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SOURCES AND INFLUENCE OF PRODUCTION RISKS ON INVESTMENT DECISIONS AMONG SMALLHOLDER POULTRY FARMERS IN SOUTHWESTERN NIGERIA

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ABSTRACT

Sustainable development in livestock sub-sector requires investments but production risk is a major factor impeding investment in this sub-sector, especially in poultry where production risks are numerous. The study was therefore conducted to investigate effects of production risks variables on investment decision and amount of investment by poultry farmers in Southwest, Nigeria. This was achieved using a two-stage estimation approach. In the first stage, production function was estimated, which was used to compute the mean and production risk variables (yield variance and skewness). These moments were used as co-variates with the socioeconomic variables in the double hurdle model to estimate their effects on investment decision and amount of investment in poultry. Findings showed that predicted insufficient mean yield and yield variability were important negative determinants of investment decision in poultry while insufficient predicted mean yield and downside risks were important negative determinants of amount of investment. Predicted insufficient mean yield and yield variability reduces probability of investment in poultry while Predicted insufficient mean yield and downside risk reduced the amount of investment. Farmers should therefore put in place risk reducing and coping strategies while considering investment in poultry for the purpose of sustainable development in the sub-sector.

Keywords: Production Risks, investment, smallholder, poultry, production function, Nigeria.

INTRODUCTION

Every sub-sector of agriculture sector requires a boost through investments for the purpose of meeting the food and fibre needs of the growing population in the country. According to FAO (2015), growing populations, economies and incomes are fuelling an ongoing trend towards higher consumption of animal protein in developing countries. FAO (2015) further forecasts that Nigerian is expected to consume two third more animal protein, with meat consumption rising nearly by 73%. This expected growth in protein consumption calls for aggressive investment in the poultry sub-sector because poultry products constitute significant proportion of animal protein consumption in Nigeria.

The demand for animal food is on the increase due to the country's geometric rise in population and growth in the economy. Nigeria's population currently, which was 45million in 1960 stands at 190 million (NPC, 2018). United Nations Population Fund (UNPF) (2019) revealed that Nigeria's population is expected to hit 201million and seventh in the world. UNPF (2019) further stressed that Nigeria's population would hit over 400 million in 2050 and third most populous country in the world. From the position of African Sustainable Livestock 2050 (ASL 2050, 2018), the demand for animal food, poultry inclusive, is directly related to human population. The population parameters imply a rapid demand for poultry product and other animal proteins.

The total production of poultry meat and egg in Nigeria in 2017 was 201,493 tonnes (FAOSTAT, 2016). Production of poultry meat and egg in Nigeria increased from 45,600 tonnes in 1968 to 201,493 tonnes in 2016 growing at an average annual rate of 3.35 % (FAOSTAT, 2016). Nigeria currently consumes about 1.5 million tonnes of chicken annually, out of which just 30% is produced locally (FAOSTATA, 2017). The implication of the parameters is that Nigeria imports about 70% of her poultry meat, which results in capital flight from the economy of Nigeria.

SAHEL (2015) and FAOSTAT (2017) posited that Nigeria is the largest producer of egg in Africa. However, the position does not imply that Nigeria is meeting its domestic demand for poultry products. Nigeria, by nature and resource endowment has the capacity to produce the needed poultry products (meat and egg) for consumption locally and Nigeria has enough poultry farmers who are ready to breed broilers as well as produce needed eggs because they have the space and farm but failed to do so because of production limitations (Onubuogu, 2012). Production limitation is primarily production risks measured by yield variance and skewness, which are measures of downside risks (Juma *et al*., 2009).

Meeting the poultry products needs in Nigeria requires significant investment in the poultry sub-sector. Investment refers to commitment towards output expansion or income boost for the purposes of self-sufficiency in products, output expansion, poverty alleviation, employment generation and improvement on the country's GDP (Hohfeld and Waibel, 2013). Attaining self-sufficiency in poultry subsector calls for optimum investment in the various components of the industry, major of which are feed mills, meat and egg production, respectively. Funding is the major driver of investments in agriculture (Khawaja and Alharbi, 2021; Hassan *et al*. 2023). The decision to invest/expand investment or otherwise is a decision that must be taken by the business owners. Investors are always faced with decision on whether or not to invest the available fund in an enterprise for output expansion and revenue improvement because of the competing option for the scarcely available resources

(Kabubo-Mariara *et al*, 2010). Divanoglu and Bagci (2018) and Hassan *et al* (2023) posited that another factor influencing farmers or agri-business owners' investments is the likelihood that the invested capital might not give the needed returns because agricultural production is weather dependent and time-specific with market imperfection. The uncertainties associated with the expected output and income is directly related to production risks inherent in poultry enterprise.

Production risk plays important role in investment decision in agricultural production decisions, mainly because of uncertainties associated with agricultural production, poultry enterprise inclusive (Ullah *et al*., 2016). There are questions about the likely factors influencing investment decision in poultry industry but the responses remain unclear, but responses have traced such factors only to socio-economic and institutional (Hohfeld and Waibel, 2013). A pivotal element missing in literature is lack of empirical analysis of the effects of risk factors on investment decision among small scale poultry farmers in Nigeria. Risk plays important roles in investment decisions (Virlics, 2013). It is expected that smallholder farmers are risk averse, hence, the reluctance to invest in output enhancing options in the industry because such investment might make them poorer in the absence of downside effects minimizing mechanisms (Kassie *et al*., 2009). An increase in variance with large downside risk may make risk averse individuals worse off. Farmers who are economically secure or buoyant and in possession of sufficient defense against downside risk would undertake profitable capital investments and output enhancing options, while the majority of the poor remains under risk-induced poverty trap (Dercon and Christiansen, 2008).

Despite the significant roles that production risk factors and its exposure play in investment decisions, there is still paucity of empirical literature in the roles production risks play on farmers' investment decisions among smallholder poultry farmers in Nigeria, hence, the study. Therefore, in one effort to investigate the link between production risk and investment decisions among smallholder poultry farmers, using cross-sectional data, the study asks the following research questions: i) What are the sources of production risk in poultry production in Southwestern Nigeria? ii) What is the poultry farmers' risk attitude? iii) What are the factors influencing poultry farmers' risk attitude? iv) What are the poultry products' production risk moments (mean yield, yield variance, and yield skewness)? v) What is the influence of production risk on investment decision among poultry farmers; vi) what is the effect of production risk on intensity of investment among poultry farmers? vii) What is the impact of production risk on revenue of poultry farmers? What are the risk coping strategies used among poultry farmers in the study area

OBJECTIVE OF THE STUDY

The broad objective of the study is to investigate the sources and effects of production risks on investment decision among smallholder poultry farmers.

The specific objectives of the study are to

i) Examine sources of production risk in poultry production in Southwestern Nigeria

iii) investigate the influence of production risk on investment decision among poultry farmers

iii) analyse the effect of production risk on intensity of investment among poultry farmers

METHODOLOGY

Study area

The study will be conducted in Southwestern, Nigeria. The zone is purposively chosen owing to the prevalence of poultry enterprise. The zone consists of Oyo, Ogun, Osun, Lagos, Ondo and Ekiti states. The climate of the region supports poultry production.

Research Design

This study will adopt survey research design approach. Survey research design is a social scientific research design which helps to obtained information from representatives of the population. Survey research is design to collect information from target population for the purpose of describing what is, identify problems, and make comparisons and systematic evaluation (Forza, 2002). Survey design ascertains respondents' experiences on a specific subject in a predetermined structured or semi-structured manner. It allows the use of research instrument for gathering information and generating data that are useful in research study. The design would help generate data from the study population through which we can examine the causal association connecting the identified variables. In this method, respondents would be given the chance to express their opinions on the variables under investigation.

Population for the study

The population for this study shall comprise of all smallholder poultry farmers in Southwestern, Nigeria, specifically in Ogun, Ondo, Osun and Oyo States. The list of registered smallholder farmers in the four states will be obtained from the states' poultry farmers association. The four states are purposively selected for the study based on concentration of poultry enterprise in the States.

Sampling Technique

Multi-stage sampling procedure will be used for the study. This procedure will comprise of purposive, random and proportional sampling procedure. A total of 400 respondents will be selected using proportional sampling procedure based on the number of smallholder poultry farmers registered with the States poultry farmers association in those States. Data will be collected on social and demographic characteristics of respondents, involvement on social capital, input and output variables as well as downside coping strategies.

Data Collection and Analysis

Data will be collected with the aid of self-designed structured questionnaire. Data will be analysed with both descriptive and econometric models.

Descriptive statistics: The descriptive statistics as used to carry out the summary statistics off the respondents. The descriptive statistics used were frequency count, simple percentage, mean and standard deviation. Descriptive statistics is important because it provides direction for advance quantitative estimation using econometric models.

Econometric models: The econometrics models used were Production function and multinomial logit.

Production function

The production function was used to compute the moments of production that were employed in analysing the determinants of investments among smallholder poultry farmers in the study area. The econometric estimation of production risk effect on investment decision was conducted in two steps. In the first step, three sample moments (namely, mean, variance, and skewness) of each farmers from the production function were computed. These estimated moments were included alongside other explanatory variables in the DHRM and MLRM in order to determine if production risk has any impact on farm investment decision and income.

In achieving this, poultry output was regressed on farm inputs to get the estimates of the mean effect. The model is specified as follows:

$$Y = f\left(L, X, \frac{B}{H}\right) + \varepsilon \qquad 1$$

where Y is the poultry output per unit of farm obtained by the farmers; L and X are production inputs, ε is the random variable denoting unobserved variables, β is a vector of parameters to be estimated, and H refers to the farmers' endowments.

The i^{th} central moment of value of poultry production about its mean is given as:

$$\varepsilon_i = e\{[Y(.) - \mu]^i\} \qquad 2$$

where μ denotes the mean value of poultry production. The estimated residual from the mean regression are estimates of the first moment of value of poultry production distribution. The estimated residuals ε are then squared and regressed on the same set of explanatory variables as shown in the equation below.

$$\varepsilon^2 = f_2\left(L, X, \hat{\beta}/_H\right) + v \qquad 3$$

The least squares estimates of $\hat{\beta}$ are consistent and asymptotically normal (Antle, 1983). The predicted values of ε^2 are also consistent estimates of the second central moment (variance of poultry production) of poultry production distribution. This approach has been used variously by authors such as Antle (1983); Koundouri *et al*. (2006) & Juma *et al*. (2009).

This approach is based on the assumption that unobserved effects are linearly correlated with explanatory variables as specified in equation 4.

$$\mu_h = a\bar{x} + e_h, e_h \sim iid(0, \sigma^2) \quad 4$$

where a is corresponding vector of coefficients, $\bar{x}$ is the mean of farm-variant explanatory variables within each respondent, and *e* is a random error term which is uncorrelated with the dependent variable. Fixed or pseudo-fixed effect approach was employed to care for household's heterogeneity in the case of significant α. Employing Juma *et al*. (2009) approach, farm characteristics means such as mean of stock size and mean of farm-market distance were included in the regression to account for some of the household heterogeneities in a random effect model. The problem of endogeneity bias was corrected by the use of pseudo-fixed effect approach.

Double hurdle regression model

The DHRM is a parametric generalization of the Tobit Regression Model. It was used to estimate the effects production risks on investment decision and intensity or amount of investment in poultry enterprise. The first stage will investigate the effects of production risk and other socioeconomic variables on investment decision while the second hurdle will determine the effects of the same set of variables on intensity or amount of investment.

Specification of model

The choice of the model is with the assumption that investment decision and amount of investment may not necessary be made jointly. In this model, a probit regression on investment decision (using all observations) is followed by a truncated regression on the non-zero observation (Cragg, 1971). It is a 2-stage regression models that integrate probit model and truncated regression model. There is possibility that we have farmers who do not invest, and hence fall at the first hurdle, and others who pass the first hurdle (Bekele and Mekonnen, 2010). The model's underlying assumption is that farmers make two decisions with regard to their investments. Their first decision is whether or not they invest in poultry farm enterprise, while their second decision is the intensity or amount of investment in the enterprise, subject to the first decision.

The double- hurdle model contains two equations (Investment decision equation and equation on intensity (amount) Bekele and Mekonnen, 2010).

$$d_i^* = z_i \alpha + \epsilon_i$$

$$y_i^{**} = x_i \beta + \mu i \quad : i = 1, 2 \ldots \ n \quad 5$$

The general model can be shown algebraically as

I= β_0 + (Socio-economic) β_1 + (Risk factors) β_2 + $\in i$

Where

d* = latent investment decision variable that takes the value 1 if consumer invest in farm, and 0 otherwise.

z_i = vector of explanatory variables.

y** = intensity or amount of investment

x_i = vector of explanatory variables and

β = vector of parameters.

The two error terms ($\in$i and μ i) in equation (1) are assumed to be normally and independently distributed. The first hurdle is thus represented by:

d_i= 1 if $d^*_i > 0$

d_i= 0 if $d^*_i \leq 0$ 6

The second hurdle is given by:

$y^*_i = \max (y^{**}_i, 0)$:

and the observed variable y_i is finally determined by equation below

$y_i = d_i y^*_i$ 7

The log-likelihood function for the double hurdle model is:

$$\text{Log L} = \sum_u In\left[1-\Phi\left(z_i^1\alpha\right)\Phi\left(\frac{x_i\beta}{\sigma}\right)\right]+\sum_+ In\left[\Phi\left(z_i^1\alpha\right)\frac{1}{\sigma}\phi\left(\frac{yi-x_i\beta}{\sigma}\right)\right] \quad 8$$

According to Cragg (1971), the decision on investment can be modelled as a probit regression;

f(y = 1/X_1iX_2) = C(X_1 β) 9

Where C(.) is the normal cumulative distribution function, and X_1 and X_2 are vectors of independent variables, not necessarily distinct.

The decision on the intensity or amount can be modelled as a regression truncated at zero:

$$f\left(y / X_{1i} X_2\right)=\left(2\pi\right)^{-1/2}\ \sigma-1\quad \exp\left\{\frac{-\left(y-X_2^1 Y\right)^2}{2\sigma^2}\right\} x\ \frac{C\left(X_i\beta\right)}{C\left(X_2^1 Y/\sigma\right)} \qquad 10$$

Equations 9 & 10 above can be specified empirically as follows:

$$\begin{aligned} Y_i = {} & \beta_0 + \beta_1 YIELDMEA + \beta_2 YIELDVAR + \beta_3 YIELDSKE + \beta_4 HHAGE + \beta_5 HHEDULEV \\ & + \beta_6 SPOUSEDULV + \beta_7 SOKAL + \beta_8 FARMEXPR + \beta_9 HHSIZE + \beta_{10} EXTN \\ & + \beta_{11} INFCREDIT + \beta_{12} FORCREDIT + \varepsilon i \end{aligned} \qquad 11$$

Where

Y_i = investment decision. (1= invest in poultry enterprise, 0=otherwise)

Y_d = *amount of* investment

YIELDMEA = Predicted mean yield of maize under each IPM typology

YIELDVAR = Predicted mean of yield variance under each IPM typology

YIELDSKE = Predicted skewness of maize yield under each IPM typology

HHAGE = Age of household head (years)

HHEDULEV = Education level of household head (years)

SPOUSEEDULV: Education level of spouse

SOKAL = Social capital and membership of association as proxy

FARMEXPR = Farming experience in years

HHSIZE = Household size

EXTN = Access to extension agents

INFCREDIT = Access to informal credit

FORCREDIT = Access to formal credit

RESULTS AND DISCUSSION

Summary Statistics

Households, institutional and farm characteristics of respondents were analysed (Table 1). The mean age of respondents was 48±13.3 years while the mean year of education of household head was 14±4.1 (see Table 1). This implied that the household heads were in their active ages and were educated. The table also showed that the mean yield of education of spouse was 12±3.3 and the mean social was 0.91±0.47. This implied that the poultry farmers' spouse in the area were also educated. The social capital proxy by membership of association showed that 91 percent of the poultry farmers in the area were members of one association or the other. The mean farming experience among the poultry farmers was 19±5.1 years, while the mean household size was 5±2.4. This implied that the poultry farmers in the area were experienced and had household size that could serve as family labour in the enterprises. The mean access to extension was 0.11±0.06 while the mean access to informal credit was 0.92. This implied that just 11 percent of the poultry farmers in the area had access to extension agents while 92±0.58 percent of them had access to informal credit in the form of loan. The high proportion of respondents who had access to informal credit could be traced to high membership of association. However, the mean access to formal credit was 0.12±0.07. This implied that just 12 percent of poultry farmers in the area had access to informal credit. The mean flock size was 1,667±450 while the mean feed consumed was 4,181±2,300kg. The mean man-day of labour used was 350±93.1 while the mean amount spent on medication was ₦13,000±4,650. This implied that poultry farmers in the area were mostly smallholder operators.

Table 1: Basic descriptive statistics

Variable	Mean	Std Dev.
Household & Institutional Characteristics		
Age of household head	48	13.3
Education of household head	14	4.1
Education of spouse	12	3.3
Social capital	0.91	0.47
Farming Experience	19	5.1
Household size	5	2.4
Access to extension	0.11	0.06
Access to informal credit	0.92	0.58
Access to formal credit	0.12	0.07
Farm characteristics		
Flock size (numbe)	1,667	450
Feed (kg)	4,181	2,300
Labour (man-day)	350	93.1
Medications (₦)	13,000	4650
Distance from home (km)	8.2	2.4

Sources of risk in poultry production

The various sources of risks in poultry enterprises are analysed (Table 2). All respondents (100%) indicated that disease as a source of risk in poultry enterprise, while 99.5 percent indicated climatic fluctuation/heat stress as a risk source in poultry enterprise. Disease and death were ranked as first and risks sources. Also in the table (Table 2), 94.7 percent indicated output fluctuations as a source risk in poultry enterprise while 82.7 percent indicated climatic fluctuation/heat stress as a risk source in poultry enterprise. Output fluctuations and climatic fluctuations/heat stress were ranked 3rd and 4th risks sources in poultry enterprises. Price fluctuations were ranked 5th as 79 percent of respondents indicated it as a risk source while market conditions was ranked 6th risk source as 57.7 percent indicated it as risk source. Theft was ranked 7th risk source as 27.7 indicated it as a risk source while pests was ranked 8th risk source as 26.7 percent of respondents indicated it as a risk source. However, just 22.2 percent and 14 percent of respondents indicated feed contamination and water contamination as sources of risk in poultry enterprise. These were ranked 9th and 10th risks sources, respectively. Poultry enterprise is vulnerable to numerous risks capable of preventing farm owners from investing further in the enterprise in the era of economic harshness in Nigeria after Covid-!9 where inputs cost are high and consumers purchasing power (real) is low.

Table 2: Sources of risk in poultry production

Sources	Frequency	Percentage	Rank
Disease	400	100	1st
Climatic fluctuations/heat stress	331	82.7	4th
Pests	107	26.7	8th
Output fluctuations	379	94.7	3rd
Price fluctuations	316	79.0	5th
Feed contamination	89	22.2	9th
Water contamination	56	14.0	10th
Theft	111	27.7	7th
Market conditions	231	57.7	6th
Death	398	99.5	2nd

Multiple responses

Investment typology

Investment typology presents poultry farmers who invested in their poultry enterprises in last three years (Fig, 1). According to the typology, just 119 (29.7%) added investment to poultry farm enterprises in the last three years while 281 (70.3%) added no investment in their poultry farms in the last three years. This implied that investment was very low among poultry farmers in the last three years. This could be traced to risks associated with poultry enterprise that are capable negatively impacting yield.

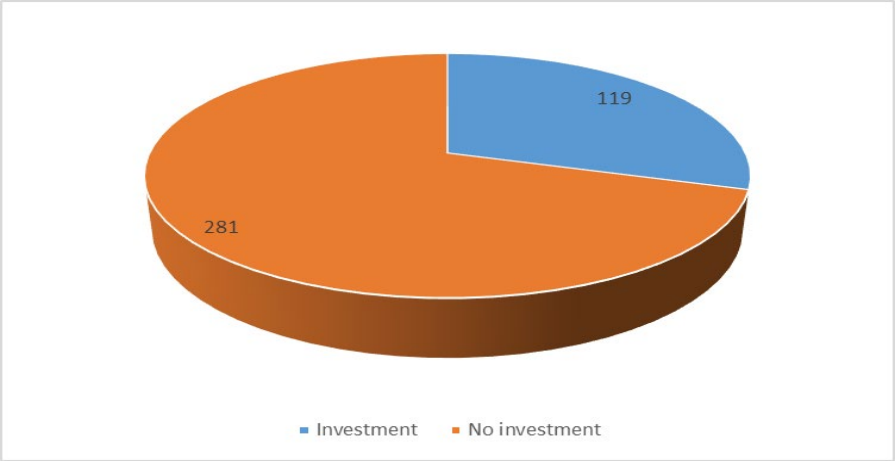

Fig. 1: Investment decision typology

Production model results

The production was estimated to generate the three moments of production used as our risk variables that are used in our investment decision model as co-variates of other socioeconomic variables. (Table 3). However, this was the focus of the study but was important means to an end of arriving at the risk variables. The R2 value of the model was 0.789 and the F-Statistic was 22.421, which was significant at 1 percent alpha level. The diagnostic variables indicated that the model was fit enough for the purpose. This results are in agreement with theory and findings of previous findings (see Ohajianya *et al*., 2013). Flock size was the input with the greatest impact on output, followed by feed, labour and medications, respectively. All technical inputs used in estimating the risks variables were significant.

Table 3: Regression estimate of the production

Variable	Coefficient	T-ratio
Flock size	0.871***	3.111
Feed	0.499**	2.732
Labour	0.229***	3.031
Medications	0.162**	2.631
R^{2+}	0.789	
Adj. R^2	0.765	
F-Statistic	22.421***	

Investment decision model results

Pseudo-fixed effect probit model was used to examine the effect of production moments estimated using the production function and other socioeconomic variables on investment decision in poultry (See Table 4). The choice of pseudo-fixed probit was based on the need to control for unobserved heterogeneity and addressing selection and endogeneity problems.

The first moment, predicted mean yield of poultry (egg) ($p \leq 0.01$) has highly negative and significant effect on investment decision in poultry. This implied that poultry farmers will not invest in enterprise without guaranteed output. Since poultry farmers and farmers generally driven by output maximization and would be interested in investing in enterprise with guaranteed output, the negative sign of predicted mean yield implied that farmers will not invest funds in enterprise with production uncertainty. The result of the marginal effect revealed that a downward reduction in the prediction yield by a unit would reduce probability of investment in poultry by 3.1 percent.

The second moment, predicted yield variance ($p \leq 0.05$) also has negative effect on investment decision in poultry (also Table 4). This implied that poultry farmers are discouraged from investing in poultry yields are less certain. The implications of the sign is that poultry farmers would rather maintain low output than invest in personal funds or loan in the pursuit uncertain output. The result of the marginal effect revealed that a downward variation in the prediction yield by a unit would reduce probability of investing in poultry by 2 percent.

The education level of household ($p \leq 0.05$) and spouse level of education in years ($p \leq 0.10$) had positive and negative effect on investment decision on poultry in the study area. Household heads who are educated had greater tendencies to invest than their counterparts who are less educated. The marginal effect result revealed that an increase in the age of household head by a unit would raise investment in poultry by 2.1 percent. However, education of spouse had inverse relationship with investment in poultry. Result of marginal effect showed that an increase in the education level of spouse by a unit would reduce investment by 1 percent. This implied spouses who are educated could have the ability to identify risks associated with poultry as well as identifying other profitable enterprises where investment can be channeled.

Social capital proxy by membership of association ($p \leq 0.10$) and informal credit ($p \leq 0.01$) had positive and significant effect on investment decision in poultry while farming experience ($p \leq 0.05$) had negative and significant effect on investment in poultry. Those who belong to association invested more than those who did not. This implied that respondents could be encouraged by their counterparts in those association to invest in poultry. Those who had access to informal credit invested in poultry compared to their counterparts who did not. This could be traced to the reason that farmers usually belong to commodity associations where they raise funds for expansion. Result of farming experience showed that the more the experience in poultry, the less the investment. The result of marginal effect implied that an increase in the year of experience by a unit would reduce probability of investment by 1.7 percent.

Table 4: Probit regression estimates of influence of risks and socioeconomic variables on investment decision among poultry farmers in the study area

Variable	Coefficient	Std. Error	Sig.	Marginal effect
Constant	10.003**	4.375	0.034	0.014
Risk factors				
YIELDMEA	-0.107***	0.035	0.007	0.031
YIELDVAR	-0.011**	0.005	0.036	0.020
YIELDSKE	0.017	0.150	0.913	0.001
Socioeconomic factors				
HHAGE	0.300	0.287	0.309	0.011
HHEDULEV	0.361**	0.168	0.045	0.021
SPOUSEDULV	-0.241*	0.013	0.086	0.008
SOKAL	0.183*	0.087	0.050	0.007
FARMEXPR	-0.423**	0.165	0.019	0.017
HHSIZE	0.331	0.275	0.242	0.001
EXTN	0.314	0.201	0.136	0.002
INFCREDIT	0.901***	0.144	0.000	0.028
FORCREDIT	0.030	0.026	0.225	0.001
Log likelihood	-216.233			

Amount of investment model results

Effect of production moments as measures of production risks and other socioeconomic variables on amount of were analysed (see Table 5). The first moment, predicted mean yield of poultry ($p \leq 0.01$) had highly negative significant effect on amount of investment in poultry. This implied that poultry farmers invested less amount without guaranteed output.

The third moment, yield skewness, a measure of probability of crop failure or downside risk ($p \leq 0.01$) had highly significant effect on amount of investment in poultry in the study area. A implied that poultry farmers would invest less with rise in the in the probability of crop failure or downside risk.

Age of household head ($p \leq 0.01$) had highly negative effect of amount of investment while education level of household head ($p \leq 0.10$) had positive effect on amount of investment in poultry. This implied the older farmers invested less amount in poultry than their younger counterparts. However, the more educated farmers invested more than their less educated counterparts.

Household size ($p \leq 0.05$) had highly negative impact on the amount of investment while informal credit ($p \leq 0.01$) had high positive effect on amount of investment in poultry. The higher the household size, the less the amount that would be invested. This could be that the households with large size spent more on consumption expenditure, hence, less is available to save for investment. However, the positive size of the informal credit implied the more the amount of informal credit accessed, the higher the amount that would be invested in poultry.

Table 5: Truncated regression estimates of the influence of risks and socioeconomic variables on amount of investment among poultry farmers in the study area

Variable	Coefficient	Std. Error	Sig.	Marginal effect
Constant	1.261***	0.182	0.000	
Risk factors				
YIELDMEA	-0.010***	0.003	0.000	0.018
YIELDVAR	0.038	0.052	0.731	0.000
YIELDSKE	-0.012***	0.004	0.001	0.022
Socioeconomic factors				
HHAGE	-0.011***	0.002	0.000	0.031
HHEDULEV	0.012*	0.007	0.091	0.009
SPOUSEDULV	0.001	0.003	0.848	0.001
SOKAL	0.071	0.062	0.254	0.001
FARMEXPR	-0.021	0.019	0.277	0.002
HHSIZE	-0.211**	0.043	0.000	0.033
EXTN	0.067	0.070	0.339	0.000
INFCREDIT	0.386***	0.085	0.000	0.041
FORCREDIT	0.031	0.033	0.636	0.000
Log likelihood	186.84			
N	119			

Conclusion

The study investigated the effects of production risks and other socioeconomic variables on investment decision in poultry in Southwest, Nigeria, where poultry is mainly dominated in Nigeria. Production function was used to generate the production moments of poultry using Juma *et al*. (2009) methods. Empirical findings showed that uncertain yield and yield variability were important negative determinants of investment decision in poultry while uncertain mean yield and downside risks were important negative determinants of amount of investment. Uncertain yield predicted and yield variability reduces probability of investment in poultry while uncertain yield predicted and downside risk reduced the amount of investment. Other factors important in investment decision and amount of investment were education of household head and informal credit. Social capital in addition enhanced investment decision. Therefore, farmers in their own should put measures in place to avert yield failure while considering investment in farm enterprise for sustainable production.

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