INTRODUCTION TO LIVESTOCK INSURANCE

by
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1. HISTORICAL BACKGROUND

1.1 Livestock insurance can look back on a long tradition. Clayton wrote that livestock schemes were devised and introduced in Europe more than a century ago,[1] although the practice has been in existence for over 200 years albeit with varying significance.[2]

Prior to the professional underwriting of this class of business, there already existed in European communities members who gave one another help whenever a loss to an animal occurred by indemnifying him. At first this involved replacing an animal by another and later on, by providing a certain amount of money to which each member of the community made contribution.[3]

1.3 Following the animal epidemic in the 18th century, European countries were forced to introduce legislations aimed at curbing such phenomena and Germany for example, legislated for an insurance fund (Hallstrom 1976) for animal epidemics which is regarded by leading insurance experts as being the fore runners of the present day Livestock insurance (Rudolph 1976). Owing to the development of agriculture in the 19th century, there was, as Rudolph reported, an almost hectic period in which small insurance societies and the like were established on the basis of a co-operative. Soon thereafter large insurance companies were established not only in Germany but also throughout many countries of the world as well.

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2. **PURPOSE**

The purpose of this paper is to address to the reasons for which livestock is reared and the importance attached to insurance in protecting the reasons for having animals. The cost of insurance is unquestionably important as the rate of premium must be both affordable by livestock owners as well as yielding sufficient premium income to enable the insurance company to survive.

3. **ECONOMIC ANIMALS**

3.1 Throughout the world and at different times and purposes, animals of different categories have been used by man to solve different economic and social activities. By far the most important use has been the food purpose in order to obtain protein of very high value and content. Animals have been used for production purposes particularly in the agricultural sectors where specially trained bulls, donkeys, and horses have been used to cultivate and to replace the hand hoe (Hallstrom & Rudolph, 1976). Other animals of the same species have been used to transport goods and people. The camel in Sudan and Arab countries is used for transport over long distances, so is the elephant in India, and the yakes in Mongolia. At the same time donkeys and cattle pull carts and labour in the farms of many countries of the world including Tanzania and Africa in general. Even dogs are known to pull sleig on ice laden countries such as Greenland and other cold countries.

3.2 There is yet another use; the by-products of various animals such as milk and milk products, hides and skins cow dung, bones and hooves, horns, fur, etc., have economic values. Canned meat or beef or live cattle are commercially traded at home and overseas to earn money including the scarce foreign exchange as is experienced by many

countries. Thus animals are a wealth and therefore, a source of income by the owners, as well as the Government.

3.3 Animals have also cultural values; in India for instance cattle have a religious connotation and is treated as sacred animal by many communities in the sub-continent. In European countries, the dog is kept as a pet or guard or both. It is also used as a hunting soldier, a phenomena that is also shared in Tanzania among rural people. In urban centres the few Tanzanians who keep dogs mainly use them as guards, not pets.

4. SIGNIFICANCE OF INSURANCE IN TANZANIA

4.1 Crops and Livestock represent, of necessity a farmer's paramount interest. In a modern insurance concept, in the present case for livestock, it has always been the key to the farmer as a client in the entire insurance business.[4]

4.2 Individuals as well as Goernments benefits from the keeping of livestock. But heavy investments are required in order to buy, keep, and maintain cattle until production begins from which the benefits are realized.

Individuals who keep commercial cattle do so in anticipation of economic gains in the end either by selling milk or meat. According to Mr. Sekiete one of the cattle keepers interviewed in Dar es Salaam says that it costs him about Shs. 50,000/= every month to feed and maintain his four dairy cattle. In return he earns an average income of Shs.60,000/= a month from his two cows in milk. At the initial stage a minimum investment of Shs.300,000/= is needed to buy one heifer and build a cattle stall. The DAFCO official gave the figure of Shs. 200,000/= at 1990/91 prices, as the sale

price of one dairy heifer which means, the balance of Shs. 100,000/= has to be spent on building the cattle stall. This small figure of Shs.300,000/= concern those who can afford to start with only one cattle, but those who want to start with say, four or more cattle the investment capital has to be counted in millions of Tanzanian shillings.

4.3 Once the money has been spent or invested in an animal for economic purposes, the risk for the invested money is very high due to mortality or sickness problems. Rather than being worried for such an eventuality, Prof. Rugaika says, an insurance protection would remove such worries by compensating those who are unfortunate to loose their animals by way of mortality.[5]

The money indemnified from insurance can help the unfortunate few insureds to reinvest, otherwise stock owners have to tie up their capital in the form of a sinking fund which money could alternatively be released for other economic projects with the back up support of insurance protection. On the part of the Government, the gains are manifold. Apart from the export earnings by way of Hides and skins, meat and canned beef, canned milk, and sometimes, of live livestock, local breeding is in a way an alternative which help conserve foreign exchange money. In other words, if cattle is not reared in the country, the Government would have to import meat, milk and milk products in order to meet the social needs of the society. Thus, the encouragement of people to increase livestock production locally, has, by far greater benefits than would otherwise be the case. One way of increasing livestock production locally is to guard against the mortality risk through a mechanism of insurance protection.

4.4 Undoubtedly, insurance has always been a handmaid of any economic activity and it is therefore not surprising to say that livestock insurance in particular, is one of the oldest classes of business and there has always been a steady demand for it.6

4.5 Before insurance on animals is introduced, insurers have to take a lot of precautions. As animals are mortals, they should therefore be viewed in much the same way as humanbeings.

Within each country around the world, human beings have an average life span. This is determined by many factors such as health, prosperity, environment, hygiene etc., and it is these factors too that have to be taken into consideration when underwriting Livestock or bloodstock.[7]

5. **ACTURIAL IMPLICATIONS**

5.1 The success of a livestock insurance scheme will depend on its viability which means that the statistical analysis must lead to or show positive result. The key element in insurance involving the life of animals is the acturial projections which equate the expected total value of mortalities and the insurance premium to be collected over a period of time. An important measure of this equality is the rating structure.

5.2 The basis of livestock insurance rating is the degree of mortality risk involved. The method adopted for assessing the mortality rik is the utilization of past experience, which can be done in one of two ways, either to work out from a plain ground where nothing exists to offer any experience, or to borrow from the experiences of other countries which have livestock insurance schemes. This second part is simple enough but has its own dangers especially because

using others' experience presumes that the environmental conditions are similar which may be misleading.

Kenya for example, charged 10% when they first introduced livestock insurance five years ago, but due to resentments and complaints by most livestock owners the rate of premium has been scaled down to 8% (Kenya Reinsurance Paper 1992)and the cover is an All Risks basis.

5.3 India and Zimbabwe are charging 5% as the rate of premium for livestock insurance on All Risks basis while West Germany are charging 4% for an All Risks cover. The Kenya Livestock Insurance Scheme was started, and still operates on a pilot basis. Whether or not the scheme is on a pilot basis, the premium to be charged is such that over a period of years the class of business must become "self sufficient" which means theoretically, the premium income obtained should be sufficient to meet all claims arising out of the livestock insurance business.

5.4 In practice however, the premium income obtained must be equal to the claims payable plus the expenses of the office and a reasonable margin of surplus. Thus, if the loss payments plus the provision for expenses and surplus are denoted by the letter "L" and if the values (total of the sum insured) at risk are denoted by the letter "V" the rate to be charged should be L/V x 100. In order to obtain the annual Livestock insurance premium rate where the scheme is just starting (the objective of this paper), two operations have to be performed.

First the actuarial projections are worked out by determining the average annual

incidents and the average annual expected deaths. A product of these two yields the risk factor. Secondly all other costs of administration, claims ratio, commission, and a margin for surplus are also determined and added onto the risk factor and the average of the two will determine the annual rate of premium per capita or per herd as the case may be.

5.5 Below is the mortality Livestock table as obtained from Arusha Region.

Table I: CATTLE DEATHS FROM DISEASES IN ARUSHA REGION

Type of disease	Total number of deaths in each year						
	incidence	incidence	death	incidence	death	incidence	death
1.East Coast Fever	14147	12488	4832	5730	2023	18638	1437
2.Anaplasmosis	16236	10477	1874	5893	1099	10521	669
3.Babesiosis	2358	5306	924	3020	433	4245	223
4.Heart Water	2877	2277	288	1196	240	2654	115
5.Trypanosomiasis	48678	48351	1347	38488	429	53463	380
Total			9265		4224		2824

SOURCE: Data collected from Arusha Municipal Council - Livestock Division.

The risk factor is obtained by performing the following operations:

1. An accumulated incidence for all the five deseases is obtained.

2. The relative frequency of incidences is obtained, that is, the number of incidences for each desease is divided by the cummulative figure which is the probability.

3. To determine expected number of death due to an incidence, and their summation. That is E(Di) = NixR.F. Where E(Di) is the expected value of total number of deaths and Ni - is the number of incidences that is i1, i2 ... i5 means East Cost Fever, Anaplasmosis, Babesiosis, Heart water and Trypanosomiasis.

Table II

Incidences 78899 (a) 1989	54327 (b) 1990	89521 (c) = axb 1991
0.1583 4832 764,9056	0.054 2023 192.99	0.2082 1437 298.14
0.1327 1874 248.6798	0.0981 1099 107.81	0.1175 669 78.61
0.0673 924 62.1852	0.0503 433 21.78	0.0474 223 10.57
0.0289 288 8.3232	0.0199 240 9.78	0.0296 115 3.40
0.6129 1347 825.5763	0.6409 429 274.95	0.5972 380 226.94
1909.670	607.31	617.66
1910		

Source: Statistical inference of table I above.

5.6 From the table above relative frequency or probability is obtained by dividing the incidence by the total incidences of all the five diseases in each year. Then the average

number of annual incidences is obtained viz: 78899 + 54327 + 89521 = 222747 and this figure is divided by 3274248. Then the total of expected death for each disease in each year are added and divided by 3, that is: 1910 + 607.31 + 617.66 = 3135/3 = 1048.

5.7 The summation of the expected values can then be obtained by the following formula - Edi/Ei x 1000

$$i = 1 - 5$$

The sample size is 1000 animals. This means the animals which die in a particular year due to all the five diseases is compared with this sample size in order to determine the risk potential.

Thus the risk factor rate will be:- 1048/74249 = 14.1146 or 14.00 (see 4.6).

5.8 Using the rating theory developed by T.Smith (1975:66) all other administrative costs must be added to the risk factor and these include the following: i. administrative expenses, ii. commission, iii. reserves, iv. profit margin. The risk factor rate is always equal to 50% or 1/2 the total costs. The rate built up on a 100% basis will be:-

(a) Risk Factor..... 14

(b) Administrative costs 28% of the risk factor.... 4

(c) Commission, etc., 15% 2

(d) Reserves 2 % 0.3

(e) Profit margin 5 % 0.7

Total rate ———

The average annual rate is therefore 21 - 3 = 7%, which equals the summation of all Relative frequencies, i.e. 1 but not less. If the total of relative frequencies add up to less than 1(100%) means that the scheme is not viable. Only if it amounts to 1(100%) or slightly more that scheme is likely to operate profitably. The three Relative frequencies add up to 1.0001, 0.9046 and 0.9999 for 1989, 1990 and 1991 respectively. The precaution here is that to charge a rate less than 7% will mean to reducing the total relative frequencies to less than 1(100%) which would be unprofitable as the premium income will be less than the expected claims costs.

5. **CONCLUSION**

Livestock insurance can only be introduced after the scheme is found to be viable. This means that acturial projections must lead to the calculation of such a rate that equates total expected deaths with the total expected benefits or premium income. This rate mustbe the result of adding relative frequencies which should be equal to 1(100%) but not less. The operations performed in this paper have indicated that the relative frequencies for all the three years 1989 through 1991 are positive and that the average annual rate of premium must be 7% but not less than this figure.

However, the premium rate has been arrived at from a very simple operation of average which considers only the past conditions. In order to get a better average there is need to consider a much present and prevailing conditions which will require the use of Exponential Smoothing.

REFERENCE NOTES

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