

## Characterisation of production systems for indigenous chicken genetic resources of South Africa

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### Abstract

Indigenous chicken production systems were studied in Limpopo, Northern Cape and Eastern Cape provinces of South Africa. Semi-structured questionnaires were administered to 137 households in the three provinces. The study showed that a small proportion of the households (9.8%) derive their livelihood from livestock compared to social grants (52.0%) and wages (35.9%). Fifty percent of the households owned chickens in comparison to 49.7% that owned other livestock. The mean flock size was  $10.9 \pm 1.95$  chickens per household with a range of 1 - 56 chickens. The mean number of chickens per household differed significantly among districts but not provinces. Households with multi-species owned on average  $6.28 \pm 0.92$  goats,  $2.55 \pm 0.57$  sheep and  $2.71 \pm 0.52$  cattle. Results indicated that indigenous chickens perform significant functions in the livelihoods of rural farmers primarily for household meat (89.8%), egg consumption (64.2%) and to a lesser extent for manure, cultural ceremonies and income generation. Farmers cited sub-standard housing, poor disease control, and absence of organised vaccination and poultry extension services as the main problems for chicken production in the provinces.

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### Introduction

Low-input indigenous chicken production is very popular amongst resource-limited rural communities of South Africa. Indigenous chickens play many socio-economic roles in traditional religious and other customs, as gift payments and serve as an important source of animal protein (McAinsh *et al.*, 2004). They are also considered to be the main source of income for the rural poor (Swatson *et al.*, 2001; Muchadeyi *et al.*, 2005; 2007).

In South Africa, as in other developing countries (Swatson *et al.*, 2001; Mwalusanya *et al.*, 2002; Tadelle *et al.*, 2003; McAinsh *et al.*, 2004; Muchadeyi *et al.*, 2004), indigenous chickens are reared in an extensive system and to a lesser extent in a semi-intensive system under subsistence farming. In subsistence farming systems chickens are left to scavenge to meet their nutritional needs. Their feed resources vary depending on local conditions. Housing may not be provided and where it is available, usually local and substandard materials are used. Proper health or vaccination programmes for disease control or management of the birds are not guaranteed because there are no disease control programmes.

Despite these challenges, indigenous chickens in South Africa contribute significantly to the livelihood of rural communities. There is, however, lack of information on the status of chicken production in most communal areas of South Africa. This information is crucial for proper planning of conservation activities and promoting the utilisation of indigenous chicken genetic resources in commercial production. The objective of the study was to collect baseline information on indigenous chicken production systems focusing on management practices, flock sizes, ownership and utilization in Limpopo, Northern Cape and Eastern Cape provinces of South Africa.

## Materials and Methods

Field surveys were conducted in the Vhembe and Mopane Districts in the Limpopo Province, Kgalagadi District in the Northern Cape Province, and the Alfred-Nzo District in the Eastern Cape Province of South Africa. Data were collected using semi-structured questionnaires administered to 137 households in villages of the selected farming regions. Information on production system, flock size, ownership and utilization of indigenous chicken were collected. The SURVEYMEANS and SURVEYFREQ Procedures of SAS (2002) were used to analyse the data.

## Results and Discussion

Chickens were raised in an extensive system (78.0%) and to a lesser extent in a semi-intensive system (12.0%) under a mixed farming system, with farmers owning mainly cattle ( $2.71 \pm 0.52$ ) and goats ( $6.28 \pm 0.92$ ) in addition to chickens. Ranking of different feeding practices of indigenous chickens by households are presented in Table 1. Kitchen waste (71.0%), whole grain (49.3%) and crushed grain (18.7%) were the most common supplementary feed. In contrast, Kusina *et al.* (2001) reported that the majority of respondents (67%) in Zimbabwe used crushed maize as a supplementary ration for poultry. These variations could be attributed to seasonal supply and fluctuation in local feed resources such as cereal grains.

Proper housing makes management easier and assists the farmer to successfully rear their chickens to market age in the shortest possible time. Sixty-six percent of the households kept their chickens in 'poor' housing at night, while 34% of the flocks spent the night in trees or in open spaces. This supports findings of Kusina *et al.* (2001), who also observed a high proportion of households kept their indigenous chickens in poor fowl runs at night.

Chicken disease symptoms observed by farmers included greenish diarrhoea, swelling of the neck and head, sudden death with no clinical signs, tremors and paralysis of legs and wings. Newcastle disease was presented as the major cause (38.7%) of chicken loss by most of the farmers. Similar results have been reported by Swatson *et al.* (2001) in the KwaZulu Natal Province of South Africa and by Chabeuf, (1990), Yongolo, (1996), Kitalyi, (1998) and Kusina *et al.*, (2001) in other African countries. Farmers indicated that they sometimes use traditional medicines (46%) or spray (12%) the chicken houses with insecticides to reduce ectoparasites, mainly fleas and mites. Traditional medicines used include aloe, salts and oil for treatment of various chicken diseases. The dosages of these types of treatments were not controlled and their effectiveness still remains questionable. The major constraints to village chicken production included lack of extension and veterinary services (94%), inadequate health care (67.3%), inappropriate housing (66%) and loss of birds to predators (62%).

**Table 1** Ranking of different feeding practices of indigenous chickens by households (%)

Feeding practice	Ranking			
	High	Medium	Low	Not applicable
Kitchen waste	71.3	0.0	0.0	28.7
Complete ration	5.3	10.0	0.0	84.7
Home made ration	0.7	6.0	2.0	91.3
Crushed grain	7.3	18.7	6.0	68.0
Whole grain	14.7	49.3	17.3	18.7

The mean chicken flock sizes per household are given in Table 2. The mean number of chickens per household differed significantly among districts ( $P < 0.05$ ) but not provinces. Higher mean number of chickens was observed in the Mopani District ( $17.0 \pm 3.45$ ), where larger proportions of men depend on livestock to increase their household food security and welfare. Similar mean flock size per household was

reported by Swatson *et al.* (2001) in Alfred District of Kwazulu-Natal in South Africa, where the correlation between gross incomes and livestock numbers of the family was highlighted as the main determinant of flock sizes per household. The number of chickens per household ranged from 1 to 56 across provinces with a mean of  $10.91 \pm 1.95$ . This mean was higher than the value of 3.05 reported by Leulseged (1998) in Ethiopia, but lower than the means of 14.44 and 24.2 reported by Kusina *et al.* (2001) and Maphosa *et al.* (2004) in Zimbabwe, respectively. Variability in flock sizes is associated with production system, management practices and availability of feed resources under subsistence chicken farming. Sonaiya & Swan (2004) observed that flock size of family poultry rarely exceeded 20 birds. On average, households owned  $6.07 \pm 0.47$  hens,  $2.07 \pm 0.17$  cocks,  $0.84 \pm 0.21$  pullets,  $0.59 \pm 0.14$  cockerels and  $1.34 \pm 0.21$  chicks. The hen to cock ratio was three hens to one cock. Rushton (1996b) reported similar ratios of hen to cock in the village chickens of Ethiopia and Gambia TCP/RAF/2376 project and Zimbabwe TCP/ZIM/4553 project. These practices appeared as a common phenomenon amongst rural households in Africa, which is compounded by ever-increasing rural population growth accompanied by declining natural resources. The proportion of mature hens in the flock was used to estimate flock productivity. Hens constituted over 50% of the flock sizes, which indicates that the proportion of laying hens in a flock was less than 10% of the total mature hen population. The low number of chicks implies low flock productivity. Management practices such as encouraging brooding, improving housing facilities and minimising predation could be used to increase the average number of chicks and overall flock productivity.

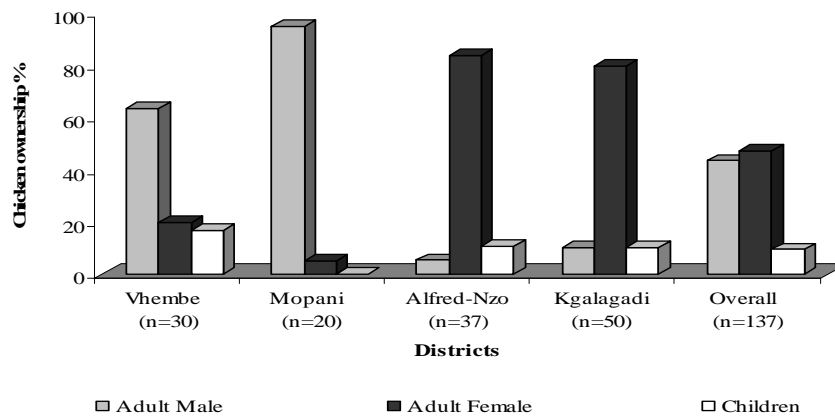
**Table 2** Means ( $\pm$  s.e.) of chickens per household by age group

Flock	Vhembe (n = 30)	Mopani (n = 20)	Alfred-Nzo (n = 37)	Kgalagadi (n = 50)	Overall (n = 137)
Chicks	$1.50^a \pm 0.57$	$2.25^a \pm 0.79$	$1.03^a \pm 0.28$	$1.12^a \pm 0.30$	$1.34 \pm 0.21$
Pullets	$0.73^{ab} \pm 0.35$	$1.6^a \pm 0.55$	$0.27^b \pm 0.16$	$1.02^{ab} \pm 0.47$	$0.84 \pm 0.21$
Cockerels	$0.37^a \pm 0.22$	$0.90^a \pm 0.37$	$0.43^a \pm 0.26$	$0.72^a \pm 0.28$	$0.59 \pm 0.14$
Hens	$5.57^{ab} \pm 0.91$	$8.35^a \pm 1.36$	$6.22^{ab} \pm 1.16$	$5.36^b \pm 0.59$	$6.07 \pm 0.47$
Cocks	$1.80^b \pm 1.89$	$3.90^a \pm 0.73$	$2.06^b \pm 0.33$	$1.52^b \pm 0.16$	$2.07 \pm 0.17$
Total	$9.97^b \pm 1.35$	$17.0^a \pm 3.45$	$10.0^b \pm 1.60$	$9.74^b \pm 1.10$	$10.91 \pm 1.95$

<sup>a, b</sup> Means with different superscripts within a row is significantly (P < 0.05) different among the districts.

Figure 1 shows the percentage chicken ownership by gender categories in different farming regions. Women and men owned the majority of flocks (47.1% vs. 43.5%), respectively, whereas children accounted for 9.4% of ownership. This finding is inline with reports of Prabakaran (2003), Muchadeyi (2004), Sonaiya & Swan (2004) and Mengesha *et al.* (2008) who observed that women were more responsible for the management of the chicken production units under subsistence farming systems. Men constitute a larger proportion of chicken ownership in Vhembe and Mopani Districts, while women dominate chicken ownership in Alfred-Nzo and Kgalagadi Districts. Men tend to be involved in chicken production when the enterprise becomes larger and when production is commercial while women tend to be largely confined to production at the subsistence level.

Priorities of keeping indigenous chickens by household are presented in Table 3. Despite their low egg production (35 - 45 eggs/hen/year), indigenous chickens are also an important element in diversifying agricultural production and increasing household food security. Chickens were primarily kept for household meat (89.8%), while egg consumption (64.2%) ranked as a second priority and to a less extent for manure, cultural ceremonies and income generation. Their meat and eggs are preferred widely by consumers because of their taste, leanness, and suitability for special dishes. Similarly, Mengesha *et al.* (2008) found that 75% of the respondents of Jamma district in Ethiopia were prioritizing poultry production for family consumption.



**Figure 1** Chicken ownership by gender categories in different farming regions.

In all districts the primary source of income for the households was social grant (47.3%), followed by wages (30.0%) and then (12.7%) and (10.0%) for crops and livestock production respectively. Selling of live chickens was done in most cases to local markets at an even higher (almost double) price compared to their exotic counterparts.

**Table 3** Priorities of keeping indigenous chickens by households (%)

Parameters	Ranking			
	High	Medium	Low	Not applicable
Consumption	89.8	8.7	1.5	0.0
Eggs	4.4	64.2	4.4	27
Selling	4.4	1.5	11.0	83.1
Ceremony	0.7	2.1	2.92	94.2
Cultural	0.0	2.2	8.76	89.0
Manure	0.7	11.7	14.6	73.0

## Conclusion

Results from the current study indicate that indigenous chickens are a significant component of the rural household livelihood by providing a source of income and nutrition, and as gifts to strengthen social relationships particularly in developing countries, such as South Africa. Subsistence chicken farming sector represents the basis on which a sustainable, well-adapted semi-commercial sub sector could be progressively developed. Farmers cited sub-standard housing, poor disease control and absence of organised vaccination and poultry extension services as the main problems for chicken production in three provinces of South Africa. Detailed information will help to develop appropriate interventions in areas such as disease prevention and control, predator control, suitable feeding and watering systems, improved poultry housing, genetic improvement and marketing of poultry products, which can strengthen low-input chicken farming in developing countries.

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