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ORIGINAL PAPER

Variation in village chicken production systems among agro-ecological zones of Zimbabwe

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Abstract The degree to which village chickens are integrated in the smallholder farming systems differs depending on the socio-economic, cultural and biological factors within each system. The objective of this study was to characterise the village chicken farming systems and identify possible threats to, and opportunities for, local chickens in the agro-ecological zones of Zimbabwe. A pre-tested questionnaire was administered to households randomly selected from five districts, Risitu (n=97), Hurungwe (n=56), Gutu (n=77), Gokwe-South (n=104) and Beitbridge (n=37) in eco-zones I–V, respectively. Age of head of household averaged 47 years (SD=14.3). Land holdings per household averaged 4.82 ha (SD=3.6). Overall, 17.7 percent of the households ranked livestock as the major source of income compared to 70.8 percent who ranked crops as the main contributor. Chicken flock size averaged 16.7 (SD=12.4), and the highest flock sizes were observed in eco-zones I and IV. Households owning cattle, goats and other livestock assigned less important ranks to chickens. Chickens were used mainly for the provision of meat and eggs whilst the use of chicken feathers and investment were uncommon practises. Results indicate that more support is necessary for village chickens in the non-cropping regions of the country.

Keywords Agro ecological zones · Production systems · Village chickens · Zimbabwe

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Introduction

Village chickens play an integral role in smallholder farming systems (Kitalyi, 1998; Mwalusanya et al., 2002). They are used to meet the multiple social, economic and cultural needs of households. Local chickens serve as an important source of animal protein to the rural poor (McAinsh et al., 2004). Households often sell chickens to generate cash. Unlike other livestock species particularly cattle, chickens are accessible even to the poor and landless households. These local chickens are part of the total poultry

diversity that comprises chickens, turkeys, quails, ducks, geese and pheasants (Delany, 2003). This diversity increases the ability to cope with changing production environments, consumer preferences and market demands.

In Zimbabwe (McAinsh et al., 2004; Muchadeyi et al., 2004), as in other developing countries (Mwalusanya et al., 2002; Tadelle et al., 2003), local chickens are reared under an extensive system of production within a mixed farming set-up. Communal farmers have limited resources to allocate to the different farming activities, and in most cases chickens are left to scavenge for feed and drink unclean water. This exposes them to predators and disease pathogens while farmers can only afford minimum interventions. When environmental conditions differ among farming systems, as is the case in Zimbabwe's agro-ecological zones (eco-zones), variation in production of village chickens becomes likely. It has been observed in other studies (Kitalyi, 1998; McAinsh et al., 2004; Gondwe, 2004) that women and children are more involved in chicken production. This gender bias in chicken production implies some variation in the valuing and management of chickens in male and female headed households of the society. The degree to which village chickens are supported and integrated in the smallholder farming systems would therefore vary depending on the socio-economic, cultural and biological factors within each system. The objectives of this study were to characterise the farming systems in Zimbabwe's agro-ecological zones and identify threats and opportunities to the existence of local chicken populations.

Materials and methods

Study site

Zimbabwe has an area of 390,757 km^2 and extends from latitudes 15° 47′ S to 22° 24′ S and from longitude 25° 14°E to 33° 04' E. It is a landlocked country and the altitude ranges from 197 m to 2592 m above sea level and can be divided into six physical regions which are the eastern highlands, the highveld, middleveld, Kalahari sandveld, Zambezi valley and the lowveld. The country experiences a tropical climate, with uni-modal rainfall patterns. However, much of the highveld and eastern highlands tend to have a subtropical to temperate climate due to the modifying effects of altitude. There are five agro-ecological zones (I–V) that vary in rainfall distribution and temperature (Government of Zimbabwe, 2000). The rainfall, temperature, major topographic features and farming systems of each agro-ecological region are given in Table 1.

Communal areas in the country practice crop-livestock farming with an average land holdings of 2.6 ha/household. The types of crops and livestock vary among agro-ecological zones. Five districts, Risitu, Hurungwe, Gutu, Gokwe-South and Beitbridge in agro-ecological zones I, II, III, IV and V, respectively, were used for this study.

Sampling procedure

In each district, 7–10 villages located in 2 wards remote from the development centres (commonly known as the growth points) were randomly selected. Villages close to growth centres were not sampled as they tend to be influenced by the urban farming community. The list of households in each village was provided by the Agricultural Research and Extension Department. Households were selected based on ownership of chickens and willingness to participate. Using theese criteria, 97 households were selected from eco-zone I while 56, 77, 104 and 37 were chosen in eco-zones II, III, IV and V, respectively. In eco-zone I, III and IV households were chosen from 10 villages, and from 7 villages in eco-zone II and V. Although the intended number of households was 100

Table 1 The rainfall, temperature and commercial farming systems of each agro-ecological region*

Eco-zone	Area (km^2)	Rainfall (mm yr^{-1})	Temperature ranges (°C)	Physical regions	Commercial farming system
I	7 000	> 1000	10–15	Eastern highlands	specialised farming
II	58 600	750–1000	20.5–30.0	Highveld	intensive
III	72 900	650–800	20.5–30.0	Middleveld	semi-intensive
IV	147 800	450–650	30.5–35	Lowveld	semi-extensive
V	104 400	< 450	> 35	Kalahari sandveld; Zambezi valley	extensive

*Source: Government of Zimbabwe, 2000

per district, some farmers in some villages were unavailable for the scheduled appointments. There was also a lack of communication with extension workers in accessing certain communities, particularly in eco-zone V, resulting in variance in the sample sizes. The ratio of male: female headed households was 4:1 in all the eco-zones.

Questionnaire administration and participatory rural appraisals

Pre-tested questionnaires were administered to randomly selected households in each district. Data collected from questionnaires included farmer′s sources of income and livelihood, crop and livestock species kept by individual farmers and the respective land and herd sizes. The reasons why farmers produce the crops and rear the respective livestock species were given and further discussed during focus group discussions. Farmers ranked their sources of income and livelihoods on a scale from 1 (most important) to 6 (least important) during questionnaire interviews. This was followed up qualitatively during focused discussions. A similar ranking system was also used for livestock species and uses of chickens and chicken by-products. Information on household chicken flock sizes and composition was collected during the interviews.

Statistical analysis

The generalised linear models procedure of SAS (2000) was used to analyse the effect of agro-ecological zone on sources of income, number of crop and livestock species and chicken flock sizes and composition. The linear model used for this analysis was:

$$Y_{ijk} = \mu + Eco - zone_i + shh_j + e_{ijk}$$

where;

Y_{ijk}	dependent factors (farmers income sources, number of crop and livestock species, chicken flock sizes and composition);
μ	overall constant mean;
Eco-zone$_i$	agro-ecological zone effects (where i=I, II, III, IV, V);
shh_j	sex of head of household effect where j=male or female; and
e_{ijk}	random residual error

An ordinal logistic regression using PROC LOGISTIC (SAS, 2000) was used to determine the odds of ranking chickens as most important versus cattle, goats and other livestock in the five agro-ecological zones. The model used for this analysis was:

$$\ln\left[\frac{P}{1-P}\right] = \beta_0 + \beta_1 cattle + \beta_2 goats + \beta_3 otherlivestock + \beta_4 Eco - zone + \varepsilon$$

where:

P	probability of a household ranking chickens first;
β_0	intercept;
$\beta_1 ... \beta_4$	the regression coefficients of ownership of other livestock species on ln $\left[\frac{P}{1-P}\right]$; and
ε	random residual error distributed as N $(0, I\sigma^2 e)$
$\left[\frac{P}{1-P}\right]$	odds ratio, which refers to the odds of ranking chickens first. When computed for each estimator ($\beta_1 ... \beta_4$), the odds ratio was interpreted as the proportion of ranking chickens first in households without cattle (β_1), goats (β_2) and other (β_3) livestock species versus those that owned these animals, and in eco-zone V (β_4) compared to the wet to moderate eco-zones I–IV, respectively.

A non-parametric Kruskal Wallis test (NPAR1WAY procedure of SAS) was used to analyse the ranking of the different sources of income, livestock species and the uses of chickens among the eco-zones by comparing the mean ranks from the five eco-zones.

Results

Household demographics and farming system

The average age of head of household was 47 years (SD=14.3) with no significant differences among agro-ecological zones. On average, a household was made up of 6.38 (SD=3.19) members, over 50 % of whom were adult males. There was no significant difference among eco-zones in household size. Per household total income sources ranged from 1 to 4 and averaged 1.8 (SD=0.63). Households in eco-zones II and III depended on significantly more

Table 2 Frequencies[1] (% of households) in the five agro-ecological zones depending on livestock, crops, home industries, salaries and /or remittances for income

	Eco-zone					% Overall	Sig
	I	II	III	IV	V		
Total number of households	97	56	77	104	37		
Livestock	38.2	67.2	61.9	52.9	55.9	51.6	***
Crops	85.4	92.5	81.8	90.2	2.9	79.8	***
Home industries	3.1	20.9	27.3	14.7	5.9	14.6	***
Salaries	27.1	13.4	16.9	18.6	20.6	19.7	***
Remittances	2.9	5.8	8.1	6.0	4.1	5.9	NS
Sig	***	***	***	***	***		

***frequencies of households depending on the different sources of income among eco-zones (rows) and among income generating activities (columns) are significantly different at $P<0.001$

[1] Multiple sources of income were observed in most households such that the frequencies within an eco-zone (column) or across eco-zone (row) will not add up to a 100.

($P<0.05$) sources of income. The sources of income included livestock, crops, salaries and wages, home industries and remittances from relatives (Table 2).

Overall, 17.7 percent of the households ranked livestock as the major source of income compared to 70.8% who ranked crops as the main contributor. Salaries and home industries (included brick making, carpentry, basket and carpet weaving and working as blacksmiths) were ranked first by 15.9 percent and 7.9 percent, respectively. Few people (4 percent) ranked remittances as the major source of income. In eco-zone I, the frequency of farmers who ranked livestock first was 1.04 percent whilst it was 20.9, 26, 11.8 and 50 percent in eco-zones II to V, respectively. The mean ranks attached to the different sources of income are shown in Table 3. There was a significant difference in the ranks attached to income sources ($P<0.001$) with most households in eco-zones I to IV giving a higher rank to crops. In eco-zone V, livestock had a higher rank among the agricultural sources of income.

Land holdings averaged 4.82 ha (SD=3.6) with a median of 3 ha per household. On this land, households produced 2.3 (SD=1.01) crop species and kept 2.3 (SD=0.84) livestock species. Land size, number of crops and number of livestock species varied significantly ($P<0.05$) among eco-zones as shown in Table 4. The main livestock species kept by farmers across eco-zones were cattle, goats and chickens (Table 5). There was variation ($P<0.05$) among eco-zones in the type of crops produced (Table 5). While households in eco-zone I produced maize, citrus fruits and bananas, cotton and soyabeans were unique to

Table 3 Mean ranks (SD) attached to the different sources of income (1=most important-up to 6=least important) and significance levels based Kruskal-Wallis test

	Eco-zone					Sig[1]
	I	II	III	IV	V	
Number of households	97	56	77	104	37	
Crops	1.9 (1.75)	1.7 (1.33)	2.5 (1.79)	1.9 (1.48)	5.9 (0.69)	***
Livestock	4.8 (1.85)	3.2 (2.04)	3.3 (2.20)	3.8 (2.11)	3.3 (2.48)	***
Home industry	5.9 (0.82)	5.1 (1.79)	4.8 (1.97)	5.3 (1.65)	5.7 (1.19)	***
Salaries	4.7 (2.17)	5.4 (1.41)	5.2 (1.74)	5.1 (1.92)	4.8 (2.05)	NS
Remittances	5.8 (0.89)	5.7 (0.89)	5.6(1.42)	5.7 (1.10)	5.9 (0.86)	NS
Sig	***	***	NS	***	*	

[1] mean ranks of the different farming activities (columns) and agro-ecological zones (rows) are significantly different at *$P<0.05$; *** $P<0.001$)

Table 4 Least square means (standard error) of household land holdings and number of livestock and crop species produced across the five agro-ecological zones

Eco-zone	Land size in ha (SE)	Crop species (SE)	Livestock species (SE)
I	2.4 (0.41)[a]	2.3 (0.10)[b]	1.9 (0.08)[a]
II	7.8 (0.47)[b]	2.9 (0.12)[c]	2.6 (0.10)[c]
III	2.1 (0.46)[a]	1.8 (0.11)[a]	2.3 (0.10)[b]
IV	7.4 (0.36)[b]	2.4 (0.10)[b]	2.3 (0.08)[b]
V	2.7 (0.69)[a]	1.9 (0.18)[a]	3.1 (0.15)[d]

[abc] values within a column with different superscript are significantly different ($P<0.05$)

agro-ecological zone II and small grains (sorghum and millet) dominated the few crops produced by farmers in eco-zone V.

Village chicken production system

The average chicken flock size was 16.74 (SD= 12.40), with a median of 13 birds per flock. Flock sizes varied significantly ($P<0.05$) among eco-zones, as shown in Table 6. The flock compositions across the 5 zones are shown in the same table. The lowest ($P<0.05$) number of chicks was observed in eco-zone V, whilst eco-zone III had the least ($P<0.05$) number of growers and mature hens and cocks.

Table 7 indicates the ranking of chickens as a major source of income and other livelihood needs compared to other livestock species. While goats and cattle were ranked least important in eco-zone I, they were considered more important sources of income and livelihood in eco-zone V. Chickens received a higher ranking in agro-ecological zone I and were ranked second to goats in eco-zone V. Across all eco-zones, the odds of assigning a higher rank to chickens were higher (at 95% confidence) for households without other livestock species compared to farmers owning other animals (Table 8). The odds were highest for households without cattle, followed by those without goats and least for farmers without other livestock species such as donkeys, pigs and sheep.

In all the eco-zones, chickens were used for provision of meat and eggs for consumption, income generation through sales, provision of manure for crop production, as an investment and source of security and for cultural reasons. As indicated in Table 9, the most important ($P<0.05$) role of chickens was in the provision of meat for household consumption, while the use of chicken feathers and as a form of investment was an uncommon practice.

Table 5 Least square means (standard error) of herd and flock sizes of livestock species reared and hectares of crops produced by households across the five eco-zones

	Eco-zone				
	I	II	III	IV	V
N (households)	97	56	77	104	37
Livestock species					
Cattle	0.3 (0.47)[a]	4.0 (0.57)[b]	3.9 (0.54)[b]	4.4 (0.46)[b]	5.0 (0.85)[b]
Goats	2.4 (0.62)[ab]	3.6 (0.76)[b]	1.1 (0.72)[a]	2.4 (0.62)[ab]	14.5 (1.16)[c]
Chickens	19.3 (1.24)[b]	16.1(1.52)[ab]	13.4(1.43)[a]	19.4 (1.23)[b]	12.0 (2.24)[a]
Other[1]	2.2 (0.38)[bc]	1.3 (0.48)[abc]	0.4 (0.44)[a]	0.7 (0.38)[ab]	2.8 (0.69)[c]
Crop species					
Maize	2.8 (0.58)[b]	5.7 (0.87)[c]	2.8 (0.87)[b]	2.7 (0.47)[b]	0.4 (0.87)[a]
Cotton	0[a]	0.5 (0.09))[b]	0[a]	0.4 (0.08)[b]	0[a]
Soyabeans	0[a]	0.3 (0.09)[b]	0.1 (0.09)[ab]	0.1 (0.08)[ab]	0[a]
Sunflower	0.1 (0.08)[ab]	0.2 (0.09)[ab]	0[a]	0.2 (0.08)[b]	0[a]
Small grain	0.5 (0.13)[bc]	0[a]	0.2 (0.16)[b]	0.6 (0.16)[bc]	0.8 (0.16)[c]
Other[2]	3.2 (0.45)[b]	1.2 (0.22)[a]	0.5 (0.46)[a]	0.3 (0.45)[a]	0.6 (0.45)[a]

[abc] values within a row with the same superscript are not significantly different ($P>0.05$);

[1] other livestock species consisted of guinea fowls (n=11), bees (n=2 bee hives), pigs (n=15), sheep (n=79, pigeons (n=39) turkeys (n=6), donkeys (n=23), rabbits (n=7) and rock rabbits (n=1) across all the agro-ecological

[2] other crop species consisted of citrus and banana plantations, sugar beans, groundnuts, round nuts, cowpeas and pumpkins.

Table 6 Least square means (Standard error) of chicken flock sizes and composition in the 5 eco-zones

	Eco-zone				
	I	II	III	IV	V
Number of households	97	56	77	104	37
Chicks	7.2 (0.85)^{b}	7.3 (1.05)^{b}	7.2 (1.04)^{b}	8.5 (0.84)^{b}	1.6 (1.55)^{a}
Pullets	4.0 (0.45)^{c}	1.3 (0.55)^{a}	0.6 (0.54)^{a}	2.7 (0.44)^{b}	1.4 (0.81)^{ab}
Cockerels	0.7 (0.21)^{a}	0.8 (0.26)^{a}	0.8 (0.23)^{a}	1.0 (0.21)^{a}	0.6 (0.38)^{a}
Hens	6.0 (0.39)^{b}	5.5 (0.48)^{ab}	4.3 (0.47)^{a}	5.6 (0.38)^{b}	6.8 (0.70)^{b}
Cocks	1.3 (0.11)^{b}	1.0 (0.14)^{b}	0.8 (0.14)^{a}	1.5 (0.11)^{bc}	1.7 (0.20)^{c}
Total	19.3 (1.24)^{b}	16.1(1.52)^{ab}	13.4(1.43)^{a}	19.4 (1.23)^{b}	12.0 (2.24)^{a}

^{abc} values within a row with the same superscript are not significantly different ($P>0.05$)

Discussion

The rearing of local chickens in Zimbabwe is typical of most village chicken production systems in Africa and other developing countries (Mwalusanya et al., 2002; Aboe et al., 2006; Abdelqader et al., 2007). Characteristics of such production systems are low or zero input of either housing, feeding and health care (Maphosa et al., 2005) and there is exposure of chickens to the full variation in environmental factors (Kitalyi, 1998). This exposure causes variations in the level of production of chickens as different areas experience varying climatic, economic, cultural and social conditions.

The rural areas are known to house the bulk of indigenous animal populations (Central Statistics Office, 1995; Geerlings et al., 2002). The young and economically active members in a society try and derive livelihoods from the available means of production such as livestock and crop production. The relatively young age of heads of households (47) observed is contrary to national reports (Central Statistics Office, 2000), that portrayed the rural areas as habitats of the economically dependent age groups ($\leq$ 15 years and $\geq$ 65 years of age). Most of the household heads were also not formally employed but full time communal farmers that depended mostly on crops and livestock (Table 2 and 3). Dependency on agricultural sources of income has also been observed in Rushinga District of Zimbabwe (Muchadeyi et al., 2004) and other countries of southern Africa (Gueye, 2002). This observed dependency on agricultural activities for income and livelihood is a positive attribute for the utilization and conservation of animal genetic resources (Anderson, 2003). Resources are more secure if communities derive benefits from them than in situations where they do not play a role in the livelihoods of their custodians (Geerlings et al., 2002). Community-based management of animal genetic resources works to promote this dependency on agricultural resources as a way to ensure their conservation (Wollny, 2003). Despite the reliance on agricultural resources, the observed over-dependence on crops and not livestock (Table 2 and 3) might, however, impact negatively on the use of livestock genetic resources.

Table 7 Mean ranks (SD) of chickens and other livestock species (1=most important up to 7=least important) across agro-ecological zones and significant levels according to Kruskal-Wallis test

	Eco-zone					Sig
	I	II	III	IV	V	
Number of households	97	56	77	104	37	
Cattle	4.7 (1.01)	2.2 (1.84)	2.1 (1.76)	2.0 (1.72)	2.9 (2.00)	***
Goats	3.0 (1.82)	3.4 (1.48)	4.0 (1.33)	3.6 (1.62)	1.7 (0.78)	***
Chickens	1.4 (0.61)	2.3 (0.97)	1.9 (0.68)	2.3 (1.13)	2.8 (1.01)	***
Other	2.2 (0.62)	3.5 (0.52)	2.5 (0.82)	3.1 (0.57)	3.0 (0.55)	***

*** Mean ranks from different agro-ecological zones are significantly different at $P<0.001$

Table 8 The odds ratio estimates, lower and upper 95% confidence interval (CI)) of ranking chickens first in households without cattle, goats and other livestock species compared to those owning these species and in eco-zone V compared to eco-zones I–IV

Parameter	Odds ratio	Lower CI	Upper CI
Eco-zone V vs I–IV	1.6	1.29	1.99
Households without cattle	178.2	74.69	425.03
Households without goats	72.8	33.56	157.75
Households without other livestock species	9.8	4.85	20.22

There are several factors that might explain the low dependence on livestock particularly in remote areas of developing countries. The low turnover of livestock species increases risks of production and is a major liability to rural farmers whose sole source of income is farming. With the exception of poultry and other smaller species, a farmer would have to wait for at least two years for returns, whereas it takes six or less months to harvest and sell crops. Risk in livestock production is also worsened by the numerous disease outbreaks and inefficient health control strategies in communal areas (Chitate and Guta, 2001). Low production turnover and high risks will dissuade farmers from investing more in livestock production even when environmental factors allow it. Marketing barriers (Omano, 1998; Tisdell, 2003) could be another reason for lower dependence on livestock. Whereas there are organized marketing channels for crops, no marketing channels exist for most livestock species. In areas where they exist, they are informally operating through the middle-man (Kusina and Kusina, 1999a, b). Farmers revealed in this study that they rarely sell chicken meat or chicken by-products mainly because of the low flock sizes, poor growth rates and the low prices they fetch on selling. However, opportunities for utilizing livestock exist particularly in marginal agro-ecological zones where crop production is restricted by climatic conditions. This is confirmed by the lower dependence on crops and relatively higher utilization of livestock to meet livelihood needs in agro-ecological zone V (Tables 2, 3 and 5).

The lower number of livestock species in eco-zone I (Table 5) can be explained by the existence of specialized farming of citrus fruits and banana plantations in this region. Hence there was virtually no land left for grazing impacting negatively on the number of livestock species. Small stock, mainly chickens, that require less land for production (McAinsh et al., 2004), are reared instead of larger species like cattle. In contrast, the large land sizes and moderate climate support the occurrence of both livestock and crops species at high frequency in eco-zone II. Although eco-zone IV is more suitable for livestock production, interventions in the form of irrigation schemes and gardening activities put limits on the number of livestock. While other species such as sheep, pigs and guinea fowl might increase species diversity at farm level, their numbers are too small (Table 5) and their ranking is too low (Table 7) to become major

Table 9 Mean ranks (SD) of the uses of chickens (1=most important-upto 7=least important) across eco-zones and significance level based on Kruskal-Wallis test

	Eco-zone					Sig[1]
	I	II	III	IV	V	
Number of households	97	56	77	104	37	
Uses of chicken						
Meat	1.3 (0.88)	1.6 (1.58)	1.4 (1.25)	1.6 (1.04)	1.4 (1.15)	**
Eggs	2.9 (1.46)	3.7 (1.99)	3.1 (1.72)	3.0 (1.23)	3.4 (1.54)	*
Feathers	6.8 (0.76)	6.7 (0.98)	6.6 (1.11)	6.7 (0.96)	6.9 (0.67)	
Manure	4.0 (1.48)	4.5 (1.57)	3.7 (1.56)	4.7 (1.97)	3.6 (1.34)	***
Cash	4.4 (2.4)	3.8 (2.13)	4.1 (1.92)	3.0 (1.8)	3.4 (2.02)	***
Investment	6.0 (1.83)	5.7 (2.09)	6.1 (1.34)	5.2 (1.94)	6.1 (1.72)	**
Other	6.9 (0.36)	6.9 (0.69)	7.0 (0.32)	7.0 (0.24)	7.0 (0.01)	*

[1] Mean ranks from different agro-ecological zones significantly different at *$P<0.05$; ** $P<0.01$ and *** $P<0.001$

competitors to local chicken populations across all the eco-zones.

Although livestock was considered to be the main source of income in the arid eco-zones (Table 2 and 3), relatively lower chicken flock sizes were observed in these regions (Table 5). In most village production systems, chickens and other livestock species depend on crop residues and household kitchen waste as the main source of feed (Gunaratne et al., 1993). Thus, although farmers in marginal agro-ecological zones have more livestock species, the flock or herd sizes are lower than of the farmers in the 'cropping' regions of the country. In the marginal agro-ecological zones, chickens depend mainly on feed from scavenging that in most cases is scarce and fluctuates with seasons (Roberts, 1992). Underfed and under-nourished birds are more prone to low growth rates, poor reproductive performances and vulnerability to diseases and mortality (Butcher and Miles, 2002; Smith et al., 2005). The relatively high temperatures particularly in eco-zone V also explain the low chicken flock sizes in these regions. High temperatures are known to cause reduced egg production, reduced feed intake and overall low level of production in chicken flocks (Jacob et al., 2003). The low number of chicks in eco-zone V (Table 6) confirms the poor reproductive performance.

Another plausible explanation for the low flock sizes could be the need to maximize returns from livestock possibly forcing farmers to concentrate on larger species, rather than chickens, in the more arid zones. Cattle and goats, in most cases, have more important roles, such as income generation, draught power, social security and investment. Chickens, on the other hand, are crucial for the day-to-day needs such as meat for consumption, petty cash through sales and cultural roles (McAinsh et al., 2004; Muchadeyi et al., 2005). In this study, results indicated that farmers used chickens mainly for meat and egg consumption (subsistence needs) and less for income-generation or investment (Table 9). Whereas farmers in eco-zone I can derive all their cash and investment needs from cropping activities and use chickens for petty needs, farmers in arid zones need to ensure the livestock species they keep are able to meet these livelihood needs. As a result, farmers will concentrate on large livestock species and in the process sideline chickens. This is supported by the low odds of attaching important ranks to chickens in households with cattle, goats and other livestock species (Table 8). The existence of these other livestock species has a negative impact on the value of chickens at household level.

In summary, the village chicken production systems in Zimbabwe are characterized by variation across eco-zones. Between eco-zones chickens are of different importance. Differences in flock sizes were observed in addition to the marked variation in the climatic factors among agro-ecological zones. Limited land and availability of more feed resources in the cropping regions support chicken production at the expense of larger livestock species.

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