significant variation in chicken numbers ($P>0.05$) between the seasons in the two zones (Table I).

TABLE I. FLOCK SIZE AND AGE CLASS DISTRIBUTION IN TWO ECOLOGICAL ZONES

Zone	Cock		Hen		Grower		Chick		Total	
	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry
Santa	2.4	1.2	5.7	4.6	6.1	6.1	2.9	7.8	17.1	19.7
Ndop	1.4	1.2	4.4	3.1	5.3	4	11	5.3	22.2	13.5
Average	1.9	1.2	5.1	3.8	5.8	5	6.6	6.5	19.4	16.5

Seasonal variation: Overall flock size was the same for both seasons in the two zones.

TABLE II. AVERAGE HEN TO COCK AND CHICK TO HEN RATIOS FOR HOUSEHOLDS IN TWO ECOLOGICAL ZONES

Zone	Hen to cock ratio		Chick to hen ratio	
	Wet	Dry	Wet	Dry
Santa	2.4	3.9	0.5	1.7
Ndop	3.1	2.7	2.5	1.7
Average	2.7	3.3	1.3	1.7

TABLE III. PRODUCTION AND REPRODUCTION PARAMETERS OF HENS REARED IN TWO ECOLOGICAL ZONES IN THE DRY AND WET SEASON

Zone	Clutch/year		Eggs/clutch		Eggs incubated		Chicks hatched		Chicks reared	
	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry
Santa	2.7	2.7	13.6	13.4	11.2	11.1	9.5	9.5	5.3	5.3
Ndop	2.7	2.7	10.8	12.5	9.6	9.9	8.0	7.5	4.6	3.7
Average	2.7	2.7	12.4	13.0	10.5	10.5	8.9	8.6	5.0	4.6

TABLE IV. PRODUCTION AND REPRODUCTION PERFORMANCE OF HENS REARED IN TWO ECOLOGICAL ZONES IN THE DRY AND WET SEASON

Zone	Eggs/hen/year		Take off (%)		Hatchability (%)		Survival (%)	
	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry
Santa	36.5	36.2	17.6	17.2	84.5	85.6	56.2	55.8
Ndop	29.2	33.8	11.2	20.8	83.7	75.8	57.2	49.3
Average	33.3	35.1	15.1	19.2	84.5	81.9	56.8	53.5

3.1. Hen to cock ratio

The results showed that one cock had access to about 2-3 hens and one hen had a brood of 1-3 chicks at a time. This hen to cock ratio was higher for Santa in the dry season, but higher in Ndop in the wet season. However, the chick to hen ratio was found to be higher for Santa in the dry season and higher for Ndop in the wet season. There was an overall higher hen/cock and chicks/hen ratio for the dry season (Table II).

3.2. Production and reproduction performance

The results showed that hens laid about 3 clutches of 12 eggs per year. However, they were allowed to incubate about 10 eggs at a time of which about 9 chicks hatched. At the end only 5 chicks were reared to weaning age. This trend did not vary from one season to the other (Table III). Generally, a hen could lay about 33 eggs per year. Farmers took off about 15% for consumption, sales or other use. It is, therefore, reasonable to state that most of the eggs laid were kept for replacing the stock. Although hatchability of all brooded eggs averaged 85%, about 4 out of 7 chicks survived due to a high mortality rate of about 43% (Table IV). The production and reproduction performance in the two zones was similar in the two seasons.

3.3. Housing systems

All participating farmers knew where their chickens were spending the night. Two housing systems could be distinguished: the single-location housing system in 58% of the households, and the multi-location housing system in 42% of the households in the wet season with a similar trend in the dry season. Single location chicken houses included the kitchen/store (38.5%) predominantly found in the Ndop zone or chicken barn (25%), which was widely used in the Santa zone. Woven-baskets, with the aim to protect a broody hen and her family was used only in the Ndop zone in the wet season. The multi-location housing system centered in both zones on a combination of kitchen/store, perching in trees and other locations such as verandas of houses, abandoned structures and the bush.

More than 80% of the farmers stated that they cleaned their chicken barns and that this was done on a daily basis in both zones with more frequent cleaning in the wet (44%) than in the dry season (41%). Within the period of a month, a greater number of farmers in Ndop (> 70%) had cleaned their chicken barns in both seasons than in the Santa zone (40%).

3.4. Feeding

Chickens lived in a free-range system where they scavenged around the homestead and surroundings. Four types of feedstuff were identified in the farms during the survey in both seasons: i) earth worms, vermin and larvae collected from manure or compost dumps, ii) grasses and various leaves, iii) kitchen refuse such as left-over meals, spoiled food and other crop residues, iv) insects and bugs (Table V). Cereals such as maize and rice grains constituted part of the chicken feed only during the wet season in both zones.

There was a similar pattern in the two zones and for both seasons on the most common feedstuff eaten by chickens. Grasses, weeds, and leaves came first, followed by earthworms, larvae and other vermin obtained by scratching piles of dung. Other feedstuffs consisted of insects and other bugs (27%), kitchen refuse and other wastes (11%). While earthworms were abundant throughout the year, grasses and weeds were abundant during the wet season and less during the dry season. Kitchen refuse was abundant in the dry season and less abundant in the wet season. Cereals were abundant in the wet season but completely absent in the dry season in both zones.

Generally, the feedstuffs were not easy to obtain within the household irrespective of the season and required a lot of exercise from the chickens during scavenging. The complete absence of cereals during the dry season may be due to the high demand for human consumption and also because of off-season. Sociological information indicated that the people of Santa were eating more roots and tubers, while those in Ndop ate more cereals.

TABLE V. TYPE OF FEEDSTUFF EATEN BY CHICKENS ON FREE-RANGE

Types of feedstuff	Number of chickens					
	Santa		Ndop		Total	
	Wet	Dry	Wet	Dry	Wet	Dry
Cereals (maize, rice, etc.)	5 (12.5)	0 (0.0)	1 (11.1)	0 (0.0)	9 (11.8)	0 (0.0)
Earthworms, etc.	10 (25.0)	9 (28.1)	6 (16.7)	9 (28.1)	16 (21.1)	18 (28.1)
Grasses, weeds, leaves.	14 (35.0)	12 (37.5)	9 (25.0)	10 (31.3)	23 (30.3)	22 (34.4)
Kitchen and other wastes	2 (5.0)	2 (6.3)	7 (19.1)	5 (15.6)	9 (11.8)	7 (10.9)
Bean flowers	2 (5.5)	0 (0.0)	0 (0.0)	0 (0.0)	2 (2.6)	0 (0.0)
Insects	7 (17.5)	9 (28.1)	10 (24.8)	8 (25.0)	17 (22.4)	17 (26.0)
Total	40 (100)	32 (100)	36 (100)	32 (100)	76 (100)	64(100)

Figures in brackets represent percentages.

3.5. Supplementary feeding

The survey results indicated that the supplements provided for the chickens on free-range consisted in descending order of importance of kitchen refuse, weeviled or purchased maize, rice grains, concentrated feeds and industrial by-products (Table VI).

TABLE VI. TYPES OF FEEDSTUFF SUPPLEMENTED BY FARMERS TO THEIR CHICKENS

Types of feed supplements	Number of farmers					
	Santa		Ndop		Total	
	Wet	Dry	Wet	Dry	Wet	Dry
Kitchen refuse	10 (12)	10 (45.5)	7 (30.1)	9 (37.5)	17 (36.2)	19 (41.3)
Weeviled or purchased maize	5 (21)	9 (40.9)	9 (39.1)	10 (41.2)	14 (29.8)	19 (41.3)
Rice grains	2 (8)	0 (0.0)	1 (4.4)	0 (0.0)	5 (6.4)	0 (0.0)
Compounded or concentrated feed	5 (21.0)	0 (0.0)	2 (8.7)	0 (0.0)	7 (14.9)	0 (0.0)
Industrial by-products	2 (8.0)	3 (13.6)	4 (17.4)	5 (20.8)	6 (12.7)	8 (17.4)
Total	24 (100)	22 (100)	23 (100)	21 (100)	47 (100)	46 (100)

Figures between brackets represent percentages; concentrated feeds and rice grains were only available in both zones during the wet season.

3.6. Marketing

3.6.1. Purchasing

Most farmers participating in the survey stated that they purchased birds for their farmyard population from various sources. The most important sources included the village market, neighbouring compounds and other family members. Other sources included the village and farm gates (Table VII).

3.6.2. Selling

More than 50% of the farmers sold most of their chicken products. Sales occurred mostly in the farmers' village in both zones. The buyers were itinerant salesmen, consumers, other family members and passers-by. More birds were bought in the market in the dry season, while 33% of birds were bought from neighbouring compounds in the rainy season.

TABLE VII. SOURCES OF BIRDS PURCHASED BY FARMERS

Sources of birds purchased	Number of birds					
	Santa		Ndop		Total	
	Wet	Dry	Wet	Dry	Wet	Dry
Market	5 (38.1)	7 (70.0)	5 (75.0)	6 (75.0)	10 (41.7)	13 (72.1)
Neighbouring compounds	4 (30.8)	0 (0.0)	4 (36.4)	1 (12.5)	8 (33.3)	1 (5.6)
Other family members	2 (15.4)	2 (20.0)	0 (0.0)	1 (12.5)	2 (8.3)	3 (16.7)
Other sources	2 (15.4)	1 (11.0)	2 (18.2)	0 (0.0)	4 (16.7)	1 (5.6)
Total	13 (100)	10 (100)	11 (100)	8 (100)	24 (100)	18 (100)

Figures between brackets represent percentages.

3.7. Health

Disease incidence was found to be higher in the wet than in the dry season in both zones. The major disease symptoms during both seasons included diarrhoea, coughing and ectoparasites. Other symptoms such as paralysis, twisted neck, swollen joints and heads and fowl pox/warts were reported to a lesser degree and mostly in the wet season.

Disease symptoms or causes of deaths such as dizziness, drowsiness, pendulous crop and predation by wild birds or foxes contributed significantly to the reduction in flock size and the farmers' profit margin. The importance of this group of symptoms (in 35.3% of cases) implied that the knowledge of disease conditions was rudimentary for most farmers.

The prevalence of gastro-intestinal parasites in farmyard poultry in the two zones showed a high infestation rate with roundworms during the rainy season. Species of round worms identified included *Ascaridia galli*, *Capillaria* sp., *Heterakis gallinarum*, *Strongyloides avium* and *Syngamus trachea*. The only flatworm species identified was *Railletina* spp.

Growers suffered most frequently from disease symptoms followed by adult birds with a higher prevalence in the rainy than in the dry season. Chicks generally suffered from illnesses unknown to the farmers (Table VIII).

TABLE VIII. DISEASE OCCURRENCE IN THREE AGE GROUPS OF CHICKENS

Chicken age group	Number of animals affected					
	Santa		Ndop		Overall	
	Wet	Dry	Wet	Dry	Wet	Dry
Chicks	15 (18.7)	14 (35.6)	25 (28.7)	13 (33.4)	40 (24.0)	27 (32.9)
Growers	30 (37.5)	16 (37.2)	34 (39.1)	13 (33.3)	64 (38.3)	29 (35.4)
Adults	35 (43.8)	13 (30.2)	28 (32.2)	13 (33.3)	63 (37.7)	26 (31.7)

Figures between brackets represent percentages.

Mortality rates due to disease alone were generally higher in all age groups during the wet season with chicks registering the highest incidence followed by growers (Table IX).

Disease control measures included ethno-veterinary practices, antibiotics, kerosene, palm oil and no action taken and/or elimination of the sick birds. In most cases (49%), no action was taken while 27% of the cases were treated using ethno-veterinary practices.

TABLE IX. DISEASE MORTALITY (%) IN VARIOUS AGE GROUPS OF CHICKENS

Chicken age group	Santa		Ndop		Total	
	Wet	Dry	Wet	Dry	Wet	Dry
Chicks	77.5	15.6	59.3	27.3	63.3	21.2
Growers	49.9	23.3	60.4	31.4	55.6	27.4
Adults	31.6	23.0	45.6	23.6	39.1	23.3

Generally, disease problems were treated with ethno-veterinary therapies and antibiotic drugs during both seasons (Table X). Ethno-veterinary practices were more extensively used than antibiotics for all ailments, particularly those not easily described by farmers. The treatment materials came from the garden or from the market and the pharmacy during both seasons (Table XI). Most of the farmers in the two zones had little or no assistance from extension workers with regard to family poultry production.

TABLE X. TYPES OF TREATMENT ADMINISTERED BY FARMERS TO CONTROL DISEASES

Types of treatment	Number of birds treated					
	Santa		Ndop		Overall	
	Wet	Dry	Wet	Dry	Wet	Dry
Ethno-veterinary	11 (42.4)	10 (58.8)	15 (71.4)	11 (78.6)	26 (55.3)	21 (67.7)
Antibiotic	13 (50.0)	7 (41.2)	5 (23.8)	3 (21.4)	18 (38.3)	10 (32.3)
Kerosine	1 (3.8)	0 (0.0)	1 (1.8)	0 (0.0)	2 (4.3)	0 (0.0)
Palm oil	1 (3.8)	0 (0.0)	0 (0.0)	0 (0.0)	1 (2.1)	0 (0.0)
Overall	26 (100)	17 (100)	21 (100)	14 (100)	47 (100)	31 (100)

Figures between brackets represent percentages.

TABLE XI. SOURCES OF DRUGS USED BY FARMERS

Sources of drugs	Number of drugs					
	Santa		Ndop		Overall	
	Wet	Dry	Wet	Dry	Wet	Dry
Market	4 (25.0)	3 (21.4)	5 (31.3)	3 (21.4)	9 (28.1)	6 (21.4)
Pharmacy	4 (25.0)	2 (14.3)	4 (25.0)	0 (0.0)	8 (25.0)	2 (7.2)
Garden	4 (25.0)	9 (64.3)	6 (37.5)	11 (78.6)	10 (31.3)	20 (71.4)
Purchase	4 (25.0)	0 (0.0)	1 (6.7)	0 (0.0)	5 (15.6)	0 (0.0)
Overall	16 (100)	14 (100)	16 (100)	14 (100)	32 (100)	28 (100)

Figures between brackets represent percentages.

3.8. Breeding

Cross breeding was practiced in both zones in at least 30% of the farms during the two seasons. In both seasons most of the breeding cocks came from the farmers' flock and neighbouring households (Table XII).

TABLE XII. ORIGIN OF BREEDING COCKS

Origin	Number of cocks					
	Santa		Ndop		Overall	
	Wet	Dry	Wet	Dry	Wet	Dry
Farmer's own flock	8 (57.0)	9 (69.2)	3 (25.0)	6 (50.0)	11 (42.3)	15 (60.0)
Neighbouring household	1 (7.2)	2 (15.4)	2 (16.7)	5 (41.7)	3 (11.5)	7 (28.0)
Neighbouring village	0 (0.0)	2 (15.4)	1 (8.3)	0 (0.0)	1 (3.9)	2 (8.0)
Farmers and neighbours	4 (28.6)	0 (0.0)	4 (33.3)	0 (0.0)	8 (30.8)	0 (0.0)
Combination of origins	1 (7.2)	0 (0.0)	2 (16.7)	1 (8.3)	3 (11.5)	1 (4.0)
Total	14 (100)	13 (100)	12 (100)	12 (100)	26 (100)	25 (100)

Figures between brackets represent percentages.

3.9. Flock ownership pattern and management at household level

Chickens belonged to the family at large, but specific ownership patterns existed, namely women owned the majority of the birds followed by the men and lastly the children (Table XIII).

TABLE XIII. FLOCK OWNERSHIP PATTERN

Owner	Number of households					
	Santa		Ndop		Overall	
	Wet	Dry	Wet	Dry	Wet	Dry
Women (wife)	5 (29.4)	7 (38.9)	9 (40.9)	8 (38.1)	14 (35.9)	15 (38.5)
Men (husband)	4 (23.6)	3 (16.7)	6 (27.3)	6 (28.6)	10 (25.7)	9 (23.1)
Children	3 (17.6)	2 (11.1)	4 (18.2)	4 (19.0)	7 (17.9)	6 (15.3)
Family as a whole	5 (29.4)	6 (33.3)	3 (13.6)	3 (14.3)	8 (20.5)	9 (23.1)
Total	17 (100)	18 (100)	22 (100)	21 (100)	30 (100)	39 (100)

Figures between brackets represent percentages.

The flock management labour profile included such activities as shelter construction, cleaning, feeding, marketing and health care. Women did by far most of the work followed by the men and children (Table XIV). This trend was the same for the two zones and in both seasons.

TABLE XIV. LABOUR PROFILE IN THE MANAGEMENT OF CHICKEN FLOCKS

Labour profile	Number of management actions					
	Santa		Ndop		Overall	
	Wet	Dry	Wet	Dry	Wet	Dry
Men	38 (37.2)	34 (40.0)	30 (28.0)	32 (31.7)	68 (32.5)	66 (35.5)
Women	42 (41.3)	28 (32.9)	47 (44.0)	45 (44.6)	89 (42.5)	73 (39.2)
Children	18 (17.6)	19 (22.4)	30 (28.0)	24 (23.7)	48 (23.0)	43 (23.1)
Family	4 (3.9)	4 (4.7)	0 (0.0)	0	4 (2.0)	4 (2.2)
Total	102 (100)	85 (100)	107 (100)	101 (100)	209 (100)	186 (100)

Figures between brackets represent percentages.

The fact that the family as an entity was involved in the routine management of the flock in only 2% of the cases suggested that a structured division in labour existed with specific job descriptions for each family member. However, men did most of the work involving construction of poultry shelters and shared with the women tasks related to treatment of sick birds. Apart from the sale of eggs, children were found to assist in most of the other activities.

3.10. Household decision-making

The results of the survey showed that men took most of the decisions related to poultry management (Table XV). This trend was obvious in the two zones and in both seasons.

TABLE XV. HOUSEHOLD DECISION-MAKING ON ISSUES RELATED TO POULTRY MANAGEMENT

Labour profile	Number of decisions					
	Santa		Ndop		Overall	
	Wet	Dry	Wet	Dry	Wet	Dry
Men	28 (62.2)	26 (70.3)	29 (60.4)	28 (63.6)	57 (61.3)	54 (66.7)
Women	16 (35.6)	10 (27.0)	16 (33.3)	13 (29.5)	32 (34.4)	23 (28.7)
Children	0 (0.0)	0 (0.0)	3 (6.3)	3 (6.8)	3 (3.2)	3 (3.7)
Family	1 (2.2)	1 (2.7)	0 (0.0)	0 (0.0)	1 (1.1)	1 (1.2)
Total	45 (100)	37 (100)	48 (100)	44 (100)	93 (100)	81 (100)

Figures between brackets represent percentages.

The fact that the family as a whole hardly was involved in decision-making (1%), suggests that decision-making was considered as too important for everyone in the family to participate and that the family is well structured with the head of the family having the last word. However, women did play an important role in the decision process when it came to the sale of chickens.

3.11. Exchange pattern of chicken products

The results of the survey showed that chickens were kept in order of priority as a source of income, a source of food and as a tool for social functions. However, a source of income was ranked as most important in the Ndop zone, while the source of food was considered most important in Santa.

Food and gifts were the predominant methods of exchange of chicken products followed by selling/buying and barter practices with similar trends in both seasons (Table XVI).

TABLE XVI. EXCHANGE PATTERN OF CHICKEN PRODUCTS

Exchange methods	Number of chicken products					
	Santa		Ndop		Overall	
	Wet	Dry	Wet	Dry	Wet	Dry
Sell/buy	23 (28.4)	17 (25.8)	25 (32.0)	24 (31.6)	48 (30.2)	41 (28.9)
Gifts	28 (34.6)	23 (34.8)	24 (30.8)	21 (27.5)	52 (32.7)	44 (31.0)
Food	26 (32.0)	22 (33.3)	24 (30.8)	25 (32.9)	50 (31.4)	47 (33.1)
Barter	4 (5.0)	4 (6.1)	5 (6.4)	6 (7.9)	9 (5.7)	10 (7.0)
Total	81 (100)	66 (100)	78 (100)	76 (100)	159 (100)	142 (100)

Figures between brackets represent percentages.

4. DISCUSSION

The results of this survey have shown that the village chicken production systems in the Bamenda area were based on the indigenous domestic fowl (*Gallus domesticus*), which is the predominant species in the rural poultry sector in Africa [7]. These chickens scavenge for most of their nutritional needs, receiving occasional feed supplements from homegrown grains and household refuse. They may or may not have shelter and have no regular health control programmes. Consequently, production is low with a survival rate averaging 50%. The findings agree with previous results from village chicken production systems in other African countries such as Burkina Faso [8], Ghana [9], Mali [10], Niger [11], Togo [12] and Tanzania [13].

The most predominant disease symptoms in descending order of importance included diarrhoea, coughing and ectoparasitism. This is not surprising given that no regular health control programme exists for the birds. The symptoms mentioned above could be due to a variety of diseases caused by viruses, bacteria or ectoparasites. However, Chabeuf [14] reported that the most devastating disease of village chickens in Cameroon is ND and research work in other African countries such as Benin [15], Burkina Faso [8], Mauritania [16] and Tanzania [13] has supported the argument that ND is the most devastating disease of village chickens. With regard to ectoparasites, a study of domestic fowl in Nigeria showed that lice, *Menacanthus stramineum*, were the major problem in rural poultry [17].

Although the overall disease occurrence rate was high in growers, chicks suffered from many unclassified ailments.

From the survey results, ethno-veterinary therapy featured as the most frequent method of treating diseases in rural poultry in the Bamenda area. However, the efficacy of the various remedies needs to be verified. Generally, ethno-veterinary practices were rather common in rural poultry production because of the almost complete absence of assistance from the extension services and the ease and low cost of acquiring ethno-veterinary substances.

With regard to flock ownership and management pattern, the survey results showed that the chickens generally belonged to the family as a whole, but with specific ownership patterns. Women owned birds in the majority of cases (38.5%), followed by men (23.1%) and children (15.3%). This result was not different from observations made in other countries. For example, chickens were predominantly owned by women and children in the Dodoma region, Tanzania, [7].

Division of labour among the different household members was another aspect that was studied. The survey showed that all gender categories were involved in village chicken management with the

greatest participation from women (39.2%), then men (35.5%), children (23.1%) and the family as a whole (2.2%). Construction of shelters was mainly a job for the men, with assistance from the children. A similar trend was observed in a study carried out in The Gambia [7]. Most of the work concerned with cleaning chicken houses was done by women (40.5%), assisted by children and to a lesser extent by the men (21.6%). Women were mostly involved in providing water to the birds, preparing supplementation rations and selling of eggs. Finally, women assisted their husbands in treating sick birds. In general, the men played a leading role in construction of houses/shelters and disease treatment, whereas the women were mainly involved in other activities.

With respect to household decision-making on issues related to poultry management, men played the major role (66.7%), followed by women (28.4%) and finally the children (3.7%). This is in complete contrast to the situation in the Gambia where decision-making in village chicken production was almost entirely a woman's role [7].

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