

PROSPECTS OF LIVESTOCK INSURANCE IN NIGERIA

Akin Ogunbiyi
O. Ayinde Orafidiya
University of Ife, Nigeria

1. Introduction

Various problems endemic in agricultural production militate against efforts at increasing the overall agricultural productivities in Nigeria. Topmost of these problems is the uncertainty/risk of loss for an individual farmer. Due to the importance of agriculture in the development of the nation, programmes facilitating extensive changes in the credit structure for agriculture were initiated, and direct price and income support programmes were formulated. A critical survey of some of these various policies shows that not a single one is directed specifically towards the reduction of risk in agricultural production.

Agricultural production in Nigeria centres mainly on rural people who are predominantly farmers with limited alternative income opportunities. When farmers exert themselves to cultivate the land and grow crops or raise livestock, the resulting yields are not predictable, while prices often fluctuate unfavourably to depress farmers' income.

Farmers are similarly exposed to the great risks of drought, flood, pests, disease and other hazards attendant in production. This leads to low incomes for farmers resulting in limited reserves, both cash and credit thus adversely affecting his choice and subsequent actions.

In order to raise the standard of living of farmers in particular and rural people in general it is necessary to minimise production risks through insurance. Besides, such an insurance provides alternative avenues for making effective use of reserves that do exist in the rural setting.

Whilst the possibility of making the existing programmes more effective should continue to be explored however, entirely new approach may be designed as a complementary measure to lift the Nigerian agriculture to a higher level of production and efficiency.

This paper thus attempts to study critically the practicability of instituting a poultry insurance scheme for Nigeria; more specifically the paper will:

- (i) appraise the experience of countries currently operating a poultry insurance scheme,
 - (ii) formulate an actuarial base (i.e. to investigate the pattern of risks and estimate the probability of occurrence in poultry production) for poultry insurance scheme in Nigeria.
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To achieve these objectives, section two looks at existing literatures of past studies on insurance in agriculture.

The third section examines the methods of data collection, and some theoretical basis of insurance.

The fourth section contains discussions of research findings, and the empirical analysis while section five gives the summary and makes statements on possible conclusions that can be drawn in view of available empirical findings of the study.

2. Literature Review.

Basically the essence of insurance lies in minimisation of uncertainty or risk of loss to individuals, through the combination of a large number of similarly exposed individuals who each contribute to a common fund, premium payments sufficient to make good the loss caused to any one individual (Alfred Mannes, 1931).

Ray (1981) considers insurance as a social devise which aims at reducing the uncertainty of loss through the combination of a large number of similar uncertainties and, through the use of accumulated funds, distributing the burden of loss, should there be any, over space and time.

In the developed countries of the world, agricultural insurance in developing countries is regarded as a useful device for reducing risk on the operations of farmers (Ray, 1981). Quite rightly, much attention has been paid to the organisational structure and the problems associated with the implementation of development efforts (Alli, 1980, Ashan, 1981). With less attention paid to the farmer himself within the context of agricultural insurance (Peinberton, 1984).

Farmers are therefore left to realise the benefits of insurance and adopt its use in compulsory national schemes where he would be forced to appreciate its "real significance" (Ray, 1981).

One paramount problem in the establishment of agricultural insurance in Nigeria lies in the determination of actuarial base. Adegeye & Akinwumi (1978), contended that this pattern of risks and probability of occurrence, have to be well formulated. Similarly, Jafiya (1984) believes that the commercial success of any insurer depends heavily on obtain-

ing and interpreting detailed historical and statistical data that should be compiled from the results of a number of years consecutively in order to know the present, project for the future and make correct judgements on probable values of inability and claim costs.

At present, Nigeria records comparatively high livestock mortality as a result of unhealthy and unsanitary living conditions, inadequate veterinary facilities due to prohibitive costs of drugs. In essence, the cost of instituting an insurance scheme is likely to be high to an average farmer. Adegeye & Akinwumi therefore recommended that the kind of agricultural insurance envisaged for Nigeria must be a national all-purpose type covering a range of risks. It is envisaged that such an arrangement will allow for wide coverage and minimum risk sharing among farmers such that individual premium payable becomes relatively small.

To ensure the success and full participation in the scheme Pemberton (1984) advised that farmer should not perceive insurance schemes as a tax measure of the central government but must be convinced that the scheme is beneficial in minimising their farming risks. Premiums charged must therefore be related to the risks being covered, while indemnity payments reflects the extent of damage incurred.

3. Methodology

Structured questionnaires were administered on 30 poultry farmers having minimum flock of 1,000 birds and with not less than 5 years of poultry farming experience. Data collection covered five of the nine southern states of Nigeria. The questionnaires sought information on flock mortality main cause of losses and age at time of death.

Secondary information were obtained through newspapers, business papers, conference papers, journals and magazines. Data were analysed with time series of tables to highlight trends in changing mortality patterns. Ordinary least squares regression analysis was adopted to investigate the relationship between mortality and other explanatory variables as defined hereunder:

where X_1 = percent mortality among pullets

X_2 = age of disease attack

X_3 = preventive measures

X_4 = farming experience

X_5 = breeds of birds reared

X_6 = causes of death

X_7 = type of disease

X_8 = carrying density

The premium for this study is determined using the net single premium - the amount required from each insured to provide all benefits promised under the contract, excluding any provision for expenses. The net single premium is given as

$$N = P \times L \times U \quad (2)$$

where: N = Net Single Premium

P = probability of dying

L = total amount of insurance policy, and

U = discount factor at an assumed interest rate.

The discount factor, U is given by $PV = A(1+i)^{-n}$ (3)

where PV = present value

A = compound amount at the end of conversion period

i = interest rate per conversion per period

n = number of conversion period

The indemnity called the relief payment in respect of an insured is the amount payable when damages due to causes defined in the policy occurred. Based on the national average bird value at cost and a discount factor agreed upon by the insurers and the insured, the indemnity is obtained as follows:

Indemnity = Original value \times Discount factor \times Number of deaths.

It must be pointed out that where there is total loss of flock, the indemnity payable should not exceed the amount of the insurance policy.

4. Empirical Analysis

A survey of the farmers' exposure to insurance was carried out among the respondents.

As shown in Table 1 approximately 77% of the respondents were not having any form of farm insurance policy. The remaining 23% took insurance covers on burglary, fire, machinery and car insurance policies.

All the farmers favoured the policy and showed eagerness to see the smooth take-off of the scheme. Large scale poultry farming has become a commonplace and millions of naira investment is being made by single or groups entrepreneurs. Seven of the

Table 1

DISTRIBUTION OF FARMERS & FARM INSURANCE POLICY

Categories	Frequency	Percent
Farmers with farm insurance cover	0	0
Farmers with other policies	7	23.3
Farmers with no form of insurance	23	76.76
	30	100

Source: Field survey, March 1986.

respondents are large scale enterprises with integrated hatcheries, feedmills, processing plants and cold storage facilities.

The huge investment in poultry industry automatically calls for financial support for farmers. Hence, all the sampled farmers have relied on the contributions from their shareholders, and the credit facilities and other incentives provided by financial houses and the government.

The reasons for limited expansion of credit to small scale farmers from the banks' point of view, are: high administrative costs, low management skill and therefore high exposure to risks and low repayment capacity. It is therefore hypothesized that livestock (poultry) insurance especially if it involved credit support, could be an efficient mechanism for extending credit to farmers. Insuring the credit allows banks to recover their investment in the event that farmers are unable to pay back loans because of national risks. This is not the work of insurers.

Mortality Study

Poultry like many livestock, are prone to several risks leading to untimely death through illness or accidents. Major causes of loss among the poultry flock maintained by 30 respondents studied, are diseases, accidents, overstocking, nutritional deficiency resulting from poor quality of feed, fatigue after delivery and prolapse nutritional deficiency which encourages becking and eventual death. Of all these, disease outbreak was the major factor that threatened the existence of poultry establishments of respondents. All farms visited experienced disease outbreaks one time or the other.

Most prevalent diseases noticed on farms include Gomboro Newcastle diseases, fowl typhoid, Respiratory Diseases (CRD), Diarrhea, Liver enlargement. Coccidiosis and Gom-

boro widespread occurrence in reported 24 and 18 farms respectively. Diseases were also known to have happened from hatching of contaminated or disease eggs, sometimes caused by power failure. Such defective birds were known to have been sent the markets because of the heavy investment involved in production.

The mortality pattern on 18 contracted farms of Mitchell Farms for broilers is shown in Table 2. The Table shows the flock mortality among the various contracted farms at various ages. To find out whether there is any relationship between mortality and age, rank correlation coefficients were computed using Var Neuman statistic to obtain data in Table below.

Ranking

based on %

Mortality 13 17 9 7 2 16 1 5 15 14 3 12 11 10 8 4 6 13

Ranking

based on

Age (days) 18 17 16 10 6 15 4 9 14 8 11 5 13 12 2 3 7 1

The differences between the two rankings are given in the following Tables.

D -5 0 -7 -3 -4 1 -3 -4 1 6 -8 7 -2 -2 6 1 -1 17

D² 25 0 49 9 16 1 9 16 1 36 64 49 4 4 36 1 1 289

$$= D^2 = 610$$

$$r^1 = 1 - \frac{6(610)}{5814} = 0.3705$$

The positive value of the rank correlation coefficient, r^1 indicates that there exists a relationship between mortality and ages of birds. The nature of this relationship is confirmed by using a simple linear regression model.

The estimated regression function is given

$$Y_i = -6.39 + 0.2704 X_i \quad (7)$$

The positive value of b_1 implies a positive association between mortality and age which tends to change in the same direction.

Table 2

BROILER FLOCK MORTALITY AMONG CONTRACTED FARMS OF FOOD AND COMMODITY PRODUCTION GROUP LTD. (Mitchell Farms). Agege 1984/85

Average Age (wks) When birds were dressed	Total D/O chicks Placed	Cumulative Mortality	Cumulative Mortality /1,000	Probability of Dying	Percent Mortality
10/4	24,500	2,973	121.35	0.121	12.14
10/2	15,603	2,956	189.45	0.189	18.95
9/6	18,598	1,511	81.25	0.084	8.13
8/4	5,046	325	64.40	0.064	6.40
7/5	8,501	213	25.06	0.025	2.51
9/5	17,735	3,058	172.43	0.172	17.24
7/3	13,950	346	24.80	0.025	2.48
8/3	16,080	668	41.54	0.042	4.20
9/4	44,768	6,899	154.12	0.154	15.41
8/2	35,000	4,937	141.06	0.141	14.11
8/5	33,103	1,155	34.89	0.035	3.49
7/4	19,084	2,252	118.00	0.118	11.80
9/3	20,834	2,281	109.48	0.109	10.95
9/1	20,834	2,068	98.56	0.099	9.86
7/1	5,812	402	69.17	0.069	6.92
7/2	6,073	246	40.51	0.041	4.10
8/1	6,000	376	62.67	0.063	6.27
7/0	47,602	10,941	229.84	0.229	22.98

Source: Field Survey, Dec./March, 1985/86

To further illustrate mortality rate on poultry, farms data from Lampco Poultry Farms, Ife, were analysed (see Table 3).

The highest loss occurred during the first and eight weeks i.e. 62 and 59 respectively. The cumulative deaths and the rate per 1,000 birds showed increasing trend with advancing age thus confirming the Spearman's correlation coefficient result and the nature of the estimated regression function earlier given (equation 7).

The irregularity in the increase of death rate in column (5) is presumably the result of the relative smallness of the flock size. A simple process of smoothing the rise was applied by working out a 3-group moving average for the age-groups from the second week. The rise in death rate during the first few weeks is considered to be the result of a temporarily increased rate of death during the brooding period.

Table 3

MORTALITY TABLE FOR LAYERS (HARCO) BASED ON 3264 BIRDS AT LAMPCO POULTRY FARMS, IFE 1984/85

Age (wks)	Number Living	Number Cumulative Death of Death	Cumulative Death Rate per 1,000	3 - Group Moving Average	Probability of dying	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	3264	62	62	18.99	—	0.019
2	3202	14	76	23.28	22.77	0.004
3	3188	9	85	26.04	25.43	0.003
4	3135	3	88	26.96	27.16	0.001
5	3178	5	93	28.49	28.08	0.002
6	3179	1	94	28.79	30.63	0.003
7	3160	19	113	34.62	38.70	0.006
8	3110	59	172	52.69	48.71	0.019
9	3080	20	192	58.82	56.78	0.006
10	3080	1	193	59.13	59.03	0.003
11	3080	0	193	59.13	59.44	0.000
12	3077	3	196	60.05	59.74	0.001
13	3077	0	196	60.05	60.25	0.000
14	3075	2	198	60.66	60.56	0.001
15	3074	1	199	60.97	61.07	0.000
16	3074	0	199	60.97	61.07	0.000
17	3073	1	200	61.27	61.58	0.003
18	3069	4	204	62.50	64.64	0.001
19	3044	25	229	70.16		0.008

Source: Computed from Data Generated from Lampco Farms, Ife, Nigeria

Statistical Analysis of Data

The linear and the logarithmic functions, stepwise inclusion of variables was adopted thus enabling the computer to pick out variables according to their importance.

From the output results a lead equation was chosen for pullets based on the value of the coefficient of determination; the conformity with *a priori* economic expectation; and statistical significance of the estimated parameters. For pullets the estimated equation is given in equation 9 below:

$$X_1 = 3.27 + 1.25X_3 + 0.02X_4 + 0.05X_5 + 0.32X_6 + 0.61X_7 \quad (9)$$

S.E (0.26) (0.07) (0.09) (0.13) (0.12)

T-values (4.75) (0.22) (0.48) (2.45) (5.19)

$R^2 = 0.94564$ $\bar{R}^2 = 0.83693$ F ratio = 8.69

Note: the figures in parenthesis are the standard errors and calculated T values respectively.

Equation above indicates that all the explanatory variables have positive relationship with the dependent variable. However, the direct relationship between X_1 and X_3 , X_4 may be attributable to the effects of other variables on the flock. For instance, the outbreak of a new kind of disease alien to the area of operation normally gives a positive association between the flock mortality and the preventive measures.

Further examination of the equation reveals that the explanatory variables X_3 and X_7 (i.e preventive measures, and type of disease) were statistically significant at 95% confidence level.

The value of the adjusted R^2 was found to be 0.83693. By that result therefore it could be said that independent variables can explain approximately 84% of the variations in the dependent variable (i.e mortality among pullets).

The regression result thus indicates that only the preventive measures, and types of disease(s) outbreak on farms are the basic factors influencing mortality on poultry farms.

5. Summary and Conclusion, and Recommendations.

Among various problems endemic in livestock (poultry) production, issue of risk management has been most neglected. The result of this study shows that farmers need an alternative source of assistance which enables them to withstand sudden and unanticipated losses of stock with the least possible disturbance to production programmes. Such an alternative is to be found in insurance. Insurance schemes help to stabilize farmers' income. They also provide the much needed collaterals for procurement of production credit.

Under insurance arrangement farmers are required to pay fixed rate - premium. This study showed that premium calculations are best based on stock mortality data on farms.

The study further revealed that implementation of insurance schemes are prone to various problems such as availability of reliable data, differences in management services on farms, inadequate effective demand and unwillingness of insurance houses to underwrite policy cover due to high risks involved. In spite of these problems, insurance schemes are desirable for ensuring production reliability and guarantee of farmers' income.

To this end, it is recommended that Nigerian government shows greater interest in setting up appropriate machinery to establish an insurance agency which will generate

reliable data for premium calculations. In order to ensure quality of inputs used in poultry production, Nigerian standard organisation should be saddled with thorough examination of food and drug qualities, both of which have direct effect on stock mortality and therefore premiums that are payable by farmers.

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PERSPECTIVES DE L'ASSURANCE CONCERNANT LA PRODUCTION ANIMALE AU NIGÉRIA

RÉSUMÉ

Dans le contexte des nombreux problèmes posés par l'exploitation de la production animale on a souvent négligé l'aspect risque. Les résultats de cette étude montrent que les exploitations agricoles ont besoin d'une source alternative d'assistance qui leur permet de faire face à des pertes importantes et inattendues de leurs récoltes procurant le moins de perturbations possibles aux programmes de production. L'assurance peut constituer un remède utile à ce propos. Les programmes d'assurance aident à stabiliser le revenu des exploitants agricoles. Ces programmes servent aussi comme garantie pour l'octroi de crédit à la production.

Avec les programmes d'assurance, les exploitants agricoles doivent payer une prime (à taux fixe). Cet article fait voir que pour le calcul des primes on a recours dans les cas les plus favorables à des données concernant la mortalité de la production animale dans les fermes.

L'article montre aussi que la réalisation des différents programmes d'assurance se heurte à beaucoup de problèmes tels que la disponibilité de données statistiques sûres, la présence de grandes différences au niveau des fermes, la faible demande solvable et l'hésitation des assurances à signer des contrats à cause des risques trop élevés.

Malgré ces problèmes, les programmes d'assurance sont souhaitables pour maintenir la stabilité de la production et garantir le revenu des exploitants agricoles.

Enfin sur la base de l'analyse précédente, on recommande au gouvernement du Nigéria de bien vouloir tout faire pour l'établissement d'une agence d'assurance en mesure de relever des données sûres pour le calcul des primes. Pour améliorer la qualité des inputs pour la production de la volaille, les organisations compétentes au Nigéria devraient se charger d'examiner la qualité des produits utilisés pour l'alimentation et le soin des animaux. La qualité de ces produits a une influence directe sur le taux de mortalité des animaux et donc aussi sur les primes payées par les exploitants agricoles.

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