

# PROFITABILITY AND EFFICIENCY ANALYSIS OF SMALLHOLDER BROILER PRODUCTION IN MOPANI DISTRICT OF LIMPOPO PROVINCE, SOUTH AFRICA

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**Abstract.** The study was conducted in the Mopani District of Limpopo province to determine the factors affecting productivity of broiler production in the area. Data were collected from 86 sampled smallholder broiler farmers in three municipalities in Mopani District namely; Greater Tzaneen municipality, Greater Letaba municipality and Maruleng municipality using a well-structured questionnaire. The results of the study indicated that feed is significant at 10% level having a positive relationship with the broiler output. However, stock size and vaccines are significant at 1% level, also with a positive relationship with broiler output. The study recommended that government should find ways of linking the smallholder farmers in the study area with other stakeholders, governmental and private, to allow smallholder farmers have the opportunities to network and get to know how the commercial successful farms operate and see where they can improve on their production systems and marketing of products.

**Key words:** constraints, efficiency, gross margin, productivity, smallholder

## INTRODUCTION

Smallholder agriculture remains one of the main drivers of many economies especially in sub-Saharan Africa despite the fact that its potential is underestimated and often ignored. Smallholder Agriculture has different

definitions and connotations depending on the context, country and geographical environment. According to DAFF (2012b), the term ‘smallholder’ is interchangeably used with ‘small-scale’, ‘resource poor’ and sometimes ‘peasant farmer’. Generally, smallholder is defined in relation to the limited resource endowment when farmers in the agriculture sector are compared. Thus, smallholder farmers are defined as those farmers cultivating small plots of land to grow crops, raise few livestock for consumption and one or two cash crops relying almost exclusively on family labour.

In South Africa, Statistics South Africa’s (STATSA, 2012) Labour Force Survey (2000–2007) indicated that over six million households are engaged in smallholder agricultural activities ranging from crop production, livestock husbandry to wood gathering. Over two million of these are females and the main reason for their participation in this form of agriculture is obtaining extra food (Aliber and Hart, 2009). Also, most smallholder farmers in South Africa are poor, less educated and reside in rural communities with less developed infrastructure which locates them in the so called second economy (Jacobs, 2008).

Meanwhile, the poultry industry is the largest segment of the South African agricultural sector, contributing more than 16% of its share of gross domestic product (Bolton, 2015). It provides employment, directly and indirectly, for about 108 000 people throughout its

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value chain and related industries. The poultry industry supports many businesses and provides a strong platform for rural development, as well as the government's zero-hunger goals, as it is the main supplier of a protein diet.

A study conducted by the Department of Agriculture, Fisheries and Forestry (DAFF) showed that Limpopo province along with Northern Cape were provinces in South Africa that produced the least broiler meat in 2010 with just 2% production each (DAFF, 2011). This indicates that broiler farmers in these provinces may still be facing some constraints in the production of poultry. These constraints may lead to ultimate consequences causing some of the broiler meat producers in these provinces to exit the broiler market because they are unable to remain competitive and earn desirable revenue.

South African Poultry Association (SAPA, 2012) explained that poultry industry in South Africa is the biggest contributor to the economic growth through Gross Domestic Product, food security and employment creation. This industry has a significant impact on the lives of South Africans mainly through its creation of informal employment where it employs approximately 375 000 people (SAPA, 2012). It is also the biggest consumer of maize in South Africa, therefore contributing to other industries in South Africa.

Broiler farming might be very popular among South Africa's smallholder farmers, but this industry still faces major challenges. These challenges include financial constraints for the farmers to succeed in their production; external constraints such as taxes and high interest rates, lack of technical information and training on the required quality standards in the market for broiler products, infrastructural constraints such as the lack of roads, electricity, production and processing facilities and market constraints (Rota and Sperandini, 2010).

Over the years, studies have shown that the consumption of broiler meat in South Africa has been more than what was produced locally, therefore leading to South Africa having to import broiler meat in order to meet the local demand (DAFF, 2012a). According to Rota and Sperandini (2010), the production of broiler by the smallholder farmers is mainly for income generation and poverty reduction. It contributes to the household nutrition and provides income to buy food. However, most of these smallholder farmers still lack the resources to grow their farm businesses and produce commercially.

Some studies showed that majority of these smallholder farmers that produce broiler are women, who women lack the technical information on how the industries operate. This study therefore analysed profitability and efficiency among smallholder broiler producers in Mopani District of Limpopo Province, South Africa. The specific objectives of the study are to:

- Estimate the profitability of smallholder broiler production in the study area.
- Determine factors influencing productivity among smallholder broiler producers in Mopani District.
- Identify the constraints facing smallholder broiler production in Mopani District.

## LITERATURE REVIEW

### Profitability of smallholder broiler production

Begum et al. (2014) explained that the profitability of poultry farming in Bangladesh was measured in terms of gross margin and net profit. The gross margin and net return of contract farms were much higher than those of independent farms, but in spite of these differences, both systems operated profitably. The results of the two farming systems indicated that if small farms entered into the Contract Farming System (that is; producing for the consumers or wholesalers they have binding contracts with), they would obtain substantial income gains.

Mabelebele et al. (2011) found that there are four categories of broiler farmers found in the poultry sector of the Greater Tzaneen Municipality, namely the contract growers, the market assured small-scale farmers, and the infrastructure subsidized farmers and the resource poor farmers. Although the small-scale and resource poor farmers operate under an open system and the study concluded that the costs of inputs (feeds, chicks, medication and transport) were very high for broiler farmers. Poor quality infrastructure and inaccessibility to formal market posed a threat of losing profits and therefore sustainability to these farmers, and may have been the reason for the farmers' inconsistent production.

Mabelebele et al. (2011) further highlighted that high cost of feed is also a challenge to the resource-poor and small-scale farmers. Some farmers have advantage over others that the strategic partner is capable of negotiating for better prices with suppliers and also buy in bulk to

make provision for years with shortages. This will be positive for the contracted farmers and for small scale farmers to increase their profit margins and move to higher production levels. Training programmes on technical and marketing skills should be made available to these farmers. This would assist in reducing the production cost, graduate from the strategic partnership model and increase savings that are a necessity in covering for emergencies.

According to Tuffour and Oppong (2014) the price of labour significantly reduced profit but the price of day old chick increased profit in their study in Greater Accra Region of Ghana. The study further showed that broiler producers were able to realize 54% of their frontier profit on the average. Number of years of experience in broiler production was found to reduce inefficiency in production whilst farms owned by sole proprietors were less economically efficient. They later recommended that inputs should be made available to farmers at competitive prices and the quantity of labour utilization should be reduced because the current level is uncompetitive. Training should also be provided to less experienced farmers to enable them adapt the poultry farming practices and thus create opportunities for profit realization.

### **Resource use efficiency of smallholder broiler farmers**

Despite the free marketing system in South Africa, feed was identified as the main cost factor for broiler producers and a perennial problem area (NAMC, 2007). Feed makes up 50% or more of the total production costs incurred by broiler producers. NAMC (2007) explained that this could be due to the impact of high transport costs for raw materials. These high feed cost and limited resources accessed by smallholder farmers result in having to reduce their broiler production to a number of broiler chickens they can afford to feed and for other farmers producing broiler chickens that are small due to improper feeding.

NAMC (2007) further explained that in a free range system for chickens, birds (even those that are diseased) are allowed to move freely. These birds can spread disease effectively and the practice runs counter to general bio-security rules. This becomes difficult for farmers to use the medication for the broiler chickens effectively, resulting in an increased mortality rate.

Ukwuaba and Inoni (2012) found that smallholder broiler farmers in Oshimili North Local Government

Area of Delta State in Nigeria were profitable in their production. This was despite the high costs of feeds and other variable costs incurred in the production of broiler. The study showed that labour and day-old chicks had a negative relationship with the total output of broiler produced. This indicates that the more labour and day-old chicks the farmers used in their production, the less broiler output they yielded. Excluding the high production costs, these smallholder broiler farmers still faced constraints in their production. These constraints included inadequate finance (lack of access to credit), which is necessary to enhance productivity and profitability in broiler production.

However, in some areas of Africa such as the Meme Division of Cameroon, broiler producers face major problems such as low market prices, high cost of feed, veterinary services, transportation, lack of access to credit and extension services (Taru et al., 2010). Broiler production was found to have resulted in overutilization of feeds, chicks and labour in the area. The results of a study by Tuffour and Oppong (2014) showed that broiler producers were able to realize 54% of profit on average. Number of years of experience in broiler production was found to reduce inefficiency.

Tuffour and Oppong (2014) indicated the ability of more experienced farmers to adapt the best farm practices through continuous learning process to produce the output using the less cost combination of the productive inputs available resulted in profit efficiency. These experienced farmers should share their production methods with the less experienced farmers to increase their efficiency in profit.

A study by Al-fawwaz and AL-Sharafat (2013) found that the total number of birds, amount of labour, cost of veterinary services, drugs, and vaccines, cost of feeds, farmer experience in poultry production, educational level of the farmer, and cost of poultry equipment considerably affected broiler production in Jordan. The results of the study also showed that the use of the inputs was inefficient. Al-fawwaz and AL-Sharafat (2013) further recommended that government should subsidize inputs to farmers along with proper extension services. This will assist broiler farmers to be productive and profitable in their broiler production.

Feed, bird stocks, operating costs, and other costs were important factors to broiler output in the Chiang Mai Province of Thailand (Todsadee et al., 2012). The socio-economic state of farmers showed that there was

technical efficiency at farm level. The results of this study (Todsadee et al., 2012) implied that the adoption of better management practises by the broiler farmers presented better opportunities for the farmers to improve broiler production and increase profits in their broiler operations.

## METHODOLOGY

### Study area

The study was carried out in Mopani District of Limpopo province. Mopani District is located in the northern parts of South Africa, with a population size of approximately 964 195. The study was conducted in 3 municipalities falling under Mopani District namely; Greater Tzaneen municipality, Maruleng municipality and Greater Letaba municipality.

### Data source and sampling method

A multistage random sampling technique was utilized in this study to collect data from the villages in the Greater Tzaneen municipality, Greater Letaba municipality and Maruleng municipality of Mopani District. A sample of 86 smallholder broiler farmers was selected and data were collected using well structured questionnaires. Data were collected from 44 smallholder broiler farmers in the Greater Tzaneen municipality, 26 smallholder broiler farmers in the Greater Letaba municipality and 16 selected in the Maruleng municipality based on probability proportionate to size.

### Analytical techniques

The primary data collected for this study were analysed using descriptive statistics, stochastic frontier production function and the gross margin analysis techniques. Descriptive statistics involved the use of tables, frequencies, percentages, sums and averages to analyse the constraints faced by smallholder broiler producers.

To analyse the productivity of the broiler farmers, the stochastic frontier production function was used. The stochastic frontier production function used is as follows:

Specific model:

Stochastic Frontier Production Function:

$$\ln Y_i = B_0 \sum_{j=1}^4 B_j \ln X_{ij} + v_i - u_i$$

Where:

$\ln$  = The natural logarithm

$B_0$  = The constant term

$B_j$  = Production coefficient to be estimated

$Y_i$  = Broiler output (in kg)

$X_1$  = Labour (in man days)

$X_2$  = Feeds (in kg)

$X_3$  = Stock size (chicks) (in numbers)

$X_4$  = Vaccines [in rands (R)]

$V_i$  = Statistical noise

$U_i$  = Technical inefficiency

Technical Efficiency:

The Technical Efficiency model was used to determine the factors that affect the technical efficiency of smallholder broiler producers (Khai and Yabe, 2011).

$$TE_i = \alpha_0 + \alpha_1 W_1 + \alpha_2 W_2 + \alpha_3 W_3 + \alpha_4 W_4 + \alpha_5 W_5$$

Where:

$TE_i$  = Technical efficiency effect of the  $i$ -th farmer;

$W_i$  is the variable representing socio-economic characteristics of farmers to explain technical inefficiency and  $\delta$  co-efficient are unknown parameters to be estimated.

$\alpha_0$  = The constant term

$\alpha_i$  = the parameters/coefficients to be estimated

$W_1$  = Age (in years)

$W_2$  = Gender (Dummy; 1 = male, 0 = female);

$W_3$  = Household size (in numbers)

$W_4$  = Level of education (in years)

$W_5$  = Experience in broiler production (in years)

The technical efficiency of a farm ranges from 0 to 1. Maximum efficiency in production has a value of 1. Lower values represent less than maximum efficiency in production (Ali and Samad, 2013).

The Gross Margin Analysis was used to estimate the costs and revenue of the smallholder broiler farmers (Ali and Samad, 2013). This in turn provided information on the profitability of the smallholder broiler farmers in Mopani District.

$$GM = TR - TVC$$

Where:

$GM$  = Gross Margin

$TR$  = Total Revenue

$TVC$  = Total Variable Cost (The costs incurred in utilizing variable inputs)

## RESULTS AND DISCUSSION

### Gross margin analysis of smallholder broiler producers in Mopani District

The result of gross margin analysis is depicted in Table 1. The cost of wages for all the farmers in Mopani District who hire labour was found to contribute 9.55% towards the total variable costs incurred in broiler production in the Mopani District. The highest cost of production for the broiler farmers was found to be the cost of feeds which took a total of 70.61% of the total variable costs of broiler production. This high cost of feeds leads to some smallholder broiler farmers being unable

to realize significant profits, or having to raise the prices of their output, and consequently reducing purchases by consumers, and this may in turn contribute to food insecurity in the area (Nkukwana, 2014). The lowest cost at R23 750 per year was found to be the cost of water. Farmers in the Mopani District do not spend a lot of their funds on water because most farmers have boreholes and some acquire water free from public taps that were erected by the government. The cost of broiler production is at 15.11%, being the cost of the stock or day old chicks that are bred to become the sold output. The farmers spent R113 740, R64 300, R113 900, R51 400, R188 866, R23 750 on sawdust, electricity, transport to

**Table 1.** Gross margin analysis of boiler production  
**Tabela 1.** Analiza marży brutto na produkcji brojlerów

Costs and Revenue Koszty i dochody	Amount (in Rands) Kwota (wartość brzegowa)	Percentage Wartość procentowa
Gross Revenue Przychód brutto	12 459 755	–
Variable costs Koszty zmienne		
Cost of wages Koszty wynagrodzeń	1 121 800	9.55
Costs of feeds Koszty pasz	8 295 338	70.61
Cost of stock/day old chicks Koszt przechowywania starszych piskląt na dzień	1 774 625	15.11
Cost of sawdust Koszt trocin	113 740	0.97
Cost of electricity Koszt energii elektrycznej	64 300	0.55
Transport cost (input market) Koszty transportu (wprowadzenie na rynek)	113 900	0.97
Transport cost (output market) Koszty transportu (odebranie z rynku)	51 400	0.44
Cost of vaccines Koszt szczepionek	188 866	1.61
Cost of water Koszt wody	23 750	0.20
Total – Łącznie	11 747 719	100
Gross Margin – Marża brutto	712 036	–

Source: own elaboration based on survey data.

Źródło: opracowanie własne na podstawie danych ankietowych.

input market, transport to output market, vaccines and water respectively. The cost of wages was high at R1 121 800 per year because labourers were expected to work every day of the week due to the vulnerability nature of broiler chickens and therefore, the labourers had to be compensated for working extra days, that is; at weekends. The cost of saw dust is low because it is very cheap to purchase it, at R5 per R80 kg bag. Some farmers used generators and paraffin heaters to maintain the required temperature in chicken houses, whilst other farmers did not purchase a large number of day old chicks to breed, and thus reducing the cost of electricity in the study area. The ratio of total variable cost to gross margin was found to be 16.50, meaning that for every R1 spent on production of broiler, the farmers stand to make R16.50 in profits. Farmers are able to cover the costs of their production and make profit from the sales of their products. Therefore, the gross margin analysis

shows that broiler farmers in the Mopani District are making profit in their broiler production.

### Factors influencing productivity among smallholder broiler producers in Mopani District

The results of the stochastic production frontier (Table 2) revealed that when feeds used in broiler production increase by one kilogram, broiler output increases by 0.018 units. This indicates that there is an efficient use and consumption of the feeds by the broiler chickens. This variable was found to be significant at 10% level, showing that a 10% increase in the feed used in broiler production will lead to an increase in broiler output produced. Adedeji et al. (2013) found that one of the major productive input that has great impact on the poultry output of poultry farmers is the feed. With a significance level of 1%, the results of the study found

**Table 2.** Estimated stochastic frontier production function for smallholder broiler farmers

**Tabela 2.** Szacowana stochastyczna graniczna funkcja produkcji dla małych producentów brojlerów

Variable Zmienna	Parameters Parametry	Coefficient Współczynnik	Standard error Błąd standardowy
Constant Stała	$B_0$	657.958	7 370.646
Labour Praca	$B_1$	2.151	1.603
Feeds Pasze	$B_2$	0.018*	0.010
Stock size Wielkość hodowli	$B_3$	0.074***	0.018
Vaccines Szczepionki	$B_4$	0.814***	0.090
Diagnostic statistics – Statystyki diagnostyczne			
Sigma	$\sigma^2$	0.2474628	0.066
	$\sigma_v$	1.12e-09	7.94e-07
	$\sigma_u$	0.497	0.066
Lambda	$\lambda$	0.444	0.0664754
Log likelihood Prawdopodobieństwo	–	–0.77122716	

\*, \*\*, \*\*\* represent significance at 10%, 5% and 1% respectively.

Source: own elaboration based on survey data.

\*, \*\*, \*\*\* oznaczają odpowiednio 10%, 5% i 1% poziom ważności.

Źródło: opracowanie własne na podstawie danych ankietowych.

that when stock size increases by 1%, the broiler output produced increases. Stock size was found to have a positive correlation with the broiler output produced, with a coefficient of 0.074. Todsadee et al. (2012) discovered that the birds stock appeared to be the second most important production factor after feeds (which is the most important), and implying that every increase in stock size, would lead to an increase in the value of broiler produced. The more money broiler farmers spent on vaccines, the more broiler output they produced. This was indicated by a positive relationship between the vaccine cost and the output produced, with a coefficient of 0.814. This variable was found to be significant at 1% level. When inputs used in broiler production were increased, the broiler output more than doubled. Smallholder broiler farmers were found to be having returns to scale of 1.681, which is greater than 1. Therefore, smallholder broiler production in the Mopani District was found to be having increasing returns to scale. Indicating that farmers can reduce cost of production by increasing their scale of production (Etuah, 2014). The study shows that smallholder broiler production in the Mopani District is profitable. The results of the study found  $\sigma_2 = 0.2474628$ , which is higher than 0,

implying that there is technical efficiency in smallholder broiler production in the study area.

### Sources of Technical Efficiency in broiler production

As shown from the result in Table 3, the age of the farmer was found to be significant at 1% level, with a negative coefficient of  $-0.838$ . This explains that age of the farmer negatively affects technical efficiency of the farmer's broiler production. This is due to older farmers not being active enough to perform daily operations that require more energy to increase efficiency. The gender of the farmers was found to be significant at 10% level. The relationship between the gender of the farmers and the technical efficiency was found to be positive, having a coefficient of 0.539. The household size of the farmers was found to be statistically significant at 1% level. A positive correlation of 0.214 implied that farmers with bigger households are more technically efficient. This is due to the fact that the farmers' household members contribute to the labour force in the broiler production and thus increasing technical efficiency in broiler production. This was contrary with Alrwis and Francis (2010) who explained that household size negatively

**Table 3.** Sources of technical efficiency in broiler production  
**Tabela 3.** Źródła sprawności technicznej w produkcji brojlerów

Variable Zmienna	Parameter Parametr	Coefficient Współczynnik	Standard error Błąd standardowy	P values Wartości P
Constant Stała	$\alpha_0$	8.100	2.458	0.095*
Age Wiek	$\alpha_1$	-0.838	0.033	0.001***
Gender Płeć	$\alpha_2$	0.539	0.284	0.107*
Household size Wielkość gospodarstwa	$\alpha_3$	0.214	0.242	0.004***
Level of education Poziom wykształcenia	$\alpha_4$	0.840	0.205	0.001***
Experience Doświadczenie	$\alpha_5$	-0.285	0.156	0.061*

\*, \*\*, \*\*\* represent significance at 10%, 5% and 1% respectively.

Source: own elaboration based on survey data.

\*, \*\*, \*\*\* oznaczają odpowiednio 10%, 5% i 1% poziom ważności.

Źródło: opracowanie własne na podstawie danych ankietowych.

affects the technical efficiency in smallholder broiler farms. The farmers' level of education was found to be having a positive relationship with technical efficiency with a coefficient of 0.84 and a significance level of 1%. This relationship indicates that the more years in education the farmers have, the higher the technical efficiency. This was confirmed by Todsadee (2012) who found that there was a positive correlation between the years of formal education and technical efficiency. The experience of farmers in broiler production was found to be statistically significant at 10% significance level with a coefficient of  $-0.285$ . This negative coefficient indicates a negative relationship between the experience of farmers in broiler production and the technical efficiency. The study further found that the smallholder broiler farmers in Mopani District could save an average of 23.4% [(that is;  $1-(76.6/100)$ ] in production costs and realize a maximum cost saving of 95.8% [(that is;  $1-(4.2/100)$ ] in production costs.

### **Constraints faced by smallholder broiler producers**

The descriptive results indicate that 58.10% of the broiler farmers in the Mopani District experience theft of their poultry by the community whilst 41.90% said they do not experience this problem. This 58.10% of farmers indicated that lack of fencing and proper security leads to theft of their broiler leading to reduced output of the broiler and thus less revenue. Out of the 86 broiler farmers interviewed, 38 farmers said they lack adequate water to farm their broiler chickens and 19 of these farmers explained that their broiler houses are of poor quality. They lack the proper curtains to maintain a certain level of temperature required to decrease mortality rate, to which 81.40% of the broiler farmers reported as a major constraint. It was also found that 47.70% of the interviewed farmers indicated that they lack the funds to grow in their broiler enterprises, and of these farmers in the Mopani District, 2.30% said that they lack collateral to acquire credit. Some farmers complained about the prices of the resources they use in production. Resources such as feeds, vaccines and electricity, with the number of farmers having this problem being 34, 5 and 4, for feeds, vaccines and electricity respectively. Fawole (2006) indicated that lack of veterinary services mainly contributes to 66% of farmers' constraints. However, 2.30% of farmers said their major constraint is finding a market for their broiler produce. Other constraints

faced by some small groups of farmers in the study area include lack of training, lack of infrastructure, lack of land, lack of broiler equipment and pest infestation. Lack of training and hygiene constraints could be attributed to no availability of extension agents explained Fawole (2006).

### **CONCLUSION AND RECOMMENDATIONS**

The study found that farmers face a variety of constraints in their broiler production. Such constraints were found to be theft, lack of fencing, inadequate water, poor quality of chicken houses, high mortality rates, lack of funds, lack of collateral to acquire credit, lack of market, lack of training, lack of infrastructure, lack of land, lack of broiler equipment, high prices of resources and pest infestations. The study also revealed that there are factors which affect the productivity of the broiler producers in the study area. These were found to be feeds, stock size and vaccines. They were found to be having a positive relationship with broiler output, implying that as these factors increase, the broiler output produced will also increase. The study further discovered farmers have an opportunity to save on cost in their production. The study highlighted that the smallholder broiler farmers in the Mopani District could save an average of 23.4% in production costs and realize a maximum cost saving of 95.8% in production costs. The highest cost incurred by farmers in their broiler production was found to be the cost of feeds due to the fact that some farmers purchase a large number of day old chicks and broiler chickens are known to consume a lot of feeds to maintain the fast growth rate. The lowest cost incurred by the farmers in the study area was the cost of water because most farmers have boreholes while others acquire their water from government taps. The study concluded that the smallholder broiler farmers in the Mopani District are profitable in their broiler production. The study recommends that;

1. Farmers be provided with security measures in their broiler production to reduce theft of their broiler chickens.
2. More extension officers should be sent to farmers to train them on hygiene and requirements of broiler production in an attempt to reduce the mortality rate in broiler production in the study area.
3. Government should find ways of linking the smallholder farmers in the study area with other stakeholders,

governmental and private, to allow smallholder farmers opportunities to network and get to know how the commercial successful farms operate and see where they can improve on their production systems and marketing of products.

4. Current programs that are set in place to assist smallholder broiler farmers should be reviewed due to the fact that some disadvantaged farmers do not get the assistance of such programmes and hence they do not have many opportunities for improvements.

## REFERENCES

- Adedeji, I. A., Kazeem, A. O., Ogunjimi, S. I., Otegunrin, A. O. (2013). Application of Stochastic Production Frontier in the Estimation of Technical Efficiency of Poultry Egg Production in Ogbomoso Metropolis of Oyo State, Nigeria. *World J. Agric. Res.*, 1, 6, 119–123.
- Al-fawwaz, T. M., AL-Sharafat, A. (2013). Estimation of Resource Use Efficiency in Broiler Farms: A Marginal Analysis Approach. *Global J. Fin. Bank. Iss.*, 7, 7.
- Ali, K. M. E., Samad, Q. A. (2013). Resource use efficiency in farming: An application of Stochastic Frontier Production Function. *J. Agric. Econ. Dev.*, 2(5), 194–202.
- Aliber, M., Hart, T. G. B. (2009). Should Subsistence Agriculture be Supported as a Strategy to Address Rural Food Security? *Agrekon.*, 48(4), 434–443.
- Alrwis, K. N., Francis E. (2010). Technical Efficiency of Broiler Farms in the Central Region of Saudi Arabia: Stochastic Frontier Approach. Retrieved Aug 20<sup>th</sup> 2015 from: <http://repository.ksu.edu.sa/>.
- Begum, I. A., Alam, M. J., Rahman, S., Van Huylenbroeck, G. (2014). An assessment of the contract farming system in improving market access for smallholder poultry farmers in Bangladesh (ch. 3). Rome, Italy: FAO.
- Bolton, T. (2015). The State of the South African Poultry Industry. *Supermar. Retail.*, 3, 17–23.
- DAFF (2011). A profile of the South African Broiler Market Value Chain. Retrieved July 19<sup>th</sup> 2014 from: <http://www.daff.gov.za>.
- DAFF (2012a). A Profile of the South African Broiler Market Value Chain. Retrieved July 30<sup>th</sup> 2014 from: <http://www.daff.gov.za>.
- DAFF (2012b). A Framework for the Development of Smallholder Farmers through Cooperative Development. Directorate Cooperative and Enterprise Development, Department of Agriculture. *Forest. Fisher.*, 7, 8.
- Etuah, S. (2014). Cost Efficiency and Economies of Scale in Broiler Production in Ghana. A Case Study of the Ashanti Region. Master of Philosophy in Agricultural Economics Thesis. Kwame Nkrumah University of Science and Technology, Ghana.
- Fawole, O. P. (2006). Poultry Farmers' Utilization of Information in Lagelu Local Government Area, Oyo State of Nigeria. *Int. J. Poult. Sci.*, 5(5), 499–501.
- Jacobs, P. (2008). Market Development and Smallholder Farmers-A Selective Literature Survey. HSRC: Durban.
- Khai, H. V., Yabe, M. (2011). Technical Efficiency Analysis of Rice Production in Vietnam. *Int. Soc. Southeas. Asian Agric. Sci.*, 17, 1, 135–146.
- Mabelebele, M., Selapa, W., Phasha, S., Masikhwa, H., Ledwaba, L. (2011). The Dynamics of the Poultry Value Chain: A Review of the Broiler Sector in the Greater Tzaneen Municipality. Agricultural Research Development.
- NAMC (2007). Subsector Study: Chicken Meat. Retrieved April 7<sup>th</sup> 2015 from: <http://www.namc.co.za/>.
- Nkukwana, T. (2014). Poultry Production for Food Security: The South African Perspective. Retrieved May 29<sup>th</sup> 2015 from: <http://www.arc.agric.za>.
- Rota, A., Sperandini, S. (2010). Livestock and Farming Systems Technical Advisory Division. Rome, Italy: International Fund for Agricultural Development.
- South Africa Poultry Association (2012). The South African Poultry Industry Profile. Retrieved Sep 17<sup>th</sup> 2014 from: <http://www.sapoultry.co.za>.
- Statistics South Africa – STATSA (2012). General Household Survey Series Volume IV. Food Security and Agriculture (2002–2011): In Depth analysis of General Household Survey. Pretoria: Statistics South Africa.
- Taru, V. B., Nkwi, G. E., Medugu, A. I., Reuben, J. (2010). Economics of Broiler Production in Meme Division of Cameroon. *J. Agric. Sci.*, 1(2), 83–87.
- Todsadee, A., Kameyama, H., Ngamsomsuk, K., Yamauchi, K. (2012). Production Efficiency of Broiler Farming in Thailand: A Stochastic Frontier Approach. *J. Agric. Sci.*, 4, 12.
- Tuffour, M., Oppong, B. A. (2014). Profit Efficiency in Broiler Production: Evidence from Greater Accra Region of Ghana. *Int. J. Food Agric. Econ.*, 2, 1, 23–32.
- Ukwuaba, S. I., Inoni, O. E. (2012). Resource Use Efficiency in Small-Holder Broiler Production in Oshimili North Local Government Area, Delta State. *Int. J. Poult. Sci.*, 11 (11), 700–705.

## ANALIZA DOCHODOWOŚCI I EFEKTYWNOŚCI PRODUKCJI BROJLERÓW W MAŁYCH GOSPODARSTWACH W DYSTRYKCIE MOPANI, PROWINCJI LIMPOPO W AFRYCE POŁUDNIOWEJ

**Streszczenie.** Badania prowadzone w dystrykcie Mopani w prowincji Limpopo miały na celu określenie czynników wpływających na produktywność gospodarstw produkujących brojlery na tym obszarze. Dane zebrano na podstawie odpowiednio uporządkowanych kwestionariuszy z 86 przykładowych małych gospodarstw produkcyjnych w 3 magistratach w dystrykcie Mopani – Greater Tzaneen, Greater Letaba i Maruleng. Wyniki badania wskazują, że pasza ma istotny pozytywny wpływ (na poziomie 10%) na uzyskiwane wyniki produkcji brojlerów. Wielkość hodowli i używanie szczepionek są istotne na poziomie 1%, wykazując również pozytywny wpływ na wielkość produkcji. Na podstawie przeprowadzonych badań można stwierdzić, że byłoby wskazane, aby rząd umożliwił połączenie działalności małych gospodarstw na tym obszarze z innymi uczestnikami rynku, podmiotami rządowymi i prywatnymi. Dzięki temu małe gospodarstwa działające w ramach sieci zyskają dostęp do wiedzy o tym, jak funkcjonują najlepiej prosperujące gospodarstwa komercyjne i dowiedzą się, jak udoskonalić swoje systemy produkcyjne i marketing produktów.

**Słowa kluczowe:** ograniczenia, efektywność, marża brutto, produktywność, małe gospodarstwo

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