

Characterization of Indigenous Poultry Production Systems in the Nkonkobe Municipality, Eastern Cape Province South Africa

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KEYWORDS Chicken Production. Ethno-veterinary. Feeding. Health Care Management. Housing

ABSTRACT A characterization of indigenous poultry production was carried out to ascertain the production systems employed by the indigenous poultry farmers over the years. A survey of 312 households was conducted in 14 villages in the Nkonkobe Municipality using structured questionnaires. Information was collected on demographic database, chicken housing, and feeding and health management. Descriptive data analysis was used. Findings revealed that keeping of indigenous poultry was popular (89.8%), most (76%) were owned by adult females who are mostly (71.8%) clustered in the age range of 46 years and above. Their literacy level was high, as the majority (71.8%) attained primary and secondary education. Mean flock size was 29.98 per household with the majority (69.5%) rearing birds for home consumption. An extensive system of production was common with housing provided at night for protection against predators and theft. Supplementary feeding was common, as was regular provision of water to the flock. The use of Aloe ferox as prophylactic treatment (94.3%) and as a booster of immunity (81.8%) to diseases was commonly practiced. Mortality in adult birds was uncommon but was high (48.1%) in chicks within six weeks after hatching. Indigenous poultry farmers face some challenges among which are, the poor housing that exposed the birds to inclement weather, predator attacks and stock theft, high mortality of chicks after hatching and expensive feed for the flock. It is, therefore, recommended that institutional support should be provided towards harnessing the potentialities of the farmers in all stages of production for sustainable up-scaling.

INTRODUCTION

Three quarters of the world's poorest people get their food and income from farming small plots of land, (Bill and Melinda Gate Foundation 2011). Common to these resource poor farmers, is the rearing of indigenous poultry that scavenge for feed and from kitchen wastes (Okeno et al. 2011). Indigenous poultry production (IPP) is important for many rural households. Various studies carried out in several countries confirm indigenous poultry production's contribution to income, improved nutritional status, reduced livelihoods vulnerability and provision of food security for rural households (Kitalyi 1998; Sonaiya et al. 1999; Dolderg 2004; Sonaiya et al. 2002; Ahuja and Sen 2007; Moges et al. 2010; Alem et al. 2014; Islam et al. 2014). According to Jens et al. (2004) nearly all rural and peri-urban families in developing countries keep a small flock of free-range chickens. A common type of production system is low input-low output and of poor quality (Fentie et al. 2013). However, low

level of risk of scavenging poultry farming has made it a choice of livelihood strategy for subsistence farmers (Sonaiya 2009). Large scale commercial poultry production in South Africa notwithstanding, indigenous poultry production still contributes meaningfully to means of livelihoods and food security (Gondwe 2004; Moreki 2006). Sharma (2007) agreed that the challenge of fighting poverty and malnutrition could be effectively met and to a large extent, by strengthening indigenous poultry production. It has low input requirements, which conform to the socio-economic conditions of rural families (Abdelqader et al. 2007). However, there has been little research conducted in this regard in South Africa (Mwale and Masika 2009) and little empirical evidence to back up the use of indigenous poultry production to alleviate poverty in Eastern Cape Province. The emphasis has often been on commercial poultry (intensive) production systems (Aklilu 2007). As a result of this, there are no accurate data on the actual population of village or backyard poultry and its' contributions to the total poultry population of the country (Bwala 2009). Mtleni et al. (2009) also confirmed the lack of information on the status of chicken production in most communal areas of

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South Africa. Swatson et al. (2001) investigated that there is a gap in research on indigenous knowledge and associated traditional production practices of village chickens and their impact. This neglect has made it difficult for any meaningful investment to harness these valuable resources as a means to alleviate pervasive poverty (Ndegwa et al. 2000). Improving indigenous poultry production requires skills and extension support, but findings by Mlozi et al. (2003) indicate that most rural communities lack the required husbandry skills, training and opportunity to effectively improve their indigenous poultry production and that it is considered a sideline activity (Burgos et al. 2007). To impact on smallholder farmers, an effective extension intervention is needed (Mwalusanya et al. 2002), while knowledge of the production systems is fundamental in forming a foundation for improvement. Towards this end, a characterization of the indigenous poultry production is imperative. Unfortunately, there is scanty information on research conducted in this area in the Eastern Cape Province (ECP). According to Muchadeyi et al. (2005), the lack of adequate information usually leads to difficulties in designing and implementing programs that could benefit rural households. In an attempt to establish an efficient and effective extension working system, an in-depth understanding and analysis of the present status of indigenous poultry production systems has now become essential. Mtileni et al. (2009); and Danda et al. (2010) voiced that the characterization of production systems should be the first step towards undertaking a study that could identify the threats and opportunities for improvement of the indigenous poultry production. Okeno et al. (2011) supported these steps as they help in understanding the production and management practices of farmers and the associated factors crucial to developing improved strategies. In carrying out characterization studies Pedersen (2002) suggested that it should be carried out under on-farm situations through baseline data collection rather than on-station experimental studies. The characterization will explore the “how”, and “why” in tracking all the stages involved, from housing, feeding, and health care, in establishing functional data about indigenous poultry production systems. The present research paper, therefore, is aimed at the characterization of the indigenous poultry production systems in their

present forms in the Nkonkobe Local Municipality. This is so because it has been practiced this way over the years by resource poor farmers, and it is necessary to ascertain the production areas (meat and eggs), feeding, health care and housing that have kept the systems going.

MATERIAL AND METHODS

Study Areas

A survey was conducted during May to November 2012 in 14 villages (Fig. 1) under the Nkonkobe Municipality in the Amathole District Municipality, Eastern Cape Province, South Africa. Secondary information was collected from the Department of Rural Development and Agrarian Reform offices at Bisho, Alice, Middledrift and Fort Beaufort and the Cape College.

Non-probability snowball sampling technique was used to identify farmers rearing indigenous poultry in the study area. Only those, who were willing to participate after they had understood the objectives of the baseline survey, were interviewed.

Data Collection

Data was collected using the Needs and Situation Analysis Questionnaire (NSAQ) for the indigenous poultry farmers. The NSAQ describes the demographic database of respondents, chicken housing, and feeding as well as health management. A total of 319 households from 14 villages (Woburn, Dyamala, Bergplaas, Ncera, Ntselamanzi, Msobomvu, Melani, Khayalethu, Kwezana, Gqumahashe, Hala, Alice, Hopefield and Mbizana LHP) were interviewed. Seven questionnaires (2.19%) were excluded from analysis for being incomplete and having poor or partial data recording. Personal observations were made in addition to a photographic collection of the types of housing, feeding methods and water troughs and plant species used in chicken health care.

Validity and Reliability

Semi-structured questionnaire was field pre-tested at Roxeni, Lalani and Memela villages for reliability and validity. The internal consistency reliability was run using Cronbach's coefficient alpha ($\alpha=0.81$). The sample size was determined

Study Locations

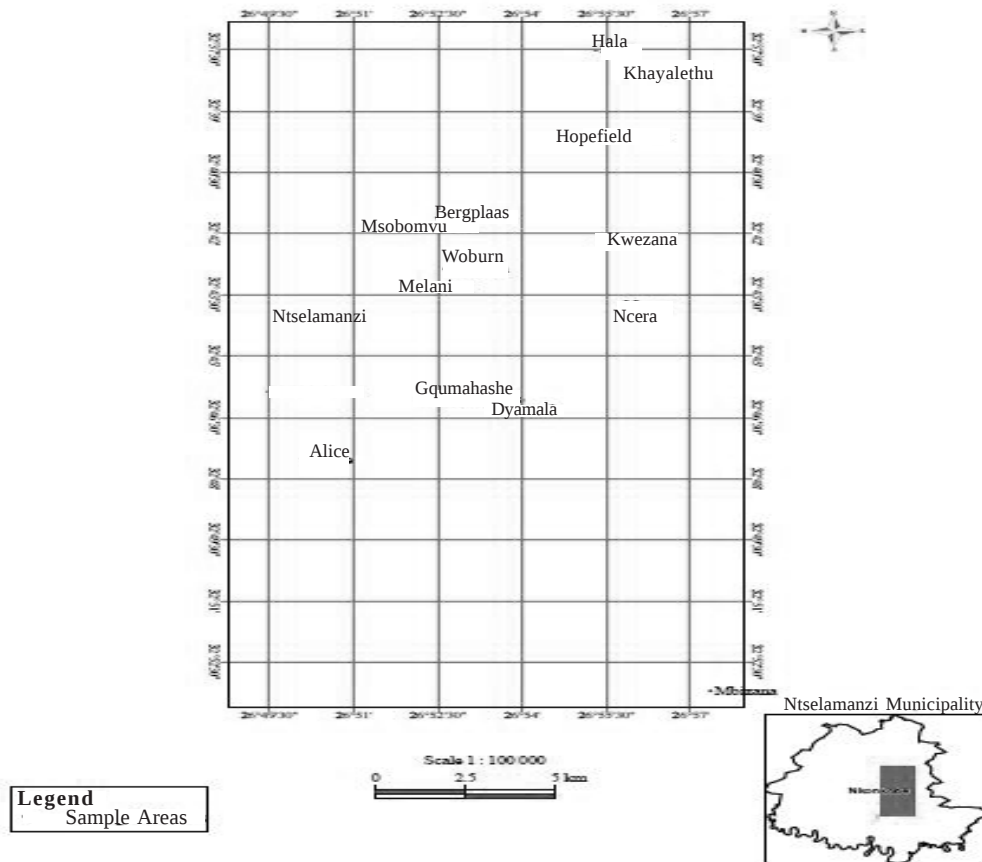


Fig. 1. Map showing the study areas

using the power analysis with the formula $N = t^2 \times p(1-p)/m^2$. Data were analyzed using descriptive statistics for SPSS version 20 (2012).

RESULTS

Indigenous poultry (89.6%) dominated the other poultry species of ducks and turkey in the study area (Table 1). There were more chicks observed during the survey than growers. This was as a result of many hens which had just hatched a large number of chicks.

Socio-economic Characteristics

Generally, the trend in the socio-economic characteristics was similar in all the study areas. Females (76%; n=312) were the principal actors.

They were older people (46-65 years) and attained some level of literacy (primary and secondary education) (Table 2). The majority were married (45.5%; n=312) and headed a household (Table 3).

The distribution pattern of feeding on chicken products and eggs indicates that egg consumption per week per household was high (52.56%) for 1-2 eggs. Between 1-2 chickens were slaughtered for consumption per month (Table 3). Cattle rearing (24.7%; n=312) and pig production (21.5%; n=312) were the dominant livestock among the respondents. Backyard gardens were common in many households (59%; n=312). Most (61.2%; n=312) claimed that crops produced from the backyard gardens were insufficient for household consumption while, very few (1.0%; n=312) claimed the crops were sufficient.

Table 1: Flock size and structure of poultry in the study area

<i>Parameters</i>	<i>Mean</i>	<i>Median</i>	<i>Range</i>	<i>SD</i>
Chicks	8.16	7.00	0-59	8.759
Growers	4.45	3.00	0-28	4.527
Cocks	4.86	4.00	0-23	3.390
Hens	12.52	10.00	3-58	7.727
<i>Hen: Cock Ratio</i>	<i>1:2.58</i>			
Duckling	0.26	0.00	0-17	1.668
Duck female	0.84	0.00	0-43	3.866
Drake	0.37	0.00	0-23	1.917
Toms	0.04	0.00	0-8	0.483

Table 2: Percentage distribution of respondents according to their social characteristics (n=312)

		<i>Fr</i>	<i>%</i>	<i>Median</i>	<i>S D</i>
<i>Gender</i>	Male	75	24.0		
	Female	237	76.0		
	Total	312	100.0	2.00	.428
<i>Age</i>	25-35	34	10.9		
	36-45	54	17.3		
	46-55	88	28.2		
	56-65	86	27.6		
	66 and above	50	16.0		
	Total	312	100.0	3.00	1.220
<i>Education</i>	No formal schooling	9	2.9		
	Primary school	104	33.3		
	Some secondary school	120	38.5		
	Completed grade 10	39	12.5		
	Completed grade 12	12	3.8		
	Certificate/ diploma	13	4.1		
	Degree program	15	4.8		
	Total	312	100.0	3.00	1.850

Table 3: Percentage demographic distribution of households and chicken/egg consumption characteristics

<i>Marital status</i>	<i>Single</i>	<i>Married</i>	<i>Divorced</i>	<i>Widowed/ Widower</i>	
Frequency/ %	116 (37.2)	142 (45.5)	3 (1.0)	51 (16.3)	
<i>Size of Households</i>	<i>1-2</i>	<i>3-4</i>	<i>5-6</i>	<i>7-8</i>	<i>9 and above</i>
Frequency/ %	26 (8.3)	124 (39.7)	111 (35.6)	43 (13.8)	8 (2.6)
<i>Head of Households</i>	<i>Male</i>	<i>Female</i>			
Frequency/ %	145 (46.5)	167 (53.5)			
<i>Egg Consumption /Week</i>	<i>0</i>	<i>1-2</i>	<i>3-4</i>	<i>5-6</i>	
Frequency/ %	27 (8.66)	164 (52.56)	103 (33.01)	18 (5.77)	
<i>Slaughtering of Chicken/Month</i>	<i>0</i>	<i>1-2</i>	<i>3-4</i>		
Frequency/ %	43 (13.78)	248 (79.49)	21 (6.73)		

Mode of Feeding

Findings from the study area indicate that birds (92.6%; n=312) were mostly kept under the free range system and the bulk of the feeds were obtained through scavenging (Table 4). The major components of the Scavenging Feed Re-

source Base (SFRB) Badhaso (2012) were plant materials, insects, worms, field remnant grains and kitchen left overs. The newly hatched chicks were given crushed yellow maize while farmers who could afford to buy feed, fed the newly hatched chicks with chicks' mash. However, the types of supplements, the number of feedings

Table 4: Indigenous poultry management practices by farmers

Parameters		Overall means %	Median	SD
Mode of Feeding	Scavenging alone	7.40		
	Scavenging with supplements	92.6	2.0	.262
Mode of Providing	Poured on ground	92.6		
Supplements	Feeding trough	7.4	8.0	1.4
Provision of Water	Provided	33.0		
	Not provided	6.4		
	Provided with aloe ferox	60.6	3.0	.929
Types of Housing	Night lock-up	74.7		
	Local perches	2.6		
	Tree top	12.5		
	Enclosed at night and some on tree top	10.3	1.0	1.055
Housing Material Commonly Used	Burnt bricks	15.1		
	Wrought iron sheet	45.5		
	Planks with wire gauze	15.1		
	Planks alone	9.9		
	Mud house	5.1		
	Nesting box only	9.3	2.0	1.459

per day, quantity and quality were functions of the financial capability of the household or the owner of the flock. After hatching, the chicks were mostly confined in a moveable safe enclosure made of wire mesh/gauze or confined to a safe place, for example, an abandoned room or garage. In the majority of cases (93.6%; n=312), farmers provided the chickens with drinking water in different containers: plastic containers, a cut vehicle tyre, and plastic bowls.

Housing

Most (74.7%; n=312) of the farmers provided shelter for the birds at night, with a few (12.5%; n=312) allowing the birds to perch on top of trees at night (Table 4). Housing was mostly

constructed with corrugated iron sheets. The use of burnt bricks and planks with wire mesh (15.1%; n=312) was also observed.

Health Management

In many instances (60.6%; n=312), farmers added Aloe ferox leaves to the drinking water for various reasons: to act as a prophylactic approach to disease control in birds (94.3%; n=189), to boost their immunity against diseases (81.8%; n=189) and to make the birds hardy (65.5%; n=189). Apart from the use of Aloe ferox, the farmers also made use of different types of traditional remedies and human medications to treat chicken diseases (Table 5). In the majority of cases (84.6%; n=312), farmers treated or protect-

Table 5: Some ethno-veterinary methods of treating chickens in the study area

Diseases	Indigenous medication
Swollen face	Cleaning of the swollen face of birds with dettol (antiseptic) and rubbed with light brown shoe polish. This makes the face to peel off naturally.
Immunity	Oral Rehydration Therapy (ORT) as a drink for newly hatched chicks for the first five days. The use of iZifozoneke (essential vitamins mixed with herbs) in water.
Internal parasites	iZifozoneke is applied in drinking water.
Lice, mites and ticks	Potassium permanganate; Blue death (permethrin); Karbar dust 50DP (5 mg/m ³ Carbaryl, 10mg/m ³ Nuisance dust) karbaspray 850WP (5 mg/m ³ Carbaryl, 10mg/m ³ Nuisance dust); Use of a brake fluid mix with Madubula (13% Carbolic acid) and used as a body spray for the birds; Bulalazonke (Mercaptothion) is sprayed on the body of birds.
Drowsiness, lameness, closed eyes, discharge from the mouth	Affected birds are given black coffee to drink.
Pimples on the face of growers	The use of engine oil, and shoe polish applied to the affected part twice daily.

ed their birds using home-made ethno veterinary remedies.

Chicken Flock Ownership, Management and Decision Making

Females owned most chicken flocks (51.0%; n=312) (Table 6) and ownership by the entire households (36.5%; n=312) was relatively lower. Shelter construction for the flock was mostly (55.4%; n=312) done by a collective effort of the household, which also included cleaning, feeding and health care. Marketing was sparingly done because most (69.5%; n=312) households kept chickens for home consumption.

Mortality in Flocks

Mortality in the flocks was common among the chicks, and was attributed to sudden death, diseases and cold, cold weather and attack by mice and giant rats (Table 7). Mortality in growers, adult hens and cocks was very low. In the majority of cases (84.6%; n=312), farmers treated or protected their birds using home-made ethno veterinary remedies. Birds of predation, hawks, owls and eagles were a menace to chicks (85.3%) during summer while wild cats and giant rats were common predators to growers, adult cocks and hens mostly of farmers sharing borders with forests or highly undulating poor topographical rocky environments.

Production and Reproduction Pattern

Chicken flocks were dominated by breeding hens, as an attempt to increase flock size through the hatching of eggs. Natural brooding was common in the study areas. The broody hen usually sits on 6-25 eggs per clutch, with the hatching rate varying from 4-17. Out of the total (56.25%) number of chicks hatched, only 31.25% attained the age of eight weeks due to death mostly associated with predator attacks. Clutches per hen per year varied from two to four times. Most (64.74%; n=312) of the farmers attributed changes in the flock population to household consumption, while stock theft (26.28%) was also reported (Fig. 2).

DISCUSSION

The present research is based on the production system of indigenous poultry in the Nkonkobe Municipality with a critical review of the housing, feeding, healthcare and marketing activities. The findings concur with those of (Safalaoh 1997; Mengesha et al. 2008; Alem et al. 2014), which indicated that indigenous poultry husbandry is largely associated with resource poor farmers (landless, marginal and small farmers), who kept the chickens under an extensive system, with the associated characteristics of low-input low-output. Most (69.56%; n=312) derived their income from several of the social

Table 6: Chicken flock ownership and management

Parameters	MHH	FHH	CHH	Boys <18	Girls <18	Median	SD
Chicken flock ownership	10.9	51.0	36.5	1.0	1.0	2.0	.697
Flock management -Shelter construction	8.0	23.7	55.4	12.2	0.6	3.0	.799
Cleaning	4.2	27.2	58.0	3.2	7.4	3.0	.859
Feeding	3.5	29.8	61.2	1.6	3.8	3.0	.731
Health care	6.4	35.9	55.8	0.6	1.3	3.0	.684
	NM	Male	Female	CHH			
Marketing	86.9	2.9	7.1	3.2		.00	.728

Key: MHH=Male Headed Household; FHH-Female Headed Household; CHH- Children Headed Household

Table 7: Overall mean of causes of mortality in birds (n=312)

	Sudden death	Diseases and cold	Cold	Cold and thunder	Mice and Giant rats	No mortality	Hot sun	Small insects	Total
Chicks	19.6	14.5	16.3	4.2	11.9	33.3	0.3	NA	100
Growers	6.7	10.6	12.5	9.3	4.8	56.1	NA	NA	100
Adult hens	0.6	9.0	2.2	2.2	11.2	67	7.7	NA	100
Adult cocks	4.2	5.5	2.2	4.5	1.3	75.6	4.5	2.2	100

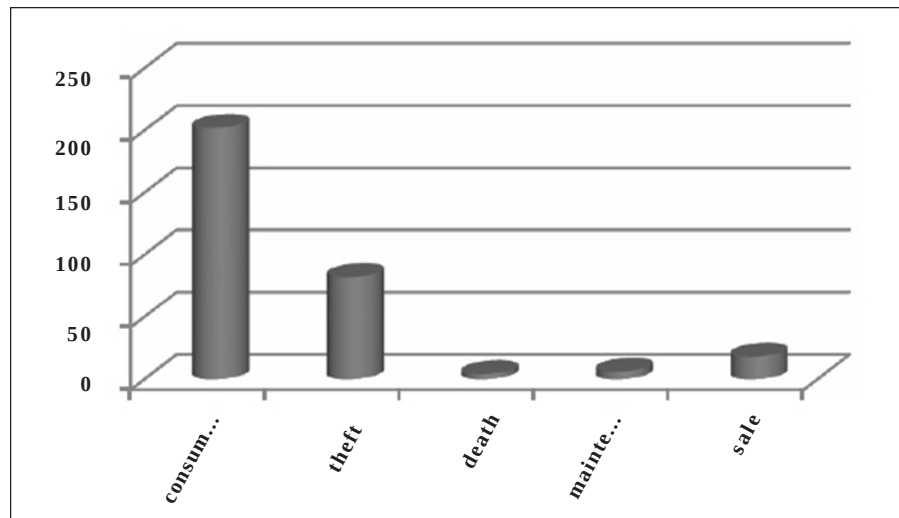


Fig. 2. Reasons for changes in flock population

government grant categories that include old-age pension, disability, war veteran's, child grant (Foster child grant), care dependency, child support grant and grant-in-aid.

The majority of farmers (89.8%; $n=312$) kept chickens, but few ducks (9.6%; $n=312$) and turkeys (0.6%; $n=312$). Most farmers do not keep ducks because of the water requirements for bathing; ducks have a longer hatching period (28 days), and take longer time to be plucked. Besides, turkeys were considered to require higher management skills, have low resistance to diseases under the scavenging system and require high quality supplements. Similar trends of high ratio of chicken to ducks and turkey were reported in Zambia (Mwenya 2001), Uganda (Kugonza et al. 2008), Ethiopia (Badhaso 2012) and in Dakshin Dinajpur district, India (Biswas et al. 2011).

The findings revealed that females (76%; $n=312$) were the principal players and caretakers of the chickens. Traditionally, males engaged in other bigger livestock such as cattle, rather than chickens, which were considered to be at the bottom of the livestock ladder. Older people (46-65 years) were more involved in chicken production, pointing to the ageing phenomenon in the rural farming community (Obboh and Sani 2009; Ayinde 2011). South Africa's ageing phenomenon is climbing to a worrisome stage. This phenomenon could be attributed to the high rural-

urban migration of able-bodied men in search of jobs in the mining industry (Magubane 1975). It could also be attributed to the scourge of HIV/AIDS that has resulted in the death of the able-bodied men and women (Niekare and Kopelman 2005), thereby leaving the rural communities with aged people. The low levels of youth participation and interest in farming could be another factor, which has also been confirmed by Adekunle et al. (2009).

A good number of respondents had attained secondary (38.5%) and primary (33.3%) school education. A person's level of education has been found to contribute to their rate of adoption of new technologies. Ochieng et al. (2012) confirmed in their findings on adoption of management intervention in IPP in Kenya, that farmers' education level had a positive marginal effect on the adoption of feed supplementation and vaccination.

The overall mean flock size of chickens was 29.98 per household, which was more than the average flock sizes reported earlier for the Eastern Cape Province (ECP), South Africa. Mtileni et al. (2009) reported overall mean flock size of 10.9 ± 1.95 in their study of three districts (Vhembe and Mopane districts; Kgalagadi and Alfred Nzo districts) in the Limpopo and EC provinces, South Africa, with no significant differences in the flock sizes in the provinces. Khosa (2003) reported an average holding of 11 chickens by

34% of households in two settlements in the Limpopo Province. Farouq et al. (2004) reported a flock size of 23.14 ± 1.97 birds per household in Chitral, Pakistan. Sonaiya et al. (2002) reported an average flock size of 15 ± 8.1 bird per family in Nigeria. Halima et al. (2007) reported a mean flock size of seven per household in north – west of Ethiopia. An average flock size of 16 birds was reported in some areas in Ethiopia and Kenya (Tadelle et al. 2003; Njenga 2005). An explanation for this high flock size in the study areas could be an attempt at food security by the household or to earn extra income. In addition, the fowls exhibited high adaptability to the environmental challenges as observed in the low mortality rate. Njagi et al. (2010) stated that climate is a risk factor, especially in the dry hot zone compared to the cool wet zone, characterized by the low prevalence of the Newcastle disease (NCD) virus. The study areas fell within the cool wet zone. The additional reasons for these high flock sizes could be the available scavenger feed resource base, good ethno veterinary management of birds, and to some extent, the security of flocks.

The majority of farmers (69.5%; $n=312$) reared the chickens for household consumption, which also provided a cheap and ready source of animal protein for the family. The consumption pattern indicated that most (52.56%) households consumed one to two eggs/week and three to four (33.01%) eggs/week while the majority (79.49%) slaughtered either one or two chickens per month. Indigenous poultry rearing provides a cheap source of animal protein to poorly resourced households (Magothe et al. 2012), while its consumption has been confirmed to develop body immunity to diseases, healthy nutrition, body weight and better performance by children in school (Florence et al. 2008; MacLellan et al. 2008; Wang and Veugelers 2008). Elsewhere, in Nigeria (Atteh 1989), Niger Republic (Bella and Abdou 1995) and Zimbabwe (Pedersen 2002; Muchadeyi et al. 2004) findings supported the rearing of chickens mostly for home consumption. The rearing for consumption in the study areas was mostly attributed to the indeterminate nature of markets for the local chicken. As a result, there is the need to assess the market and the conditions in an event of intervention.

Sex ratio in poultry production is an important factor that affects fertility (Alsobayel and

Albadry 2012). The sex ratio of cock to hen observed in the study area was 1:2.58. Mopate and Lony (1999) reported a ratio of 1:6 cocks to hen; Khalafalla et al. (2001) observed a cock to hen ratio of 1:4.4 in Sudan. The average cock to hen ratios of 1:3.3, 1:3.2 and 1:2.2 were reported in Bure, Fogera and Dale, respectively (Moges et al. 2010). However, in exotic poultry production, the recommended cock to hen ratio in modern light and heavy breeds is 1:10 and 1:8 respectively (Moges et al. 2010). The low sex ratio in this research paper could create unhealthy rivalry and in-fighting that often times results in physical injury to the cocks. Cocks were more favored for consumption while the multiplier effects of hens were better preferred for reproduction. Also most farmers depended on neighbors' cocks for mating, with ignorance of the over stretching the cock and eventual genetic erosion. Farmers will, therefore, need to be educated on the importance of keeping a minimum number of cocks in ratio to the hen flock sizes. The flock structure of the study area was mainly composed of hens, chicks, and cocks and followed by growers (12-15 weeks old). Growers are the most often disposed of by selling and as gifts.

The production system commonly practiced by the farmers is extensive. Birds roam freely about scavenging for insects, (which in some instances could expose the birds to insects that are intermediate hosts of intestinal worms), grasses and waste. Some of these insects include ants, cockroaches, grasshoppers, houseflies, and beetles, and the mollusc for example, snails. However, the findings of Luka and Ndams (2007) indicated that ingestion of insects that are intermediate hosts often resulted in gastrointestinal parasites for scavenging chickens. Scavenging reduced the cost of supplements, which were expensive; (for example, a 10kg bag of chicks' mash (Phase 1) was sold at R60 (ZAR 9.04=\$1 on 3rd May 2013) and 10kg of growing mash was R73.80 at *Umtiza*, (a local supplier). However, birds were faced with the problem of theft, environmental hazards, predator attacks and many laid their eggs in unidentified places.

Most of the chicken houses were in poor hygienic condition. The houses were not adequate to protect the birds from inclement weather and, hence, the many reasons given for the loss of chickens, such as cold, rainfall, the hot sun and thunder. Most of the birds lost their eggs in this poor state of housing especially

birds not provided with nesting materials. Some hens laid their eggs in the bush where dogs or other wild animals attacked them, and some were pilfered in such unsecured places. Hens, which lay in the same nest, were also observed fighting at times during brooding.

The poor and un-hygienic system of housing was similar to those reported earlier by Natukunda et al. (2011), Mapiye et al. (2008), Halima et al. (2007), Tadelles et al. (2003), and Pedersen (2002). This scenario, common to the production system, negatively affects production; for example, the loss of eggs, which could be a threat to household food security. The challenges of theft and predators were also reported by Bett et al. (2012) in Kenya.

The majority (92.6%) of the farmers provided supplementary feeding in the form of crushed maize for the chicks and whole grain maize for the adults, while some provided rice grain. Other scholars Minh (2005); Mapiye and Sibanda (2005); Halima et al. (2007), and Goromela et al. (2008) also observed similar trends in supplementary feeding, but most of the supplements identified included maize, millet, sorghum, rice bran, and guinea-corn and wheat bran. Reports from other African countries confirmed the common practice of feed supplementation: Malawi (Ahlers 1999; Gondwe 2004); Ethiopia (Dessie and Ogle 2001); and Burkina Faso (Kondombo et al. 2003). However, the types of supplements available could be attributed to the climatic conditions prevalent in the region or country. Meanwhile, the challenges of the free range production system in the study area include the seasonality of scavenging feed resource base (SFRB), stock theft and the high cost of chick mash. The amount and availability of SFRB per bird according to Badhaso (2012) is dependent on the season, grain availability for the households, time of sowing and harvesting the grain and the biomass of the village flock. The relative scarcity of water (Ortmann and Machete 2003) in the Eastern Cape Province could compound the challenge of the availability of the SFRB. Therefore, in an attempt to promote improved technologies for indigenous poultry to the rural communities of the ECP, these factors are very crucial. Most farmers (92.6%) pour feed on the ground, which could expose the chickens to parasites and disease causing organisms and is source of feed wastage, while the remaining made use of the feeding trough. The similar trend

was observed by Halima et al. (2007) in north-west Ethiopia. To check the method of pouring feed on the ground, feeding trough was strongly encouraged.

Mortality in chicks was 50.4%, which was attributed to several causes: sudden death (19.6%; n=312), cold (16.3%; n=312) and diseases and cold (14.5%; n=312) and attributed to be prevalent after hatching (42.6%; n=312). Mortality was low in adult hens and cocks (5.4% and 4.5%) respectively. The findings were similar to that of Mtleni et al. (2012). Chicks require protein for good growth and building of immunity to diseases (Kugonza et al. 2008). Other nutritive elements are also needed in the feeds. However, these are lacking in crushed maize that was the main supplements given to chicks. An attempt to correct the nutrient imbalance requires feeds that are high in protein and other essential ingredients that could be sourced locally are affordable and readily available in an event of intervention. Vaccination initiatives are also required to reduce the scourge of chick mortality.

Water is an essential part of the feeding regime of chickens and according to Tadelles (1996), regular provision of water for scavenging birds is an important way of achieving optimum production. Provision of water was common (93.6%) while 60.6% (n=189) provided water with *Aloe ferox*. The finding was consistent with that of Moges et al. (2010) and Petrus et al. (2011). The use of *Aloe ferox* was reported by Dold and Cocks (2001), Mwale and Masika (2008, 2009), and Chulayo et al. (2012) in the Eastern Cape Province, and in Uganda (Kugonza et al. 2008) for the treatment and control of indigenous poultry diseases. Similarly, Okitai et al. (2007) observed the use of *Aloe ferox*, pepper, Neem juice and sisal as common indigenous knowledge of treating chicken diseases in the Western part of Kenya. The efficacy of the properties of *Aloe ferox* as an anti-inflammatory, anti-bacterial, anti-viral and energy tonic has been reported (Rabe and Staden 1997; Balch and James 2000; Joseph and Justin 2010; and Nandal and Bhardwaj 2012). Thus, it could be concluded that the low incidence of diseases in adult hens and cocks could be attributed to the creativity and ingenuity of these resource poor farmers who constantly include *Aloe ferox* in the drinking water for the birds.

Mortality in chicken flocks when not controlled could have a negative impact on sustain-

ability and production (Kugonza et al. 2008). The high mortality of chicks from both diseases and predators could pose a threat to food security. The variations observed in the mortality rate were attributed to disease and predators (Fig. 3) and showed that aerial predators were common in all areas, while there was a low incidence of predator attacks in Khayaletu and Kwezana. Besides, mortality in chicks was common in Woborn, Dyamala, Msobomvu, Melani, Khayaletu and Gqumashe. In an attempt to reduce this mortality, the IPPs in the study area made use of various indigenous methods of disease and pest control. Amongst the medicines used are Madubula (a household disinfectant with 13% carbolic acid as active ingredient), Karbadust (Carbaryl 5%), Karbaspray (Carbaryl 5%). Others are Izifozoneke and Bulalazonke (trade names) (active ingredient, Mercaptothion). The use of Madubula, Karbadust, Karbaspray and Bulalazonke in active ingredient form was reported by Moyo (2009). Moreki (2012) reported the use of Karbadust in Botswana and other common remedies such as paraffin, used engine oil, ashes and potassium permanganate. The report of the use of used engine oil is consistent with Moyo (2009); and Matekaire and Bwakura (2004). Some of this ingenuity has been proved

to be effective, to a certain degree (Moyo 2009); however, the health implications of using some of these drugs should be investigated.

CONCLUSION

The present situation of the indigenous poultry farmers in the study areas was described based on the housing, feeding, healthcare management, breeding and marketing conditions. Findings revealed poor housing not conducive for optimum production, the poor housing exposed the birds to extreme climatic conditions and theft. Feeding was mostly by scavenging with supplementary feeding of grains. Farmers made use of ethno veterinary methods in the health care management of the flock. The majority rear the chickens for home consumption to secure food at home. The present capacity of the IPPs is a solid platform upon which further capacity development training could be built.

RECOMMENDATIONS

There is the dire need for institutional support for the IPP in the study areas to the farmers. This should take the form of massive campaigns on the awareness of the commercialization ad-

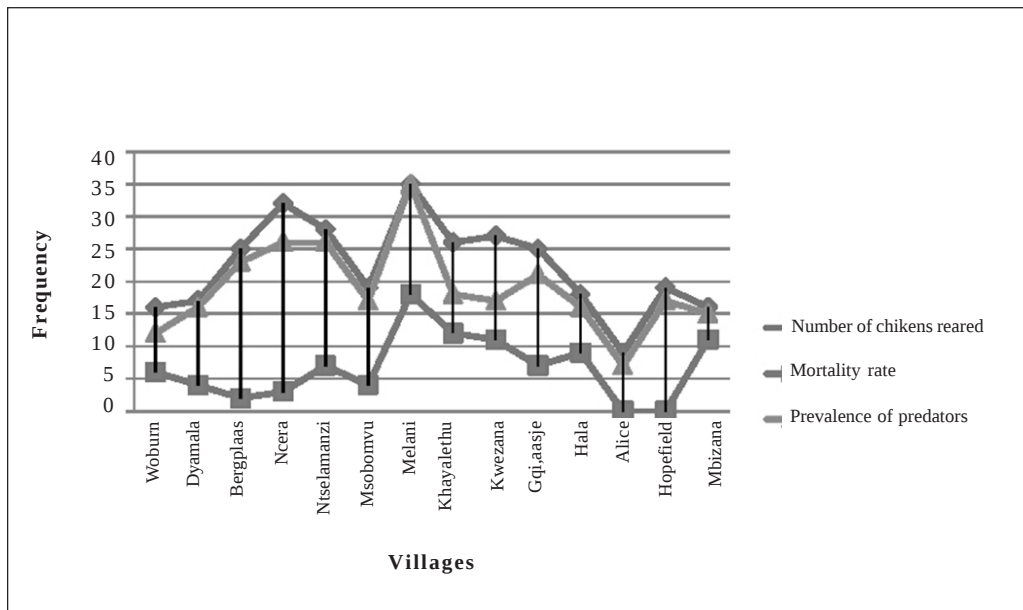


Fig. 3. Prevalence of mortality, predators and number of chickens reared per sampled village

vantages of the IPP, demonstrate, organize and train the farmers in all stages of production that could lead to massive adoption of the production technologies. Finally, the farmers have demonstrated the potentialities inherent in their present husbandry method. This could be improved upon and used to design an appropriate production model.

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