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### **ABSTRACT**

*The advent of democracy in South Africa in 1994 necessitated socio-economic transformation for rural poverty reduction and development. Since then, all spheres of government, non-governmental organisations, the business sector and residents of rural areas have been introducing poultry-based poverty alleviation projects (PAPs). Despite the benefits that accrue from implementing poultry-based PAPs such as improved food security and job creation, there is a growing concern that the support from the government-led extension service is inadequate. Coping strategies, which PAPs rely on are not sustainable. Taking this issue into account, a study was carried out to identify and explain the institutional, production and marketing coping strategies that the poultry-based PAPs in Bushbuckridge Local Municipality of Mpumalanga Province adopted. Questionnaires were administered to 116 respondents comprising of chairpersons, secretaries, and ordinary members of PAPs. The Statistical Package for Social Sciences (SPSS), version 23.0 was used to compute the means of scores assigned to perceptions of institutional, production and marketing coping strategies of PAPs. The top ranked coping strategies were inadequate extension officers supporting the PAPs, procurement of stock in small quantities, buying water from people who owned boreholes, purchasing poor quality day-old chicks, relying on the local community as the market for produce, and selling broilers on credit. It was reconfirmed that inadequate extension support forced the PAPs to adopt various coping strategies. The need for more effective strategies that would enhance the sustainability of PAPs was highlighted.*

**Keywords:** Extension challenges, food security, projects

## **1. INTRODUCTION**

The contribution of food of animal origin to the nutritional status of the world population is well documented (Jensen & Dolberg, 2003; Radolph *et al.*, 2007; Ndlovu, 2010; Wang, Nguyen, Aengwanich, Ilha & Li, 2015). Demand for animal products due to the ever-increasing human population, especially in marginal rural areas of sub-Saharan Africa, poses serious challenges with respect to how to reduce food and nutrition insecurity. Apart from this, the food of animal origin is required to help combat poverty in environments that are extremely vulnerable to climate variability and change. Thus, it is not surprising that livestock projects, in particular those that are poultry-based, remain popular in anti-poverty strategies in many developing countries, including South Africa (Jensen & Dolberg, 2003; Tshitangoni, Okorie & Francis, 2010; Dube, Francis & Maliwichi, 2016; Mikihyaev, Afra & Hashemi, 2017).

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In South Africa, the need for an effective and efficient agricultural extension system that assists poultry-based Poverty Alleviation Projects (PAPs) to improve productivity and competitiveness has been highlighted in past studies. For example, Oladele & Mabe (2010) contend that improvement in the country's agriculture, especially in rural areas, demands considerable efforts that might enhance the quality of the government extension service. Ngomane (2006) is of the view that the main focus of the extension service should be to increase food production and spread the benefits of improved farming techniques more widely. This is crucial because of the need for increased production and liberating the residents of rural areas from poverty.

Agricultural extension and advisory services encompass systems and mechanisms designed to build and strengthen the capacity of farmers to produce more efficiently. This is accomplished through improved provision and access to relevant information and suitable scientific technologies (Ssemakula & Mutimba, 2011). In addition, farming skills and practices, capacity to innovate and address varied rural development challenges are enhanced through training programmes and better management (Birner *et al.* 2009; Christoplos, 2010). Magoro & Hlungwani (2014) believe that one of the factors that often hampers the extension system to have a significant impact is the tendency to apply top-down approaches (Meinzen-Dick *et al.*, 2011), which disempowers farmers. Yet, practitioners who value sustainability seem to be the most relevant in providing extension services in the 21<sup>st</sup> century. Achieving the latter goal demands that extension officers transform their way of doing business and become catalysts as well as agents of empowerment, with special emphasis on developing human capital. As Opio-Odongo (1999) contends, strict adherence to the top-down approach undermines the value of the wealth of knowledge, expertise, wisdom and experience that farmers accumulated over time.

## **2. DEFINITION OF THE PROBLEM**

In most parts of South Africa, inadequate and ineffective extension support available to poultry-based PAPs forces farmers to adopt a diverse range of coping strategies. However, not much is known about the nature of institutional, production and marketing coping strategies applied in the poultry-based PAPs operating in most rural areas of South Africa, including Bushbuckridge Local Municipality of Mpumalanga Province. This situation emanates from inadequate research undertaken in the most rural and poverty-stricken areas.

## **3. MATERIALS AND METHODS**

### **3.1. Study focus and site**

The current study on the strategies used to cope with ineffective extension in poultry-based PAPs was conducted in the northern and southern regions of Bushbuckridge Local Municipality located in Ehlanzeni District. Ehlanzeni, Gert Sibande and Nkangala District Municipalities make up the Mpumalanga Province of South Africa. The province is found to the northeast of the country, while the district lies 105°E. 32° 2' 76" to 30°06'25" East and 24° 2' 26" to 25°59'25" South (Ehlanzeni District Municipality, 2017). Thaba Chweu, Mbombela, Nkomazi and Bushbuckridge Local Municipalities make up the district. In addition, its total geographical area is approximately 2366353 ha. There are about 1688615 people who reside in the 445087 households.

Bushbuckridge Municipality is a category B local government institution established in 2000. It is home to 541 250 people, with 99.5% of them being Black Africans (Bushbuckridge Local Municipality, 2015). The municipality occupies the north-eastern part of Mpumalanga Province. Statistics South Africa (2011) estimates that the Bushbuckridge Local Municipality covers more than one million hectares of land. Approximately 96.2% of the land falls under traditional leadership, implying that the municipality is mainly rural. The governmental Departments of Agriculture, Health, Education and Social Development, as well as municipal Local Economic Development Offices introduced poultry-based PAPs mainly to fight poverty, create jobs and address food and nutrition insecurity.

### **3.2. Sampling procedures and data collection**

Ordinary members, chairpersons and secretaries of poultry-based PAPs, and extension officers serving them were purposively sampled for the current study. This procedure was used since it made it possible to select 116 respondents who were closely associated with the PAPs. The chosen respondents were best placed to provide informed insights that the study sought. A questionnaire that was developed using the results of an exploratory survey of the PAPs in Bushbuckridge Local Municipality was used to collect data. It contained questions requiring responses on a 4-point Likert scale where 1=strongly agree and 4=strongly disagree. Prior to the workshops where the questionnaire was administered, three well-trained research assistants were recruited and trained in various aspects of data collection.

### **3.3. Data analysis**

Data collected using the questionnaire were coded, cleaned and captured into Microsoft Excel spreadsheets. The double entry system was used in order to minimise errors. All data entry errors were corrected through constantly referring to the survey instruments. Categorical and non-parametric data were collected. They were imported into the Statistical Package for Social Sciences (SPSS), version 23.0 for analysis. The mean scores and standard deviations for each perception of institutional, production and marketing coping strategies of poultry-based PAPs were calculated and used for ranking purposes.

## **4. RESULTS**

### **4.1. Demographic characteristics of respondents**

Most of the 116 respondents (57%) were members of poultry-based PAPs operating in Bushbuckridge North. Females constituted more than half (58%) of the sample. Furthermore, the modal age group was 51-60 years (39%), closely followed by those aged 36-50 years (37%). Only 13% of the respondents were younger than 35 years of age. Moreover, 67% of respondents were married, while household sizes varied from two to 13 members. With respect to the highest level of education attained, 45% of the respondents had completed primary schooling. Almost the same proportion (44%) had attained secondary school education but did not matriculate. The remaining proportion comprised of respondents who had not attended school at all.

The respondents in the current study had been involved in poultry-based PAPs for 1-15 years. Thus, their experience was greatly variable. Slightly more than half of the respondents (54%) had been members of PAPs for 5-10 years. Furthermore, a quarter of the sample had been involved in the projects for 10-15 years. Only a few of respondents (3%) had less than five

years' experience, while 17% had more than 15 years of experience. Finally, membership fees for each poultry-based PAPs varied widely.

## 4.2. Adopted coping strategies

Institutional, production and marketing strategies that the poultry-based PAPs commonly used are presented in Table 1. Thereafter, the results for each category of coping strategy is described separately.

**Table 1:** Ranked scores of institutional, production and marketing coping strategies that poultry-based PAPs in Bushbuckridge Municipality relied on

Themes of coping strategies	Mean score	Standard deviation	Rank
<b>Institutional</b>			
a) Operate with limited number of extension officers	1.6	0.51	1
b) Chicken feed is not regulated, making it easy to escalate prices	2.2	1.01	2
c) Project beneficiaries contribute money to support projects	2.5	0.97	3
<b>Production</b>			
a) Procure stock in small numbers from middlemen	1.7	0.95	1
b) Purchase substandard (often second and third grade) day-old chicks	1.9	0.95	2
c) Buy water from people with boreholes	3.5	0.88	3
d) Keep chickens of different ages in the same poultry house	3.8	1.65	4
<b>Marketing</b>			
a) Sell produce to local community members or marketing points	1.6	0.77	1
b) Put up poor signage and advertising strategies	1.8	0.83	2
c) Reduce price of chicken and sell on credit to avoid incurring huge expenses feeding chickens that are ready for the market	2.6	0.51	3

**Key:** Rank = position of statement within the themes: The lower the mean score, the more pressing the issue.

### 4.2.1. Institutional coping strategies used in poultry-based PAPs

It is shown in Table 1 that extension officers were failing to cope with their workloads. This was partly attributed to them serving a vast expanse of areas and multiple commodities, namely poultry, cattle and goats. As a result of this wide scope, the extension personnel often took quite long before they could visit the poultry-based PAPs. Faced with this challenge, the PAPs had to rely on their members' own experience of rearing chickens.

It was also revealed that the prices of feeds were escalating since they were not regulated. Consequently, the PAPs failed to buy enough feed required to meet the growth and development requirements of the chickens they reared. Lack of subsidy or start-up capital

worsened the situation, resulting in the PAPs adopting a ‘hand to mouth approach’. These entailed individuals contributing their own money to buy inputs. The limited start-up capital made it impossible for the PAPs to have adequate stock.

#### 4.2.2. Production coping strategies

Poultry-based PAPs faced the predicament of purchasing less stock of day-old chicks than what they wanted (Table 1). Middlemen who sold the stock to them usually charged exorbitant prices. In most cases, poor quality day-old chicks in which first, second and third grade stock were mixed in the same batch were sold to the PAPs for a uniform price. Lack of a local hatchery and failure to jointly purchase inputs meant that the PAPs were not benefitting from the possible discounting of prices. As a result, they could not take advantage of economies of scale.

Another challenge was the poor state of infrastructure used, particularly housing. Some PAPs kept chickens of varied ages in the same broiler houses, mainly because of limited space to accommodate them separately. In addition, empty bags of chicken feeds were used as curtains. Coupled with this challenge was the shortage of water, which compelled the PAPs to purchase from people who owned boreholes. The water was reported to be expensive and contributed to the low profit margins that characterised the PAPs.

#### 4.2.3. Marketing coping strategies

Lack of marketing outlets forced the poultry-based PAPs to sell their produce to the local community. However, in doing so, they faced stiff competition from large-scale commercial poultry producers who monopolised the market. The PAPs did not have well-defined marketing strategies. Word of mouth communication was harnessed to advertise and sell broilers. Furthermore, poor signage meant to direct potential buyers to the PAPs premises was so poor that it did not achieve the intended purpose.

In order to avoid incurring excessive expenses as a result of keeping chickens in broiler houses for too long after marketing weight had been attained, the PAPs often reduced the selling prices substantially. Moreover, they lent the chickens to those who wanted to buy but could not pay upon receiving the broilers. Consequently, the PAPs often failed to recover the money for the chickens sold on credit, which resulted in a failure to increase the size of their stock. Therefore, most PAPs found it almost impossible to make a profit and thus, some inevitably collapsed.

## 5. DISCUSSION

The more active involvement of women in poultry-based PAPs compared to men was not surprising. Since 1994, successive governments in South Africa have been promoting women empowerment (Moyo & Francis, 2010; Department of Trade and Industry, 2011). Evidence from other parts of Africa (Akeweta, Oyesola, Ndanghu & Ademola, 2014; Miklyaev *et al.*, 2017; Sambo *et al.*, 2015) and Asia (Jensen & Dolberg, 2003; Wong, De Bruyn, Bagnol, Grieve, Pym & Alders, 2017) highlights the centrality of broiler and egg laying poultry in women empowerment. Another observation in the current study was that more than 90% of the members of the PAPs had attained at most secondary schooling but without matriculating. It can be argued that they resorted to income generation through the PAPs due to lack of employable skills. However, they had been involved in this type of business for considerably

long periods of time. Lastly, the fact that about 13% of the members of the PAPs were youth was worrisome. It reflected the likelihood of non-existence of succession planning, which meant that sustainability of the PAPs was questionable.

A limited number of extension officers whose workloads was overwhelming served the poultry-based PAPs in both regions of Bushbuckridge. This explained why they took long before visiting the PAPs. These findings are consistent with those obtained in the Oladele & Mabe (2010) study undertaken in the North West Province of South Africa. Considering that a wide range of information communication technologies that can be used to improve the delivery of extension services are readily available, it is crucial for local officers to harness them with the goal of enhancing the quality of their service.

It was reported that the prices of chicken feeds were not regulated. The PAPs bought stock from middlemen who added huge mark ups to the already difficult to afford prices. Ntuli and Oladele (2013) made similar observations in a study conducted in Capricorn District of Limpopo Province in South Africa. Other studies conducted in Botswana (Moreki, 2011) and Ghana (Ampofo, 2013) yielded similar observations. In Ethiopia, shortage of feeds was cited as one of the major factors causing small-scale poultry enterprises to underperform (Mohammed, Hallemaryam, Gebremedhin & Geneyew, 2016). These observations reveal that a lack of extension support on feed-related matters increases the PAPs struggle to contribute more meaningfully to food and nutrition security. Therefore, it is necessary to explore the viability of producing own poultry feeds as a strategy for addressing this challenge.

Most PAPs depended on meagre financial contributions from members for their operations. Lack of start-up capital forced them to adopt this strategy. Thus, stock was purchased in small quantities and the PAPs operated below optimum capacity. Kirui (2014) examined the factors of performance of poultry projects in the Bureti sub-county of Kenya and came to the same conclusions. The same results were obtained from studies in South Africa (Masipa, 2010), Ethiopia (Sambo *et al.*, 2015) and a cocktail of Asian countries (Wong *et al.*, 2017). These results suggest that more appropriate start-up funding mechanisms for PAPs should be developed.

Quite often, PAPs purchased poor quality day-old chicks. It was argued that this was unavoidable since there was no hatchery within Bushbuckridge Local Municipality, which forced the PAPs to buy whatever stock they could get. In addition to this, PAPs rarely pursued joint input purchasing as a strategy that would enable them to benefit from discounts associated with bulk purchasing. These observations were in line with those made in the Adebayo and Adeola (2005), Badubi, Ravindran & Reid (2004), and Ntuli & Oladele (2013) studies. Therefore, the poor quality of day-old chicks used hampers successful running of poultry-based PAPs.

In the current study, it was found that the inadequate and substandard infrastructure that PAPs used made it impossible for them to house chickens of different ages separately. This unavoidable practice was highly risky because it created conditions that made it easy for Newcastle disease and Bronchitis, among others, to spread easily. Ntuli and Oladele (2013) observed the same in a study in Limpopo Province. In addition, Billah, Nargis, Hossain, Howlinder & Lee (2013) and Sambo *et al.* (2015) pointed out that in Bangladesh and Ethiopia respectively, observed prevalence of diseases resulted from poor state of infrastructure and inadequate supply of vaccines and medicines. Wang *et al.* (2015) carried out a comprehensive review of literature on livelihood and biosecurity improvement of small

poultry producers in Asia. They concluded that poultry producers were not very concerned about enhancing biosecurity and environmental management. All these results indicate that investing in construction of quality infrastructure for use in broiler production is crucial in the fight against poverty, and food and nutrition insecurity.

Sometimes, the PAPs in Bushbuckridge Local Municipality purchased water from households with boreholes on their homesteads. Although this strategy increased the costs of running the businesses, it was inevitable considering that water is a crucial input in broiler chicken rearing. Previously conducted research (Moreki, 2011; Ntuli & Oladele, 2013; Permin, Pedersen & Riise, 2001;) revealed that water hinders the success of small-scale poultry production. Therefore, there is an urgent need for improving water supply in the rural areas of Bushbuckridge where the PAPs were located.

The local community was the major market for the produce from the PAPs. This emanated from the inability to compete effectively with large-scale commercial poultry producers. In an effort to sustain business operations, the PAPs often reduced the prices of their chickens substantially. Moreki (2011) also identified a lack of visible and constant markets as the main threat to the survival of poultry-based PAPs in Gaborone, Botswana. Another study in Benin City Metropolis of Nigeria (Ekunwe, Fiona & Ogbeide, 2014) concluded that ineffective and inefficient marketing of fully grown chickens resulted in considerable reduction in profit margins. Other studies carried out in South Africa (Masipa, 2010; Ntuli & Oladele, 2013; Tshitangoni *et al.*, 2010) confirmed the existence of this trend. These results also affirmed the views that Jensen & Dolberg (2003) had expressed earlier at an international conference in the United Kingdom.

Another major factor hindering the performance of poultry-based PAPs was that when faced with the prospect of keeping broilers beyond saleable weight and age, some resorted to selling on credit. This was done in order not to incur exorbitant costs, mostly arising from using the expensive feed to broilers that had already reached marketing weight and age. An earlier study (Masipa, 2010) revealed that supply of broilers in the market often exceeded demand. This forced the PAPs to keep the broilers for much longer than desirable periods. Poor record keeping and lending to some people who often failed to pay back exacerbated the already considerable financial losses. These results corroborate those observed in the study conducted by Ntuli & Oladele (2013).

## **6. CONCLUSIONS AND RECOMMENDATIONS**

In the current study, it was observed that the poultry-based PAPs relied on various strategies to cope with the numerous challenges they faced. Most of the PAPs were regarded as ‘hand to mouth’ enterprises. Inadequate start-up capital and poor extension support hampered the possibility of PAPs graduating into viable enterprises that achieve the goals for which they were set up. Other interventions that might help grow and develop the PAPs include: (a) growing and formulating their own feed; (b) designing and constructing suitable housing; (c) investing in provision of reliable water resources; (d) assistance with buying day-old chicks of better quality; (e) cooperative buying of inputs to take advantage of the economies of scale and reducing transportation costs; and (f) developing effective strategies for marketing broilers. Central to these suggestions is the need for more responsive and effective agricultural extension services.

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## REFERENCES

- ADEBAYO, O. O & ADEOLA, R. G., 2005. Socio-economic Factors Affecting Poultry Producers in Ejigbo Local Government Area of Osun State. *J. Hum. Ecol.*, 18(1):39-41.
- AMPOFO, S. D., 2013. *Modelling the feed Mix for Poultry Production: The Case of ADAMA Musa Farms, Dormaa-Ahenkro in Brong Ahafo Region of Ghana*. Unpublished Masters Dissertation, Kwame Nkrumah University of Technology, Ghana.
- AKEWETA, J., OYESOLA, O. B., NDANGHU, A. & ADEMOLA, A. O., 2014. Social Capital and Poverty Coping Strategies of Rural Women in Song Local Government Area of Adamawa State, *Nig. J. Rur. Ext. Edu.*, 8:1-8.
- BADUBI, S. S., RAVINDRAN, V. & REID, J., 2004. A Survey of Small-Scale Broiler Production System in Botswana, *Trop. Anim Health Prod.*, 36(8):823-834.
- BILLAH, S. M., NARGIS, F., HOSSAIN, M. E., HOWLIDER, M. A. R & LEE, S. H., 2013. Family Poultry Production and Consumption Patterns in Selected Households of Bangladesh. *J. Agric. Ext. Rur. Dev.*, 5(4):62-69.
- BIRNER, R., DAVIS, K., PENDER, J., NKONYA, E., ANANDAJAYASEKARAN, P., EKBOIR, J., MBABU, A., SPIELMAN, D. J., HORNA, D., BENIN, S & COHEN, M., 2009. From Best Practices to Best Fit: A Framework for Designing and Analysing Pluralistic Agricultural Advisory Services Worldwide. *J. Agr. Edu. Ext.*, 15(4):341-355.
- BUSHBUCKRIDGE LOCAL MUNICIPALITY, 2015. Bushbuckridge Local Municipality Integrated Development Plan 2015/2016. Bushbuckridge, South Africa.
- CHRISTOPLOS, I., 2010. *Mobilizing the Potential of Rural and Agricultural Extension*. Food and Agriculture Organization (FAO) of the United Nations and Global Forum for Rural Advisory Services. Rome, Italy.
- DEPARTMENT OF TRADE AND INDUSTRY, 2011. *Towards an Enabling Environment for Women Economic Empowerment in South Africa: A Status Quo Report*. Department of Trade and Industry, South Africa.
- DUBE, M. H., FRANCIS, J. & MALIWICHI, L. L., 2016. Poultry-based Poverty Alleviation Projects in Ehlanzeni District Municipality: Do they contribute to the South African Government's 'Developmental State' Ambition? *S. Afr. J. Agr. Ext.*, 44(2):147-157.
- EHLANZENI DISTRICT MUNICIPALITY, 2017. Ehlanzeni District Municipality's Final Integrated Development Plan and Budget, 2017-2022. Mbombela, South Africa.
- EKUNWE, P. A., FIONA, O & OGBEIDE, R., 2014. Socio-economic Factors Influencing Broilers Marketing in Bernin City Metropolis, Edo State, Nigeria. *J. Agri. Sci.*, 13(4):78 – 81.
- JENSEN, H. A. & DOLBERG, F., 2003. A Conceptual Framework for Using Poultry as a Tool in Poverty Alleviation, *International Conference on Staying Poor: Chronic Poverty and Development Policy IDPM*, 7 to 9 April. University of Manchester, UK.
- KIRUI, K., 2014. *Factors Influencing Performance of Poultry Farming Projects In Bureti Sub County Kericho, Kenya*. Unpublished Masters Dissertation, University of Nairobi, Kenya.

- S. Afr. J. Agric. Ext.  
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DOI: <http://dx.doi.org/10.17159/2413-3221/2018/v46n1a424>
- Dube, Francis, & Maliwichi.  
(License: CC BY 4.0)
- MAGORO, M. D. & HLUNGWANI, S. S., 2014. The Role of Agricultural Extension in the 21<sup>st</sup> Century: Reflections from Africa. *Int. J. Agr. Ext.*, 2(1):89-93.
- MASIPA, M. P., 2010. *An Assessment of the Sustainability of Poverty Eradication Projects in Rural Communities of Capricorn District Municipality: Limpopo Province in South Africa*. Unpublished PhD Thesis. University of Venda, South Africa.
- MEINZEN-DICK, R. S., QUISUMBING, A. R., BEHRMAN, J. A., BIERMAYR-JENZANO, P., WILDE, V., NOORDELOOS, M., RAGAS, C. & BEINTEMA, N. M., 2011. *Engendering Agricultural Research, Development and Extension*. International Food Policy Research Institute. Washington DC, USA.
- MIKLYAEV, M., AFRA, S. & HASHEMI, M., 2017. *Cost-benefit Analysis of Rwanda's Poultry Value Chains. Development Discussion Paper 2017-05*. USAID, USA.
- MOHAMMED, A., HALLEMARIAM, S., GEBREMEDHIN, G. & GEBEYEW, K., 2016. Challenges and Opportunities of Small-scale Poultry Production System in Jigija Zone, Somali Regional State, Ethiopia. *Pou. Fish Wildl. Sci.*, 4(1):144. Doi:10.4172/2375-446X.1000144.
- MOREKI, J. C., 2011. Challenges in Small-Scale Broiler Production in Botswana. *J. Agric. Tech.*, 7(6):1579–1587.
- MOYO, C. S. & FRANCIS, J., 2010. Women empowerment initiatives for rural development in South Africa: The missing piece of the puzzle. *Pula Bot. J. Afr. Stud.*, 24(1):43-61.
- NDLOVU, L., 2010. The Role of Food of Animal Origin in Human Nutrition and Health. P77-92. In: SWANEPOEL, F. J. C., STROEBEL, A. & MOYO, S. (Eds). *The Role of Livestock in Developing Communities: Enhancing Multi-functionality*. CTA, Wageningen, The Netherlands.
- NGOMANE, T., 2006. Research and Extension Process and Practices in Relation to Smallholder Agriculture in Africa: Present, Past to Present. *S Afr. J. Agric. Ext.*, 35(2):199-220.
- NTULI, V. & OLADELE, O. I., 2013. Analysis of Constraints Faced by Small Scale Broiler Farmers in Capricorn District in Limpopo Province. *Life Sci. J.*, 10(1):2990-2996.
- OLADELE, O. I & MABE, L. K., 2010. Job Burnout and Coping Strategies among Extension Officers in North West Province, *Afr. J. Agric. Res.*, 5(17):2321-2325.
- OPIO-ODONGO, J., 1999. Roles and Challenges of Agricultural Extension in Africa. In: BRETH, S.A (Ed.), *Innovative Extension Education in Africa. Second Workshop on Training Mid-career Agricultural Extension Professionals*. July 6-8. Red Cross Training Institute. Addis Ababa, Ethiopia.
- PERMIN, A., PEDERSEN, G. & RIISE, J. C., 2001. Poultry as a Tool for Poverty Alleviation: Opportunities and Problems Related to Poultry Production at Village Level. In ALDERS, R. G. AND SPRADBROW, P. B. (Eds). *SADC Planning Workshop on Newcastle Disease Control in Village Chickens, ACIAR Proceedings of an International Workshop*. Maputo, Mozambique.
- RADOLPH, T. F., SCHELLING, E., GRACE, D., NICHOLSON, C. F., LEROY, J. L., COLE, D. C., DEMMENT, M. W., OMORE, A., ZINSSTAG, J. & RUEL, M., 2007. Role of Livestock in Human Nutrition and Health for Poverty Reduction in Developing Countries. *J Anim. Sci.*, 85(11):2788-2800.
- SAMBO, E., BETTRIDGE, J., DESSIE, T., AMARE, A., HABTE, T., WIGLEY, P. & CHRISTLEY, R. M., 2015. Participatory Evaluation of Chicken Health and Production Constraints in Ethiopia. *Prev. Vet. Med.*, 118:117-127.
- SSEMAKULA, E. & MUTIMBA, J. K., 2011. Effectiveness of the Farmer-to-Farmer Extension Model in Increasing Technology Uptake in Masaka and Tororo Districts of Uganda. *S Afr. J. Agric. Ext.*, 39(2):30 – 46

- S. Afr. J. Agric. Ext.  
Vol. 46, No. 1, 2018: 34 – 43  
DOI: <http://dx.doi.org/10.17159/2413-3221/2018/v46n1a424>
- Dube, Francis, &  
Maliwichi.  
(License: CC BY 4.0)
- STATISTICS SOUTH AFRICA, 2011. *Census 2011 Municipal Report*. Pretoria, South Africa.
- TSHITANGONI, M., OKORIE, A. & FRANCIS, J., 2010. Performance of Poverty Alleviation Projects in South Africa: The Case of the Vhembe District, Limpopo Province. *Sci. Res. Essays.*, 6(5):1005-1012.
- WANG, L., NGUYEN, T., AENGWANICH, W., ILHA, M. N. & LI, X., 2015. An Ecohealth Assessment of Poultry Production Clusters (PPCs) for the Livelihood and Biosecurity Improvement of Small Poultry Producers in Asia. *Infec. Dis. Pov.*, 4:6.
- WONG, J. T., DE BRUYN, J., BAGNOL, B., GRIEVE, H., LI, M., PYM, R. & ALDERS, R. G., 2017. Small-scale poultry and food security in resource-poor settings: A review. *Global Food Security.*, 15:43-52.